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What Good Are Positive Emotions in Crises? A Prospective Study of Resilience and Emotions Following the Terrorist Attacks on the United States on September 11th, 2001

Barbara L. Fredrickson
Department of Psychology and Research Center for Group Dynamics at the Institute for Social Research, University of Michigan

Michele M. Tugade
Department of Psychology, Boston College

Christian E. Waugh and **Gregory R. Larkin**
Department of Psychology, University of Michigan

Abstract

Extrapolating from B. L. Fredrickson's (1998, 2001) broaden-and-build theory of positive emotions, the authors hypothesized that positive emotions are active ingredients within trait resilience. U.S. college students (18 men and 28 women) were tested in early 2001 and again in the weeks following the September 11th terrorist attacks. Mediational analyses showed that positive emotions experienced in the wake of the attacks— gratitude, interest, love, and so forth—fully accounted for the relations between (a) precrisis resilience and later development of depressive symptoms and (b) precrisis resilience and postcrisis growth in psychological resources. Findings suggest that positive emotions in the aftermath of crises buffer resilient people against depression and fuel thriving, consistent with the broaden-and-build theory. Discussion touches on implications for coping.

The following historical summary has become all too familiar. On September 11th, 2001, terrorists hijacked four U.S. passenger planes. Two crashed into New York City's twin World Trade Center towers, a third crashed into U.S. military headquarters at the Pentagon, outside Washington, D.C., and the fourth crashed in Pennsylvania, missing its intended target. In addition to the hundreds of people killed on board the airplanes and in the Pentagon, nearly 3,000 people remained in the World Trade Center towers when they collapsed from the impact. The September 11th terrorist attacks produced more civilian casualties in a single day than has any other event in U.S. history.

Beyond the extraordinary physical and financial devastation and loss of human life, the September 11th attacks generated considerable emotional turmoil among U.S. citizens. Early polling in the days after the attacks found that 70% had cried about the tragedy (Saad, 2001b), 52–70% felt depressed, 33–62% had trouble sleeping (Institute for Social Research, 2001; Pew Charitable Trusts, 2001), and 66% had trouble concentrating (Institute for Social Research, 2001). When asked about specific emotions experienced, people most frequently mentioned anger and sadness (Saad, 2001b). Fear and anxiety also seemed prevalent: Sixty-three percent of people polled said their personal sense of safety and security had been shaken

Correspondence concerning this article should be addressed to Barbara L. Fredrickson, Department of Psychology, University of Michigan, 525 East University Avenue, Ann Arbor, Michigan 48109-1109. blf@umich.edu.

by the attacks (Saad, 2001b), and 54% were worried that they or someone in their family would become a victim of a terrorist attack, compared with 24% the previous year (Gallup News Service, 2001).

Amidst this amalgam of anger, sadness, fear, and anxiety, positive emotions seem unwarranted, even inappropriate. Even so, positive emotions are known to co-occur alongside negative emotions during stressful circumstances (Folkman & Moskowitz, 2000). Indeed, intermixed experiences of positive emotions were justifiable after the September 11th attacks. For instance, people might have felt grateful to be alive or to know that their loved ones were safe. They might also have felt keenly interested in the country's unfolding political, social, and spiritual responses. And they might have also felt heightened love, drawing their loved ones closer as an uncertain future shifted their social priorities (cf. Fredrickson, 1995; Fredrickson & Carstensen, 1990). Indeed, several polls indicated that U.S. citizens reported showing more affection for family members and relatives, with 60% reporting that their personal relationships were strengthened following the attacks (Saad, 2001a). At least one positive emotion took a hit in the attacks: Only 21% felt hopeful about the future, compared with 68% in 1990 (Institute for Social Research, 2001).

It is clear that positive emotions such as gratitude, interest, and love provide more pleasant subjective experiences than do negative emotions such as anger, sadness, fear, and anxiety. As such, to the extent that positive emotions reduce the focus on negative emotions, they can put people's minds at ease. That is a welcomed effect of positive emotions in crises. But are positive emotions merely pleasant distractions? We think not. To the contrary, alongside a growing number of theorists (Bonanno & Keltner, 1997; Folkman, 1997; Folkman & Moskowitz, 2000; Keltner & Bonanno, 1997; Moskowitz, 2001; Ryff & Singer, 1998), we see positive emotions as active ingredients in superior coping and thriving despite adversity. We examined U.S. college students' emotional responses to the September 11th terrorist attacks to test this proposition.

Benefits of Positive Emotions

Physiological Undoing

Beyond providing pleasant distractions, which put people's minds at ease, positive emotions also have a unique capacity to put people's bodies at ease. Negative emotions such as anger, fear, anxiety— even sadness and crying—arouse people's autonomic nervous systems, producing increases in heart rate, vasoconstriction, and blood pressure, among other changes (Fredrickson, Maynard, et al., 2000; Gross, Fredrickson, & Levenson, 1994; Levenson, Ekman, & Friesen, 1990; Ohman, 2000). Laboratory experiments have shown that experiences of positive emotions can quell or undo the lingering cardiovascular effects of these negative emotions. That is, compared with neutral distractions and sadness, positive emotions produce faster returns to baseline levels of cardiovascular activation following negative emotional arousal (Fredrickson & Levenson, 1998; Fredrickson, Mancuso, Branigan, & Tugade, 2000). It is notable that this undoing effect of positive emotions has been demonstrated for high-activation positive emotions such as joy or amusement as well as for low-activation positive emotions such as contentment or serenity.

