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The contemptuous separation: Facial expressions of emotion and breakups in young adulthood

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Abstract
The importance of studying specific and expressed emotions after a stressful life event is well known, yet few studies have moved beyond assessing self-reported emotional responses to a romantic breakup. This study examined associations between computer-recognized facial expressions and self-reported breakup-related distress among recently separated college-aged young adults ($N = 135$; 37 men) on four visits across 9 weeks. Participants' facial expressions were coded using the Computer Expression Recognition Toolbox while participants spoke about their breakups. Of the seven expressed emotions studied, only Contempt showed a unique association with breakup-related distress over time. At baseline, greater Contempt was associated with less breakup-related distress; however, over time, greater Contempt was associated with greater breakup-related distress.

Romantic breakups in young adulthood are associated with considerable emotional distress and increased risk for a range of poor outcomes, ranging from decreases in self-concept clarity (Slotter, Gardner, & Finkel, 2010) to depression (Mearns, 1991; Ross, 1995; Simon & Barrett, 2010). Affective experiences provide information about the value of thought content (Clore, Gasper, & Garvin, 2001; Clore & Huntsinger, 2007) and are critical for understanding how people cope with stressful life events (Lazarus, 2006; Tugade, Fredrickson, & Feldman Barrett, 2004). In this study, we examine how discrete emotions in the form of facial expressions are associated with subjective experiences of distress following a romantic breakup. Discrete emotions, as opposed to core affect (emotional arousal and valence), are assumed to be unique experiential states that rise from distinct causes (Ekman, 1992; Stein & Oatley, 1992). For this reason, exploring discrete emotions following a romantic breakup may provide a unique vantage point for understanding emotional coping in the wake of this stressful life event.

Emotional reactions following a romantic breakup span the range of human affective experience. We may feel sad, happy, fearful, or surprised, and we may laugh, cry, scream, or simply sit frozen on the couch. The central question of this study is whether the behavioral expression of some emotions—more than others—predicts better overall adjustment following a breakup. If a person is asked to describe his or her breakup and he or she responds with contempt, or anger, or happiness, or fear, do these expressions of emotions predict feelings about the breakup experience in the future?

Facial expressions of emotion following romantic breakups

Many studies examine emotional distress following a romantic breakup, but the

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near-exclusive focus of this literature is on self-reported distress (e.g., Davis, Shaver, & Vernon, 2003; Fraley & Shaver, 1999; Sbarra, 2006), which limits the understanding of emotional experiences that may play key roles in adaptive recovery. Although asking people how they feel is often considered a gold-standard outcome in this area, self-report is limited in several ways, especially when considered a predictor of recovery. For example, people may state that they feel good about a breakup but behave in ways that suggest otherwise and undermine a positive transition out of the relationship.

Why study expressed emotions?

Moving beyond self-report to study *expressed* emotion as an objective measure of spontaneous and perhaps unintentional displays of emotions may provide an unbiased and profitable means of understanding emotional behaviors that promote (or hinder) recovery from a romantic breakup. Human facial anatomy is constructed to make these expressions that act in service of solving similar problems cross-culturally (Matsumoto, Keltner, Shiota, Frank, & O'Sullivan, 2008). Specifically, in the current study, we investigated young adults' facial expressions as they talk about their breakup in a laboratory setting. Our goal is to capture the nature of the emotion that arises from the psychological state associated with, or the emotional schema (Izard, 2007) elicited by, memories activated during an interview about their separation experience.

A large body of research using the Facial Action Coding System (FACS), a widely used method of quantifying expressed emotion (described more below), speaks to the utility of studying specific expressed emotions, including, for example, in the areas of stress responsivity (Lerner, Dahl, Hariri, & Taylor, 2007), personality styles and alcohol on mood states (Ruch, 1994), and disclosure of traumatic events (Bonanno et al., 2002). These studies suggest that the FACS—systematic measurement of facial expressions—may have utility in the study of discrete emotions associated with recovery after a romantic breakup.

The social function of expressed emotions

Facial expressions of emotion coordinate social interactions in at least three ways: by conveying information to others about the individual's emotions, intentions, and relational orientations; by evoking emotions in other people that are related to behaviors that help meet the individual's goals; and by serving as incentives or deterrents for other individuals' behavior (Keltner & Kring, 1998). For example, Gottman and Levenson (1992) found that when heterosexual couples discussed a topic that both partners perceived to be a conflict in their relationship, husbands' expressions of contempt and wives' expressions of disgust predicted dissatisfaction and eventual dissolution of the relationship. With respect to coping following a stressful event, Bonanno and Keltner (1997) and Keltner and Bonanno (1997) found that the *expression* of specific types of emotional behavior (cf. Timmers, Fischer, & Manstead, 2003) is associated with positive outcomes after the death of a spouse. These authors studied bereaved adults' laughter and smiling and found that greater Duchenne laughter—characterized by the movement of the orbicularis oculi muscle (muscle surrounding the eyes)—during a stressful interview about the death of a spouse was associated with less negative and more positive emotions. The authors reasoned that Duchenne laughter, while producing physiological and behavioral responses, might have the effect of counteracting the responses of negative emotion and thus facilitating a transition to a positive state (Keltner & Bonanno, 1997). Bonanno and Keltner (1997) also explored the mediating role of facial expressions of emotions in the course of grief for the loss of a spouse and found that expressions of negative emotions, such as contempt, fear, and especially anger, were correlated with self-reports of increased grief severity and poorer health. Both of the above studies demonstrate the social function of facial expressions (of emotions) in conveying individuals' emotional state and orientation with respect to the stressful event while assisting people to cope more or less effectively with the loss.

