Journal of Personality and Social Psychology
2008, Vol. 95, No. 2, 385–403

0022-3514/08/$12.00 DOI: 10.1037/0022-3514.95.2.385

Every Time You Go Away: Changes in Affect, Behavior, and Physiology Associated With Travel-Related Separations From Romantic Partners

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This study investigated changes in day-to-day affect, behavior, and physiology (hypothalamic–pituitary–adrenocortical axis activity) associated with temporary physical separations from romantic partners (such as those brought about by work-related travel). Daily diaries and measures of salivary cortisol were collected from 42 couples over a 21-day period that was timed to coincide with a naturally occurring 4- to 7-day separation. There were significant changes from preseparation to separation and from separation to reunion in the quality of partners' interactions, their positive and negative affect, sleeping problems, subjective stress, physical symptoms, and cortisol levels. Separation and reunion effects were generally more pronounced in homebound partners, partners with high attachment anxiety, and partners who had less contact with each other during the separation. Separation and reunion effects were not moderated by relationship length, relationship satisfaction, how often couples underwent separations, or the presence of children in the home. The results are discussed with respect to the role of daily proximity and contact between partners for day-to-day affective and physiological regulation.

Keywords: adult attachment, separation, HPA activity, daily diary

Numerous psychological, sociological, and epidemiological studies have established that well-functioning, long-term romantic relationships are associated with better psychological well-being (Horwitz, McLaughlin, & White, 1998; Mastekaasa, 1994; Ryff, Singer, Wing, & Love, 2001; Stack & Eshleman, 1998). One potential mechanism thought to underlie these effects is affect regulation, the process by which individuals modulate their affective responses to internal and external stimuli to cope with everyday challenges. Regular contact with our closest and most important social partners appears particularly important for day-to-day affect regulation (Berlin & Cassidy, 1999; Simpson & Rholes, 1994). Not only does such regular contact provide plentiful opportunities for mutual comfort and support provision (Collins & Feeney, 2000), but some researchers have suggested that it also activates a range of unconscious, automatic, proximity-dependent processes by which partners reciprocally regulate one another's psychological and physiological states (Field, 1985; Hofer, 1984, 1995).

The end result, theoretically, is that partners in long-term relationships should feel and function better when they are regularly together than when they are regularly apart. This is consistent with the fact that in our culture and practically every other, spouses and long-term couples choose to live together, often sacrificing career opportunities, educational plans, or proximity to family members to maintain a shared residence. Yet of course, periodic physical separations from romantic partners are inevitable, especially in our highly mobile contemporary society. Anecdotal accounts suggest that such separations—even when brief—are potentially disruptive and disorienting. However, rigorous, theoretically grounded tests of this notion are scarce (as reviewed by Vormbrock, 1993). This is a notable shortcoming for relationship science because short-term separations provide valuable "natural experiments" for addressing basic questions about the role of proximity and contact in fostering day-to-day affect regulation within romantic attachments. In the present research, therefore, we used daily diaries of mood and behavior and measures of salivary cortisol to investigate the psychological and physiological sequelae of temporary physical separations from, and reunions with, cohabiting romantic partners.

Attachment, Proximity, and Affect Regulation

Attachment theory posits that at all stages of life, proximity to attachment figures provides a secure base, or a core sense of emotional security, and fosters effective day-to-day affect regulation (Brennan & Shaver, 1995; Feeney, 1995; Field, 1991; Kobak & Sceery, 1988; Reite & Boccia, 1994; Simpson, Rholes, & Nelligan, 1992), meaning the process by which individuals consciously and unconsciously modulate their ongoing affective and physiological responses to external and internal stimuli (Porges, Doussard-Roosevelt, & Maiti, 1994; Thompson, 1994). Attachment figures can provide external affect regulation by offering comfort and support, making us laugh, communicating empathy, extending a listening ear, distracting us from our problems, or sharing in our successes (Collins & Feeney, 2000; Gable, Reis, Impett, & Asher, 2004; Gross & Munoz, 1995; Thompson, 1994). Yet although one's partner need not be physically present to serve these functions, day-to-day proximity may also be important:

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This work was supported by Grant 1R03MH64813-01 from the National Institute of Mental Health, awarded to Lisa M. Diamond. Selected findings from the study were presented at the 2006 annual meeting of the Society for Personality and Social Psychology, New Orleans, LA.

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Researchers have argued on the basis of animal research that sustained physical proximity to attachment figures has positive, regulatory effects on affective functioning that are independent of concrete supportive interactions (Hofer, 1984).

If so, then physical separations from these individuals should be at least somewhat disruptive. Numerous studies of animals and infants separated from their caregivers suggest this to be the case, documenting heightened behavioral agitation, psychological distress, and even physiological reactivity associated with both brief and extended separations (e.g., Ainsworth, Blehar, Waters, & Wall, 1978; Field, 1991; Gunnar, Brodersen, Nachmias, Buss, & Rigatuso, 1996; Gunnar, Gonzalez, Goodlin, & Levine, 1981; Hennessy, 1997; Spangler & Grossman, 1993). Studying separation-related disruption in adult attachment relationships is more difficult because adults can obviously withstand much lengthier separations from their partners than can infants from their caregivers. Hence, in lieu of carefully controlled laboratory studies, researchers investigating physical separations in adult couples have typically relied on partners' retrospective accounts of such separations and have most typically assessed extremely long separations brought about by military deployment or prolonged job-related absences (Fisher & Stoneman, 1998; Gerstel & Gross, 1984; Hughes & Galinsky, 1994; Hughes, Galinsky, & Morris, 1992; Medway, Davis, Cafferty, & Chappell, 1995; Riggs, 1990; Roehling & Bultman, 2002).

Vormbrock (1993) extensively reviewed this literature nearly 15 years ago and found that extended separations were generally associated (at least in partners' recollections) with heightened anxiety, sleeplessness, anger, depression, agitation, and a variety of other forms of behavioral and psychological dysregulation. These findings are bolstered by Fraley and Shaver's (1998) observational study of couples at a local airport anticipating an upcoming separation. Paralleling research on children separating from their caregivers, they found that adults anticipating a separation displayed classic signs of separation distress, such as clinging, crying, following, holding, and the seeking or provision of support. Such findings suggest that the loss of contact with one's secure base can provoke affective and physical dysregulation. Yet because previous studies of separation effects have relied exclusively on retrospective accounts of overall moods and behaviors, typically collected from only one member of the couple, we know little about how physical separations affect both partners' day-to-day feelings and behaviors in real time. Also, because most prior research has focused on military families, it is impossible to disentangle emotional effects attributable to the separation from emotional effects attributable to fears for the partner's safety during military deployment.

In this study, therefore, we investigated whether shorter, more routine separations activate the attachment system and disrupt routine processes of mutual affect regulation. For example, whereas most prior studies have assessed separation effects retrospectively (with some exceptions such as Taylor, Morrice, Clark, & McCann, 1985), we used real-time assessments of day-to-day affect and behavior before, during, and after a naturally occurring separation. The assessment of reunion is particularly important, given that it allows for an assessment of the progressive reestablishment of the regulatory influence of partner proximity.

We also investigated potential physiological changes associated with separation, focusing specifically on activity of the hypothalamic–pituitary–adrenocortical (HPA) axis. Animal research has consistently found elevated levels of HPA activity in animals undergoing separations from conspecifics to which they had an emotional attachment (reviewed in Hennessy, 1997). Given that HPA reactivity is associated with appraisals of environmental demands as threatening or affectively negative (reviewed in Cacioppo, 1994), this suggests that animals experienced such separations as distressing, that routine environmental demands were experienced as more taxing or threatening in the absence of these attachment figures, or both. Thus, HPA activity provides a potential window into disruptions in day-to-day affect regulation brought about by the loss of regular proximity to one's attachment figure. Investigating such processes is important for elucidating psychobiological aspects of the attachment system that may contribute to the links between close relationships and physical health. For example, excessive and sustained patterns of HPA activity are associated with impaired immune functioning (Coe, Rosenberg, & Levine, 1988; Munck & Guyre, 1991; Webster, Elenkov, & Chrousos, 1997), impaired memory and attentional processes (Lupien et al., 1994; McEwen et al., 1992), and increased risks for a variety of pathophysiological processes and outcomes, including cardiovascular disease, diabetes, hypertension, and cancer (Brindley & Rolland, 1989; Everitt, 1966; Henry, 1983; Krantz & Manuck, 1984; McEwen & Stellar, 1993; Munck, Guyre, & Holbrook, 1984; Truhan & Ahmed, 1989).

Potential Moderators of Separation Effects

In this study, we investigate three potential moderators of separation effects: homebound–traveler status (a situational factor), attachment style (a psychological factor), and degree of contact during the separation (a behavioral factor).

Although both members of the couple experience the same loss of day-to-day proximity and contact with one another during a separation, attachment theory would suggest that the partner who is left behind will be more likely to experience feelings of abandonment and loneliness than the partner who is traveling. In contrast, because the traveling partner is exploring a different environment, sleeping in a different bed, pursuing different daily routines, and interacting with a totally different set of individuals, the specific disruptive effects of being separated from his or her partner may be less noticeable and less potent (especially, too, if the trip is a pleasurable and enjoyable one). This conceptualization of the difference between homebound–traveler experiences of separation builds directly on the findings of previous research (Fisher & Stoneman, 1998; Gerstel & Gross, 1984; Hughes & Galinsky, 1994; Hughes et al., 1992; Medway et al., 1995; Riggs, 1990; Roehling & Bultman, 2002), yet because nearly all prior studies have focused exclusively on either the homebound or the traveling partner (reviewed in Vormbrock, 1993), there has never been a direct test of the differences between their separation experiences.

Attachment style is another potential moderator of separation effects. Originally conceived in terms of stable expectations concerning the responsiveness of attachment figures (Ainsworth et al., 1978), attachment anxiety and avoidance have been increasingly conceptualized as indexing distinct capacities and strategies for affect regulation (Cooper, Shaver, & Collins, 1998; Kobak & Sceery, 1988; Mikulincer & Florian, 1998; Rholes, Simpson, & Orina, 1999; Simpson et al., 1992). Individuals with high attachment avoidance are generally reluctant to turn to attachment figures for emotional security, and they regulate negative affect by suppressing or denying it rather than seeking comfort from social partners (Fraley & Shaver, 1997). In contrast, individuals with high attachment anxiety do not feel secure in the availability and sensitivity of their attachment figures and are hypersensitive to threats of loss or unavailability in their intimate relationships (Fraley & Shaver, 1997; Mayseless, Danieli, & Sharabany, 1996). Anxiously attached individuals also have difficulty regulating negative affect and tend to ruminate about and "maximize" negative affective experiences (Allen, Moore, Kuperminc, & Bell, 1998; Kobak, Sudler, & Gamble, 1991; Rosenstein & Horowitz, 1996).