If we extrapolate from these laboratory experiments on the undoing effect of positive emotions to U.S. citizens' emotional responses to the September 11th attacks, it is likely that the cardiovascular systems of those who felt grateful, loving, or interested endured less protracted aversive activation than did the systems of those who did not feel these or other positive emotions. In the context of negative emotions, then, positive emotions serve not only as breathers, providing a psychological break or respite, but also as restorers, replenishing

resources—for instance, cardiovascular quiescence—that have been depleted by stress (Lazarus, Kanner, & Folkman, 1980).

Cognitive Broadening

Possibly intertwined with the undoing effect on the body, positive emotions also alter people's modes of thinking. Fredrickson (1998, 2000) has argued that whereas negative emotions heighten people's autonomic activity and narrow their attention to support specific action tendencies (e.g., attack, escape), positive emotions quell autonomic arousal because they broaden people's attention, thinking, and behavioral repertoires (e.g., play, explore). Experiments by Isen and colleagues provide evidence for cognitive broadening. Across many studies, induced positive emotions produced patterns of thought that were notably unusual (Isen, Johnson, Mertz, & Robinson, 1985), flexible (Isen & Daubman, 1984), creative (Isen, Daubman, & Nowicki, 1987), integrative (Isen, Rosenzweig, & Young, 1991), open to information (Estrada, Isen, & Young, 1997), and efficient (Isen & Means, 1983; Isen et al., 1991). Isen and colleagues have also shown that induced positive emotions increase people's preferences for variety and broaden their arrays of acceptable behavioral options (Kahn & Isen, 1993). And they now suggest that these cognitive effects of positive emotions are linked to increases in circulating brain dopamine (Ashby, Isen, & Turken, 1999; Isen, 2002). More recently, Fredrickson and Branigan (2002) have shown that, relative to neutral states and negative emotions, positive emotions broaden the scope of people's visual attention as well as their momentary thought–action repertoires and that these broadening effects emerge for high-activation pleasant states such as joy or amusement as well as for low-activation pleasant states such as contentment or serenity (see also Gasper & Clore, 2002).

We contend that the cognitive broadening that accompanies states of positive emotion expands and improves the ways people cope during crises. Indeed, laboratory experiments have shown that induced positive emotions facilitate attention to and processing of important, self-relevant information (Reed & Aspinwall, 1998; Trope & Pomerantz, 1998; for reviews, see Aspinwall, 1998, 2001). Consistent with these experimental data, longitudinal studies of bereaved caregivers found that those who experienced positive emotions in the midst of their bereavement were also more likely to find positive meaning in their experiences, a measure of posttraumatic growth (Moskowitz, 2001). Similarly, those who experienced more positive emotions in bereavement were more likely to develop long-term plans and goals. Together with positive emotions, plans and goals predicted greater well-being 12 months postbereavement (Stein, Folkman, Trabasso, & Richards, 1997; see also Bonanno & Keltner, 1997; Keltner & Bonanno, 1997). Likewise, a recent study of stress and coping among college students links positive emotions to a style of coping characterized by taking a broad perspective on problems, seeing beyond immediate stressors, and generating multiple courses of action. Prospective evidence shows that positive emotions and such broad-minded coping serially enhance one another, with initial levels of positive emotions predicting improvements in broad-minded coping over time and initial levels of broad-minded coping predicting increases in positive emotions over time (Fredrickson & Joiner, 2002; see also Fredrickson, 2000).

Each of these studies suggests that positive emotions do more than simply feel good in the moment. Rather, by improving the ways that people cope with adversity, positive emotions also increase the odds that people will feel good in the future. Moreover, as the study by Fredrickson and Joiner (2002) shows, this upward spiral toward improved emotional well-being is linked to the broadened thinking that accompanies positive emotions.

Resource Building

Physiological undoing and cognitive broadening are benefits that positive emotions carry in the moment, as people are experiencing these pleasant states. Beyond these momentary

benefits, positive emotions—if recurrent—are also thought to generate other benefits that accrue over time and endure. To illustrate, as we have seen, positive emotions can momentarily broaden people's modes of thinking, which in turn can improve their ways of coping with a current stress. Over time and with repeated experiences of positive emotions, a style of such broad-minded coping might become habitual. And habitual good coping is a durable personal resource, a facet of trait resilience, that functions as a reserve that can be drawn on later to help people bounce back from a wide range of future adversities.

This and other ways that positive emotions build durable personal resources are featured in Fredrickson's (1998, 2000, 2001) *broaden-and-build theory* of positive emotions. The theory holds that, over time, the broadening triggered by positive emotions builds a range of personal resources, including physical resources (e.g., physical skills, health, longevity), social resources (e.g., friendships, social support networks), intellectual resources (e.g., expert knowledge, intellectual complexity), and psychological resources (e.g., resilience, optimism, creativity).

It is important to note that the personal resources accrued through positive emotions are durable—they outlast the transient emotional states that led to their acquisition. By consequence, then, the often incidental effect of experiencing a positive emotion is an increase in one's personal resources. So, through experiences of positive emotions, people may literally transform themselves, becoming more creative, knowledgeable, socially integrated, healthy, and resilient individuals. These various resources function as reserves that can be drawn on throughout life to improve coping and odds of survival. Indeed, a recent study of elderly nuns found that those who expressed the most positive emotions in early adulthood lived up to 10 years longer than those who expressed the least positive emotions (Danner, Snowdon, & Friesen, 2001; see also Ostir, Markides, Black, & Goodwin, 2000).