Discrete emotions following relationship dissolution

An additional limitation in the study of romantic breakups is that investigations of subjective distress also tend to be investigations of *global* subjective distress. Although previous research has emphasized the role of discrete emotions in providing intra- and interpersonal information about the need to deal with environmental/situational demands (Campos, Campos, & Barrett, 1989; Keltner & Haidt, 1999; Lazarus, 1991; Levenson, 1999), very few investigations examine whether and how discrete emotions promote or hinder adjustment following this life event over time. Some researchers have argued that "the key to the assessment of emotion is specificity" (Gottman & Levenson, 1986, p. 31). Indeed, there is strong evidence that discrete emotions function in establishing, terminating, or maintaining a relationship between a person and his or her environment for matters that are personally salient (Campos, Mumme, Kermoian, & Campos, 1994; Campos et al., 1989), which underscores the potential utility of examining the functional role of discrete emotions in relationship dissolution.

Emotional specificity following romantic breakups

A few studies have examined specific emotions following relationship dissolution. Sbarra and Emery (2005), for example, examined changes in self-reported love, anger, sadness, and relief over 28 days in people who had and had not experienced a romantic separation. Relative to people who had not experienced a separation, those who experienced a romantic separation reported more anger and less love throughout the study period. In a follow-up study, Sbarra and Ferrer (2006) reported findings implicating distinct patterns of emotional responses evident in participants' diary data (e.g., oscillation in which no one emotion dominated a person's subjective experience). Sbarra (2006) used the level of the specific emotions of sadness and anger expressed within an intact relationship as a reference to operationalize and define emotional recovery as an event in time and found that sadness recovery from nonmarital relationship dissolution decreased with greater levels of love and anger expressions. Although this line of research is informative in terms of exploring specific emotional response patterns after romantic breakup, it has evolved in a manner that is largely disconnected from mainstream affective science. In other words, the study of how people cope with a romantic breakup would benefit if work in this area focused on the social function of discrete emotional expressions.

A functionalist perspective on expressed emotions following romantic breakups

Given the literature suggesting that studying expressed and discrete emotions has the potential to deepen our understanding of how people cope with a romantic breakup, we adopt a functionalist perspective to make predictions about the ways in which specific emotional expressions may be associated with subjective feelings of distress following a breakup. Fischer and Manstead (2008) outlined a model describing the social-relational goals of expressed emotion that we can use to inform the present analysis. These authors proposed a social distancing function for certain emotions—for example, anger, contempt, disgust, and fear—that signal the need to increase distance from others and, potentially, signal the need for others to create distance from us. In contrast, other emotions—for example, joy, sympathy, guilt, and shame—signal the need for closeness and identification (see Fridlund, 1994; Kitayama, Mesquita, & Karasawa, 2006; Oatley & Jenkins, 1992).

Looking closer at the two emotions of anger and contempt, although both are labeled as distancing emotions, there is a slight difference in the way these two emotions function in interpersonal relationships. The expression of anger, for example, has the effect of pressuring a person into changing his or her behavior (toward a positive or negative outcome) and exerting control on another person (Carver & Harmon-Jones, 2009; Fischer & Roseman, 2007; Timmers et al., 2003). In contrast, contempt is typically expressed in the form of derogation and rejection, resulting in the social exclusion of the target person (Fischer & Roseman, 2007). Thus, although the expression of

both of these emotions can serve a social distancing function by blaming the target and seeking to change or alter the immediate social context, anger may have an additional function. Anger has the potential to promote improvement in relationships by encouraging a change in the recipient for the purpose of continuing the relationship rather than being used as a tool for derogation. The expression of contempt, on the other hand, is largely a means of boosting one's social position by derogating and distancing the target person (Fischer & Manstead, 2008).

Compared to both anger and contempt, disgust is primarily defined as the sense of revulsion in relation to the sight, smell, or touch of an offensive object (Angyal, 1941; Darwin, 1872/1965). In interpersonal relations, disgust is expressed when an individual intends to distance him- or herself from an object or a situation that is characterized by rejection (Rozin, Haidt, & McCauley, 2008). Fear serves a similar distancing function by provoking the desire to escape anxiety-provoking stimuli and/or defend oneself (Ohman, 2008). Therefore, similar to anger and contempt, expressions of both disgust and fear in interpersonal relationships may motivate people to remove themselves from the context in which they feel uncomfortable or signal the need for interpersonal distance.

In contrast to these distancing emotions, expressions of sadness can *maintain* social relationships and organize interactions that promote social connection (Darwin, 1872/1965; Keltner & Kring, 1998). Expressed sadness can evoke sympathy and induce social responses in others (Bonanno, Goorin, & Coifman, 2008; Izard, 1993; Keltner & Kring, 1998; Lazarus, 1991). Although a functionalist perspective informs considerable research on expressed emotions (e.g., Keltner, Kring, & Bonanno, 1999), no studies have used this work to examine breakup-related emotional distress. On one hand, the idea that people can become "stuck" on certain emotions has a long history in clinical psychology and the study of coping with loss (Emery, 1994; Sbarra & Emery, 2005; Wortman & Silver, 1989). Expressed emotions—anger, contempt, disgust, fear, *or* sadness—may serve as a marker of the extent to which people are struggling with their separation experience. Finding, for example, that expressed anger predicts subjective breakup-related distress over and above expressed sadness would suggest that poor adaptation is not simply a state characterized by low mood and social withdrawal but a state characterized by blaming one's ex-partner (or a dissatisfying social context—e.g., being angry that your ex-partner has a new partner). On the other hand, it is possible that the distancing function of anger or contempt promotes adaptive recovery over and above the extent to which someone expressed sadness about the breakup. This would be consistent with the ideas that expressed negative emotions serve the intrapersonal function of creating distance from one's ex-partner.