These findings suggest that individuals with high attachment anxiety should be particularly dependent on actual contact with their partners for day-to-day affect regulation, making the loss of day-to-day proximity and face-to-face interaction particularly disruptive (especially for anxious homebound partners). In contrast, avoidant individuals' tendency to dismiss and deny distress, and to prefer greater interpersonal distance from romantic partners, should ameliorate the disruptive effects of separation. There is some suggestive evidence for these moderating effects from previous research (Cafferty, Davis, Medway, O'Hearn, & Chappell, 1994; Fraley & Shaver, 1998; Medway et al., 1995), but the present study provides the first real-time test of attachment style effects on day-to-day responses to short-term separations.

Another potential moderator of separation effects is the amount of "remote" contact that partners pursue with one another during the separation. After all, the most obvious loss associated with a partner's absence is that of daily interaction, and separated couples have reported sorely missing the mundane daily conversations that are a characteristic feature of coupled life (Gerstel & Gross, 1984). Vormbrock (1993) interpreted these responses as indicating that "the lack of daily interchanges seemed to make it more difficult for them to keep on an even keel emotionally when little mishaps occurred to them" (p. 135). How much actual interaction—and in what form—is necessary to serve this function? Gerstel and Gross (1984) found that brief chats or one-sided exchanges (such as leaving telephone messages), even when pursued daily, were not judged by spouses as helpful or satisfying because they did not allow for extended mutual sharing of daily experiences. One might therefore hypothesize that the best substitute for an actual face-to-face interaction with one's partner is a lengthy telephone call because this medium allows for real-time emotional exchange and responsiveness. We examine this possibility in the present research.

The Current Study

This study provides the first real-time investigation of the effects of short-term, naturally occurring separations (and subsequent reunions) on cohabiting couples' affect, behavior, and physiology. We used a daily diary methodology to capture day-to-day variation in each member of the couple over a period of 3 weeks, beginning approximately 10 days before the anticipated separation and continuing through the 4- to 7-day separation and subsequent reunion. Overall, we expected separations to be associated with (a) declines in both the positive and the negative features of partners' daily interactions with one another; (b) lower positive affect and higher negative affect and subjective stress, (c) greater sleeping problems and greater physical symptomatology; and (d) increased overall HPA activation. We expected significant changes in the opposite direction at reunion.

Our second set of hypotheses concerned moderating effects of homebound–traveler status, attachment style, and degree of partner contact during the separation (operationalized as the length of daily phone conversations during the separation). In particular, we expected separation-related changes to be greater—and recovery poorer—among homebound partners, highly anxious partners, and partners with low levels of contact with one another during the separation. We expected fewer separation-related changes among highly avoidant partners. Of course, there are other factors that might influence separation effects, such as marital status, the presence of children in the home, the number of days separated, the specific reason for the separation, and whether couples undergo separations frequently or infrequently. We tested for and controlled such effects where appropriate. Because we are interested in capturing the dynamics of physical separation in well-functioning couples (given that physical separation is likely to be an altogether different experience among couples experiencing relationship distress), we focus our analyses on couples reporting moderate to high relationship satisfaction.

Method

Participants

Participants were 42 married or cohabitating heterosexual couples, all of whom had been together for at least 1 year. Potential participants were recruited through newspaper advertisements and electronic messages distributed to academic departments at local universities. Advertisements specified that eligible couples should be anticipating a 4- to 7-day physical separation. Participants ranged in age from 21 to 53, with a mean age of 30 ($SD = 7.5$). Mean relationship length was 8 years ($SD = 6$), and 74% of couples were married. Thirty-eight percent of couples had children living in the home. In all, 88% of participants were White. Nearly all participants had completed at least some college, and 61% had at least a college degree. The mean household income was \$53,000 (SD = \$30,000, maximum = \$150,000, Mdn = \$50,000).

The small size of the sample raises issues of power. To address this issue, we consulted a statistician specializing in hierarchical linear modeling and used the methods of Satorra and Saris (1985) to compute estimates of observed power of our reported effects. The results indicated that the average observed power of the lowest power interactions effects in our models was .78.[1]

[1] The technique developed by Satorra and Saris (1985) for estimating observed power was originally designed and validated for SEM models but is directly applicable, and widely used, to conduct power analysis for multilevel random coefficient modeling. It uses the noncentral chi-square distribution to calculate observed power on the basis of the sample size, alpha level, and a noncentrality parameter represented by the change in fit (i.e., change in deviance values) when the effect of interest is deleted from the model, as well as the degrees of freedom associated with the deleted effect. Using this technique, we recomputed all of our models with and without the person-level moderators of within-person changes (such as moderating effects of attachment anxiety on changes from preseparation to separation) because these were the lowest power effects in the study. The average change in deviance was 9, corresponding to an observed power of .78.

We designated the partner who underwent the trip as the traveling partner and the partner who stayed behind as the homebound partner. Two thirds of the separations were work related. In 57% of couples, the homebound partner was female. In all, 38% of couples experienced separations regularly (i.e., they were separated for at least 2 days at a time more than once a month). Mean number of days separated was 4.5 (SD = 2.3). On days when they were not separated, couples spent an average of 7.2 waking hours together (SD = 2.2). Couples were screened for relationship quality using Hendrick's (1988) Relationship Satisfaction measure. We planned to exclude couples with an average score of 2 or lower (the scale ranges from 1 to 5), which corresponds to reporting "very little" satisfaction in their relationship. However, none of the couples reported levels of satisfaction this low. Average relationship satisfaction (on a Likert scale ranging from 1 to 5) was 4.5 for the homebound partner (SD = 0.47, Cronbach's α = .86) and 4.6 for the traveling partner (SD = 0.36, Cronbach's α = .91).

Measures

Participants completed the Experiences in Close Relationships measure of attachment style (Brennan, Clark, & Shaver, 1998), a 36-item scale yielding two 7-point scales, attachment anxiety and attachment avoidance. Mean attachment anxiety and avoidance were, respectively, 2.1 (SD = 0.7 Cronbach's α = .85, range = 1–4) and 2.4 (SD = 1.0, α = .89, range = 1–5) for the homebound partner and 2.4 (SD = 1.0, α = .87, range = 1–6) and 2.1 (SD = 0.8, α = .88, range = 1–5) for the traveling partner.

Each participant also completed a paper-and-pencil diary once a day (at bedtime) for 21 days, assessing the measures listed below. Descriptive statistics and reliabilities for all diary measures are presented in Table 1, stratified by the preseparation, separation, and reunion episodes. Correlations among study variables are presented in Table 2.

Positive and negative affect were assessed with the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988), a 20-item scale that yields two 10-item scales, one for positive affect and one for negative affect. Physical symptoms were assessed with a 12-item symptom checklist (adapted from Derogatis & Melisaratos, 1983). The number of positive and negative events experienced each day was assessed with a modified version of a daily event checklist (adapted from a checklist used by Gable, Reis, & Elliot, 2000) that has been shown to relate to daily positive and negative affect. We included this measure to partial out variability in daily affect that was due to simply having a particularly good or bad day. Examples of positive items include "Had enough time to do what I wanted" and "Did something special for someone that was appreciated." Examples of negative items include "Something happened that made me feel awkward or embarrassed" and "Experienced a setback at work." There were 10 positive and 14 negative items (none of the items specifically involved interactions with the partner). Subjective stress was assessed with a composite of (a) the participant's rating of the overall stressfulness of their day on a scale ranging from 1 to 5, (b) their rating of the stressfulness of the most stressful problem they experienced during the day, and (c) the number of negative events that they experienced. Each of these indexes was standardized and averaged to form the subjective stress measure. Cronbach's alpha for this composite measure was .65.

Positivity and negativity of daily interactions with partner was assessed with a measure designed by Reis, Sheldon, Gable, Roscoe, and Ryan (2000) to assess associations between everyday experiences of relatedness and daily well-being. Positive interaction quality is indexed by ratings (on a scale ranging from 1 to 5) of the extent to which the interaction elicited feelings of closeness with the other person, involved meaningful conversation, and elicited feelings of being understood and appreciated. Negative qualities are indexed by ratings of the extent to which the interaction involved arguments or conflict and made the individual feel self-conscious or judged by others.

Each day participants indicated the number of times they had contact with one another via phone, e-mail, pager, or text or voicemail message (denoted *remote contacts*), how many of these

Table 1
Descriptive Statistics for Study Variables

	Preseparation (M [SD])		Separation (M [SD])		Reunion (M [SD])		Overall			
							Homebound		Traveling	
Variable	Homebound	Traveling	Homebound	Traveling	Homebound	Traveling	M (SD)	α	M (SD)	α
Positive affect	2.8 (0.5)	2.9 (0.5)	2.7 (0.6)	2.9 (0.6)	2.9 (0.6)	2.8 (0.6)	2.8 (0.5)	.90	2.9 (0.5)	.86
Negative affect	1.5 (0.3)	1.5 (0.4)	1.4 (0.3)	1.5 (0.4)	1.4 (0.3)	1.4 (0.3)	1.4 (0.3)	.84	1.5 (0.3)	.87
Stress	2.3 (1.0)	2.3 (1.0)	2.3 (1.0)	2.3 (1.0)	2.0 (1.0)	2.1 (1.0)	2.2 (1.0)	—	2.2 (1.0)	—
Physical symptoms	1.5 (0.3)	1.5 (0.4)	1.4 (0.4)	1.4 (0.3)	1.4 (0.4)	1.4 (0.4)	1.5 (0.3)	.81	1.5 (0.3)	.84
Sleeping problems	0.12 (0.46)	0.05 (0.45)	–0.02 (0.38)	0.04 (.040)	–0.07 (0.36)	–0.10 (0.40)	0.01 (0.41)	.57	0.001 (0.42)	.56
Positivity of partner interactions	3.3 (0.7)	3.2 (0.6)	2.6 (1.2)	2.7 (1.1)	3.3 (0.9)	3.4 (1.0)	3.1 (0.8)	.84	3.1 (0.8)	.82
Negativity of partner interactions	1.2 (0.3)	1.3 (0.4)	0.9 (0.4)	1.0 (0.5)	1.1 (0.4)	1.1 (0.3)	1.1 (0.3)	.82	1.1 (0.3)	.84
No. positive events	4.4 (2.0)	4.2 (2.0)	4.7 (2.1)	3.7 (1.8)	4.1 (2.1)	3.9 (1.8)	3.0 (2.50)	—	2.6 (2.0)	—
No. negative events	3.0 (2.4)	2.8 (2.1)	3.1 (2.3)	2.5 (1.9)	2.8 (2.7)	2.5 (1.9)	4.3 (2.0)	—	4.0 (1.9)	—
No. remote contacts	1.7 (1.0)	1.6 (1.1)	1.9 (1.2)	2.1 (1.3)	1.4 (1.0)	1.2 (1.2)	1.7 (0.8)	—	1.7 (0.9)	—
Longest phone call with partner	4.3 (3.4)	3.8 (2.7)	11.9 (8.7)	12.5 (8.3)	3.9 (2.9)	3.4 (3.3)	6.5 (4.3)	—	6.1 (4.1)	—
Cortisol level	8.6 (2.6)	—	8.8 (2.8)	—	9.6 (4.2)	—	8.9 (2.7)	—		