Resilient People

Psychological resilience is viewed as a relatively stable personality trait characterized by the ability to bounce back from negative experience and by flexible adaptation to the ever-changing demands of life (J. H. Block & Block, 1980; J. Block & Kremen, 1996; Lazarus, 1993). As we have seen, the broaden-and-build theory suggests that recurrent experiences of positive emotions may help people build this beneficial trait. This perspective resonates with Masten's (2001) *ordinary magic* reframing of resilience: Whereas early reports on the construct of resilience cast it as a rare trait held by extraordinary individuals, more recent work suggests that resilience is a common trait “that results... from the operation of basic human adaptational systems” (Masten, 2001, p. 227). One such basic system, we contend, is the capacity to experience positive emotions.

The association between resilience and positive emotions is supported by the network of correlates of resilience discovered across a range of self-report, observational, and longitudinal studies. This converging evidence suggests that resilient people have optimistic, zestful, and energetic approaches to life, are curious and open to new experiences, and are characterized by high positive emotionality (J. Block & Kremen, 1996; Klohnen, 1996). Although positive emotions are, no doubt, at times an outcome of resilient coping (J. Block & Kremen, 1996), other evidence suggests that resilient people may also use positive emotions to achieve their effective coping, indicating reciprocal causality. For instance, resilient people have been found to use humor (Masten, 1994; Werner & Smith, 1992; Wolin & Wolin, 1993), creative exploration (Cohler, 1987), relaxation (Anthony, 1987; Murphy & Moriarty, 1976), and optimistic thinking (Anthony, 1987; Murphy & Moriarty, 1976) as ways of coping. This diverse set of coping strategies has in common the ability to cultivate one or more positive emotions, such as amusement, interest, contentment, or hope, respectively. It is striking that resilient

people not only cultivate positive emotions in themselves to cope but are also skilled at eliciting positive emotions in close others (e.g., caregivers early in life and companions later on), which creates a supportive social context that also facilitates coping (Demos, 1989; Kumpfer, 1999; Werner & Smith, 1992).

Further investigating the possibility that resilient people use positive emotions to cope, in preliminary studies we found that people who score high on a self-report index of psychological resilience report experiencing more positive emotions in response to stressors, both in the laboratory and in daily life (Tugade & Fredrickson, 2002b). We have also found that these resilient people report finding more positive meaning within daily life stressors and exhibit faster returns to baseline levels of cardiovascular activation following laboratory stressors. More important, the experience of positive emotions at least partially mediates these beneficial correlates of resilience (Tugade & Fredrickson, 2002b).

Although the existing data suggest that resilient people may use positive emotions strategically or intelligently to achieve their superior coping outcomes (Tugade & Fredrickson, 2002a), the evidence is far from definitive. Earlier work by others did not track positive emotions directly but instead focused on coping strategies that are plausible precursors to positive emotions (e.g., humor, relaxation). Whereas recent work by us focused more directly on positive emotions, it examined only contemporaneous correlates of resilience, either in the laboratory or in retrospective assessments of a stressful life experience. As part of our ongoing research program on positive emotions and resilience, we had studied a sample of U.S. college students in early 2001. By retesting a subset of these students following the September 11th attacks, we were able to make an in-depth prospective assessment of the benefits of trait resilience and positive emotions in the wake of that crisis.

Hypotheses

Are positive emotions critical, active ingredients within trait resilience? We think so, and we unpack this general prediction into the following two hypotheses:

Hypothesis 1: Resilient people are buffered from depression by positive emotions.

We expect resilient people to experience fewer symptoms of depression following crises, and we hypothesize that this buffering effect is mediated by their more frequent postcrisis experience of positive emotions.

Hypothesis 2: Resilient people thrive through positive emotions.

Whereas crises can be expected to deplete people's psychological resources, resilient people thrive, showing a paradoxical increase in psychological resources (life satisfaction, optimism, and tranquility). We hypothesize that such postcrisis growth is also mediated by resilient people's more frequent postcrisis experience of positive emotions.

Method

Participants

Participants were college students and recent graduates of the University of Michigan drawn from a larger sample that had participated in a study on emotions between March and June of 2001. Participants in the parent study (N = 133) were recruited through newspaper and flyer advertisements and were paid $25 for a 2.5-hr study.[1] On September 20th, 2001, we recontacted participants in the parent study to recruit them for a follow-up study on reactions to and since

[1]In the parent study, psychophysiological, behavioral, and self-report data were obtained. The psychophysiological and behavioral data are unrelated to the current investigation and will be reported separately.

the September 11th attacks. Participants in the follow-up study (N = 47) were paid $10 for a 30-min questionnaire study.

A portion of the parent sample could not be reached by E-mail because addresses were unavailable or no longer valid (25 of 133, or 19%). Another portion, although reached by E-mail, replied that they no longer lived in the Ann Arbor area (9 of 133, or 7%). We calculated our response rate on the basis of the 99 remaining participants who were successfully contacted and presumably still lived in the Ann Arbor area. Of these, 68 (69%) replied by E-mail and expressed an interest in participating. These respondents were offered a range of times to participate, and eventually 47 of them did so, which represents a 47% response rate.