Real-time expressed emotion: The Computer Expression Recognition Toolbox

To explore these ideas in detail requires the ability to study expressed emotions in real time. The FACS (Ekman & Friesen, 1978), which we mentioned above, is an anatomically based system for measuring facial muscle movements. Videotaped facial behavior can be coded by trained coders using FACS based on a dictionary set of possible facial movements, which are referred to as action units (AUs; e.g., inner brow raiser, nose wrinkle, lip stretcher, etc.). There are 46 AUs in the FACS code (Ekman & Friesen, 1978). Specific combinations of these AUs represent discrete expressions of emotions. One of the main strengths of the FACS system is its objectivity and comprehensiveness in describing facial expressions, which allows for the discovery of patterns related to emotional states. The FACS is used to study many different emotional processes, including pain expressions in infants (Grunau & Craig, 1987), cognitive-affective states during learning (Craig, D'Mello, Witherspoon, & Graesser, 2008), and the course of grief after loss of a spouse (Bonanno & Keltner, 1997).

Computer-assisted FACS scoring

The FACS is hand-coded by trained human coders, rendering it quite time consuming and

costly. Scientists need to spend more than 100 hr to become certified FACS coders, and once certified, their coding speed is approximately 2 hr per minute of video. The Computer Expression Recognition Toolbox (CERT; Littlewort, Whitehill et al., 2011) is a fully automated computerized system that can process video data to code facial actions as coded in FACS. Specifically, the CERT system automatically detects frontal faces in the video stream and codes 20 AUs from the FACS in addition to distinctive expressions of emotions such as Anger, Contempt, Disgust, Fear, Surprise, Sadness, and Joy.

The codes outputted by the CERT system are significantly correlated with the intensity codes made by human raters using the FACS (Bartlett & Whitehill, 2010; Bartlett et al., 2006; Littlewort, Whitehill, et al., 2011). The CERT system has demonstrated predictive validity in a variety of research contexts, including the study of driver fatigue detection (Littlewort, Whitehill, et al., 2011), developing adaptive tutoring systems (Littlewort, Bartlett, Salamanca, & Reilly, 2011), and discrimination of real from faked expressions of pain (Littlewort, Bartlett, & Lee, 2009). Given that the CERT system is fully automated, these findings suggest that it is a reliable, valid, and efficient tool when manual FACS coding is not a readily available option (Bartlett & Whitehill, 2010; Littlewort, Whitehill, et al., 2011).

This Study

Given the potential utility of the CERT system for conducting large-scale, automated coding of expressed emotions, the need to move beyond self-reports in the study of romantic breakups, and the value of studying specific emotional expressions following stressful life events, we designed the current study to investigate young adults' expressed emotions over 9 weeks following a nonmarital romantic breakup. Nonmarital breakups are associated with significant psychological distress, but for most people, this stress abates relatively quickly, on the order of a few months (Sbarra & Emery, 2005). This makes studying the correlates of successful and/or unsuccessful recovery possible in the short term. In this report, we focus on a period of 9 weeks. Our goal was to extend the follow-up period used in prior prospective studies of breakups (cf. Sbarra & Emery, 2005) without overburdening participants with too frequent or too many total assessments. We therefore assessed participants on four occasions over the course of 2 months.

Participants completed a standardized interview about their breakup experience at four visits while being video recorded. In the first video-recorded minute, participants described when they first realized their relationship was coming to an end, and we analyzed data from this minute using the CERT system. Prior research with divorcing adults found that judges' ratings of emotional distress in the first 30 s of a stream-of-consciousness (SOC) recording (by participants about their own divorce) predicted participants' self-reported outcomes 90 days later (Mason, Sbarra, & Mehl, 2010). In the current study, we used these findings as a basis for selecting the first minute of our breakup interview; our goal was to assess the expressed emotion when people initiated a discussion about their relationship history and breakup.

The CERT system provided an automated coding of seven characteristic emotions (Anger, Contempt, Disgust, Fear, Surprise, Sadness, and Joy) for each video minute at each (of the four) study visit. To determine if the CERT-coded facial emotion responses were associated with changes in self-reported, breakup-related emotional distress following the separation, we entered the seven CERT emotions into a multilevel model predicting changes in emotional distress over time. Based on the model of social-relational goals of expressed emotion (Fischer & Manstead, 2008), which holds that specific emotions play a role in creating social distance, we expected higher levels of expressed Anger, Contempt, and Disgust to be associated with lower within-occasion levels of self-reported emotional distress following the breakup. Similarly, we expected higher levels of expressed Fear and Sadness to be associated with higher emotional distress. Beyond these predictions, our general interest was in exploring which of these emotions—if any—would predict

unique variance in subjective distress when considered together in a simultaneous analysis.