Table 2
Correlations Among Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Attachment anxiety	—														
2. Attachment avoidance	.36**	—													
3. Relationship satisfaction	−.41**	−.45**	—												
4. Mean positive affect	−.04	−.09	.06	—											
5. Mean negative affect	.37**	.03	−.10	−.14	—										
6. Mean subjective stress	.22*	−.02	−.11	.03	.56**	—									
7. Mean physical symptoms	.23*	.16	−.19	−.08	.62**	.57**	—								
8. Mean sleeping problems	.02	.08	−.05	−.10	.27*	.32**	.37**	—							
9. Mean positivity of partner interactions	−.23*	−.29**	.22*	.55**	.04	.15	−.06	.05	—						
10. Mean negativity of partner interactions	.32*	.01	−.40**	.06	.49**	.28*	.20	.16	.15	—					
11. Mean positive events	−.11	−.03	−.20†	.40**	−.01	.13	.23*	.15	.24*	.16	—				
12. Mean negative events	.11	.14	−.20	−.06	.49**	.36**	.56**	.46**	−.04	.31**	.45*	—			
13. Mean no. remote contacts during separation	−.02	−.17	−.06	.20	.28*	.13	.08	.04	.35**	.36**	.17	.07	—		
14. Mean length of longest phone call during separation	−.22*	−.14	.16	.10	.14	.19	.08	.22*	.40**	.16	.01	−.04	.41**	—	
15. Mean cortisol$_{\text{(homebound)}}$	.13	−.07	−.01	.04	−.16	−.14	−.15	−.23	.01	.06	−.03	−.22	.13	−.07	—

$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$.

contacts they initiated, and the length (in minutes) of their longest telephone conversation with one another. Both the number and the percentage of remote contacts were logged before analysis to normalize their distributions.

Sleeping problems were assessed with a reduced version of the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), which calculates a sleep quality score on the basis of individuals' latency to fall asleep, number of hours slept, number of wakings during the night, and subjective quality of sleep. Because different aspects of the scale have different metrics, their average was taken in standardized form. Higher scores represent poorer sleep quality.

HPA activity was assessed with measures of salivary cortisol, described in detail below. We only assessed HPA activity in the homebound partner because we expected that the traveling partner's trip would make it difficult for him or her to adhere to rigorous sampling protocol (which required collection of five carefully timed saliva samples per day, as described in more detail below) and would introduce a number of potential confounds that could not be adequately measured or controlled.

Procedure

Couples were screened over the phone to ascertain the timing of their upcoming separation. They visited our laboratory 10 days before the anticipated separation, where they underwent informed consent, completed the measure of attachment style (as well as additional trait dimensions not reported here), and completed an assessment of cardiovascular and neuroendocrine reactivity (reported elsewhere). Couples began the daily diary the next day, so that there were approximately 10 preseparation days, followed by 4–7 separation days and 4–7 reunion days. In 11 of the couples who underwent fairly routine separations, the traveling partner actually left town again toward the end of the 21-day assessment period. To ensure comparability with the rest of the couples, these additional separation days were not included in the present analyses. Couples received $100 after completing all study procedures.

To familiarize the participants with the daily diary, a research assistant reviewed all items with them and answered any specific questions that they had. Couples were instructed to provide their diary entries before going to bed. Because we used paper-and-pencil diaries (rather than electronic diaries with an automatic timestamp), we cannot confirm that each and every entry was made on time (rather than participants skipping 1 day and then completing the diary information on the next day). However, we sought to maximize compliance with the diary protocol by carefully explaining to our participants that because we had statistical procedures capable of dealing with skipped days, there was no reason for them to try and fill in any entries that they missed. We specifically indicated that we actually preferred for them to leave a day blank than to try and fill in the missing information the next day and that periodic blank days were less detrimental to the study than days that were completed at the wrong time. We also emphasized that their financial compensation was not tied to the number of completed entries.

Additionally, consistent with Green, Rafaeli, Bolger, Shrout, and Reis's (2006) recommendations for maximizing diary compliance, we sought to establish a strong rapport with our participants and to increase their sense of investment in the study by personalizing their diaries with large stickers showing their first names and also by giving each couple a personalized calendar that displayed their first names, showed all of the days of the current month, and highlighted which days they were to keep the diary. Also, we assigned each couple their own research assistant, so that they could direct all of their questions to the same person (the research assistant's name and cell phone number were printed on the front cover of the participants' personalized diaries). The research assistant also periodically checked in with them to see whether they had any questions or concerns. Green et al. noted that such strategies are highly effective in increasing compliance, and their research found that when using such techniques, data collected using paper-and-pencil methods were basically equivalent to data collected using time-stamped electronic collection procedures. They also indicated that compliance is often facilitated in studies of couples because partners can serve to remind and reinforce one another. Of course, a potential complication with collecting diary data from couples is that partners might share their entries with each other. To guard against this possibility, we emphasized the importance of confidentiality to our participants, clarifying that although it might seem harmless to discuss the diary material, it was important that they not do so.

Approximately one third of the participants had complete data for all items and all days, with a within-person average of 94% complete. Only 4 individuals had less then 80% completion across the days, with the lowest completion rate across days being 66.7%. We used *PAN* (Schafer, 2001) to impute within-person data and *NORM* (Graham & Hofer, 2000) to impute between-person data (i.e., attachment style). Both programs use multiple imputation, in which all of the nonmissing data available are used to predict the missing values. Imputation is performed on the raw data set before reducing items into scales. The imputation process is repeated several times (following standard practice, we completed five runs) to approximate the measurement error that is represented in real data. Data reduction is then completed on each imputed data set. All analyses are then repeated with each of the full datasets, and the coefficients generated by each separate run are averaged to produce final estimates. This produces unbiased parameter estimates that appropriately reflect the variability of the missing data. This technique has been shown to perform well when data are missing at random and even acceptably under some cases of nonrandom missingness (Schafer & Graham, 2002). It is also robust to departures from normality assumptions and performs well even with low sample sizes.

To assess the homebound partner's HPA reactivity to the separation, he or she also provided salivary samples during the preseparation, separation, and reunion episodes to assess the production of cortisol. Cortisol secretion shows distinct diurnal variation (reviewed in Lovallo & Thomas, 2000). To accurately capture this profile, it is generally recommended that sampling begin with the moment of waking (while respondents remain in bed), then 30 min later, followed by 3 hr after waking, 8 hr after waking, 12 hr after waking, and finally at bedtime (Stewart & Seeman, 2000). Hence, participants provided five saliva samples per day for 6 days total: Two consecutive days within the preseparation episode (timed to occur at least 1 full week before the separation), 2 consecutive days within the separation episode (starting the first full day after the partner's departure), and 2 consecutive days within the reunion episode (starting the first full day after the partner's return), for a total of 30 samples per person. The data of 9 individuals were not analyzed either because they were on medications known to influence endocrine activity or because they failed to comply with the cortisol protocol. There were no significant differences between these individuals and the rest of the sample on study variables.

All samples were taken using Salivettes (Sarstedt, Germany), consisting of a plastic tube with a cotton insert. The participant was instructed to lightly chew on the insert to thoroughly soak it with his or her saliva. After providing the first two morning samples (at waking and 30 min after waking), the participant phoned a research assistant to report the time of the first sample. The research assistant then calculated the correct times for the rest of the day's samples and paged the participant throughout the day to provide the rest of the samples. At each assessment, participants completed a paper-and-pencil record of their activity level, food intake, and stress level during the half hour preceding the sample (cortisol released in the brain takes approximately 15–25 min to reach the bloodstream), as these factors can influence cortisol level (Backhaus, Junghanns, & Hohagen, 2004). Participants were instructed that if they were not able to respond to the cortisol page within 15 min of receiving it, they should skip that sample. All samples were stored in participants' freezers until the end of the collection period and then mailed back to the laboratory. We kept samples frozen at −25 °C until they were shipped on dry ice to be assayed by the laboratory of Clemens Kirschbaum at the Technical University of Dresden, which uses a time-resolved immunoassay with flurometric endpoint detection (see Dressendorfer, Kirschbaum, Rohde, Stahl, & Strasburger, 1992). In all, 6% of cortisol samples were either missing or could not be assayed, and follow-up analyses detected no systematic patterns of missingness (i.e., no correlations with daily affect, overall attachment style, or any other study variables). Cortisol values were temporarily z transformed to examine outliers. Following established guidelines (Smyth et al., 1998), data points that were more than 4 standard deviations from the mean were discarded ($n = 6$). Follow-up analyses showed that this did not change the results.

Results

We used multivariate multilevel random coefficient modeling to conduct all analyses (using WHLM; Bryk & Raudenbush, 1992). This technique is designed for multilevel data structures in which observations at one level of analysis (in this case, ratings of affect on Days 1 through 21) are nested within higher levels of analysis (individuals). Within-person and between-person effects are estimated simultaneously. To analyze homebound and traveling partners' diary responses simultaneously, we used a parallel process model (Raudenbush, Brennan, & Barnett, 1995). This model treats the couple as the unit of analysis, beginning with a Level 1 equation that predicts the outcome variable (in the example below, positive affect) from two dummy codes, one for the homebound and one for the traveling partner, and excludes the intercept:

$$\text{Positive Affect}_{\text{day } i,\text{ couple } j,\text{ participant } g} = \pi_{1ijm}\,(\text{Homebound}) + \pi_{2ijf}\,(\text{Traveler}) + e_{ijg}.$$

The resulting coefficients for the dummy codes, π_{1jm} and π_{2jf}, end up representing the population true scores for positive affect for each member of couple j on day i. These become the dependent variables for subsequent levels of analysis. Thus, the Level 2 (i.e., within-person) equations for modeling day-to-day variability in positive affect were as follows:

$$\pi_{1\text{ day } i,\text{ couple } j,\text{ homebound}} = \beta_{10jh} + \beta_{11jh}X11_{ij} + \beta_{12jh}X12_{ij} + \beta_{13jh}X13_{ij} + e_{ijh}$$

$$\pi_{2\text{ day } i,\text{ couple } j,\text{ traveler}} = \beta_{20jt} + \beta_{21jt}X21_{ij} + \beta_{22jt}X22_{ij} + \beta_{23jt}X23_{ij} + e_{ijt}.$$

Coefficients β_{11} and β_{12} were dummy codes representing the preseparation and reunion episodes. The separation episode was treated as the base category, so that β_{11} represents the difference between separation and preseparation, and β_{12} represents the difference between separation and reunion. Hence, modeling these coefficients at Level 3 tests for whether separation- and reunion-related changes in the dependent variable are moderated by interindividual differences such as gender and attachment style. Similarly, modeling the intercepts, β_{10} and β_{20}, at Level 3 tests for whether levels of the dependent variable during the separation are specifically moderated by these interindividual factors. All models also included a categorical covariate, X13, to control for whether day *i* was a weekend day or a weekday. Models of positive and negative affect also included the covariate X14, representing the number of positive or negative events experienced that day, centered around the individual's own 21-day mean.