The eventual sample in the follow-up study included 18 men and 29 women between the ages of 18 and 25 (mean age = 20). Thirty (64%) indicated their ethnicity as White, 7 (15%) indicated it as Black, 6 (13%) indicated it as Asian or Pacific Islander, 2 (4%) indicated it as Hispanic, and 2 indicated it as another, unspecified ethnicity. Those in the follow-up sample (N = 47) did not differ from those in the parent sample who did not participate (n = 86) in age, sex, or ethnicity or on any of the reported precrisis variables, including resilience (all ps > .15).

Precrisis Measures

Trait resilience—J. Block and Kremen's (1996) ego-resiliency scale was used to assess psychological resilience, defined as "the capacity of the individual to effectively modulate and monitor an ever-changing complex of desires and reality constraints" (J. Block & Kremen, 1996, p. 359). The scale consists of 14 items, each responded to on a 4-point Likert scale (1 = *does not apply at all*, 4 = *applies very strongly*). Sample items include "I quickly get over and recover from being startled," and "I enjoy dealing with new and unusual situations." Those who score high on this measure are described as "personally secure and vital individual[s] who savor being" (J. Block & Kremen, p. 357). Coefficient alpha was .76 in the parent sample and .77 in the follow-up sample.

Trait affectivity—We used a shortened version of Costa and McCrae's (1992) NEO Five-Factor Inventory (NEO–FFI). The original NEO–FFI has five 12-item scales designed to measure the Big Five traits of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness (John, 1990). We selected the three 12-item measures of Neuroticism, Extraversion, and Openness because these traits have been linked to trait affectivity (Larsen & Ketelaar, 1991; Watson & Clark, 1992) and resilience (J. Block & Kremen, 1996). The 36 potentially self-descriptive items were rated on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). In the parent sample, coefficient alphas for Neuroticism, Extraversion, and Openness were .85, .79, and .71, respectively. In the follow-up sample, these values were .86, .73, and .77, respectively.

Psychological resources—Life satisfaction, a component of subjective well-being, was assessed by the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985). The SWLS contains five items, such as "I am satisfied with my life," which were rated on a 7-point scale (1 = *strongly agree*, 7 = *strongly disagree*). Coefficient alpha was .64 in the parent sample and .69 in the follow-up sample. Optimism was assessed by the Life Orientation Test (LOT; Scheier & Carver, 1985), which contains eight items, such as "In uncertain times, I usually expect the best." These items, along with four filler items, were rated on a 5-point scale (0 = *strongly disagree*, 4 = *strongly agree*). Coefficient alpha for the LOT was .83 in the parent sample and .84 in the follow-up sample. We also created a new mini-measure of tranquility by combining two filler items from the LOT that, at face value, index an individual's ability to achieve or remain calm: "It's easy for me to relax" and "I don't get upset too easily." The alpha reliability of these items was .70 in the parent sample and .65 in the follow-up sample.

To validate this new index, we correlated it with other precrisis measures used in the parent sample. We expected and found a strong negative association with Neuroticism ($r = -.53$, $p < .001$) and, because tranquility is one aspect of resilience, a moderate positive association with psychological resilience ($r = .36$, $p < .001$). Among baseline facial electromyography (EMG) measures,[2] this tranquility measure correlated negatively with corrugator activity ($r = -.20$, $p = .03$), suggesting that those scoring low on tranquility were more likely to have furrowed brows at rest (potentially unobservable), a facial marker of tension and negative affect (Cacioppo, Petty, Losch, & Kim, 1986).

Postcrisis Measures

Current mood—A modified single-item Affect Grid (Russell, Weiss, & Mendelsohn, 1989) was composed of a 9 × 9 matrix. Participants were instructed to place a check within the cell of the grid that best reflected how they were currently feeling along the two dimensions of valence and arousal. Emotion adjectives drawn mainly from circumplex models of emotion (Larsen & Diener, 1992; Russell, 1980) were placed at the midpoints of each side of the grid as well as at the four corners. These adjectives were (starting at the upper right corner and proceeding clockwise): joy/excitement, pleasantness, contentment/relaxation, sleepiness, sadness/depression, unpleasantness, anger/stress/anxiety, and *high arousal*.

Experienced problems and stresses—Participants were asked to consider "the most important problem or stressful situation … experienced since Tuesday, September 11th, 2001 … that was in some way related to the terrorist attacks on the United States" and to briefly describe the problem in their own words.

Finding positive meaning—Following prior work (Tugade & Fredrickson, 2002b), we measured the extent to which participants found positive meaning within their current problems and stressors. Five items composed the Positive Meaning Scale. Three were rated on a 4-point scale (0 = *definitely no*, 3 = *definitely yes*): "Did anything good come out of dealing with this problem?" "Do you feel that you might find benefit in this situation in the long-term?" and "Do you think it is likely that there is something to learn from this experience?" These items joined two others drawn from Moos's (1988) Coping Response Inventory, which were rated on a different 4-point scale (0 = *no*, 3 = *yes, fairly often*): "Did you try to see the good side of the situation?" and "Did you think about how this event could change your life in a positive way?" Respondents were also given the option of indicating that any item was "not applicable," which was scored as missing data. The internal reliability of this Positive Meaning Scale was acceptable ($\alpha = .73$).

