

Emotional Convergence Between People Over Time

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The authors propose that people in relationships become emotionally similar over time—as this similarity would help coordinate the thoughts and behaviors of the relationship partners, increase their mutual understanding, and foster their social cohesion. Using laboratory procedures to induce and assess emotional response, the authors found that dating partners (Study 1) and college roommates (Studies 2 and 3) became more similar in their emotional responses over the course of a year. Further, relationship partners with less power made more of the change necessary for convergence to occur. Consistent with the proposed benefits of emotional similarity, relationships whose partners were more emotionally similar were more cohesive and less likely to dissolve. Discussion focuses on implications of emotional convergence and on potential mechanisms.

A primary function of emotion is the coordination of social interactions (Frijda & Mesquita, 1994; Keltner & Haidt, 1999, in press). Emotional feelings and displays help facilitate mother–infant attachment (Bowlby, 1969), coordinate courtship and romantic processes (Eibl-Eibesfeldt, 1989), promote interpersonal trust and reconciliation following norm transgressions (Keltner, 1995), and deter cheating behavior (Frank, 1988).

One implication of the foregoing analysis is that the emotions of individuals in relationships will become increasingly similar over time—a process we call *emotional convergence*—as they navigate the terrain of long-term bonds. Emotional similarity, it is believed, promotes coordinated thoughts and actions, mutual understanding, and interpersonal cohesion and attraction (Hatfield, Cacioppo, & Rapson, 1994; Preston & de Waal, in press; Schachter, 1951).

In three studies of opposite-sex dating couples and same-sex roommates, we pursued three aims. First, we examined whether emotional convergence occurs, using longitudinal designs and multiple inductions and measures of emotion. Second, we examined whether individuals with less power make more of the change necessary for emotional convergence to occur. Third, we examined whether emotional similarity indeed benefits long-term relationships, as is so widely assumed.

Similarity in Relationships

It is axiomatic that similarity is essential to the formation and maintenance of long-term bonds. Similarity in attitudes, intelli-

gence, and demographic variables promotes attraction between strangers (for reviews, see Berscheid & Walster, 1983; Byrne, 1971; Fehr, 1996). Similarity among relationship partners in many domains also leads to greater relationship cohesion and stability (e.g., Acitelli, Kenny, & Weiner, 2001; Burleson & Denton, 1992).

Given the benefits of similarity, people in close relationships become more similar to each other over time. For example, relationship partners converge in their values and attitudes (e.g., Acitelli et al., 2001), verbal and social skills (Burleson & Denton, 1992), cognitive complexity and mental abilities (Burleson & Denton, 1992; Gruber-Baldini, Schaie, & Willis, 1995; Watkins & Meredith, 1981), eating and drinking habits (Price & Vandenberg, 1980), and perceptions of others (Deutsch & Mackesy, 1985; Kenny & Kashy, 1994).

These studies have focused largely on convergence in cognitive or behavioral processes. In the present study, we ask: Do relationship partners also converge emotionally over time? That is, do romantic partners and roommates become more similar in their brief and automatic emotional responses to events?

Some studies relevant to this question have examined the transmission of emotional disorders among friends. Thus, high school friends and college roommates of a depressed or chronically anxious person became more depressed or anxious over the course of an academic year (Hogue & Steinberg, 1995; Howes, Hokanson, & Loewenstein, 1985). However, as these studies focused on such extreme forms of negative emotionality, we do not know whether convergence occurs at less extreme levels of emotion, and for both negative and positive emotion. For example, friends of a depressed person might have become depressed only because the disorder is such a powerful and salient feature of their interactions.

The Functional Basis of Emotional Convergence

The literature on emotional communication reveals the building blocks for how emotional convergence could occur. People express emotion through facial, vocal, and postural behavior (Ekman, 1993; Keltner, Ekman, Gonzaga, & Beer, in press; Scherer, 1986),

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and quickly and automatically detect and interpret the emotional expressions of others (Dimberg & Ohman, 1996; Keltner & Kring, 1999). Moreover, people are quite susceptible to the social transmission of emotion. Research on emotional contagion has shown that people automatically mimic facial expressions, vocalizations, and postures when they interact with another person, which leads both individuals to experience similar emotions (Barsade, 2001; Dimberg & Ohman, 1996; Hatfield et al., 1994). Studies of empathy find that people take the perspective of others and vicariously feel the emotions that the other person feels (Eisenberg, Fabes, Schaller, & Miller, 1989; Feshbach, 1975; Stotland, Matthews, Sherman, Hansson, & Richardson, 1978).

The development of emotional similarity would benefit relationships in at least three ways. First, because emotions are modes of relating to the environment (Frijda & Mesquita, 1994), emotional similarity would coordinate relationship partners' thoughts and behaviors and help them respond to potential opportunities or threats (Festinger, 1951; Hatfield et al., 1994; Kemper, 1991; Preston & de Waal, in press; Schachter, 1951; Sherif, 1936). Second, when two people feel similar emotions, they more accurately perceive each other's intentions and motivations (Hatfield et al., 1994; Keltner & Kring, 1999; Levenson & Ruef, 1994). Third, emotional similarity would be reinforcing to relationship partners; when two people feel similar emotions, their own feelings and appraisals are validated (LaFrance & Ickes, 1981; K. D. Locke & Horowitz, 1990; Rosenblatt & Greenberg, 1991; Schachter, 1951).

In sum, the ease and automaticity with which humans communicate and transmit emotions between each other would allow emotional convergence to develop. This emotional similarity would prompt coordinated and rewarding interactions, the satisfaction of mutual goals, and in the long run, relationship satisfaction and longevity.

Documenting Emotional Convergence in Long-Term Bonds

Our primary aim in the current research was to examine whether emotional convergence occurs in long-term bonds. Cross-sectional designs documenting similarity among relationship partners confound selection with convergence effects; that is, relationship partners might show similarity at a particular moment because they selected each other based on their similarity, because they converged over time, or both. Thus, the most suitable approach to examining convergence is longitudinal. In Studies 1 and 2, we assessed dating partners' and college roommates' emotional responses at two times, at least 6 months apart. In Study 3, we used a cross-sectional design not affected by potential selection biases because we compared the emotional similarity of dormitory roommates randomly paired by their university with control dyads.

To ascertain the generality of emotional convergence, we assessed multiple positive and negative emotions and used multiple elicitation tasks. We expected emotional convergence to occur for positive and negative emotion, largely because positive and negative emotion are both important in helping relationship partners respond to problems and opportunities in the environment. Further, attraction toward others who feel similar emotions has been shown for both positive and negative emotion (e.g., Bell, 1978; Gibbons, 1986).

To address whether emotional convergence might be a by-product of convergence in personalities, we also computed similarity correlations between partners' personality traits. Although previous research has shown that married partners do not become more similar in personality over time (e.g., Buss, 1984; Caspi, Herbener, & Ozer, 1992; Price & Vandenberg, 1980), it is possible that personality convergence occurs earlier in relationships, within the first months of the relationship's development. Thus, we wanted to rule out personality convergence as a possible determinant of emotional convergence.

Contextual Determinants of Emotional Convergence: Power and Gender

Our second aim was to examine how the development of emotional convergence is shaped by contextual factors within relationships. Specifically, we tested the hypothesis that the relationship partner with less power would change more than the partner with elevated power. Power is defined as the ability to provide or withhold resources or administer punishments in specific relationships (Emerson, 1962; Fiske, 1993; Thibaut & Kelley, 1959). Previous research suggests that differences in power develop in virtually all relationships (Anderson, John, Keltner, & Kring, 2001; Gray-Little & Burks, 1983; Owens & Sutton, 2001; Savin-Williams, 1979; Sulloway, 1996) and that people with less power attend to those with high power (Fiske, 1993; Keltner & Robinson, 1997) and mimic their behavior (Newcomb, 1943). To our knowledge, however, no study has examined the role of power in convergence processes.

In Study 1, we tested this hypothesis by measuring partners' relative power within the context of their dating relationship. In Study 2, we focused on each partner's social status outside the relationship, in the larger social group. Social status involves prominence and respect in social groups (Anderson et al., 2001; Goldhamer & Shils, 1939) and, like social power, endows certain individuals with the capacity to influence others (Anderson et al., 2001; Savin-Williams, 1979).