Level 3 models tested for moderation of the Level 2 coefficients by the following factors: gender, presence of children in the home, attachment anxiety, attachment avoidance, partner's anxiety and avoidance, whether the couple was frequently or infrequently separated, reason for the separation (primarily business or primarily pleasure), and degree of contact during the separation, operationalized as the average daily length of their longest phone conversation during the separation. Attachment style ratings were centered. All analyses included tests for interactions between anxiety and avoidance and between anxiety and avoidance and the other moderators. We examined scatterplots of the major variables and residual plots to ensure that significant associations were not driven by outliers. Level 3 moderators that showed no significant effects for any of the coefficients were dropped from final models. Also, to ensure that any attachment anxiety effects were specific to attachment anxiety rather than generalized trait anxiety or neuroticism, we conducted additional analyses that controlled for trait anxiety (Spielberger, 1983). In all cases, the attachment anxiety effects were unchanged and the trait anxiety effects were nonsignificant. We also conducted additional analyses to examine whether there were moderating effects of relationship satisfaction, marital status, or separation length. There were none.

Because we modeled homebound and traveling partners simultaneously, in parallel equations, we were able to directly test whether specific coefficients varied as a function of homebound versus traveler status. These contrasts take the form of 1-degree-of-freedom chi-square tests. We conducted these tests for all of the model coefficients, and in cases in which there were no significant differences between the homebound and traveling partner, we used a joint chi-square significance test on the coefficient to test the nonzero magnitude of the coefficient, collapsing across the homebound and traveling partner (while controlling for within-couple dependency). Coefficients for all of the models are presented in Table 3.

Last, we conducted additional analyses focusing specifically on reunion episodes to test for the possibility that reunion-related changes in affect and behavior take the form of linear growth trajectories, reflecting day-by-day processes of readjustment.[2] These models were constructed identically to those above, except for the following: At Level 2, there were two dummy codes, one that was coded 1 for the preseparation episode and one that was coded 1 for the separation, making the reunion episode the base category. There was also a growth term (denoted *reunion growth*) that was coded 0 for all nonreunion days up until the last day of the separation. That day was coded 1, and then each successive day of the reunion was coded in consecutive integers (i.e., 2, 3, and 4). Hence, if the reunion began on Day 15, then the value of reunion growth was 0 for Days 1–13, 1 for Day 14 (the last day of separation), 2 for Day 16, 3 for Day 17, and so forth. Using this structure, the Level 2 intercept for reunion growth estimates the linear, day-to-day change in the dependent variable beginning on the last day of the separation and proceeding through the reunion. Hence, independent of average levels of the dependent variable, the coefficient for this term tests whether the dependent variable increases or decreases in a progressive, linear fashion during the reunion. Only the results of reunion growth models showing significant effects are discussed below.

Interactions, Affect, Stress, Symptoms, and Sleep

Daily partner interactions involved significantly more positivity during the preseparation episode than during the separation, joint $\chi^2(2) = 44.7$, $p < .001$, and also during the reunion than the separation, joint $\chi^2(2) = 36.5$, $p < .001$. The separation change was moderated by an interaction between attachment anxiety and the length of partners' longest telephone calls during the separation, joint $\chi^2(2) = 8.9$, $p = .01$. Figure 1 displays this interaction graphically, showing the predicted values of interaction positivity for individuals 1 standard deviation above and below the mean for attachment anxiety and telephone contact; because couples' longest telephone conversations during the separation averaged 12 min, with a standard deviation of 8 min, the low-contact group represents couples whose longest daily phone conversation during the separation averaged only a few minutes, whereas the high-contact group represents couples whose longest calls were about 20 min. As shown in Figure 1, the steepest decline in interaction positivity and the lowest levels of interaction positivity during the separation episode overall were reported by individuals with high attachment anxiety and low telephone contact, and this effect was comparable across both homebound and traveling partners. Reunion-related recovery in interaction quality, however, did not show this interaction effect; rather, there were separate, unique effects of both anxiety and telephone contact. High-anxious individuals reported a greater increase in positivity from separation to reunion, joint $\chi^2(2) = 7.8$, $p = .02$, whereas those with high levels of telephone contact reported less of a change, joint $\chi^2(2) = 20.8$, $p < .001$. Given the findings regarding telephone contact, we ran an addi-

[2] Our prediction of linear day-to-day readjustment during the reunion episode was guided by our conceptualization of the separation episode as a perturbation in the mutual affective–behavioral regulation established in the couple through regular proximity. According to this perspective, reestablishing physical proximity should progressively reestablish their mutual regulation. We are mindful, however, of other possibilities that are consistent with attachment theory. For example, research on infants' reactions to reunion with their mothers after the Strange Situation (Ainsworth et al., 1978) might be interpreted to suggest that the 1st day of reunion will be unusually positive or even unusually negative, especially for insecurely attached individuals, and should then stabilize over time, yielding linear or even quadratic effects. Yet it is not clear that the Strange Situation provides a clear-cut analog for the experiences of adults undergoing temporary separations from their romantic attachment figures. We therefore concluded that a hypothesis of linear growth, representing gradual reestablishment of proximity-dependent coregulation, was the most parsimonious. We did, however, conduct ancillary tests for curvilinear and quadratic effects and found none.

Table 3

Results of Multilevel Random Coefficient Models Assessing Separation-Related and Reunion-Related Changes in Daily Partner Interactions, Positive and Negative Affect, Sleeping Problems, Physical Symptoms, Subjective Stress, and Cortisol Levels

Variable	Intercept (value of DV during separation)	Preseparation difference from separation	Reunion difference from separation	Weekday status	Events of day (positive for positive affect, negative for negative affect)	Activity level (aggregated over day)	Perceived stress (aggregated over day)
Positivity of partner interactions							
Homebound							
Intercept	2.77**	.61^{***b}	.59^{***b}	.19**			
Attachment anxiety	−0.39^{*b}	.33^{**b}	.28^{b}				
Average phone call length during separation	0.08^{***b}	−.07^{***b}	−.05^{**b}				
Interaction between anxiety and call length	0.04^{*b}	−.03^{*b}	−.02				
Traveler							
Intercept	2.78**	.50^{***b}	.65^{***b}	.09			
Attachment anxiety	−0.18^{b}	.15^{b}	.26^{*b}				
Average phone call length during separation	0.07^{***b}	−.07^{***b}	−.05^{**b}				
Interaction between anxiety and call length	0.004^{b}	−.02^{b}	−.01				
Negativity of partner interactions							
Homebound							
Intercept	0.91***	.38^{***b}	.28$^{**a, b}$	.05			
Attachment anxiety	−.19^{*a}	.30^{***a}	.30^{**a}				
Partner's anxiety	.06^{a}	−.07^{a}	−.10^{a}				
Average phone call length during separation	.01^{*b}	−.01^{*b}	−.02^{**b}				
Traveler							
Intercept	1.01^{***a}	.24^{***b}	.09^{b}	.02			
Attachment anxiety	.27^{**a}	−.06^{a}	−.20^{**a}				
Partner's anxiety	−.18^{*a}	.21^{a}	.25^{**a}				
Average phone call length during separation	.02^{**b}	−.01^{**b}	−.02^{**b}				
Positive affect							
Homebound							
Intercept	2.49***	.23^{*b}	.22^{***a}	−.02	.10***		
Purpose of trip	.34	−.36^{**b}	−.09				
Attachment anxiety	−.08	−.11	.05				
Average phone call length during separation	.01	−.01	.01				
Interaction between anxiety and call length	−.01^{b}	−.01$^{\dagger a}$	.01				
Traveler							
Intercept	2.78***	.08	−.12^{*a}	−.01	.08***		
Purpose of trip	.38*	−.30^{*b}	.04				
Attachment anxiety	−.13	.05	.10*				
Average phone call length during separation	−.01	−.01	.01				
Interaction between anxiety and call length	−.04^{*b}	.01^{a}	.02†				
Negative affect							
Homebound							
Intercept	1.43***	.11^{*a}	−.09^{*b}	−.10*	.09***		
Gender	.14†	−.20^{*a}	−.13†				
Attachment anxiety	.07^{a,b}	.02	−.07^{b}				
Average phone call length during separation	.01	−.001	−.01				
Interaction between anxiety and call length	.01^{b}	.01^{a}	−.01^{*b}				
Traveler							
Intercept	1.56***	−.04	−.12^{*b}	−.03	.09***		
Gender	−.05	.16^{a}	.04				
Attachment anxiety	.22$^{**a, b}$	−.06	−.15^{**b}				
Average phone call length during separation	.02*	.003	−.01				
Interaction between anxiety and call length	.01^{*b}	−.01^{*a}	−.01^{*b}				
Sleeping problems							
Homebound							
Intercept	0.13*	−.14^{*b}	−.20^{**b}	−.05			
Frequency of separation	−.12^{a}	.27^{*a}	.31^{*a}				
Attachment anxiety	.15*	−.11$^{\dagger a}$	−.16^{*a}				
Traveler							
Intercept	.08	−.10^{*b}	−.17^{**b}	−.07†			
Frequency of separation	.22$^{\dagger a}$	−.28^{*a}	−.02^{a}				
Attachment anxiety	−.01	.04^{a}	.01^{a}				