Positive and negative emotions—We modified Izard's (1977) Differential Emotions Scale (DES) to assess experiences of discrete emotions. Building on preliminary work by Shiota and Keltner (2002), we supplemented the original DES with eight additional discrete positive emotions: amusement, awe, contentment, gratitude, hope, love, pride, and *sexual desire*. These joined *joy*, *interest*, and eight negative emotions plus *surprise*, all of which appear on the original DES. We also added an item to measure sympathy. Participants were asked to "think back to the September 11th attacks and the days that have passed since then" and report on how often they had felt each of 20 different emotions, including those both related and seemingly unrelated to the attacks (e.g., "I have felt grateful, appreciative, thankful"). Ratings

[2]Baseline recordings of facial EMG in the parent study proved useful for validating the new measure of tranquility. Facial EMG assessed even unobservable activity of the corrugator supercilli (COR), zygomaticus major (ZYG), and orbicularis occuli (ORB) muscles. Past research indicates that the COR tracks activity associated with tension and negative emotions, namely, the brow furrow, whereas the ZYG and ORB track activity associated with positive emotions, namely the lip corner raise and the cheek raise near the outer corner of the eye, respectively (Cacioppo, Petty, Losch, & Kim, 1986; Tassinary & Cacioppo, 1992). Continuous physiological recordings were made during an initial 90-s resting baseline phase at a sampling rate of 1,000 Hz and reduced off-line to create mean baseline levels.

were made on a 5-point scale (0 = *never*, 4 = *most of the time*). In addition to measuring discrete emotions, we used item analyses to create separate aggregate subscales for positive and negative emotions. The Positive Emotions subscale is a composite of 9 positive emotions (all but *awe*), with coefficient $\alpha = .79$. The Negative Emotions subscale is a composite of 7 negative emotions (all but *embarrassment*), with coefficient $\alpha = .69$.

Depressive symptoms—We assessed depressive symptoms with the 20-item Center for Epidemiological Studies–Depression Measure (CES-D; Radloff, 1977). On a 5-point scale, participants indicated how often they had felt each symptom since the September 11th attacks (0 = *never*, 4 = *most of the time*; e.g., "I was bothered by things that usually don't bother me," "I felt that I could not shake off the blues even with help from my family or friends"; $\alpha = .88$).

Psychological resources—We readministered measures used at precrisis to assess life satisfaction, optimism, and tranquility. At postcrisis assessment, coefficient alphas were .86, .86, and .62, respectively.

Procedures

In the parent study, participants were tested individually. After participants provided informed consent, physiological sensors were attached. After a 10-min adaptation period, participants were asked to relax for a 90-s baseline physiological assessment. After a series of films and behavioral tasks (see Footnote [1]), participants completed a packet of questionnaires that included the precrisis self-report measures.

In the follow-up study, participants were tested in small groups or individually. After informed consent, participants completed a questionnaire packet that included the postcrisis measures in the order listed above. The Affect Grid was administered twice, at the start of the packet and also after the CES-D. Day tested was recorded as days elapsed since September 11th, 2001. Testing began 12 days after the attack (on September 23rd, 2001), and 89% of the sample ($n = 42$) was tested within 24 days (by October 5th, 2001). The remaining 11% ($n = 5$) were tested between 37 and 56 days after the attacks (between October 18th and November 6th). National polls indicated that emotional turmoil among U.S. citizens continued throughout this data collection period (Gallup News Service, 2001) as news reports covered investigations into five mysterious bioterrorist deaths from anthrax (October 5th through November 21st), the 1st month of air strikes by U.S. and allied forces in Afghanistan (October 7th through November 7th), and a nation placed on high alert status for subsequent terrorism (October 11th).

Results

Experienced Problems and Stresses

To capture the stressors participants experienced, we culled a description of the problems they faced in the wake of the September 11th attacks from their open-ended responses. Fortunately, none in this sample lost a loved one in the attacks. Two participants reported that a friend or roommate had lost a loved one on September 11th. The most frequent problems, however, experienced by 26% of the sample, concerned fear of future terrorist attacks and the possibility of war. For instance, 3 participants mentioned a fear of flying. Two others mentioned a fear of a biochemical terrorist attack on the Michigan Stadium, which is the largest open-air sports arena in the United States and perhaps a conspicuous target during football games. Another mentioned concern that a brother who was in the Marines might go to war. The second most frequent problem, experienced by 23% of the sample, was concern about friends or relatives who lived or worked in New York City or Washington, DC. For instance, the father of 1 participant worked a block away from the Pentagon. Two others had immediate family members (a father, a brother) who worked in Manhattan. Others had friends or more distant

relatives in New York City. In the hours and days following the attacks, these friends and family members could not be reached to confirm their safety. Other frequent problems concerned trouble concentrating on studies (13%), helping friends deal with the stress of their unaccounted for friends and family (11%), and extreme emotional reactions to the events (8%). One participant's response illustrates this last category: “Thinking about the attacks produced uncontrollable shaking, an urge to cry, and high anxiety.” It is notable that these types of problems and stressors were unassociated with levels of resilience, indicating that individuals who scored higher and lower on resilience encountered comparable problems and stressors in the wake of the attacks.