We also explored the influence of gender on emotional convergence. Relationship research has found that men have more influence in romantic relationships (e.g., Falbo & Peplau, 1980), which suggests that women might make more of the change in the emotional convergence process. However, research on small groups has shown that men lead in task-oriented aspects of group behavior, whereas women lead in more socioemotional aspects of group behavior (for review, see Eagly & Karau, 1991). This suggests that men might be more influenced by their partner's emotions than vice versa. In Study 1, we examined whether men and women differ in how much they changed to match their partner's emotions.

Does Emotional Similarity Benefit Relationships?

Our third aim in the current research was to examine whether emotional similarity benefits relationships. People consistently report a preference to interact with a stranger who feels similar emotions (e.g., Gibbons, 1986; Rosenblatt & Greenberg, 1988; Schachter, 1959). Few, if any, studies, however, have examined the benefits of emotional similarity in extant relationships. Thus,

we examined whether emotional similarity predicted positive relationship outcomes such as satisfaction, closeness, and longevity, which are considered the most important relationship outcomes (Berscheid & Reis, 1998).

The Present Studies

In sum, the current research extends the literature on similarity in relationships in three important ways. First, we examined whether people in close relationships become more emotionally similar over time, extending prior research that has focused on convergence in cognitive and behavioral processes, and studies of the transmission of emotional disorders. To do so, we computed similarity correlations among relationship partners early in the relationship, and again at least 6 months later. In Study 1, we anticipated significant emotional similarity at the initial assessment and for this similarity to increase over time. In Study 2, we expected dormitory roommates not to be similar at the initial assessment, but to show emotional similarity by the second assessment. In Study 3, we again examined dormitory roommates.

Second, we uniquely examined whether power and gender predict which partner changes more in the convergence process. To do so, we conducted cross-lagged correlations, predicting participants' emotions at Time 2 with their partner's emotions at Time 1. Higher correlations imply that participants have changed their emotions over time to match their partner's emotions. We expected relationship partners with less power and status to change more than their partners. We did not expect men and women to differ in the degree to which they changed.

Third, the current research examined the benefits of emotional similarity in extant relationships. In Study 1, we tested whether emotional similarity at the initial assessment would predict romantic partners' relationship satisfaction and likelihood of break-up 6 months later. In Study 2, we examined whether roommates who had become more emotionally similar by the end of the year would feel closer to each other and anticipate staying friends after college.

Study 1: Emotional Convergence in Romantic Couples

Method

Participants. Sixty heterosexual couples at the University of Wisconsin—Madison participated as part of a larger study of relationship development. Participants were recruited by advertisements for a Couples Study placed in college newspapers and fliers posted in dormitories. Each couple was paid \$20 per session. Similar to the University's undergraduate population, participants were on average 20 years old ($SD = 1.78$), and almost all were Caucasian. The study consisted of two assessments. The initial assessment took place in the Fall semester (referred to as Time 1). The follow-up assessment took place 6 months later (referred to as Time 2). At Time 1, the couples had been dating for an average of 22 months ($SD = 14$), ranging from 6 months to 5.5 years. We expected that half a year later at the follow-up assessment a considerable number of these college relationships would have broken up. Indeed, more than one third ($n = 21$) had broken up by then, leaving 39 intact couples, from whom we could collect follow-up data. All but 1 of these 39 couples participated in the 6-month follow-up.

Procedure. During the initial assessment, measures of personality, relative power in the relationship, and relationship satisfaction were ob-

tained, and positive and negative emotional experiences were assessed in the laboratory 2 weeks later with three discussion tasks. During the 6-month follow-up assessment, measures of personality and relationship satisfaction were obtained again, as were positive and negative emotional experiences in the laboratory 2 weeks later, using the same discussion tasks.

Personality traits. Participants completed the 44-item Big Five Inventory (BFI; John, Donahue, & Kentle, 1991). The BFI uses short phrases to assess the most prototypical traits defining each of the Big Five dimensions: Extraversion, Agreeableness, Conscientiousness, and Openness to Experience (John & Srivastava, 1999). The trait adjectives (e.g., *energetic*) that form the core of each of the 44 BFI items (e.g., "Is full of energy") were selected because experts judged them as the most clear and prototypical markers of the Big Five dimensions (John, 1989, 1990). The BFI scales show substantial internal consistency, retest reliability, and clear factor structure, as well as considerable convergent and discriminant validity (Benet-Martinez & John, 1998; John & Srivastava, 1999). To assess partners' similarity in personality traits, we calculated the correlations between partners separately for each Big Five trait domain (Buss, 1984; Caspi et al., 1992).

Relative power in the relationship. To ascertain which partner had more power in the relationship, we used three items: "My partner influences the way I feel about myself"; "My partner influences which parties and other social events I attend"; and "My partner does not influence everyday things in my life" (reverse-scored). Each participant rated these items on a 7-point scale ranging from 1 = *strongly disagree* to 7 = *strongly agree* ($\alpha = .56$). To index relative power, we calculated the difference between partners' rated overall power, so that positive scores for an individual indicated higher relative power in the relationship, and negative scores indicated lower relative power. We then assigned a 1 to the partner with more power and a -1 to the partner with less power. The mean of this difference score was, by definition, zero ($SD = 1.40$).

Relationship satisfaction. To measure couples' relationship satisfaction, we used H. J. Locke and Wallace's (1959) 15-item scale. Because some of the items mention relationship satisfaction in marriages, we tailored them for romantic relationships more generally. For example, the item "Do you ever wish you had not married?" was changed to "Do you ever wish that you were not in the relationship?" The alpha reliability coefficient was .80.

Eliciting positive and negative emotion in the laboratory. To induce a mixture of positive and negative emotions, partners discussed the events of their day. To induce positive emotions, partners discussed a recent success or good event. To induce negative emotions, partners discussed a current concern or worry. Participants took turns in each discussion task, talking about their events without much response from their partner. This allowed us to assess emotional responses to the events they described, rather than assessing emotional reactions to conversations with their partner (Gottman & Levenson, 1992). For each of the three discussion topics, partners reported privately their own emotional experiences after both partners had talked about that topic.

Emotional experience. Positive emotion was measured as the composite of three specific emotions: *happiness*, *amusement*, and *pride*. Negative emotion was measured as the composite of seven specific emotions: *anger*, *contempt*, *discomfort*, *disgust*, *fear*, *guilt*, and *sadness*. Participants rated their experience of each emotion on a 9-point scale ranging from 0 = *none* to 8 = *extreme*.

Reliability of positive and negative emotional experiences can be assessed in two ways: (a) across emotion items and (b) across discussion tasks. First, averaging the emotion ratings across discussion tasks, we computed internal consistency reliability for the two scales. At Time 1, alpha was .78 for the positive emotion scale and .85 for the negative emotion scale. At Time 2, alpha was .77 for positive emotion and .84 for negative emotion. Second, the two scales were also reliable across the three

discussion tasks. Averaging the emotion items that participants rated after each discussion, the cross-task alphas were .68 for positive emotion and .75 for negative emotion at the initial assessment, and .61 and .81, respectively, at the follow-up.

We created an overall positive emotional experience score for each assessment by averaging all nine individual positive emotion reports (3 emotions \times 3 discussion tasks). We created an overall negative emotional experience score for each assessment by averaging all 21 individual negative emotion reports (7 emotions \times 3 discussion tasks). Finally, we created a total emotional experience score for each assessment by averaging the two positive and negative emotion scores.

Results

Emotional convergence over time. To assess whether dating partners became more similar in their emotional responses over time, the 38 couples that participated in both sessions provided the relevant cross-time comparison. Thus, any increases in partners' emotional similarity would not be inflated by attrition effects (i.e., less emotionally similar couples breaking up and dropping out by Time 2).

To index within-couple similarity in emotional responses, we calculated similarity correlations between the two partners' emotional responses to the discussion tasks. Positive correlations indicate similarity between the partners and negative correlations indicate dissimilarity. To test the significance of similarity correlations, we used methods outlined by Gonzalez and Griffin (1997).¹

At Time 1, all couples had been dating for at least 6 months, and we thus expected that some emotional similarity had already developed between the dating partners. Consistent with this expectation, as shown in Table 1, the within-couple similarity correlation was positive and significant for total emotional experience at Time 1 ($r = .30$). That is, if one partner's emotional experience was higher than average, the other partner's experience tended to be higher than average as well; conversely, if one partner's emo-

tional experience was less than average, the other partner's experience tended to be less than average as well. This effect held for positive emotion and negative emotion.