Table 3 *(continued)*

Variable	Intercept (value of DV during separation)	Preseparation difference from separation	Reunion difference from separation	Weekday status	Events of day (positive for positive affect, negative for negative affect)	Activity level (aggregated over day)	Perceived stress (aggregated over day)
Physical symptoms							
Homebound							
Intercept	1.45***	.07^{*b}	−.02	−.02			
Age	.02*	−.01	−.01*				
Attachment anxiety	.09	.01	.07^{a}				
Partner's anxiety	−.01	.09^{*a}	.09^{*a}				
Traveler							
Intercept	1.44**	.06^{b}	−.02	−.05			
Age	−.01	−.01	−.01				
Attachment anxiety	.05	.05	−.06^{a}				
Partner's anxiety	.10	−.06^{a}	−.05^{a}				
Subjective stress							
Homebound							
Intercept	−0.01	.08	−.15*	−.20***			
Attachment anxiety	−.07	.23^{**b}	.10	—			
Attachment avoidance	.05	−.01	.18^{*b}	—			
Partner's avoidance	−.14^{a}	.03	−.15*	—			
Traveler							
Intercept	−.14	.09	−.01	—			
Attachment anxiety	.01	.12^{b}	.05	−.21***			
Attachment avoidance	−.07	−.05	.03^{b}	—			
Partner's avoidance	.17^{a}	−.10	−.06	—			
No. remote contacts (logged)							
Homebound							
Intercept	0.54***	−.09^{b}	−.17^{**b}	−.33***			
Attachment avoidance	−.13^{*a}	.11^{*a}	.15^{*a}				
Partner's avoidance	.10^{a}	−.19^{**a}	−.14^{**a}				
Traveler							
Intercept	.60**	−.15^{**b}	−.23^{**b}	−.31***			
Attachment avoidance	.06^{a}	−.16^{**a}	−.12^{a}				
Partner's avoidance	−.21^{**a}	.19^{**a}	.21^{***a}				
Proportion contacts initiated (logged)							
Homebound							
Intercept	0.23***	−.03^{a}	−.01^{b}	−.10***			
Partner's anxiety	−.02	.05^{*b}	.05^{*b}				
Partner's avoidance	.07^{*a}	−.08^{*a}	−.09^{**a}				
Traveler							
Intercept	.39***	−.16^{***a}	−.17^{b}	−.14***			
Partner's anxiety	−.05	.03^{b}	.05^{b}				
Partner's avoidance	−.07^{*a}	.08^{a}	.09^{a}				
Cortisol level (logged)							
Homebound							
Intercept	2.02***	.02	−.05	.05		.11	−.03
Gender	.14	—	—	—		—	—
Body weight	.003	—	—	—		—	—
Age	−.01	—	—	—		—	—
Attachment anxiety	.12*	−.10*	−.06	—		—	—

Note. DV = dependent variable. [b] denotes a statistically significant joint effect (i.e., collapsing across homebound and traveling partners, and controlling for within-couple dependency) and [a] denotes a statistically significant difference between the homebound and traveling partner.
[a] Significant difference between homebound and traveler, $p < .05$.
[b] Significant joint effect across homebound and traveler (i.e., collapsing across homebound and traveling partners, and controlling for within-couple dependency), $p < .05$.
$^{\dagger} p < .10$. $^{*} p < .05$. $^{**} p < .01$. $^{***} p < .001$.

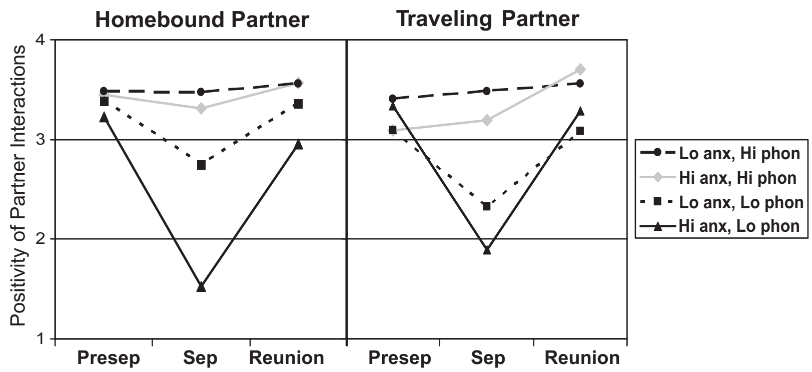

Figure 1. Interaction between attachment anxiety and telephone contact on positivity of partner interactions before, during, and after separation. Lo anx = low anxiety; Hi phon = high phone contact; Hi anx = high anxiety; Lo phon = low phone contact; Presep = preseparation; Sep = separation.

tional set of analyses to test whether the total number of times partners had remote contact with one another during the separation, via text messages, e-mail, and phone messages, also moderated separation–reunion effects. The only significant effect was that partners with a greater number of contacts during the separation reported less of a separation-related decline in the positivity of their interactions ($\beta_{homebound} = -0.70$, $\beta_{traveler} = -0.68$), joint $\chi^2(2) = 9.3$, $p < .01$.

Both attachment anxiety and telephone call length also moderated changes in the negativity of partner interactions. There was an overall decline in the negativity of daily interactions among both homebound and traveling partners, joint $\chi^2(2) = 62.1$, $p < .001$. This decline was more pronounced in both homebound and traveling partners if the homebound partner was high in attachment anxiety ($\beta_{homebound,\ own\ anxiety} = 0.30$, $\beta_{traveler,\ partner's\ anxiety} = 0.24$), joint $\chi^2(2) = 22.7$, $p < .001$. Telephone contact moderated the change in negativity in both homebound and traveling partners, joint $\chi^2(2) = 10.0$, $p < .01$, with less of a change observed among couples with longer daily phone conversations during the separation. As for the reunion, both partners reported that the negativity of their interactions increased from separation to reunion, joint $\chi^2(2) = 27.8$, $p < .001$, although the increase was significantly greater for the homebound partner, $\chi^2_{homebound\text{–}traveler\ difference}(1) = 9.13$, $p < .001$. Also, the homebound partner's attachment anxiety was associated with an even greater increase in negativity for both the homebound and the traveling partner ($\beta_{homebound,\ own\ anxiety} = 0.30$, $\beta_{traveler,\ partner's\ anxiety} = 0.25$), joint $\chi^2(2) = 20.3$, $p < .001$, whereas the traveler's anxiety was associated with less of an increase in negativity for both partners ($\beta_{homebound,\ partner's\ anxiety} = -0.10$, $\beta_{traveler,\ own\ anxiety} = -0.20$), joint $\chi^2(2) = 14.5$, $p < .001$. These effects are displayed in Figure 2, which displays changes in interaction negativity, averaged across homebound and traveling partners and plotted as a function of whether the homebound or the traveling partner was high or low on anxiety. This graph shows that when the homebound partner was high on anxiety, both partners showed a separation-related decline in negativity, followed by an increase on reunion. Yet when the traveling partner was high on anxiety, there was less of a decline during the separation and less change from separation to reunion. There was also an effect of telephone contact: For both partners, greater telephone contact during the separation was associated with less of an increase in negativity on reunion, joint $\chi^2(2) = 18.7$, $p < .001$. This effect was also found when we repeated this model with number of remote contacts rather than telephone call

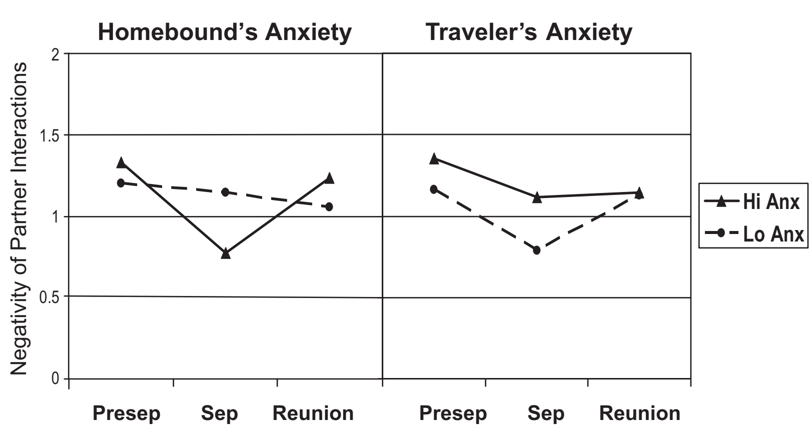

Figure 2. Association between anxiety in the homebound versus the traveling partner and negativity of partner interactions before, during, and after separation. Hi anx = high anxiety; lo anx = low anxiety; Presep = preseparation; Sep = separation.

length ($\beta_{homebound} = -0.25$, $\beta_{traveler} = -0.20$), joint $\chi^2(2) = 7.8$, $p < .05$.

As for overall changes in remote contacts, we found that both partners reported increases in remote contacts during the separation, joint $\chi^2(2) = 9.2$, $p < .05$, and declines on reunion, joint $\chi^2(2) = 19.2$, $p < .001$. Yet homebound partners with higher levels of attachment avoidance reported less of an increase in remote contacts during the separation and less of a decline on reunion, whereas those whose partners had higher levels of attachment avoidance showed more of an increase during the separation and more of a decline on reunion. For the traveler, these effects were basically reversed, $\chi^2_{\text{homebound–traveler difference, own avoidance, separation}}(1) = 10.7$, $p < .01$; $\chi^2_{\text{homebound–traveler difference, partner's avoidance, separation}}(1) = 22.0$, $p < .001$; $\chi^2_{\text{homebound–traveler difference, own avoidance, reunion}}(1) = 9.7$, $p < .01$; and $\chi^2_{\text{homebound–traveler difference, partner's avoidance, reunion}}(1) = 18.0$, $p < .001$. This suggests that these effects are best summarized in terms of homebound avoidance and traveler avoidance rather than own avoidance and partner avoidance. Accordingly, Figure 3 displays changes in remote contacts, averaged across homebound and traveling partners and plotted as a function of whether the homebound or the traveling partner was high or low on avoidance. This graph shows that when the homebound partner is high on avoidance, there is no separation-related increase in remote contacts. Yet when the traveling partner is high on avoidance, remote contacts increase during the separation.

Analyses of the proportion of remote contacts initiated by each partner suggest that this separation-related increase is driven by the homebound partner. Although travelers generally reported initiating significantly more contacts during the separation than the preseparation, $\chi^2_{\text{homebound–traveler difference}}(1) = 17.3$, $p < .001$, homebound individuals with avoidant partners reported greater increases in contact initiation, $\chi^2_{\text{homebound–traveler difference}}(1) = 17.8$, $p < .001$. Among both members of the couple, the partner's attachment anxiety was associated with less of a change in initiating behavior from the preseparation to the separation, joint $\chi^2(2) = 6.0$, $p < .05$. The reunion was associated with a decline in initiating behavior in both partners, joint $\chi^2(2) = 27.2$, $p < .001$. There was less of a decline, however, among individuals with anxious partners, joint $\chi^2(2) = 6.8$, $p < .05$, and more of a decline in homebound partners with avoidant partners, $\chi^2_{\text{homebound–traveler difference}}(1) = 14.7$, $p < .001$.

As for positive affect, controlling for the number of positive events experienced over the course of the day, there was a significant decline in positive affect from the preseparation to the separation episode among both partners, joint $\chi^2(2) = 12.9$, $p < .01$. Although the magnitude of this change was larger in the homebound partner than in the traveling partner, this difference was not statistically significant, $\chi^2(1) = 2.5$, $p = .11$. The decline in positive affect was less pronounced if the traveler's trip was exclusively pleasure related (positive affect was the only variable that showed any associations with the work–pleasure status of the traveler's trip), joint $\chi^2(2) = 16.0$, $p < .001$. Additionally, the change from preseparation to separation was moderated in the homebound partner (at the trend level), but not in the traveling partner, by an interaction between attachment anxiety and telephone contact, $\chi^2_{\text{homebound–traveler difference}}(1) = 4.5$, $p < .05$. In the homebound partner, the largest declines in positive affect from preseparation to separation were observed among high-anxious individuals with short telephone calls and low-anxious individuals with long telephone calls. As for reunion, there was a significant increase in positive affect from the separation to the reunion among the homebound partner, but a significant decline for the traveling partner, $\chi^2_{\text{homebound–traveler difference}}(1) = 13.6$, $p < .001$. The decline in the traveling partner's positive affect, however, was counteracted if the traveler was higher in anxiety ($\beta = 0.10$, $p < .05$). These effects are displayed graphically in Figure 4, which shows preseparation, separation, and reunion levels of positive affect in each partner, stratified by attachment anxiety and telephone contact. When repeating these analyses with number of remote contacts instead of telephone call length, we no longer found an interaction between remote contacts and attachment anxiety on the separation effect, and there were no effects of remote contacts on reunion.