Preliminary Analyses: Correlates of Resilience

Before testing our hypotheses,[3] we examined whether data from the current sample replicated correlates of resilience found in past research. Table 1 reports the means and standard deviations for targeted measures along with their zero-order correlations with trait resilience.[4] As seen in Table 1, our sample replicates known correlates of resilience. In particular, reflecting greater trait positive affectivity, resilience was negatively correlated with Neuroticism and positively correlated with Extraversion and Openness to Experience. Resilience was also positively correlated with measures of psychological resources, including life satisfaction, optimism, and tranquility, both before and after the September 11th crisis. Additionally, consistent with our past findings (Tugade & Fredrickson, 2002b), resilience was positively correlated with (a) finding positive meaning within current stressors, (b) pleasant mood during follow-up testing (as indexed by the mean valence score across the two administrations of the Affect Grid), and (c) frequency of positive emotions experienced in the aftermath of the September 11th attacks. Resilience was also negatively correlated with the frequency of negative emotions experienced in the aftermath of the attacks.

Finally, we found that resilience was negatively correlated with depressive symptoms. Another way to examine the association between resilience and depression is to split the sample by the cut-off score used to indicate clinically significant depressive symptoms, which for the CES-D is 16 (Myers & Weissman, 1980). By this criterion, 72% of participants (34 of 47) showed clinically significant depressive symptoms, comparable to levels reported in national polls following September 11th (Institute for Social Research, 2001; Pew Charitable Trusts, 2001). Resilience also showed a negative correlation with this dichotomous index of depression (point biserial $r = -.40$, $p < .002$).

To further unpack the associations between trait resilience and emotions, we also examined the emotion data by discrete emotions. Table 2 reports the means and standard deviations for discrete emotions along with their zero-order correlations with trait resilience.[5] As Table 2 shows, across all participants, the 3 most frequently experienced negative emotions were anger, sadness, and fear, a pattern consistent with reports from national polls following September 11th (Saad, 2001b). Further descriptive analysis revealed that 5 of the 8 negative emotions assessed (anger, sadness, fear, disgust, and contempt) yielded modal responses of 2, indicating that most participants experienced each of these discrete negative emotions at least “some of the time” in the days following the September 11th attacks. The 3 most frequently experienced positive emotions were gratitude, interest, and love. Eight of the 10 positive emotions assessed (gratitude, interest, love, amusement, joy, hope, sexual desire, and pride) yielded modal

[3]Because our hypotheses are directional, all reported *p* values are one-tailed unless otherwise noted.

[4]We also computed partial correlations between each target measure and resilience, controlling for sex of participant and day tested (individually, and in conjunction). Because patterns of significance were unaltered when these control variables were partialed out, Table 1 reports only the zero-order correlations.

[5]We also computed partial correlations between discrete emotions and resilience, controlling for sex of participant and day tested (individually, and in conjunction). Again, however, because patterns of significance were unaltered when these control variables were partialed out, Table 2 reports only the zero-order correlations.

responses of 2 or higher,[6] indicating that most participants experienced each of these discrete positive emotions at least "some of the time" following the attacks. The emotion of sympathy, which is not easily categorized as either positive or negative,[7] was the most frequently experienced emotion overall, with a modal response of 3, indicating that, after the attacks, most participants experienced sympathy "often."

Trait resilience was negatively correlated with experiences of only two negative emotions, namely, anger and sadness (see Table 2). To assess whether high- and low-resilient participants were equally represented among those who frequently experienced the five most common negative emotions, we divided participants at the median on resilience (*Mdn* = 41) and at the modes of reported emotion frequency (mode = 2). Chi-square analyses revealed that high- and low-resilient participants were equally represented among those who reported frequent anger, fear, disgust, and contempt, all $\chi^2(1, N = 47) < 3.14$, all *ns*. The only difference in frequency of experience was obtained for sadness, $\chi^2(1, N = 47) = 5.11$, $p = .024$. This pattern of results suggests that, on the whole (with the exception of sadness), respondents who were higher and lower on resilience experienced comparable and frequent negative emotions following the September 11th attacks.

By contrast, trait resilience was positively correlated with experiences of six positive emotions, including interest, joy, hope, sexual desire, pride, and contentment (see Table 2). It is interesting that two of the three most frequent positive emotions— gratitude and love—were uncorrelated with trait resilience, suggesting that they were comparably frequent among those who were lower and higher on resilience. Even so, the many positive correlations between trait resilience and discrete positive emotions suggest that, intermixed with their frequent experiences of anger, fear, disgust, and contempt following the attacks, participants who were higher on resilience also frequently experienced a wide variety of discrete positive emotions.

Finally, trait resilience was uncorrelated with sympathy, and a chi-square analysis revealed that high- and low-resilient participants were equally represented among those who reported very frequent sympathy (greater than 3), $\chi^2(1, N = 47) = 0.00$, *ns*. From this we can conclude that, following the attacks, those who were lower and higher on resilience were comparably and often moved by the suffering of others.

Hypothesis 1: Resilient People Are Buffered From Depression by Positive Emotions

We hypothesized that experiences of positive emotions in the aftermath of crises would mediate the beneficial effect of trait resilience on symptoms of depression. Kenny, Kashy, and Bolger (1998) described four steps to determine whether mediation occurs. Step 1 is to show a significant correlation between predictor and outcome (here, between trait resilience and depressive symptoms). Step 2 is to show a significant correlation between predictor and mediator (here, between trait resilience and positive emotions). Table 1 shows that these two steps are met.