The central test of our emotional convergence hypothesis, however, is whether dating partners significantly increased in their emotional similarity from Time 1 to Time 2. As shown in Table 1, by 6 months later, the similarity correlation had become substantial for total emotional experience ($r = .56$).² Further, this effect replicated for positive and negative emotional experiences. Indeed, at Time 2 each of the similarity correlations exceeded .50, indicating that partners' emotional experiences accounted for more than 25% of the total variance in participants' emotional experiences, as compared with about 11% at Time 1.

The last column of Table 1 presents the temporal increases in similarity correlations; these were derived by transforming each correlation into a Fisher's z -score, calculating the difference between them, and transforming each difference score back into the correlation metric. To test whether these increases in similarity correlations were indeed significant, we used Raghunathan, Rosenthal, and Rubin's (1996) test for the difference between dependent correlations. As predicted, the temporal increase in partner similarity was significant for total emotional experience ($z = 3.06, p < .01$), positive emotional experience ($z = 1.63, p < .05$), and negative emotional experience ($z = 1.93, p < .05$).

Personality convergence. As shown in Table 1, none of the similarity correlations between partners' personality dimensions was positive and significant at Time 1. The average of these correlations was $-.02$, and the only significant correlation, for Neuroticism, was negative. At Time 2, none of the personality similarity correlations had become positive and significant; the average correlation was $.02$. As one might expect, a test of dependent correlations showed that none of the similarity correlations between partners' personality dimensions increased over time (see the last column in Table 1). The finding that dating partners were not similar in personality traits at the initial assessment and did not become more similar over time rules out the possibility that our emotional convergence findings were due to personality convergence or to an increasing similarity in general self-report styles.

Power and change in the emotional convergence process. To examine whether partners with less power changed more in the emotional convergence process, we computed two cross-lagged correlations: (a) how well the emotions of the more powerful partner at Time 2 were predicted by the emotions of the less powerful partner at Time 1, and (b) how well the emotions of the less powerful partner at Time 2 were predicted by the emotions of

Table 1
Study 1: Dating Partners' Similarity in Emotion and in Personality Traits

Domain	Similarity correlations between partners		
	Time 1	Time 2	Increase ^a
Emotion			
Total emotion	.30*	.56**	.31**
Positive emotion	.32*	.51**	.23*
Negative emotion	.43**	.61**	.24*
Personality dimension			
Extraversion	.12	.09	-.03
Agreeableness	-.03	-.10	-.07
Conscientiousness	.06	.25	.19
Neuroticism	-.42**	-.32*	.12
Openness to Experience	.18	.20	.02

Note. Personality dimensions measured with the Big Five Inventory (John et al., 1991).

^a Increases in r were computed by Fisher r -to- z transformations and tested for significance using a z test (Raghunathan et al. 1996, p. 179).

* $p < .05$. ** $p < .01$.

¹ This method involves double-stringing the data, calculating the correlation between partner's emotional responses, and translating the data into z -scores in a way that accounts for dependence in the data.

² Another way to test whether dating partners became more similar is to examine whether the absolute difference between their emotional experiences decreased over time. We conducted a one-way repeated-measures analysis of variance, testing for absolute differences in total emotional experiences with Time (Time 1 vs. Time 2). As expected, and consistent with the correlational findings, the effect of time was significant, $F(1, 38) = 2.65, p < .05$. The average absolute difference in total emotional experience was 0.78 ($SD = 0.55$) at Time 1, and 0.63 ($SD = 0.51$) at Time 2.

the more powerful partner at Time 1.³ These cross-lagged correlations are presented in Table 2, for more and less powerful partners, between their own emotions at Time 2 and their partners' emotions at Time 1. The correlation between the more powerful partners' own emotion at Time 2 and their partners' emotion at Time 1 was not significant. This null finding emerged for positive and negative emotion. In contrast, the correlation between the total emotion of the less powerful partner at Time 2 and their partners' prior total emotion at Time 1 was substantial. Moreover, this effect held for positive emotion and for negative emotion.

To test whether the Time 2 emotions of the less powerful partner were significantly better predicted by the more powerful partner's emotions at Time 1, we conducted moderated multiple regressions. For total emotional experience, we predicted the participants' total emotional experience at Time 2 from their partner's emotional experiences at Time 1 ($R^2 = .00$), participants' relative power in the relationship at Time 1 (R^2 increase = .14), and the interaction between these two variables (R^2 increase = .06, $\beta = -.25$, $p < .05$); we predicted participants' positive emotional experience at Time 2 from their partner's positive emotional experience at Time 1 (R^2 increase = .00), participants' relative power in the relationship (R^2 increase = .08), and the interaction (R^2 increase = .04, $\beta = .19$, $p < .05$); we predicted participants' negative emotional experience at Time 2 from their partner's negative emotional experience at Time 1 ($R^2 = .00$), their relative power in the relationship (R^2 increase = .15), and the interaction (R^2 increase = .02, $\beta = .13$, *ns*).⁴

Gender and change in the emotional convergence process. Did men or women change more in the emotional convergence process? Using moderated multiple regression analyses, we found no significant difference in how well men's or women's total emotional experience at Time 1 predicted their partner's total emotional experience at Time 2. We did find, however, that women's positive emotions at Time 1 predicted their partner's emotions at Time 2 better than how well men's positive emotions at Time 1 predicted their partner's emotions at Time 2 ($\beta = -.21$, $p < .05$). There was not a significant difference in how well men's or women's negative emotions at Time 1 predicted their partner's emotions at Time 2, however. As a whole, therefore, the findings

Table 2
Study 1: Differential Influence in the Emotional Convergence Process: Cross-Lagged Correlations Between Participants' Emotions at Time 2 and Their Partner's Emotions at Time 1 Separately for Participants High and Low in Power

Emotional experience	Participants with more power	Participants with less power
Total emotion	.19	.69**
Positive emotion	.12	.50**
Negative emotion	.27	.53**

Note. The first column of correlations indicates how well the later emotions of the participants with more power were predicted by the prior emotions of the participant with less power. The second column of correlations indicates how well the later emotions of the participants with less power were predicted by the prior emotions of the participants with more power.

** $p < .01$.

do not clearly show that men or women were more influential in the emotional convergence process.

Emotional convergence and relationship satisfaction. Were more emotionally similar couples more satisfied with their relationship? We first examined this question among all 60 couples that participated at Time 1, testing cross-sectionally whether emotional similarity at Time 1 concurrently predicted their relationship satisfaction at Time 1. The appropriate test for this hypothesis is whether relationship satisfaction moderates the similarity correlation between partners (for a similar test, see Buss, 1984; Price & Vandenberg, 1980). If more satisfied couples are more similar in their emotional responses than less satisfied couples, then relationship satisfaction should positively moderate the correlation between partners' emotional responses. Thus, we used moderated multiple regressions (Aiken & West, 1991), in which we predicted participants' emotional experiences at Time 1 from their partner's emotional experiences at Time 1, their couple's combined relationship satisfaction at Time 1, and the interaction of those two variables.⁵

For predicting total emotional experience at Time 1, the R^2 was .03 when entering partner's total emotional experience ($p < .05$); the R^2 increase was .01 when entering relationship satisfaction (*ns*), and .08 when entering the interaction ($\beta = .28$, $p < .01$). This indicates that more satisfied couples at Time 1 showed greater emotional similarity than less satisfied couples. For predicting positive emotional experience, the R^2 was .03 when entering partner's positive emotional experience ($p < .05$); the R^2 increase was .03 when entering relationship satisfaction ($p < .05$), and .14 when entering the interaction ($\beta = .38$, $p < .01$). Unexpectedly, relationship satisfaction did not moderate similarity in negative emotion (interaction $\beta = -.05$). Thus, couples' similarity in negative emotion at Time 1 did not relate to their relationship satisfaction at Time 1. This null finding might be due to the

³ We also examined on the couple-level of analysis whether the process of emotional convergence tended to be symmetrical (i.e., partners changed about equally over time) or asymmetrical (i.e., one partner tended to change more than the other over time). We calculated how much each participant's emotional responses moved from Time 1 to Time 2 in the direction of their partner's emotional responses at Time 1. For example, if participants had a stronger emotional response at Time 1 than their partner, we calculated how much their emotional response decreased from Time 1 to Time 2. These analyses suggested that the process of emotional convergence was asymmetrical. One partner tended to converge more than the other for total emotional experience by an average of 0.89 ($SD = 0.75$), $t(39) = 7.35$, $p < .01$; for positive emotional experience by an average of 1.72 ($SD = 1.21$), $t(39) = 8.86$, $p < .01$; for negative emotional experience by an average of 1.14 ($SD = 1.15$), $t(39) = 8.52$, $p < .01$.