Method

Participants

Participants were 135 young adults (37 men; $M_{age} = 19$ years, $SD = 1.86$ years, range = 18–29) who recently ended a committed romantic relationship (average time since separation = 3.4 months, $SD = 2.5$ months; average relationship length prior to the separation = 20.86 months, $SD = 14.76$ months) and contributed usable video data at the first assessment; these participants were retained as the final sample for the current analyses. Although previous studies of nonmarital romantic breakups find no sex differences in negative emotions (Simpson, 1987; Sprecher, 1994), research into adults coping with marital separation finds that men tend to fare worse, emotionally and physically, upon divorce (Mason & Sbarra, 2012). Therefore, we included sex as a control variable in our primary analyses.

The study was limited to nonmarital breakups in order to identify a relatively homogenous sample, but anyone over 18 years of age was permitted to enroll in the study. We recruited participants using flyers, daily university advertisements, and social media. A total of 58% ($n = 78$) of the participants described themselves as White, 26% ($n = 35$) as Hispanic, and 16% ($n = 22$) as other races. A total of 45% ($n = 61$) of the participants initiated the breakup with their partner; 10% ($n = 14$) of the participants reported current contact with their ex-partner more than once a day; 19% ($n = 26$) reported contact with their ex-partner about once a day; 21% ($n = 28$) reported contact with their ex-partner about once a week; 26% ($n = 35$) reported they contact their ex-partner but only either once a month or less; and, finally, 24% ($n = 32$) reported no contact with their ex-partner at all. A total of 13% ($n = 18$) of the participants were involved in a new relationship at the first assessment.

There was considerable attrition from the study over time. A total of 135 ($N = 135$) participants began the study and contributed useable video data at the first visit; 99 participants completed the second visit ($n = 37$ men); 83 completed the third visit ($n = 18$ men); and 63 completed the final study visit ($n = 18$ men). Across all measurement occasions, participants provided 380 one-min video segments for CERT coding. We used multilevel modeling using maximum likelihood estimation procedures so as to adequately address missing data. Finally, we compared participants who did and did not complete the final study visit on their first visit scores. There was no significant differential attrition as a function of participants' age, sex, length of relationship, time since the breakup, or overall breakup-related emotional distress at the first study visit.

Procedures

Participants completed four laboratory assessments over the course of 9 weeks (one visit every 3 weeks). At each laboratory visit, participants completed self-report measures of breakup-specific emotional distress and a 4-min SOC interview task asking them to speak about their thoughts and feelings regarding their breakup while being video recorded. This task, based on a similar task designed for adults coping with marital separation (see Mason et al., 2010), asked participants to speak continuously for 1 min following each of four specific question prompts about their separation experience. Questions were: (a) When did you first realize you were heading towards breakup? (b) What were your feelings when you were breaking up? (c) Have you talked or made contact after your breakup? (d) How did your breakup affect you? Each person was free to speak about whatever thoughts and feelings came to mind for a 1-min period following each question prompt. Participants were video recorded during the SOC interview. We used the first minute of each breakup interview for the CERT-based assessment of expressed emotions (see below for a full description of the CERT quantification process). The CERT system provides 1,800 emotion expression units per minute; hence, we elected to quantify expressed emotion from only the first minute of the breakup interview in order to limit the

within-person variability (in specific emotions) across the entire interview.

Measures

Impact of Event Scale–Revised

The Impact of Event Scale–Revised (IES–R; Creamer, Bell, & Failla, 2003), our primary self-reported outcome variable, is a 22-item scale that assesses the psychological impact of participants' recent romantic separation (breakup-related distress). The IES–R assesses emotional distress following a specific event (in this case, the romantic breakup) in three domains: avoidance, emotional intrusion, and somatic hyperarousal. Participants respond on a 5-point Likert-type scale from *not at all* to *extremely*, with higher total scores reflecting greater subjective distress regarding the breakup. The scale includes items such as "I thought about it when I didn't mean to" and "I had trouble concentrating." The IES–R covaries with other measures of separation-related psychological adjustment and is a valid measure for assessing subjective emotional responses over time following a breakup (Mason et al., 2010; Sbarra, Smith, & Mehl, 2012). The composite scale demonstrated high internal consistency at each assessment (α range = .94–.90), and summed scores on the IES–R ranged from 35.89 ($SD = 16.45$) at the first assessment to 21.34 ($SD = 16.45$) at the final assessment.

Computer Expression Recognition Toolbox

We used CERT (Bartlett, Littlewort, & Movellan, 2008) version 5.1 for the coding of emotion expressions. CERT detects frontal faces in the video stream and codes for 20 AUs from FACS in addition to expressions of several emotions, including Anger, Disgust, Fear, Joy, Sadness, Surprise, and Contempt. Facial action detectors in the CERT system detect the presence or absence of each of the AUs and the seven emotions of interest using over 5,000 examples from spontaneous expressions as training data sets[1] (Littlewort, Bartlett, et al., 2011). CERT operates at 30 frames per second producing approximately 1,800 values per AU and emotion for each of the 1-min clips recorded at each visit of this study. CERT output consists of log odd values indicating the presence or absence of each of the AUs and the seven emotions (Anger, Contempt, Disgust, Fear, Surprise, Sadness, and Joy), which are significantly correlated with the intensity of the facial actions as measured by FACS expert intensity codes (Bartlett et al., 2006; Whitehill, Littlewort, Fasel, Bartlett, & Movellan, 2009). We have provided a technical appendix on the CERT system on the Open Science Framework. This can be found at the following link:[2] https://osf.io/q72s8/.