Negative affect was the only dependent variable to show a significant effect of gender. The predicted increase in negative affect from preseparation to separation was significant only among female homebound partners, $\chi^2_{\text{homebound–traveler difference}}(1) = 9.9$ $p < .01$. As with positive affect, there was a significant interaction

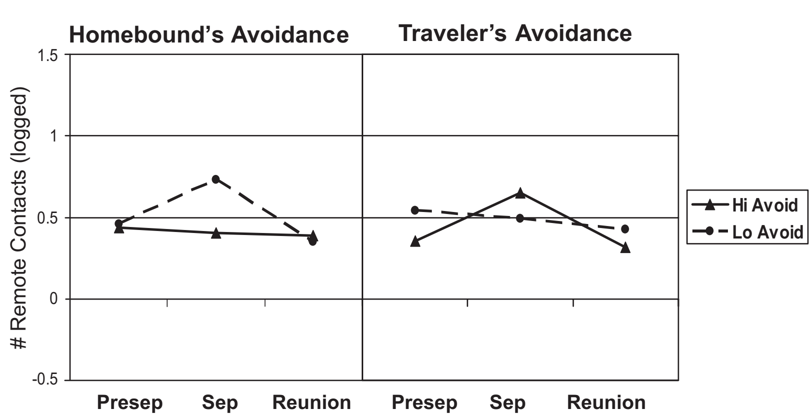

Figure 3. Association between avoidance in the homebound versus the traveling partner and number of remote contacts pursued before, during, and after separation. Hi Avoid = high avoidance; Lo Avoid= low avoidance; Presep = preseparation; Sep = separation.

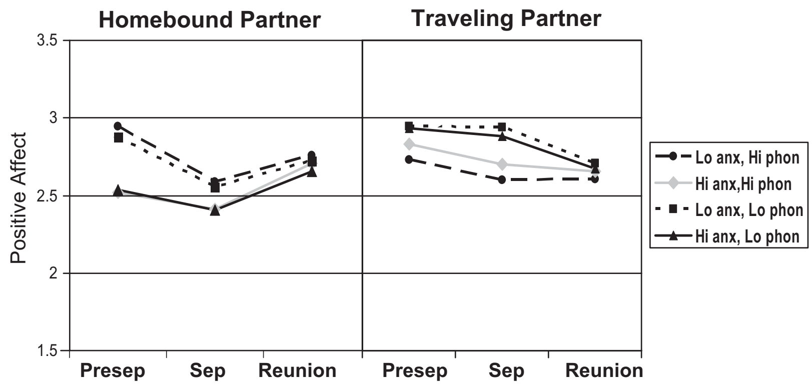

Figure 4. Interaction between attachment anxiety and telephone contact on positive affect before, during, and after separation. Lo anx = low anxiety; Hi phon = high phone contact; Hi anx = high anxiety; Lo phon = low phone contact; Presep = preseparation; Sep = separation.

between attachment anxiety and telephone contact on the change from preseparation to separation among the homebound partners, but not among the traveling partners, $\chi^2_{\text{homebound–traveler difference}}(1) = 6.7$ $p < .01$, such that high-anxious–high-contact individuals actually showed a decline in negative affect associated with the separation, whereas the other groups showed little change. As for reunion, both homebound and traveling partners showed a significant decline in negative affect from the separation to the reunion, joint $\chi^2(2) = 10.5$ $p < .01$, which was moderated in both partners by an interaction between attachment anxiety and telephone contact, joint $\chi^2(2) = 7.9$, $p < .05$. As with positive affect, high-anxious–high-contact individuals showed the greatest declines in negative affect from separation to reunion. These effects are displayed graphically in Figure 5, which shows preseparation, separation, and reunion levels of negative affect in each partner, stratified by attachment anxiety and telephone contact. This graph also shows that the highest levels of negative affect overall were reported by low-anxious travelers who had low levels of telephone contact with their partners. We did not find parallel effects when we repeated these analyses with number of remote contacts instead of telephone call length. Finally, the reunion growth model detected a significant day-by-day decline in negative affect in the homebound partner on reunion ($\beta = -0.02$, $p < .05$), but not in the traveling partner ($\beta = 0.01$, *ns*), $\chi^2_{\text{homebound–traveler difference}}(1) = 4.9$ $p < .05$.

For sleeping problems, both the homebound and the traveling partners reported greater sleeping problems during the separation than the preseparation, joint $\chi^2(2) = 9.7$, $p < .01$. This was less so among homebound (but not traveling) partners who were accustomed to frequent separations, $\chi^2_{\text{homebound–traveler difference}}(1) = 16.5$, $p < .001$. There was also a moderating effect of attachment anxiety in the homebound partner but not the traveling partner, $\chi^2_{\text{homebound–traveler difference}}(1) = 3.9$, $p < .05$, such that attachment anxiety exacerbated the increase in sleeping problems among the homebound partner only. Both partners reported significant reductions in sleeping problems from the separation to the reunion, joint $\chi^2(2) = 19.3$, $p < .001$. This was less so among homebound partners who underwent more frequent separations, $\chi^2_{\text{homebound–traveler difference}}(1) = 5.5$, $p < .05$, and more so among high-anxious homebound (but not traveling) partners, $\chi^2_{\text{homebound–traveler difference}}(1) = 3.9$, $p < .05$. These results are displayed in Figure 6, which shows the homebound and the traveling partners' preseparation, separation, and reunion levels of sleeping problems, stratified by each partner's attachment anxiety. Finally, the reunion growth model detected

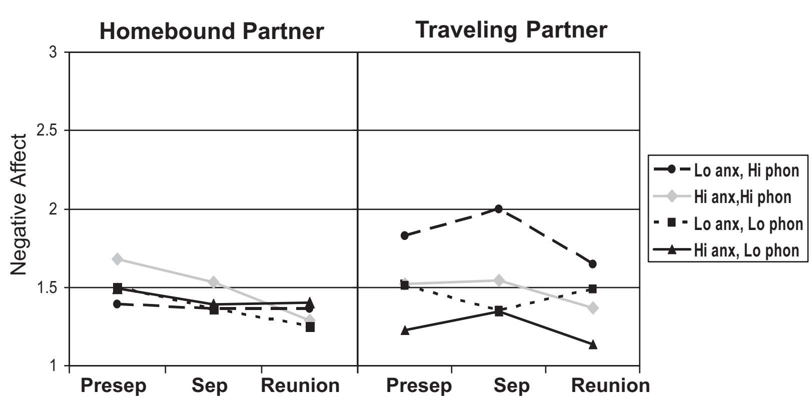

Figure 5. Interaction between attachment anxiety and telephone contact on negative affect before, during, and after separation. Lo anx = low anxiety; Hi phon = high phone contact; Hi anx = high anxiety; Lo phon = low phone contact; Presep = preseparation; Sep = separation.

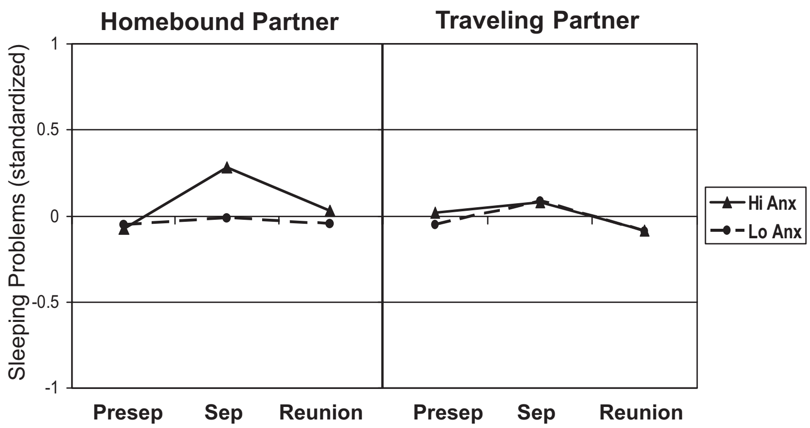

Figure 6. Association between attachment anxiety and sleeping problems before, during, and after separation. Hi Anx = high anxiety; Lo Anx = low anxiety; Presep = preseparation; Sep = separation.

a significant day-by-day decline in sleeping problems in both homebound and traveling partners ($\beta_{\text{homebound}}$ and $\beta_{\text{traveler}} = -0.03$), joint $\chi^2(2) = 7.4$, $p < .05$. This effect was moderated by the homebound partner's anxiety, such that both homebound and traveling partners showed greater day-to-day declines in sleeping problems during the reunion when the homebound partner was high on attachment anxiety ($\beta_{\text{homebound}} = 0.03$, $\beta_{\text{traveler}} = -0.04$), joint $\chi^2(2) = 7.3$, $p < .05$. Traveling partners' own attachment anxiety counteracted their linear decline in sleeping problems. Figure 6 displays overall sleeping problems before, during, and after the separation among high-anxious and low-anxious homebound and traveling partners.

The model for physical symptoms included age, as older individuals reported more physical symptoms throughout the observation (see Table 3). Both homebound and traveling partners reported declines in physical symptoms from preseparation to separation, joint $\chi^2(2) = 6.3$, $p < .05$. At reunion, homebound partners with high attachment anxiety showed an increase in symptoms, whereas high-anxious travelers showed a decrease, $\chi^2_{\text{homebound–traveler difference}}(1) = 3.7$, $p < .05$. The partner's anxiety was also associated with an increase in symptoms on reunion among homebound partners and a decrease among traveling partners, $\chi^2_{\text{homebound–traveler difference}}(1) = 4.0$, $p < .05$. As for subjective stress, both homebound and traveling individuals with high attachment anxiety reported a significant decline in subjective stress from preseparation to separation, joint $\chi^2(2) = 11.7$, $p < .01$. Homebound partners' subjective stress declined further on reunion ($\beta = -0.15$, $p < .05$), particularly if they had high-avoidant partners ($\beta = -0.15$, $p = .05$). Similarly, the linear growth model found significant day-by-day declines in subjective stress in the homebound (but not the traveling) partner during the reunion, $\chi^2_{\text{homebound–traveler difference}}(1) = 7.0$, $p < .05$, which was more pronounced if they had high-avoidant partners ($\beta = -0.04$, $p < .01$), $\chi^2_{\text{homebound–traveler difference}}(1) = 6.6$, $p < .05$, and less pronounced if they themselves were high in avoidance ($\beta = 0.03$, $p < .05$), $\chi^2_{\text{homebound–traveler difference}}(2) = 5.2$, $p < .10$. Yet both homebound and traveling participants reported increased overall stress at reunion if they themselves were high in avoidance, joint $\chi^2(2) = 7.2$, $p < .05$.