⁴ We also conducted moderated multiple regressions using continuous difference scores in power, to see whether the extent to which partners differed in power would make a difference in these findings. These results showed that the extent of the power difference between partners did not matter—that is, the partner with less power made more of the change necessary for emotional convergence to occur, and it did not matter whether the partner was much lower in power or only slightly lower in power.

⁵ As Aiken and West (1991) suggested, we standardized the continuous predictors before multiplying them to create the interaction variable for this and all other moderated multiple regression analyses.

relatively low level of negative emotional experience ($M = 1.29$); a floor effect would make it more difficult to find a significant relation between similarity in negative emotion and relationship satisfaction.

A stronger test of whether emotional similarity leads to relationship satisfaction is whether emotional similarity at Time 1 predicts later relationship satisfaction, measured 6 months later at Time 2. Among the 38 couples who were still together and participated at Time 2, we predicted participants' total emotional experience at Time 1 with their partner's emotional experience at Time 1 ($R^2 = .08, p < .05$), their relationship satisfaction at Time 2 (R^2 increase = .00, *ns*), and the interaction (R^2 increase = .10, $\beta = .32, p < .01$). Thus, emotional similarity at Time 1 predicted relationship satisfaction 6 months later. We also predicted participants' positive emotional experience at Time 1 with their partner's positive emotional experience at Time 1 ($R^2 = .12, p < .01$), their relationship satisfaction (R^2 increase = .00, *ns*), and the interaction (R^2 increase = .18, $\beta = .43, p < .01$). The interaction again failed to hold for negative emotion (interaction $\beta = -.09$).

Did emotional similarity predict increasing levels of relationship satisfaction over time? To test this hypothesis, we examined whether emotional similarity at Time 1 predicted relationship satisfaction at Time 2 above and beyond the level expected from Time 1 (i.e., we controlled for relationship satisfaction at Time 1). We predicted participants' total emotional similarity with their relationship satisfaction at Time 1 ($R^2 = .00, ns$), their partner's total emotional similarity at Time 1 (R^2 increase = .08, $p < .05$), their relationship satisfaction at Time 2 (R^2 increase = .00, *ns*), and their interaction (R^2 increase = .10, $\beta = .32, p < .01$). The significant interaction indicates that emotional similarity did predict an increase in relationship satisfaction. We predicted participants' positive emotional experience at Time 1 with their relationship satisfaction at Time 1 ($R^2 = .01, ns$), their partner's positive emotional experience at Time 1 (R^2 increase = .11, $p < .01$), their relationship satisfaction at Time 2 (R^2 increase = .00, *ns*), and their interaction (R^2 increase = .19, $\beta = .45, p < .01$). Thus, this finding again held for positive emotion. It did not hold for negative emotion (interaction $\beta = -.10$).⁶

Emotional convergence and relationship breakup. The ultimate criterion for relationship stability is whether a couple breaks up. We expected couples that were less emotionally similar at Time 1 to be more likely to break up within the 6 months of our study. To test this hypothesis, we examined whether the similarity correlations at Time 1 were higher for couples that were still together at Time 2 than for couples that had broken up by Time 2.

As shown in Table 3, the couples who were still together at Time 2 were more emotionally similar at Time 1 ($r = .30$) than the couples who had broken up ($r = -.06$). This effect also held for positive emotion and for negative emotion. To test whether these differences were significant, we again used moderated multiple regressions. For total emotional experience, we predicted participants' total emotional experience at Time 1 from their partner's total emotional experience at Time 1 ($R^2 = .03, p < .05$), their relationship status at Time 2 (still together vs. broken up; R^2 change = .00, *ns*), and the interaction of those two variables (R^2 change = .03, interaction $\beta = .16, p < .05$). For positive emotional experience, we predicted participants' positive emotional

Table 3

Study 1: Emotional Similarity at Time 1 for Couples Who Broke Up or Were Still Together 6 Months Later

Emotional experience	Similarity correlation between partners at Time 1	
	Couples broken up	Couples still together
Total emotion	-.06	.30*
Positive emotion	-.05	.32*
Negative emotion	-.02	.43**

* $p < .05$. ** $p < .01$.

experience at Time 1 from their partner's positive emotional experience at Time 1 ($R^2 = .03, p < .05$), their relationship status at Time 2 (still together vs. broken up; R^2 change = .00, *ns*), and the interaction of those two variables (R^2 change = .03, interaction $\beta = .19, p < .05$). For negative emotion, we predicted participants' negative emotional experience at Time 1 from their partner's negative emotional experience at Time 1 ($R^2 = .09, p < .05$), their relationship status at Time 2 (still together vs. broken up; R^2 change = .00, *ns*), and the interaction of those two variables (R^2 change = .04, interaction $\beta = .21, p < .05$). Thus, less emotionally similar couples at Time 1 were significantly more likely to break up by Time 2. This effect held up for total emotional similarity, positive emotional similarity, and negative emotional similarity. In relation to our third aim, then, the relationship satisfaction and break-up findings provide strong evidence that emotional similarity was beneficial for these dating couples.

Discussion

Study 1 found strong evidence for emotional convergence among dating partners. On average, their emotional responses were somewhat similar at the initial assessment, suggesting that they had already begun the process of convergence. However, their emotional responses still became significantly more similar during the next 6 months, suggesting continuing convergence. We also found that this emotional convergence was not due to a convergence in personality traits. Dating partners were not similar in their personality traits at the initial assessment, nor did they become more similar over the next 6 months.

Partners' emotional convergence was asymmetrical. The partner with less power in the relationship more broadly changed so as to become more similar to the more powerful partner. It should be noted, however, that our measure of power might have been limited in the aspects of power it measured. For example, studies have shown that men have more power in relationships more

⁶ Levene's test of equality of variances showed that the variance in emotional similarity at Time 2 was significantly more limited than at Time 1. This was true for total emotional similarity, $F(1, 39) = 8.28, p < .01$, for positive emotional similarity, $F(1, 39) = 3.89, p < .05$, and for negative emotional similarity, $F(1, 39) = 14.71, p < .01$. Therefore, not surprisingly, there was not a significant relation between emotional similarity at Time 2 and relationship satisfaction at Time 2.

broadly, but that women have more power over some aspects of the relationship (Gray-Little & Burks, 1983). Our measure did not show a gender difference in power, which suggests that we might have tapped only some aspects of power.

Study 1 revealed a fairly clear picture regarding the benefits of emotional similarity. Dating partners' emotional similarity at the initial assessment predicted their concurrent relationship satisfaction, their relationship satisfaction 6 months later, increases in their relationship satisfaction over time, and perhaps most notably, whether they would break up by the 6-month follow-up assessment.

Study 2: Emotional Convergence in Same-Sex Roommates

In Study 2, we extended the findings from Study 1 in a number of ways. First, we examined whether emotional convergence occurs in the development of friendships among same-sex roommates. Studying romantic relationships was an ideal starting place because romantic relationships have received the most attention in research on similarity in relationships (Berscheid & Reis, 1998, Blieszner & Adams, 1992). However, studying emotional convergence in same-sex relationships such as that among roommates would allow us to examine the boundary conditions of emotional convergence. That is, does emotional convergence occur in platonic as well as romantic relationships?; in same-sex as well as mixed-sex relationships? More generally, the emotional dynamics and development of adult friendships have received little attention (Blieszner & Adams, 1992).