In this study, we were specifically interested in the display of the seven emotions in the participants' faces while they spoke about their separation. Thus, for each specific emotion, we created an average score of the log odd values across the 1,800 samples per emotion for the first video minute of each SOC interview task prompt at each visit, yielding a single composite score for each emotion that varied at each visit. The mean log odd values (and standard deviations) for each of the seven emotions at each of the four visits are displayed in Table 1. From the log odd values, we calculated the mean probability of an expressed emotion. For example, a mean log odd value of .0980 for Contempt is equivalent to an average probability; 53% expressed Contempt at the first visit of the study. In this way, the log odd values represent the (logit transformed) likelihood that a specific emotion is expressed.

Data analysis

We used SPSS (version 22.0) to conduct mixed model regression analysis (Singer & Willett, 2003). We first identified the functional form of our outcome variable (IES–R) by fitting two Level 1 models. The first model was an unconditional means model, which assessed the extent to which IES–R varied over multiple occasions of measurement. The second

1. Probability of correctness on a two-alternative forced choice (2AFC) task between one positive and one negative example.

2. In addition, consistent with current best practices in open science, we have uploaded a de-identified version of data file used in this study as well as our SPSS computer code for the main study analyses.

Table 1. *Emotion expression log odd mean values (and standard deviations) of the seven basic emotions at each of the four visits and correlation of the emotion expression log odds at first and last visits*

Emotion	Visit 1	Visit 2	Visit 3	Visit 4	V1–V4 correlation
Anger	.05 (.06)	.05 (.04)	.06 (.06)	.05 (.06)	.31
Sadness	.22 (.16)	.20 (.14)	.20 (.14)	.22 (.17)	.52
Joy	.02 (.02)	.02 (.03)	.01 (.02)	.02 (.03)	.06
Contempt	.10 (.08)	.11 (.09)	.10 (.08)	.11 (.09)	.35
Disgust	.12 (.12)	.16 (.15)	.15 (.12)	.14 (.13)	.64
Surprise	.04 (.05)	.04 (.04)	.04 (.04)	.03 (.04)	.35
Fear	.03 (.03)	.02 (.04)	.02 (.04)	.02 (.02)	.45

model examined systematic changes in IES–R over time with various representations of the change processes, including linear ($TIME_{ij}$) and quadratic ($TIME^2_{ij}$) time functions. We fitted the data with an autoregressive error covariance structure due to the nonindependence of the data resulting from taking repeated measurements over time (Goldstein, Healy, & Rasbash, 1994; Mason et al., 2010; Singer & Willett, 2003). Because each of the CERT emotions was measured at each of the four visits, we examined the within-occasion effects of the seven time-variant (Level 1) CERT emotions (Anger, Contempt, Disgust, Fear, Surprise, Sadness, and Joy) across several models. We began by evaluating which of the seven emotion variables were associated with self-reported distress in a series of basic models (which included only the time parameters). Finally, upon determining which of the emotions were predictive of self-reported distress in the basic models, we placed those variables in a model simultaneously. For simplicity, we refer to the first set of models as a univariate specification (even though the time parameters were in the model) and the second set as a multivariate specification.

Results

Models

Unconditional means model

Before evaluating change in the IES–R outcome variable, we specified a baseline unconditional means model to examine variation around the mean between individuals using the intraclass correlation coefficient (ICC; Shrout & Fleiss, 1979). The ICC indicated that 40% of the total variation in the IES–R was attributable to interindividual differences, which suggests meaningful variability for between-persons prediction models ($b = 28.87$, $p < .001$; Heinrich & Lynn, 2001; Shek & Ma, 2011).

Unconditional growth model

To study systematic change of IES–R over the four visits of the study, we examined a series of unconditional growth models, entering linear and quadratic TIME functions as fixed and random effects. The results revealed that both linear ($b = -11.81$, $SE = 1.86$, $p < .001$) and quadratic ($b = 2.21$, $SE = 0.62$, $p < .001$) time functions significantly predicted IES–R over time. (We refer to the quadratic time parameterization as $Time^2$ in the models reported below.) Participants entered the study with a mean score of 35.89, which reflects substantial emotional distress surrounding the recent breakup and subjective impairment consistent with levels observed in a diagnosis of clinical syndromes such as posttraumatic stress disorder (see Creamer et al., 2003). There was significant variation around this intercept ($p < .001$), which we allowed to vary randomly.

Conditional growth model

To address the main research questions of this study, the next series of models evaluated the effects of the seven CERT-derived emotion

Table 2. *Correlations between CERT emotion composites and IES–R scores*

IES–R	Visit 1	Visit 2	Visit 3	Visit 4
Anger	.15	−.08	−.17	−.03
Sadness	.14	.05	.02	−.01
Joy	−.27**	−.05	.05	.08
Contempt	−.27**	.05	.20	−.10
Disgust	−.07	−.18	−.16	.05
Surprise	.08	.12	.04	.06
Fear	.03	.06	.05	.15

Note. CERT = Computerized Expression Recognition Toolbox; IES–R = Impact of Event Scale–Revised.

composites (Anger, Contempt, Disgust, Fear, Surprise, Sadness, and Joy) on the IES–R and changes in the IES–R over time. Table 2 displays the visit-specific associations between the IES–R scores and each CERT emotion composite. Because we were interested in the unique predictive power of each composite over and above the other emotion composites, we first tested a series of univariate models to identify the independent associations between each emotion composite and IES–R scores in a time-varying nature. We observed within-occasion main effects for Sadness ($b = -.76$, $SE = .32$, $p < .05$), Joy ($b = -3.99$, $SE = 1.73$, $p < .05$), and Disgust ($b = -.96$, $SE = .35$, $p < .05$), but only the Contempt variable interacted with the two time parameters ($b = 4.38$, $SE = 1.10$ and $b = -1.23$, $SE = .37$, $p < .005$, for the interaction with the linear and quadratic time parameters, respectively).