HPA Activity

As with the daily diary data, we used three-level random coefficient models (using the WHLM model of hierarchical linear modeling) to analyze the salivary cortisol data. We ran two separate models. The first estimates each participant's average level of cortisol during the day.[3] The second is a growth model that estimates each individual's trajectory of cortisol secretion from morning to evening. In both models, the parameters of interest (either average cortisol level or trajectory of change) were modeled at Level 2 as a function of separation and reunion. At Level 3, separation-related and reunion-related changes were modeled as a function of person-level moderators (described below). Following standard practice, cortisol values were logged before analysis to normalize their distribution. For analyses of the average daily level of cortisol, the Level 1 model was as follows: Cortisol $(\text{logged})_{\text{measure } i, \text{ day } j, \text{ participant } g} = \pi_{0ijm} + e_{ijg}$.

In this model, π_{0ijm} represents average cortisol level aggregated over the course of the day. Level 2 captured variation at the day level. At this level, we modeled average cortisol level (π_{0ijm}) as a function of separation, reunion, whether the day in question was a weekend or a weekday, average activity level (aggregated over the participant's reports within the day and centered), and average stress level (aggregated over the participant's reports within the day and centered). As with the diary analyses, separation and reunion effects were modeled with two dummy-coded variables, one representing the difference between separation and preseparation, and one representing the difference between separation and reunion. Hence, the separation was treated as the base category so that we could examine separation and reunion changes simultaneously and also examine person-level moderators of overall cortisol levels during the separation episode itself. At Level 3, we

[3] Another common practice for analyzing overall cortisol levels throughout the course of the day is to take into account the total amount of time spent at different levels by constructing an across-the-day curve with the data points and calculating the total area "under" the curve (Pruessner, Kirschbaum, Meinlschmid, & Hellhammer, 2003). When analyzed using this method, our cortisol findings were unchanged.

tested for moderating effects of gender, age, body weight, attachment style, presence of children in the home, couple type (frequently separated vs. infrequently separated), and degree of contact during the separation. Nonsignificant effects were deleted from final models (except for gender, age, and body weight, which were retained because of their known biological relevance to cortisol levels). The structure of the growth curve Level 1 model was as follows: Cortisol (logged)$_{\text{measure } i, \text{ day } j, \text{ participant } g} = \pi_{0ijm} + \pi_{1ijm}$ (Time) + π_{2ijf} (Time^2) + π_{2ijf} (Activity Level) + $e_{ijg.}$ Here, π_{0ijm} represents midday cortisol level at the individual's average activity level (activity level was group centered), and π_{1ijm} and π_{2ijm} model the slope of diurnal change in cortisol level. The Time^2 term was added to represent the known curvilinear function of HPA activity from morning to evening. Analyses of the Level 1 coefficients at Level 2 and Level 3 paralleled the model for average cortisol levels.

We present only the results of the average cortisol model, as the growth model detected no separation- or reunion-related changes in the slope of cortisol release over the day. As shown at the bottom of Table 3, individuals with high attachment anxiety showed significant increases in cortisol levels from the preseparation to the separation ($\beta_{\text{separation } - \text{ preseparation}} = -0.10$, $p < .05$). Furthermore, during the separation episode itself, higher levels of anxiety were associated with higher levels of cortisol ($\beta = 0.12$, $p < .05$). We ran two additional analyses, one with the preseparation treated as the base category and one with the reunion treated as the base category, to examine whether the positive relationship between attachment anxiety and cortisol level was also observed during these episodes, and it was not ($\beta_{\text{preseparation}} = 0.09$, *ns,* and $\beta_{\text{reunion}} = 0.09$, *ns*, respectively). Hence, consistent with our conceptualization of the separation as an attachment-specific threat, attachment anxiety was only manifested in heightened HPA activity during the separation. We also reran models including trait anxiety as a covariate to examine whether the effect could be attributed to generalized rather than attachment-specific anxiety. As with the daily diary findings reported above, there were no effects of trait anxiety, and inclusion of trait anxiety did not weaken the attachment style effects. Figure 7 presents average cortisol levels for high-anxious and low-anxious individuals during the preseparation, separation, and reunion episodes. Again, it is notable that this effect is independent of the individuals' self-perceived stress.[4]

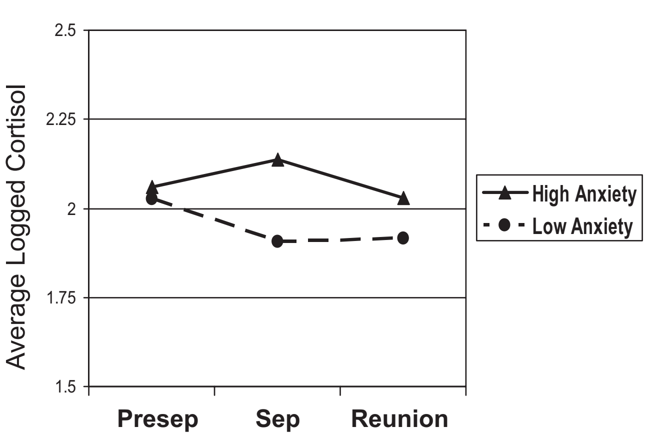

Figure 7. Association between attachment anxiety and cortisol levels before, during, and after separation. Presep = preseparation; Sep = separation.

Discussion

The present study is the first to examine affective, behavioral, and physiological changes associated with naturally occurring, travel-related separations of 4–7 days between cohabiting romantic partners. We found significant separation-related and reunion-related changes for both members of the couple (but especially for the homebound partner) in the quality of daily interactions, positive and negative affect, subjective stress, sleeping problems, physical symptoms, and HPA axis activity. These changes were particularly pronounced for individuals with high attachment anxiety. Our findings are consistent with the results of separation studies conducted with infants and animals that demonstrated that day-to-day proximity to attachment figures has regulatory effects on affect and physiology (Gunnar et al., 1996, 1981; Hennessy, 1997; Spangler & Grossman, 1993).

Interactions and Affect

As we expected, both the degree of positivity (i.e., feelings of closeness, meaningfulness, and mutual appreciation) and the degree of negativity (i.e., criticism and conflict) in partners' daily interactions declined during the separation and "rebounded" during the reunion. Hence, whereas partners may not derive as much pleasure and benefit from their interactions with one another during physical separations, they also do not have as many opportunities for criticism and quarreling (similar to the findings of Vormbrock's 1993 review of the research on wartime and job-related marital separations). Notably, separation-related changes were more pronounced among individuals with high attachment anxiety, consistent with the notion that such individuals are disproportionately sensitive to the loss of partner availability brought about by separation (and consistent with the findings of Fraley and Shaver, 1998, on anxious individuals' distress when anticipating separations from their partners). Yet we also found a significant effect of the amount of contact that partners had with one another

[4] To rule out the possibility that the homebound partners' cortisol levels might have increased because of increased responsibilities at home, we tested whether homebound partners reported a significant increase in daily negative events during the separation (the daily negative event checklist contains household chores and responsibilities and also includes items assessing feelings of being overtaxed, such as "did not have enough time to do all the things that I needed to do"). There was no such separation-related change in homebound partners or in those high in attachment anxiety. There were also no separation-related changes in homebound partners' activity levels or among those high in anxiety. Also, when daily negative events were included as day-level covariates in the model predicting cortisol changes (daily perceived stress was already included in the model), the effect of attachment anxiety was unchanged, suggesting that changes in daily household demands and perceived stress do not account for the findings. To provide one additional check on this possibility, we averaged homebound partners' daily negative events within the separation episode, and their daily subjective stress within the separation episode, and added these variables to the Level 3 models to see whether their inclusion reduced the attachment anxiety effect. This was not the case.

during the separation. Couples who had longer daily conversations with one another or more frequent calls, pages, e-mails, or text or voicemail messages reported less of a change in the quality of their day-to-day interactions. This demonstrates that to some degree, remote contact can substitute for face-to-face interactions in facilitating partner availability. Furthermore, telephone call length—which provides perhaps the best remote substitute for face-to-face contact—was able to counteract the sharp drops in positivity experienced by high-anxious individuals.

As for daily affect, we found that only female homebound partners reported the expected increase in negative affect during the separation, although both partners' negative affect significantly decreased from separation to reunion. Furthermore, this decline took a linear, day-by-day form for the homebound partner, consistent with the notion that reestablishing regular contact gradually reregulates daily affect. Positive affect, like the positivity of daily interactions, declined during the separation and recovered during reunion (although there was less of a decline for travelers, particularly for those on pleasure-oriented trips). As with interaction quality, there was an interaction between attachment anxiety and telephone call length: Homebound anxious partners with shorter telephone conversations showed the greatest declines in positive affect.

Notably, the interaction effects that we observed with telephone call length did not extend to the numbers of e-mails, phone calls, and messages transmitted between partners. This suggests anxious individuals' hypersensitivity to the loss of partner availability is best remedied by forms of contact that provide for extended, real-time interpersonal exchange. Of course, it is often easier for separated couples to leave text, voicemail, and electronic messages for one another than to set aside time for lengthy telephone calls, and this is reflected by the fact that overall numbers of remote contacts (such as phone messages and e-mails) increased during the separation, most of them initiated by the traveler. Interestingly, changes both in the number of remote contacts and in individuals' tendencies to initiate these contacts were moderated by partner's attachment style, suggesting that individuals' contact-seeking behavior during a separation is partly influenced by what they think their partner is likely to want, expect, and do. For example, there were greater separation-related increases in contact initiation among individuals with avoidant partners, perhaps because avoidant partners are expected to neglect touching base during the separation. Yet individuals with anxious partners showed less of an increase in contact initiation during the separation, perhaps because anxious partners are expected to be particularly vigilant about maintaining contact. A valuable direction for future research is to examine each partner's motives for initiating contact and their perceptions of the other person's motives. Greater investigation into the subjective experiences associated with different types of remote contact is also valuable for advancing our understanding of affect regulation within attachment relationships and how it is affected by the increasing use of remote communication technologies such as cell phones and text messaging.

Of course, our data on partner contact during temporary separations do not permit causal inferences. In other words, we cannot conclude that couples who had high levels of contact with one another during the separation showed different patterns of affective change because of such contact. Rather, we must also consider the possibility that these couples were distinctive to begin with and potentially less vulnerable to separation-related changes in affect and interpersonal behavior.