Second, we examined whether emotional convergence can develop when relationship partners are initially not emotionally similar. Pressures toward uniformity are likely to be less potent in relations between dissimilar individuals (Schachter, 1959). This raises the possibility that emotional convergence might not occur among relationship partners who start out emotionally nonsimilar. In Study 2, the first assessment took place when the roommates had lived together for only 2 weeks and most of them did not know each other well, so they should not have been emotionally similar to each other.

Third, studying both male and female same-sex relationships allowed us to examine whether male and female pairs would show different levels of convergence. For example, research has shown that female friends tend to be more intimate and communicative than male friendships (for a review, see Fehr, 1996).

Fourth, we extended our examination of social power and influence in the emotional convergence process. In Study 1, we found that the partner who changed more had less power in the relationship. A more conservative test of the link between power and emotional convergence, however, would be to examine whether the person who changes more in the emotional convergence process has less power outside the relationship. In Study 2, we tested this idea by assessing participants' status on the dormitory floor through peer ratings.

Finally, we used standardized emotion elicitation procedures for all participants, to rule out a potential confound. Specifically, in Study 1, participants had selected their own emotion-inducing stimuli, in the topics they chose to speak about. The increased similarity in partners' emotional experiences from Time 1 to

Time 2 could have been partly due to choosing more similar topics at Time 2 than they had chosen at Time 1.

Method

Participants. Thirty-seven same-sex pairs of dormitory roommates (16 female, 21 male pairs) at the University of Wisconsin—Madison participated as part of a larger study of personality and emotion. Participants were recruited by research assistants. The dormitory received \$400 for participating. The students were freshman and sophomores mostly 18 and 19 years old and, similar to the University as a whole, almost all were Caucasian. Similar to Study 1, the study consisted of two assessments. The initial assessment took place 2 weeks into the Fall semester (referred to as Time 1). The follow-up session took place 9 months later at the end of the Spring semester (referred to as Time 2). Twenty-five pairs of roommates participated in both assessments.

Procedure. During the Time 1 assessment, measures of personality and status on the dormitory floor were obtained, and positive and negative emotional experiences were assessed in the laboratory. During the Time 2 assessment, measures of personality were obtained again, as were positive and negative emotional experiences in the laboratory. In addition, measures of closeness between roommates were obtained.

Personality traits. As in Study 1, participants completed the 44-item BFI (John et al., 1991) at both assessments.

Peer-rated status in the dormitory at Time 1. To ascertain which roommate had higher status within their broader social group, we used peer ratings of status in the dormitory collected at the initial assessment. Each roommate was rated by peers in terms of their status, defined for raters as "the amount of prominence, respect, and influence" the individual held in the residence hall, from 1 = *low* to 7 = *high*. Consistent with previous research that suggests status can be reliably measured early on in social groups (e.g., Savin-Williams, 1979), these ratings were reliable ($\alpha = .77$). We averaged all ratings given to each roommate by the other dormitory members ($M = 4.35$, $SD = 0.70$), and assigned a 1 to the roommate with relatively higher status in the dormitory and a -1 to the roommate with lower status. For the four pairs of roommates who had equal levels of peer-rated status in the dormitory, we used self-ratings of status to break the tie.

Roommates' closeness by the end of the year. To measure roommates' closeness by the end of the year, we used three items: "How much do you trust your roommate?"; "How likely is it that you would disclose a problem to your roommate?"; and "How likely is it that you will stay friends with your roommate over the next 10 years?" Each participant rated these items on a 7-point scale ranging from 1 = *not much/not high* to 7 = *a great deal/very high*. These items formed an internally consistent scale ($\alpha = .78$). Roommates also showed reciprocity on this measure ($r = .46$, $p < .01$); we averaged their two scores to index overall closeness of the relationship ($M = 5.29$, $SD = 1.20$).

Eliciting positive and negative emotion in the laboratory. We used three procedures to induce diverse emotions. So that participants would not be aware that the study focused on emotions, the experimenter explained that the study examined "creativity in a group setting." Further, to heighten emotional responses, participants underwent the emotion-induction procedures in the presence of two confederates who posed as fellow participants. In the first procedure, one of the roommates was publicly praised for his or her performance following an anagram task. Second, using a rigged lottery, each of the 2 roommates was ostensibly randomly chosen, and they in turn posed and held an embarrassing facial expression for 1 min. Third, all 4 people at the table, in turn, were given a five-digit number and asked to subtract a second number from it aloud for 1 min (Tomaka, Blascovich, Kelsey, & Leitten, 1993). Finally, one of the roommates was publicly praised for his or her performance on a painting task (the roommate who was not praised earlier in the session). During the follow-up session, the

procedure was almost identical, except for the tasks in which participants were publicly praised, which were varied to maintain credibility. The new tasks involved writing pieces of a fictional story and making up definitions for nonsense words. As in the initial assessment, however, one randomly chosen roommate was praised after the first creativity task, and the other was praised after the second creativity task.

Emotional experience. Similar to Study 1, positive emotion was measured as the composite of three specific emotions: *happiness*, *amusement*, and *pride*. Negative emotion was measured as the composite of the same seven specific emotions as in Study 1 (i.e., *anger*, *contempt*, *discomfort*, *disgust*, *fear*, *guilt*, and *sadness*) plus two self-conscious emotions, *embarrassment* and *shame*, which were added because the procedures were designed to also elicit self-conscious emotion. Participants rated their experience of each emotion on a 9-point scale ranging from 0 = *none* to 8 = *extreme*.

Similar to Study 1, we assessed the reliability of positive and negative emotional experiences across emotion items and across procedures. Averaging the emotion ratings across procedures, we computed internal consistency reliabilities for the two scales. At Time 1, alpha was .78 for positive emotion and .95 for negative emotion. At Time 2, alpha was .85 for the positive and .90 for the negative. The two scales were also reliable across the three procedures. Averaging the emotion items that participants rated for each procedure, the cross-procedure alphas were .79 for the positive emotion scale and .81 for the negative emotion scale at the initial assessment, and .80 and .81, respectively, at the follow-up.

We therefore created one overall positive emotional experience score for each assessment by averaging all nine individual emotion reports (3 emotions \times 3 procedures) and one overall negative emotional experience score for each assessment by averaging all 27 individual emotion reports (9 emotions \times 3 procedures). Finally, we created one total emotional experience score for each assessment by averaging the two overall positive and negative scores.

Results

Emotional convergence over time. To assess whether roommates became more similar in their emotional responses over time, the 25 roommate pairs that participated in both sessions provide the relevant cross-time comparison. As in Study 1, we indexed within-dyad similarity in emotional responses with similarity correlations between the roommates, and used Gonzalez and Griffin's (1997) significance test for these similarity correlations.

At Time 1, the roommates had lived together for only 2 weeks. Consistent with our expectation, the similarity correlations for total emotional experience, positive emotion, and negative emotion at Time 1 were not significant (see Table 4).

Nine months later (Time 2), the similarity correlation had become substantial for total emotional experience ($r = .55$). This effect replicated for positive and negative emotion at Time 2. The last column of Table 4 presents the temporal increases in similarity correlations. Using a test that compares dependent correlations (Raghunathan et al., 1996), we found support for the emotional convergence hypothesis: The temporal increase in partner similarity was significant for total emotional experience ($z = 2.88, p < .01$), positive experience ($z = 1.57, p < .05$), and for negative emotional experience ($z = 1.79, p < .05$).

Did female roommate pairs become more emotionally similar than male roommate pairs over the course of the year? The female within-roommate correlations at Time 2 were substantial ($r_s = .63, .53, \text{ and } .48$ for total emotion, positive emotion, and negative emotion, respectively). By comparison, the male within-roommate

Table 4
Study 2: Roommates' Similarity in Emotion and in Personality Traits

Domain	Similarity correlations between roommates		
	Time 1	Time 2	Increase ^a
Emotional experience			
Total emotion	.02	.55**	.54**
Positive emotion	.19	.47**	.31*
Negative emotion	.05	.38†	.34*
Personality dimension			
Extraversion	-.27	-.21	.06
Agreeableness	.28	.25	-.03
Conscientiousness	-.38*	-.51**	-.16
Neuroticism	.22	-.10	-.31
Openness to Experience	.10	-.04	-.14

Note. Personality dimensions were measured with the Big Five Inventory (John et al., 1991).