Having established these univariate associations, we entered all significant predictors into a single multilevel regression model predicting IES–R scores over time. As shown in Table 3 (Model 1), the within-occasion association between Disgust and the IES–R approached significance, but Contempt was the only emotion that showed significant associations with IES–R scores over time. The within-occasion association between Contempt and the IES–R was significant and negative ($b = -23.74$, $SE = 6.84$, $p < .01$), indicating that on visits in which people *expressed* greater contempt on the study videos, they reported *less* breakup-related emotional distress. This main effect, evidenced most strongly at the initial assessment (when time is parametrized to zero), was qualified by significant interactions with both the linear and quadratic effects of time. At any given occasion, the association between Contempt and IES–R scores needs to be understood as a function of three forces: the main effect of Contempt, the Contempt × Time interaction, and the Contempt × Time^2 interaction. More simply, higher contempt is associated with lower distress early in the study, but with relatively higher distress at the second and third visits.

Figure 1 displays the predicted IES–R scores for participants 1 *SD* above or below the mean expressed contempt at each visit. As shown, participants higher in expressed contempt, relative to those lower in expressed contempt, reported significantly lower rates of breakup-related emotional distress at the first visit. The difference between participants 1 *SD* above or below the mean expressed contempt was .60 of a standard deviation in IES–R scores at the first assessment. The Contempt × Time^2 interaction was in the same direction and augmented the negative within-occasion association between Contempt and IES–R; at the second and third visits, people higher in expressed contempt also evidenced declines in their emotional distress. The combination of these two effects, however, was offset by a positive Contempt × Time interaction such that as time moved forward, greater expressed contempt was associated with *greater* breakup-related emotional distress.

This latter effect explains why participants higher in contempt evidenced a parabolic trajectory of emotional distress over time. Early in the study, when contempt levels were higher, distress scores were lower. Because of the positive linear association between Contempt and IES–R scores, distress levels (for participants with higher contempt) rose from the first to the second visits. This effect persisted into the third visit, as evidenced by the steeper (negative) slope from the second to third visits (the lower contempt participants having a steeper slope than the higher contempt participants). This effect was then offset by the negative quadratic time effect that was the strongest at the final visit of the study. An

Table 3. *Multilevel results predicting IES–R scores using full maximum likelihood estimation (Model 1,* N = *135)*

		Model 1				Model 2			
DV	Parameter	*B*	*SE*	*p*	95% confidence interval	*B*	*SE*	*p*	95% confidence interval
IES–R	Intercept	37.75	1.38	.00	[35.04, 40.47]	36.30	2.44	.00	[31.48, 41.12]
	Time	−13.47	1.69	.00	[−16.81, −10.14]	−13.52	1.69	.00	[−16.85, −10.18]
	Time^2	2.57	.58	.00	[1.44, 3.71]	2.59	0.58	.00	[1.45, 3.72]
	Sadness	9.75	6.22	.12	[−2.47, 21.98]	9.78	6.25	.12	[−2.52, 22.07]
	Joy	−25.81	29.28	.38	[−83.41, 31.79]	−24.43	29.29	.41	[−82.06, 33.20]
	Disgust	−10.01	7.30	.17	[−24.36, 4.35]	−10.35	7.32	.16	[−24.76, 4.05]
	Contempt	−42.54	14.25	.00	[−70.58, −14.50]	−41.72	14.40	.00	[−70.06, −13.38]
	Time × Contempt	83.46	20.64	.00	[42.83, 124.08]	82.31	20.74	.00	[41.48, 123.14]
	Time^2 × Contempt	−23.74	6.84	.00	[−37.21, −10.27]	−23.35	6.86	.00	[−36.86, −9.85]
	Initiate	—	—	—	—	−0.66	2.41	.78	[−5.42, 4.10]
	Length	—	—	—	—	0.03	0.08	.74	[−.14, .19]
	Age	—	—	—	—	−0.28	0.69	.68	[−1.64, 1.08]
	Sex	—	—	—	—	1.96	2.74	.48	[−3.45, 7.37]

Note. Akaike information criterion fit statistic for Model 1 = 3064.5, Model 2 = 3063.3. Initiate = item denoting who initiated the breakup on a continuous 4-point scale; higher scores indicate that participants felt their ex-partners initiated the breakup. Length = length of relationship in months prior to the separation. Sex is coded as 0/1 where 0 = male. All the variables including the covariates are centered around the mean in this model. Time = linear time function; Time^2 = quadratic time function. IES–R = Impact of Event Scale–Revised; DV = dependent variable.

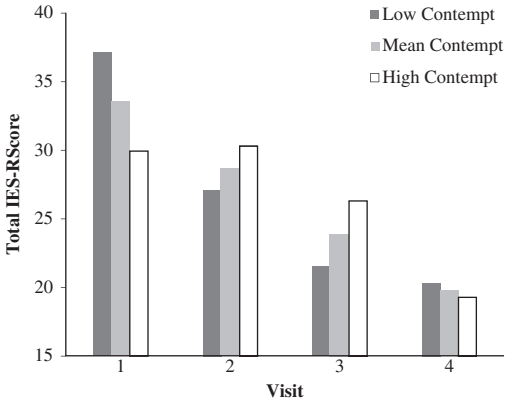

Figure 1. Impact of Event Scale–Revised (IES–R) values for people scoring 1 *SD* below/above the mean and at mean level of contempt at each visit (based on the within-occasion, time-varying scores for expressed contempt). At the first visit, the only predictor of IES–R scores is contempt; the time and time by contempt interactions fall out of the model at the intercept.

important consideration is that Contempt was a within-person variable that varied at each visit. The IES–R scores displayed in Figure 1 assumed that if a participant expressed higher contempt, he or she maintained this initial level over time. This is not necessarily the case (see Table 1), and it is plausible for someone to vary in his or her expressed contempt across visits.