Steps 3 and 4 are accomplished with one regression analysis, with the outcome as dependent variable (here, depressive symptoms) and with the mediator and predictor entered simultaneously as independent variables (here, positive emotions and trait resilience, respectively). Step 3 is that the mediator affects the outcome when the predictor is controlled for. Consistent with Step 3, positive emotions were associated with depressive symptoms when we controlled for trait resilience ($\beta = -.45$), $t(44) = -2.67$, $p < .01$. Step 4 determines whether

[6]The mode was 3 for gratitude and interest.

[7]Although neither sympathy nor surprise is easily classified as a negative or positive emotion, in the context of this crisis, both emotions were correlated with the negative emotion composite (sympathy: $r = .50$, $p < .001$; surprise: $r = .34$, $p = .021$, both two-tailed) and not the positive emotion composite (both rs $< -.07$, *ns*).

complete or partial mediation has occurred; complete mediation is indicated by the effect of the predictor (trait resilience) on the outcome (depressive symptoms) being completely removed when the mediator (positive emotions) is controlled. If Steps 1–3 are satisfied but Step 4 is not, partial mediation is indicated. The data indicate full mediation: Trait resilience was no longer a significant predictor of depressive symptoms when positive emotions were controlled ($\beta = .02$; $t < 1.00$, *ns*). Figure 1 illustrates this mediational model. These findings provide clear support for Hypothesis 1: Experiences of positive emotions appear to be critical, active ingredients that buffer resilient people from depression in the aftermath of crises.

To determine whether the causal path implied in Figure 1 represents the most viable interpretation of the data, we also tested several alternative models of mediation. The first alternative model tested the discriminant validity of the positive emotions variable by testing whether trait resilience might in fact mediate the negative association ($r = -.44$, $p < .001$) between positive emotions (as predictor) and depressive symptoms (as outcome). This alternative model was in fact tested in Step 3 above. The mediator (here, trait resilience) did not affect depressive symptoms when we controlled for positive emotions ($\beta = .02$; $t < 1.00$, *ns*).

A second alternative model also tested the discriminant validity of the positive emotions variable, this time by testing whether negative emotions, which are inversely related to positive emotions ($r = -.54$, $p < .001$), might also mediate the relationship between trait resilience and depressive symptoms. For this analysis, we calculated a purified index of negative emotions that removed its shared variance with positive emotions. Although this residualized measure of negative emotions was found to correlate with depressive symptoms ($r = .26$, $p < .05$), it did not correlate with trait resilience ($r = .08$, *ns*), failing to satisfy Step 2, and, when added to the regression equation to test Steps 3 and 4, it did not reduce the association between trait resilience and depressive symptoms ($\beta = -.27$), $t(44) = -1.90$, $p < .05$.

A third alternative model tested whether the depressive symptoms experienced by low-resilient individuals might prevent the experience of positive emotions. This alternative model positions depressive symptoms as the mediator accounting for the positive association between trait resilience (predictor) and positive emotions (outcome). Table 1 shows that Steps 1 and 2 are met for this alternative model (as they were for our Hypothesis 1). Steps 3 and 4 were tested using a regression equation in which positive emotions were the dependent variable, with trait resilience and depressive symptoms entered simultaneously as independent variables. No evidence of mediation was obtained. Trait resilience remained a strong predictor of positive emotions even when depressive symptoms were controlled ($\beta = .52$), $t(44) = 4.42$, $p < .001$.

The null effects for these three alternative models support the discriminant validity of our index of positive emotions as a mediator of the pathway from high trait resilience to low depressive symptoms and strengthen our confidence in the causal order implied within the hypothesized model presented in Figure 1.

Hypothesis 2: Resilient People Thrive Through Positive Emotions

Whereas crises can be expected to deplete people's psychological resources, resilient individuals are hypothesized to thrive, showing a paradoxical increase in psychological resources, a pattern of postcrisis growth that we hypothesize is mediated by the experience of positive emotions. To test this hypothesis, we first estimated changes in psychological resources (life satisfaction, optimism, tranquility) by computing the standardized residuals of postcrisis psychological resources when regressed on their respective precrisis measures. We then computed a composite score (termed *residual resources*) for changes in psychological resources by summing the standardized residuals for each of the three individual resources.

Again following Kenny et al.'s (1998) four steps for testing whether mediation occurs, we learned that Step 1 is satisfied by the correlation between trait resilience (predictor) and residual resources (outcome; $r = .27$, $p < .05$).[8] As seen earlier, Step 2 is also satisfied by the correlation between trait resilience (predictor) and positive emotions (mediator; $r = .59$, $p < .001$). We then assessed Steps 3 and 4 by computing the regression equation with residual resources as the dependent variable and trait resilience and positive emotions entered simultaneously as independent variables. Consistent with Step 3, positive emotions were associated with increases in psychological resources when we controlled for trait resilience ($\beta = .48$), $t(43) = 2.88$, $p < .01$. Step 4 was also satisfied, indicating complete mediation: Trait resilience was no longer a significant predictor of increases in psychological resources when positive emotions were controlled ($\beta = -.01$; $t < 1.00$, *ns*). Figure 2 illustrates this mediational model. It suggests that precrisis psychological resilience predicted increases in psychological resources from pre- to postcrisis and that this postcrisis change is fully mediated by participants' postcrisis experiences of positive emotions.

Again, to determine whether the causal path implied in Figure 2 represents the most viable interpretation of the data, we also tested several alternative models of mediation. As before, the first alternative model tested the discriminant validity of the positive emotions variable by testing whether trait resilience might in fact mediate the positive association ($r = .47$, $p < .001$) between positive emotions (as predictor) and residual resources (as outcome). This alternative model was tested in Step 3 above. The mediator (here, trait resilience) did not affect residual resources when we controlled for positive emotions ($\beta = -.01$; $t < 1.00$, *ns*).