^a Increases in r were computed by Fisher r -to- z transformations and tested for significance using a z test (Raghunathan et al., 1996, p. 179).

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

correlations at Time 2 were .40, .31, .26. Although these correlations were smaller, they were not significantly different.

Personality convergence. As in Study 1, none of the similarity correlations in personality dimensions were positive and significant at Time 1 or Time 2 (see Table 4); none of the similarity correlations in personality traits increased significantly over time.

Status in the dormitory and change in the emotional convergence process. To address whether social status accounted for asymmetries in emotional convergence, we computed cross-lagged correlations between higher status roommates' emotions at Time 2 and lower status roommates' emotions at Time 1, and between lower status roommates' emotions at Time 2 and higher status roommates' emotions at Time 1.⁷ As seen in Table 5, the correlation between the higher status roommates' emotion at Time 2 and the lower status roommates' emotion at Time 1 was not significant. This null effect held for both positive and negative emotional experiences as well. In contrast, the correlation between the lower status roommates' total emotional experience at Time 2 and the higher status roommates' total emotional experience at Time 1 was significant. Further, this effect held for positive and negative emotion.

To test whether the Time 2 emotions of the lower status roommates were significantly better predicted by their roommates' emotions at Time 1, we conducted moderated multiple regressions

⁷ We again examined whether, across relationships, the process of emotional convergence tended to be symmetrical or asymmetrical by calculating how much each participant's emotional responses moved from Time 1 to Time 2 in the direction of their partner's emotional responses at Time 1. These analyses again suggested that the process of emotional convergence was asymmetrical. One roommate tended to converge more than the other for total emotional experience by an average of 1.29 ($SD = 1.10$), $t(25) = 5.85, p < .01$; for positive emotional experience by an average of 1.59 ($SD = 1.22$), $t(25) = 6.46, p < .01$; for negative emotional experience by an average of 0.93 ($SD = 0.85$), $t(25) = 5.48, p < .01$.

Table 5
Study 2: Differential Influence in the Emotional Convergence Process: Cross-Lagged Correlations Between Participants' Emotions at Time 2 and Their Roommate's Emotions at Time 1 for Higher and Lower Status Roommates

Emotional experience	Higher status roommate	Lower status roommate
Total emotion	-.10	.40**
Positive emotion	.32	.38*
Negative emotion	-.10	.42**

Note. The first column of correlations indicates how well the later emotions of the participants with more status were predicted by the prior emotions of the participant with less status. The second column of correlations indicates how well the later emotions of the participants with less status were predicted by the prior emotions of the participants with more status.

* $p < .05$. ** $p < .01$.

similar to those in Study 1. For total emotional experience, we predicted the participants' total emotional experiences at Time 2 from their roommate's emotions at Time 1 ($R^2 = .02$), participants' relative status in the dormitory (R^2 increase = .03), and the interaction between these two variables (R^2 increase = .06, $\beta = -.25$, $p < .05$). For positive emotional experience, we predicted participants' positive emotional experience at Time 2 from their roommate's emotions at Time 1 ($R^2 = .04$), participants' relative status in the dormitory (R^2 increase = .13, $p < .05$), and the interaction between these two variables (R^2 increase = .00, $\beta = -.03$, *ns*). For negative emotional experience, we predicted participants' negative emotional experiences at Time 2 from their roommate's negative emotions at Time 1 ($R^2 = .00$), participants' relative status in the dormitory (R^2 increase = .00), and the interaction between these two variables (R^2 increase = .06, $\beta = -.26$, $p < .05$). These findings indicate that the lower status roommate made more of the changes necessary for emotional convergence to occur, for total emotion and negative emotion but not for positive emotion.

Emotional convergence and closeness by the end of the year. Did roommates who became more emotionally similar by the end of the year become closer friends than roommates who did not become as emotionally similar? To examine this question, we conducted moderated multiple regression analyses similar to those in Study 1, examining whether more emotionally similar roommates at Time 2 were closer than less emotionally similar roommates. For total emotional experience, we predicted participants' total emotional experiences at Time 2 from their roommates' total emotional experiences at Time 2 ($R^2 = .30$), the relationship closeness ratings at Time 2 (R^2 increase = .00), and the interaction of these two variables (R^2 increase = .05, $\beta = .23$, $p < .05$). For positive emotional experience, we predicted participants' positive emotional experiences at Time 2 from their roommates' positive emotional experiences at Time 2 ($R^2 = .22$), the relationship closeness ratings at Time 2 (R^2 increase = .02), and the interaction of these two variables (R^2 increase = .07, $\beta = .27$, $p < .05$). For negative emotional experience, we predicted participants' negative emotional experiences at Time 2 from their roommates' negative emotional experiences at Time 2 ($R^2 = .14$), the relationship

closeness ratings at Time 2 (R^2 increase = .01), and the interaction of these two variables (R^2 increase = .07, $\beta = .27$, $p < .05$). Thus, the more emotionally similar roommates became by the end of the academic year, the closer was their relationship: they trusted each other more, were more likely to disclose problems to each other, and expected to remain friends over the next 10 years.

A *t* test showed that male and female roommates did not differ in how close they became by the end of the year. The mean closeness rating was 5.27 ($SD = 1.12$) for males and 5.31 ($SD = 1.31$) for females, $t(23) = -0.09$.

Discussion

In Study 2, we examined a different type of relationship (same-sex roommates) than we had in Study 1, we used different methods to elicit emotion, and we examined relationship partners who were not emotionally similar at the beginning of their relationship. In spite of these methodological differences, the findings from Study 2 were consistent with the findings from Study 1. First, roommates' emotional responses became significantly similar over the course of the academic year, suggesting that they had emotionally converged over the academic year. Further, emotional convergence was not due to a convergence in personality traits. Roommates were not similar in their personality traits at the beginning of the academic year, and they did not become more similar over the course of the academic year.

Second, Study 2 found evidence suggesting that emotional convergence was an asymmetrical process. The roommate who had less status in the dormitory floor changed more in the emotional convergence process to match his or her roommates' emotions. Third, Study 2 found evidence that the developing emotional similarity benefited roommates' relationships. Roommates who became more emotionally similar by the end of the academic year were closer friends than roommates who did not become as close by the end of the year.

Study 3: Evidence for Emotional Convergence in Independent Emotional Responses

In Studies 1 and 2, participants responded to experimental stimuli in the presence of their partner. Thus, relationship partners were able to observe each other's reactions to the laboratory procedures. Can we expect the effects of emotional convergence to occur even when relationship partners cannot see each other's emotional reactions? If so, this would imply that relationship partners develop similar ways of appraising events and responding emotionally even when not present together.

We tested this notion by separating roommates and assessing their emotional responses in different rooms, using film clips as emotion-induction stimuli. We were concerned that roommates might arrive to the laboratory in a similar mood, which could then color their reactions to the films, enhancing the similarity of their emotional reactions. To eliminate the effects of shared moods, we obtained measures of participants' baseline moods, and controlled for them in all analyses testing emotional convergence.

We also examined whether emotional convergence influences emotional expression. According to the emotional convergence hypothesis, relationship partners should become more similar in

both their emotional experience and expressions, yet thus far we have focused on emotional experience. Therefore, we coded roommates' facial expressions of emotions they showed while watching the films. This coding of participants' behavior by independent judges was also important for methodological reasons: using a nonself-report measure of emotion adds to the generalizability of the findings.

In Study 3, we again examined dormitory roommates, only these roommates did not know and choose each other at the beginning of the year. Thus, without any selection effects or prior acquaintances, there would be no reason that the roommates would start their cohabitation being already emotionally similar; indeed, Study 2 showed that the dormitory roommates at 2 weeks were not yet similar. Thus, we measured their responses in one assessment, after they had lived together for 7 months, with the assumption that any similarity observed would have been due to emotional convergence. Nonetheless, to reassure ourselves that the roommates were more similar to each other after 7 months than when they were randomly paired together at the beginning of the year, we created a comparison group similar to the roommates at the beginning of the year. Specifically, we randomly paired participants with another roommate from the sample, and correlated participants' emotions with the emotions of these randomly chosen partners. We then tested the difference in similarity correlations between the actual roommate pairs and the yoked-comparison group (i.e., the dyads who were randomly paired together).