Finally, we examined whether the Contempt effects remained stable when including a series of relevant covariates (age, sex, length of relationship, and initiator status) to the model predicting IES–R scores. The parameter estimates from this augmented model appear in Table 3 (Model 2). As shown, the effects of interest are virtually unchanged with these additional four variables in the model, none of which were significantly associated with IES–R scores.

In order to quantify the proportion of outcome variation explained by time and the CERT-derived emotion composites added to the multivariate model, we computed a pseudo-R^2 statistics in each step. We first assessed the proportion of within-person variation explained by time. Our results indicated that 11% of the within-person variation (pseudo-$R^2 = 0.11$) in IES is explained by time. We then assessed the proportion of within-person variation explained when the CERT-derived composite was added to the unconditional growth model. With the emotion composites included in Model 1, we explained 39% of the within-person variation in IES, indicating that the CERT variables explained an additional 28% of the within-person variability in IES over and above the unconditional growth model that included only the time variables.

Discussion

Although the importance of studying specific and expressed emotions in relationships and following stressful life events is well known (Barrett, Mesquita, Ochsner, & Gross, 2007; Bonanno & Keltner, 1997; Gottman & Levenson, 1986; Keltner & Bonanno, 1997), few studies have moved beyond self-report in tracking adults' emotional responses to a romantic breakup. This report examined facial expressions using an automated FACS (CERT) as a way of identifying specific emotions that are associated with changes in emotional distress following romantic separation. Based on a functionalist perspective of emotional experience, we hypothesized that specific expressions of Anger, Contempt, and Disgust would be associated with lower levels of self-reported emotional distress following the breakup. Furthermore, we hypothesized that expressed Fear and Sadness would be associated with greater levels of emotional distress. Finally, we examined the roles of the seven emotions—Anger, Sadness, Contempt, Disgust, Fear, Surprise, or Joy—in predicting unique variance in self-reported emotional distress over time.

We found little evidence for distinct roles of Anger, Disgust, Sadness, and Fear as unique predictors of psychological well-being after the breakup over time (see Table 2). Indeed, of the seven expressed emotions, only Contempt was uniquely associated with breakup-related emotional distress over time. Specifically, at our baseline assessment, people who expressed greater contempt reported significantly less breakup-related emotional distress. As time progressed, however, greater

expressed contempt was associated with greater emotional distress.

Why might contempt be such a strong predictor of participants' subjective responses to a breakup and their emotional adjustment over time? Contempt is considered a "moral emotion" that is often elicited in response to a violation of moral codes regarding disrespect, duty, or hierarchy (Rozin, Lowery, Imada, & Haidt, 1999). The experience of contempt often involves feelings of rejection, disapproval, and a degree of hostility toward social and interpersonal relationships (Aleman & Swart, 2008). Contempt is frequently directed at another person, allowing individuals to position others in the social hierarchy as inferior to themselves (Aleman & Swart, 2008). Individuals often express contempt when they want to feel stronger, more intelligent, and more civilized or in some way better than the other person (Weiner, 2007). Because contempt is expressed as a form of derogation and rejection of the other person, it can play a powerful role in socially excluding a target person, thus serving as a social distancing emotion as well (Fischer & Roseman, 2007).

Together, these points suggest that people expressing more contempt relatively early after their separation may be doing so in an effort to feel superior to their ex-partner or to derogate their ex-partner (in a conscious or nonconscious manner) while at the same time distancing themselves from that person. Indeed, the *generation of contempt*—that is, pushing yourself to be disapproving and scornful of your ex-partner—may help alleviate some of the emotional distress associated with a breakup, at least initially. The latter explanation, of course, is causal in nature and cannot be determined from our correlational study. However, the idea that contempt early after a breakup might drive a portion of the recovery process is an intriguing possibility that merits further investigation.

An equally intriguing finding from this study is that when maintained over time, higher levels of expressed contempt were associated with *greater* breakup-related emotional distress. The off-setting patterns in the association between contempt and subjective breakup-related emotional distress is complex and awaits further study, but the possibility that higher levels of expressed contempt are inversely associated with *greater distress* as time goes by has intuitive appeal. People must be able to allow strong emotions of hostility and disapproval to abate so that they can move on with their lives. This raises important questions about how the interpersonal and intrapersonal functions of expressed emotions may work together. From an *interpersonal* perspective, it may be the case that expressed contempt is adaptive, allowing a person to create distance from an ex-partner. In contrast, from an *intrapersonal* perspective, this social distancing function may come at a personal cost to one's well-being. Thus, in the weeks and months after a breakup, expressed contempt may be a marker of poor adjustment or may be a mechanism contributing to poorer adjustment. We believe it important that future investigations consider both possibilities.