Stress, Sleep, and Symptoms

Confirming our expectations, we found that physical separations were associated with increased sleeping problems in both partners, which were ameliorated on reunion. Furthermore, the decline in sleeping problems on reunion followed a linear, day-by-day pattern suggesting progressive readjustment. As we predicted, attachment anxiety was found to moderate separation and reunion effects in the homebound partner's sleep quality, with high-anxious individuals showing greater separation-related increases in sleeping problems and greater subsequent declines on reunion. This provides yet more evidence that anxious individuals—especially anxious homebound partners—are particularly sensitive to the loss of proximity and contact with their partners brought about by the separation. In fact, both homebound and traveling partners showed greater day-by-day linear declines in sleeping problems if the homebound partner was high in attachment anxiety, suggesting that in couples with anxious homebound partners, both members of the couple may be sensitive to the strain that these individuals experienced during separations.

This type of pattern—in which both partners respond to the homebound partner's attachment anxiety—was also found with respect to the negativity of partner interactions (i.e., both partners reported greater changes at separation and reunion if the homebound partner was anxious). Hence, when the challenges of being left behind are compounded by attachment anxiety, both partners may sense and react to this. Similarly, both partners may expect separations to be easier when the homebound partner is high on avoidance, which might account for the fact that the overall increase in remote contacts during the separation was less pronounced when the homebound partner was high in avoidance. Hence, when interpreting the implications of one's own attachment style and one's partner's attachment style, homebound–traveler status must be taken into account.

As for the issue of separation frequency, the only separation-related change that was less pronounced among couples who underwent frequent separations was sleeping problems. Hence, consistent with the separation studies reviewed by Vormbrock (1993), partners do not appear to adjust to a cohabiting partner's recurring absence. Yet Fraley and Shaver (1998) observed that frequently separated couples showed less overt signs of separation distress right before saying goodbye to their partner than did infrequently separated couples. This suggests that the experience of getting used to a partner's frequent absence is not a unitary phenomenon. Straightforward distress over such separations may diminish (as evidenced by Fraley and Shaver's findings) and individuals may gradually adjust to sleeping alone, but the other affective and behavioral disruptions associated with the separation may remain potent.

Contrary to our predictions, physical symptomatology actually declined from preseparation to separation in both homebound and traveling partners. Reunion effects were moderated by attachment anxiety, but in different ways for the homebound versus the traveling partner: Homebound partners reported increased physical symptoms on reunion if they or the returning partner was high on attachment anxiety, whereas traveling partners showed the reverse pattern. As for subjective stress, both homebound and traveling partners with high attachment anxiety reported a significant decline in subjective stress during the separation. Homebound partners' subjective stress declined even further on reunion, in a linear, day-by-day fashion. Yet interestingly, the reunion decline in subjective stress was less pronounced among partners who were high in avoidance, suggesting that reunion creates additional stressors for partners who prefer a degree of interpersonal distance.

One potential explanation for the unexpected declines in both subjective stress and physical symptomatology that were observed during the separation patterns is that both the reporting and the self-awareness of physical symptomatology and subjective stress might serve social signaling functions for anxious individuals, aiming to effectively solicit the attention and care of the partner (albeit unconsciously). Hence, individuals' awareness of and sensitivity to psychological stress and physical discomfort might inevitably wane in the partner's absence, when its signaling function becomes moot, and rebound on reunion. This possibility suggests that when considering how separations from attachment figures influence day-to-day experience and behavior, we should adopt a broad conceptualization of affect regulation that includes partners' unconscious and conscious strategies for modulating or attenuating affect through different interpersonal displays and interactions (as in the model outlined by Mikulincer, Shaver, & Pereg, 2003).

HPA Activity

Among the most notable findings of this study is that homebound partners with high levels of attachment anxiety showed increases in daily HPA activity (manifested in heightened cortisol secretion) associated with the separation, whereas low-anxious individuals did not. This is the first study to assess HPA activity in response to real-time social separations in romantic partners, and the findings are consistent with animal and infant studies demonstrating that separations from attachment figures are associated with HPA system reactivity. They are also consistent with recent research demonstrating that in a laboratory setting, anxiously attached men show heightened HPA reactivity in response to conflicts with their partners (Powers, Pietromonaco, Gunlicks, & Sayer, 2006). Such findings demonstrate the sensitivity of the HPA axis to attachment-style differences in individuals' responses to relationship-specific threats and stressors. The fact that we observed heightened HPA reactivity only among anxious individuals is consistent with our expectation that such individuals would be particularly sensitive to threats regarding the partner's availability. Notably, attachment anxiety was not significantly associated with greater HPA activity during either the preseparation or the reunion episodes. It was only during the separation—when, theoretically, anxious individuals should be experiencing the highest levels of attachment-specific "threats" regarding partner availability—that they showed heightened levels of cortisol secretion throughout the day. Furthermore, these effects were found even after controlling for individuals' self-reported stress (assessed with each cortisol sample and aggregated over the course of the day). This could be interpreted to suggest that high-anxious individuals experience physical separations from romantic attachment figures as attachment-specific threats, even in the absence of specific cognitive appraisals of threat and stress.

Given how little research has specifically assessed associations between HPA axis activity and adults' attachment-relevant experiences and individual differences (reviewed in Diamond, 2001; Powers et al., 2006), these findings make an important contribution to our growing understanding of psychobiological aspects of the attachment system in adulthood. In recent years, research has demonstrated associations between adult attachment security and parasympathetic regulation of heart rate (Diamond & Hicks, 2005; Maunder, Lancee, Nolan, Hunter, & Tannenbaum, 2006), electrodermal reactivity to laboratory stressors (Diamond, Hicks, & Otter-Henderson, 2006), and blood pressure reactivity to both laboratory stressors (Kim, 2006; Lawler-Row, Younger, Piferi, & Jones, 2006) and everyday events (Gallo & Matthews, 2006). Collectively, the findings demonstrate that both attachment anxiety and avoidance have implications for physiological aspects of affect and distress regulation, notably consistent with Bowlby's (1973) early conceptualization of attachment as regulating homeostasis in both an "inner ring" of physiological, life-maintaining systems and an "outer ring" of behavior. The specific interrelationships among affective, behavioral, and physiological aspects of the attachment system remain a critical direction for future research.

Limitations and Future Directions

Although one of the strengths of this study is its focus on a naturally occurring event within the lives of the participants—a travel-related separation of 4–7 days—this also introduces a number of limitations. Chief among them is the small size of the sample. Our strict inclusion criteria with regard to the specific duration of the upcoming separation and the duration of couples' previous cohabitation restricted the number of couples who qualified for the study, limiting our power. Thus, continued examination of these issues in larger and more diverse samples of couples is an important direction for future research, particularly for providing more robust and definitive tests for potential moderating effects of attachment avoidance. Overall, we found much more consistent effects of attachment anxiety (one's own and one's partner's) than avoidance. This might suggest that avoidant participants do not, in fact, appraise brief separations from their partners as a potent attachment-related threat. Future research should examine whether lengthier separations, perhaps as long as several months, trigger the distinctive distancing strategies characteristic of avoidant individuals. The specific distance of the separation might also play a role: Perhaps separations more reliably activate the attachment system when the partner is far enough away to feel truly unavailable (i.e., several thousand miles away, in a completely different time zone, reachable only by airplane).

Another limitation of our naturalistic study design is that we cannot rule out the possibility that some of our effects were influenced by self-selection. We obviously could not take a group of cohabiting couples and randomly assign one of the partners to leave town for 4–7 days. Hence, there may be a number of subtle ways in which the couples who qualified for our study differed from other cohabiting couples, and this may have influenced the results. We did assess the overall frequency of couples' separations from one another and found that the only significant effect of separation frequency concerned sleep quality (as discussed earlier), but this is not the only potential confound. For example, because we recruited couples who were anticipating a travel-related separation, it is possible that this anticipation magnified separation effects.

The homogeneous nature of our sample with regard to relationship satisfaction also limits the generalizability of the findings. We did not include distressed couples because we were interested in capturing basic separation effects in well-functioning attachments and expected that distressed couples might approach and react to physical separations in an altogether different way. Yet to comprehensively explore whether physical separations are, in fact, detrimental to couple functioning under certain circumstances (e.g., if they are too frequent or too lengthy) or whether distressed couples have more difficulty maintaining adaptive affect regulation during separations, future research must include couples with lower levels of satisfaction.

Another limitation of this study is that we cannot speak to the specific psychological and physiological mechanisms through which different separation and reunion effects operate. For some outcomes, potential mechanisms seem self-evident: For example, it seems likely that the loss of face-to-face contact contributes to separation-related changes in the self-reported quality of partners' day-to-day interactions. Yet it is more difficult to pinpoint candidate mechanisms for some of the other effects, such as the overall changes in positive and negative affect. Our analyses statistically partialed out the effects of individuals' daily positive and negative events, and therefore the changes cannot be attributed to the fact that individuals simply had better days when they were together than when they were not. We also conducted ancillary analyses to determine whether the significant changes in the quality of partners' day-to-day interactions mediated affective changes (i.e., positive affect declines during the separation because the positivity of partner interactions declines) and found that this was not the case. What, then, makes day-to-day life a little less sweet when one's partner is temporarily gone?

The underlying mechanisms and processes may involve nonconscious regulatory processes rather than consciously appraised emotional events and experiences. From this perspective, proximity to one's attachment figure is its own regulatory "reward," such that separation-related perturbations in affect and behavior are inevitable even if one does not experience the sort of profound separation distress observed among infants. Hence, an important direction for future research involves further parsing these regulatory effects and investigating the processes through which they are conferred. If telephone contact was able to substitute for face-to-face interactions with respect to interaction quality, what sorts of substitutions for partner contact might ameliorate separation-related changes in affect, stress, or symptoms? Seeing the partner's face? Might physical touch have irreplaceable effects? Future research might profit by examining separation-related changes in couples who have unusually high or unusually low levels of contact with one another in the normal course of life (e.g., couples who live together but spend very little time together versus couples who spend nearly every waking hour with one another, perhaps corunning a business).

Conclusion

Proximity plays a critical role in attachment relationships over the lifespan. Some of the foundational theoretical and empirical advances in attachment theory have been based on observations of infants and animals who were temporarily separated from their attachment figures and who experienced notable affective, behavioral, and physiological disruptions as a result. Yet separations in the adult attachment context have received less attention. Although most adult couples attempt to avoid lengthy separations from one another, up until now we have had no systematic data on how the abrupt loss of regular daily proximity and contact affects their day-to-day psychological and physical functioning. By systematically documenting that short-term, naturally occurring separations disrupt cohabiting couples' day-to-day affect, behavior, and physiology, the present study adds to our growing understanding of the basic biobehavioral functioning of the attachment system in adulthood. It also helps to expand the empirical basis for the future formulation and testing of hypotheses concerning the multiple, proximity-dependent processes through which attachment relationships foster psychological and physical well-being over the lifespan.

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Received November 26, 2006
Revision received November 7, 2007
Accepted November 20, 2007 ■