Method

Participants. Thirty-five pairs (22 female, 13 male pairs) of dormitory roommates were recruited through posted advertisements at the University of California, Berkeley. Only roommates who did not know each other before the academic year were allowed to participate. All participants were freshmen or sophomores, and they constituted an ethnically diverse sample: 42% were Caucasian, 50% were Asian or Asian American, and 8% were of other ethnicities. Participants received course credit if they were enrolled in an introductory psychology course or received \$8 if they were not. As we know from Study 1, 6 months is enough to create emotional convergence effects. Thus, the study took place 7 months into the academic year.

Procedure. When roommates arrived to the laboratory, they were separated into different rooms. Each was seated at a table in full view of a video camera. On the table was a 25-in. television monitor, a VCR with a remote control, and the packet of questionnaires. As instructed by the experimenter, participants watched each film and rated their emotional experiences during that film. After each film, they were given a 1-min resting period. This procedure was repeated for the three films.

Personality traits. As in Studies 1 and 2, participants' personality traits were measured with the 44-item BFI (John et al., 1991).

Eliciting positive and negative emotion in the laboratory: Three films. We used three emotion-induction films that have been used in previous research (Gross & Levenson, 1995). Each film was 2 to 3 min long. The first film, used to measure baseline mood, shows flowers in a park. The second film, a clip from the movie "The Champ," shows a boy crying after the death of his father; it elicits negative emotion. The third film shows a comedy routine by Robin Williams; it elicits positive emotion.

Emotional experience. Positive emotion was measured as the composite of the same three emotions as in Study 1 ($\alpha = .77$), and negative emotion was measured as the composite of the same seven emotions as in Study 1 ($\alpha = .77$). Because responses to the first film were used to measure baseline mood, the two latter films provided measures of emotional re-

sponse, which we combined into overall scores. That is, we created an overall positive score by averaging all six individual positive emotion reports (3 emotions \times 2 films), and an overall negative score by averaging all 14 individual negative emotion reports (7 emotions \times 2 films). The total emotional experience score was the average of the two positive and negative emotion scores. To control for baseline mood, we partialled out positive and negative emotional experiences during the first film in analyses that examined roommates' similarity in responses.

Emotional expressions during films. An independent coder, blind to which of the participants were roommates, rated participants' facial expressions of positive and negative emotion during each film on a 7-point scale ranging from 1 = *no expressions* to 7 = *frequent expressions*. For example, a participant who showed Duchenne smiles and laughter 11 times or more during one film would be assigned a score of 7 for positive emotional expression for that film. Thus, each participant received six codes for emotional expression (positive and negative emotion expressed during each of the three films). To test the reliability of these codes, a second coder rated 20% of the videotaped responses. The two coders agreed substantially; the intercoder correlation was .87 for overall expression ($p < .01$), .93 for positive expression ($p < .01$), and .78 for negative expression ($p < .01$). We averaged participants' emotional expressions across the films.

Random selection for a yoked comparison. Using a random number generator, we paired each participant with a randomly selected other from the sample. Specifically, we assigned each participant a number between 1 and 70, used the random number generator to select a number between 1 and 70, and paired each participant with the participant of that number. If the random number generator came up with the number 8 for the first participant, for example, we would pair the first participant with participant #8. We repeated this process until all participants had their own unique randomly selected partner; that is, no participant was paired with two or more others.

Results

Convergence in emotional experience. Table 6 shows the similarity correlations between roommates in their emotional experience, as well as similarity correlations of the yoked-comparison group (i.e., between participants and another randomly selected participant from the sample). As expected, for the yoked-comparison group, none of the similarity correlations was positive and significant. However, the similarity correlation between actual roommates was significant for total emotional experience, positive emotion, and negative emotion. All differences in correlations, shown in the last column, were significant (z test, Cohen & Cohen, 1983), showing that roommates were more similar to each other in their emotional experiences than they were to another randomly chosen participant in the sample. Given the fact that roommates were randomly paired with each other at the beginning of the academic year (and thus likely started the year not emotionally similar), these findings suggest that roommates had become more similar in their emotional experiences over the 7 months they had lived together.

Convergence in emotional expression. Again, none of the similarity correlations for emotional expression was significant for the yoked-comparison group, but all three similarity correlations between actual roommates were significant (see Table 6). Moreover, the differences between the similarity correlations for actual roommates and for the yoked-comparison group were significant for overall emotional expression and negative expression, and at the

Table 6
Study 3: Similarity in Emotion Between Roommates and Between Randomly Paired Participants

Measure	Similarity correlations		
	Between randomly paired participants	Between roommates	Difference ^a
Emotional experience			
Total emotion	-.18	.29*	.45*
Positive emotion	-.05	.26*	.31*
Negative emotion	-.24	.35*	.54**
Emotional expression			
Total emotion	-.15	.43*	.54*
Positive emotion	.02	.28*	.26†
Negative emotion	-.07	.27*	.33*
Personality dimension			
Extraversion	.32*	-.02	
Agreeableness	.03	-.26*	
Conscientiousness	.04	-.03	
Neuroticism	.14	.04	
Openness to Experience	-.01	-.14	

Note. Personality dimensions were measured with the Big Five Inventory (John et al., 1991).

^a Differences in r were computed by Fisher r -to- z transformations and tested for significance using a z test (Cohen & Cohen, 1983)

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

trend level for positive emotion. These findings suggest that emotional convergence occurs in the expressive realm as well.

Personality convergence. Once again, roommates were not similar in their personality traits (see Table 6). Thus, emotional convergence cannot be due to a convergence in personality traits, or to a convergence in general self-report styles.

Discussion

The aim of Study 3 was to provide evidence that relationship partners internalize a shared style of emotional responding. As expected, relationship partners showed emotional convergence, in this case both in the experiential and the expressive realm, and this emotional similarity could not be attributed to personality convergence, which failed to emerge for a third time. Of importance, however, roommates' emotions were evoked and measured in separated rooms. Thus the similarity in their emotional experiences could not be due to the immediate transmission of emotion through emotional contagion or empathy. Further, Table 6 presents partial correlations controlling for roommates' baseline moods. Therefore, roommates' similarity in their emotional experiences during our second and third laboratory films cannot be due to similarity in their moods before coming to the laboratory. In fact, controlling for participants' baseline moods did not significantly change the similarity correlations for emotional experience during the second and third films. Taken together, these findings support the idea that roommates had internalized a similar style of emotionally responding to events.

It is illustrative to compare the similarity correlations for emotional experience in the actual roommates in Study 3 with the

similarity correlations for emotional experience in the Study 2 roommates during the second assessment. Both sets of similarity correlations were assessed when roommates had lived together for at least 7 months. However, in the second assessment of Study 2, roommates were assessed in the same room; thus, part of their emotional similarity could have been due to emotional transfer effects such as emotional contagion or empathy. The similarity correlations for total, positive, and negative emotional experience among the separated roommates of Study 3 were .29, .26, and .35, respectively, compared with the corresponding similarity correlations of .55, .47, and .38, respectively, in Study 2. Although the correlations come from separate data sets and are thus not easily statistically compared, one can see that the similarity correlations in Study 2 were substantially higher for total emotional experience and positive emotional experience. There was not a substantial difference between the similarity correlations for negative emotional experience, however. These rough comparisons are at least suggestive that the emotional convergence effects of Study 2 were not solely due to effects such as emotional contagion or empathy, but that these effects may have augmented the effects of emotional convergence. More broadly, these comparisons suggest that when relationship partners are together, some of their emotional similarity is due to internalized factors and some to external factors (such as contagion or empathy).

General Discussion

Emotional Convergence Occurs in Close Relationships

The primary aim of the current research was to examine whether emotional convergence occurs in close relationships. Using two longitudinal and one cross-sectional design as well as different measures of diverse emotions, our three studies offer strong evidence that emotional convergence does occur both in romantic couples and in same-sex platonic relationships. In Study 1, dating partners were similar in their emotional responses in our first assessment, and became significantly more similar 6 months later. In Study 2, roommates' emotional responses were significantly more similar after they had lived together for 9 months than after they had lived together for only 2 weeks. In Study 3, randomly paired roommates who had lived together for 7 months showed significant similarity in their emotional experience and expression, even though they responded to the evocative film clips in different rooms, indicating that emotional convergence affects internalized ways of responding to events.