The current findings also raise the question as to why expressed contempt, but not anger or sadness, might be more closely associated with subjective reports of distress. Although anger and contempt are closely related to each other and may co-occur, anger is a known response to short-term attack responses and confrontations, which, from a functional perspective, dissipates in long-term reconciliation (Fischer & Roseman, 2007). When an individual experiences anger directed at another, he or she may desire to change the other's behavior but does not necessarily want to exclude the other from his or her life. On the other hand, contempt is intertwined with rejection and social exclusion of another person in both the short and long terms (Fischer & Roseman, 2007). It therefore makes sense for people who have recently ended a relationship and who have excluded their ex-partner from their lives (or who have been excluded by their now ex-partner) to express contempt when speaking about the breakup. Our univariate models demonstrated that expressed sadness was associated with participants' breakup-related distress, but this effect did not hold in the multivariate models. Of note, this was not an issue of frequency of the expressed emotion: Participants expressed as much sadness as contempt during the first breakup interview question. It is therefore unlikely that the nature of the

question elicited expressed contempt more strongly than it did expressed sadness, but we cannot rule out this possibility without computing expressed emotions during another period of the interview. Substantively, this raises an interesting avenue for future research: Are some specific expressed emotions better predictors of distress than others? If so, why? We believe that future work will uncover answers to these questions.

A notable strength of this study is that the CERT system provides a tool for analyzing spontaneous emotion expressions in large data sets without requiring lengthy hours of human coding. Indeed, human FACS coding of the current data, with a reasonably large sample assessed at four total visits, would not be feasible. To our knowledge, we are reporting the first use of the CERT system in the study of stress and coping. Despite controversy about the universality and validity of the facial expression of Contempt (Ekman & Friesen, 1988; Ekman, O'Sullivan, & Matsumoto, 1991; Izard & Haynes, 1988; Matsumoto & Ekman, 2004; Rosenberg & Ekman, 1995; Russell, 1991a, 1991b), the automatic facial analysis used here supports the notion that Contempt, as measured by the FACS system (which underlies the CERT method), provides predictive information that is associated with participants' reports of breakup-related emotional distress.

Findings from this study should be viewed in light of several limitations. First, without the ability to compare data collected with CERT against manually coded FACS data, we cannot be sure of the extent to which the CERT coding system adequately yielded data that would be identical to that obtained from human-coded FACS data. Given a previously documented correlation between CERT and manual FACS codes (Bartlett & Whitehill, 2010; Bartlett et al., 2006; Littlewort, Whitehill, et al., 2011), as well as the high sensitivity and specificity for the CERT system, we retained the FACS terminology when referring to the emotion composites. However, in the area of stress and coping research, the field awaits a definitive reliability study in which FACS-coded emotions are directly compared to CERT-quantified expressions within the same study. Until this work is conducted, we cannot have complete confidence that CERT fully captures FACS-coded emotions.

Second, a clear limitation of this study is that our analysis focuses solely on expressed emotions in the first minute of the breakup interview in which participants were asked, on four occasions, "When did you first realize you were heading towards breakup?" It is reasonable to expect that the results would differ if we quantified CERT scores across the entire interview or focused more specifically on affect-laden questions (e.g., "How did your breakup affect you?"). In addition, repeated exposure to the same question may have constrained the finding by creating an unnatural context in which participants repeatedly discussed their separation. Going forward, it would be worthwhile for researchers to explore how other design considerations alter the nature of expressed emotion and its association with subjective experience. Minimally, the current findings should be interpreted in light of the specific design of this study in which we quantified expressed emotion in response to a single question that was repeated over four occasions.

Third, our study included more women than men. Although this imbalance is consistent with other studies on romantic breakups (e.g., Mason et al., 2010; Sbarra, Law, Lee, & Mason, 2009), it precludes testing for sex differences or moderation by sex in a meaningful way. Fourth, this study focused on nonmarital breakups in young adulthood (18–29 years) and may not be generalizable to older adults or to adults ending a marriage or marriage-like relationship. That is, we are unsure of the extent to which these findings apply to people amidst the aftermath of divorce, as is the degree to which these short-term findings—the study assessment period lasted just 9 weeks—apply to questions about long-term adjustment. Finally, the results we report here focus on emotional distress, and it would be beneficial for future studies to focus on clinical symptoms to assess whether the expression of contempt is associated with clinically meaningful patterns of symptomology. Moreover, our main outcome was self-reported distress with expressed emotions as the main predictor

variables. It is worth noting, however, that it is quite likely that expressed emotion and subjective distress change together in time, and it will be important for future research to fully capture changes in expressed emotion and the potential ways in which these changes lead or follow changes in subjective distress.

Finally, we had a considerable amount of attrition in our data over time. We originally had 135 individuals participating in the first visit and concluded with 63 individuals who completed the fourth visit. We handled the missing data in the multilevel modeling framework using maximum likelihood estimation under a missing, at-random assumption. The multilevel modeling gives us the advantage of being able to use all available data (even a participant's data who was only available on the first visit) in the estimation of model parameters as it treats time predictors flexibly.

Conclusion

This study used the CERT to examine associations between specific expressed emotions (derived from the FACS) and subjective emotional distress among young adults at four points across 9 weeks following a romantic breakup. Using a functionalist perspective on expressed emotions to guide the predictions, we observed that the specific emotions of Sadness, Joy, Contempt, and Disgust were associated with participants' self-reported breakup-related emotional distress. When these variables were entered together into a multilevel model, however, only Contempt remained a significant predictor of emotional distress. At our baseline assessment, people who expressed greater contempt reported significantly less breakup-related emotional distress; however, over time, participants who evidenced higher levels of expressed contempt also reported greater breakup-related emotional distress.

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