The current research extends the literature on similarity in relationships in a number of ways. First, and most important, this research is the first to examine whether people in close relationships become more emotionally similar over time. Second, it is the only study we know of that has examined whether power differences predict who makes more of the change required for convergence to occur. Third, it is one of very few studies that has examined the benefits of emotional similarity in extant relationships.

Implications for emotion research. In illustrating how emotions help promote cohesion in social relationships, the current research makes an important contribution to research on the social functions of emotion. Although previous work has illustrated how

emotions help coordinate social processes such as mother–infant attachment, courtship rituals, or helping behavior, the current research shows how emotions help individuals build and maintain long-term, intimate relationships.

Our studies also complement the small but growing research on the interaction between social context and emotion. Studies have illuminated how the presence of others can influence emotional displays (Chovil, 1991; Ekman, 1973; Fridlund, 1991), and that status influences emotion-related appraisal (Tiedens, 2001) and expression (Keltner, Young, Heerey, Oemig, & Monarch, 1998). Our research shows that close relationships shape emotional responses in fundamental ways (see also Tiedens, 2001). We become emotionally similar, both in experience and display, to those people with whom we are intertwined.

Finally, our findings shed light on processes by which relationship partners “transmit” emotional disorders such as depression or anxiety. For example, children of depressed parents are often themselves depressed (Field, Healy, Goldstein, & Guthertz, 1990; Gaensbauer, Harmon, Cytryn, & McKnew, 1984; Zahn-Waxler, Cummings, McKnew, & Radke-Yarrow, 1984), and individuals who live with a depressed person can become depressed (Howes et al., 1985). The social transmission of emotion may not be limited to clinical levels of emotionality, or even limited to negative emotion. The transmission of emotional disorders can now be understood as a special case of a much broader and inherently normal emotion process in close relationships.

Contextual Determinants of Emotional Convergence

In Studies 1 and 2, one relationship partner, who had less power more broadly, made more of the change necessary for emotional convergence to occur. That is, the emotions of the relationship partner with lower power or status were better predicted by their partners’ prior emotions than vice versa. This finding extends recent research relating power and status to the quality and coherence of emotional response (Anderson & Berdahl, 2002; Hecht & LaFrance, 1998; Keltner et al., 1998; Tiedens, 2001; Tiedens, Ellsworth, & Mesquita, 2000). More generally, it is widely claimed that high power and status dictate the norms and standards of group behavior (Fine, 1979; Goffman, 1951; Hatfield et al., 1994; Hsee, Hatfield, Carlson, & Chemtob, 1990; Newcomb, 1943). Our findings provide some of the most direct evidence for this idea—namely, our high-power participants shaped the emotions of low-power partners.

These findings paint a striking picture of the emotional lives of powerful and powerless people. They suggest that high-power individuals may create social environments inhabited by people with emotional tendencies similar to their own. The emotional lives of low-power individuals, on the contrary, would seem more variable, changing across relationship contexts. Future research should examine whether people with low power across relationships show more variability in their emotional responding than people with elevated power across relationships.

Finally, we did not find consistent evidence in Study 1 that men and women differ in the amount they change in the emotional convergence process. Women’s emotions at Time 1, for example, did not consistently better predict men’s emotions at Time 2 than vice versa. This suggests that while men might have more

power in society more broadly, men and women do not differ in their influence over emotional convergence in intimate relationships.

Emotional Similarity Benefits Extant Relationships

On the basis of a social functional analysis of emotion, we hypothesized that emotional similarity would benefit close relationships. The evidence for this hypothesis was strong and consistent across studies. In Study 1, dating partners’ emotional similarity at the initial assessment predicted their concurrent relationship satisfaction, their relationship satisfaction 6 months later, increases in their relationship satisfaction during these 6 months, and, most important, whether couples broke up in these 6 months. In Study 2, roommates who became similar in emotional similarity during the academic year also became closer than roommates who did not become similar, and they reported a higher likelihood of remaining friends with each other in the subsequent 10 years.

These findings complement research by Gottman and Levenson (1992), who have consistently found that higher average levels of positive emotion and lower average levels of negative emotion within relationships predict relationship health and later dissolution (e.g., Gottman & Levenson, 1992). The similarity or match between relationship partners’ emotions also has an important influence on relationship outcomes.

It is interesting to note that although low-power individuals change to be more like high-power individuals—which seems like an unhealthy process—the resulting emotional similarity can be considered healthy, as it contributes to relationship cohesion and longevity. This irony is probably not uncommon in relationships. That is, the beneficial processes that help maintain relationships, such as open communication, reconciliation following a dispute, accommodating, and compromising on points of disagreement, are likely carried out more by people with less power. In general, people with lower power might tend to put greater work into relationships for those relationships to function properly.

Boundary conditions. Our findings speak more to the long-term effects of patterns of emotional response. We did not address specific conditions under which emotional similarity might harm relationship stability and longevity, and this remains an important line of inquiry. For example, in interactions that involve conflict, similar anger responses are likely to be counterproductive (Gottman & Levenson, 1992), and instead complementary emotions, such as calm or sympathy, are likely to be more beneficial. In these short-term contexts, emotional dissimilarity rather than emotional similarity might thus be beneficial. Future research needs to examine the specific contexts in which emotional dissimilarity is more beneficial than emotional similarity.

Mechanisms for Emotional Convergence

There are at least three possible ways in which emotional convergence might occur, one of which is addressed by our studies. First, emotional convergence may be the product of relationship partners’ creation of a shared emotional context, which in turn colors their reactions to outside events. For example, relationship partners who frequently fight might tend to feel high levels of negative emotion together (Berscheid & Reis, 1998). This elevated

baseline negative emotion might in turn shape both relationship partners' reactions to outside events, making them react similarly negative to events on a consistent basis. Although the current research cannot rule out this possibility, the findings from Study 3 suggest that it is not likely the only explanation. In Study 3, roommates' prior moods were partialled out before emotional similarity correlations were computed. Thus, similarity was observed in roommates' emotional responses even after their moods were controlled for.

Second, emotional convergence may be due to a convergence in appraisal styles (Lazarus, 1968; Smith & Ellsworth, 1985). Ways of appraising events lead to specific emotions, just as specific emotional dispositions lead to ways of appraising social events (Lerner & Keltner, 2001). For example, people who view an event as uncontrollable and dangerous tend to experience fear in response to that event (Smith & Ellsworth, 1985). When individuals become close, they might converge in appraisal styles, which in turn leads to greater similarity in emotional responses. Consistent with this idea, close friends are similar in the cognitive dimensions they use to describe themselves and others (Deutsch & Mackesy, 1985). Future research needs to pursue the idea that people in close relationships develop similar appraisal styles, and whether "appraisal convergence" underlies emotional convergence.

Finally, emotional convergence might develop not out of cognitive processes, but out of more "primitive" processes such as emotional contagion (Hatfield et al., 1994). That is, relationship partners might continually share emotions through emotional contagion, which then develops into emotional patterns or habits within each individual. For example, if individuals continually "catch" their friend's negative emotions in specific contexts, they might develop a habit of responding negatively to events when with that friend. Future research needs to examine the role of emotional contagion in the development of emotional convergence.

In the current studies, we found that emotional convergence occurs in different kinds of relationships, and that emotional convergence is integral to the health of those bonds. However, further questions abound. Does emotional convergence occur in less close relationships (e.g., among coworkers)? Does it occur in larger social groups (e.g., in families, peer groups, or teams)? What are the social contextual elements required for emotional convergence to occur—is it enough for people to merely spend time together, or must they share emotion-relevant information? Future work should also pinpoint the necessary elements that allow emotional convergence to develop in relationships.

Emotion researchers have long looked within the individual to understand the nature of experience, documenting relations between emotion components (e.g., emotional experience, expressive behavior, and physiological response). This intrapersonal focus made sense, as emotional experience is usually private, personal, and covert. However, the current research suggests that our understanding of emotional experience will be just as fruitfully advanced by looking outside of the individual, especially to the individual's relationship context. Human experience may be even more social than we imagined or that the prose of our private experience suggests.

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