A second alternative model also tested the discriminant validity of the positive emotions variable, again by testing whether a purified index of negative emotions might also mediate the relationship between trait resilience and residual resources. As seen in the second alternative model for Hypothesis 1, the residualized measure of negative emotions did not correlate with trait resilience ($r = .08$, *ns*), nor did it correlate with residual resources ($r = .08$, *ns*), and, when added to the regression equation to test Steps 3 and 4, it did not reduce the association between trait resilience and residual resources ($\beta = .27$), $t(43) = 1.82$, $p < .05$.

A third alternative model tested whether the posttraumatic growth in resources experienced by high trait resilient individuals might account for their experiences of positive emotions. This alternative model positions residual resources as the mediator accounting for the positive association between trait resilience (predictor) and positive emotions (outcome). Steps 1 and 2 are met for this alternative model (as they were for our preferred model, stated in Hypothesis 2). Steps 3 and 4 were tested using a regression equation in which positive emotions were the dependent variable, with trait resilience and residual resources entered simultaneously as independent variables. No evidence of mediation was obtained. Trait resilience remained a strong predictor of positive emotions even when residual resources were controlled ($\beta = .50$), $t(43) = 4.29$, $p < .001$.

The null effects for these three alternative models again support the discriminant validity of our index of positive emotions as a mediator of the pathway from high trait resilience to posttraumatic growth in psychological resources and strengthen our confidence in the causal order implied within the hypothesized model presented in Figure 2.

[8]To support our interpretation of this correlation as indicative of postcrisis growth among high trait resilient participants, we also calculated the unstandardized residuals for each individual resource (life satisfaction, optimism, and tranquility). A median split on the trait resilience variable showed that participants classified as high resilient, on average, exhibited positive values for each resource indicative of growth, whereas those classified as low resilient exhibited, on average, negative values indicative of decline.

Discussion

The September 11th terrorist attacks on the United States shook the emotions of U.S. citizens. Indeed, the emotional responses of the small sample of U.S. college students studied here mirror those depicted in national polls that followed the attacks. The sample studied here—like most U.S. citizens—experienced considerable anger, sadness, and fear in the days and weeks after September 11th. And, as for U.S. citizens more generally, signs of depression were common, experienced by 72% of the students tested. Yet within this dense cloud of anguish, a silver lining shimmered: Positive emotions emerged as well. Following the attacks, alongside considerable distress and sympathy, our sample reported frequent experiences of gratitude, interest, and love, among other positive emotions. After September 11th, nonbereaved U.S. citizens were likely feeling grateful for their own safety and for the safety of their loved ones and motivated to count their blessings. And from their position of relative safety, these U.S. citizens were likely feeling keenly interested both in the terrorist attacks themselves, horrifying and mysterious as they were, and also in the world's unfolding reactions to them. And when not counting blessings or absorbing news media, U.S. citizens were likely feeling newfound love for friends and family and the urge to express it. Although our participants experienced these and other positive emotions frequently after the September 11th attacks, some people experienced interest and other pleasant states more than did others—namely, those individuals with preexisting high trait resilience. Plus, analyses suggest that positive emotions were critical active ingredients that helped resilient people to thrive despite the emotional blows delivered by the September 11th attacks.

Trait Resilience Unpacked

Replicating prior research, we found that trait resilience was associated with a range of psychological benefits, both in day-to-day life and in coping with crises. First, people scoring high on trait resilience share a set of affect-related traits—low neuroticism coupled with high extraversion and high openness—that predispose them toward positive affectivity. Second, trait resilience—which itself can be considered a psychological resource—is associated with a host of other psychological resources, including life satisfaction, optimism, and tranquility. These are each enduring resources that can be drawn on time and again as people respond to their ever-changing circumstances. Third, people scoring higher on trait resilience were more likely to find positive meaning within the problems they faced as a result of the September 11th attacks. Fourth, people scoring higher on trait resilience endured fewer depressive symptoms following the attacks. And, most critical, those scoring high on trait resilience experienced more positive emotions: They were in better moods when tested and reported that since the attacks, they had experienced positive emotions more frequently (and negative emotions somewhat less frequently) than did their less resilient peers.

Examining the interrelations among these various correlates of resilience, we found—as hypothesized—that people's experiences of positive emotions after the September 11th attacks could fully account for the relation between preexisting trait resilience and the later development of depressive symptoms. In other words, positive emotions appear to be a core active ingredient that buffers resilient people against depression in the aftermath of crises. We also examined the relationship between trait resilience and postcrisis growth in psychological resources. We targeted a set of psychological resources closely related to resilience itself, including life satisfaction, optimism, and tranquility, and measured them both before and after the crisis. We found—as hypothesized—that trait resilience predicted increases in these psychological resources and that this association was fully mediated by postcrisis experiences of positive emotions. So although crises can be expected to deplete people's psychological resources—indeed, national polls indicated that few people felt hopeful about the future after September 11th—resilient people appear to bounce back stronger than before. In other words,

positive emotions may have helped resilient people to thrive after this crisis. They emerged from their anguish more satisfied with life, more optimistic, more tranquil—and likely more resilient—than before. Because positive emotions are commonplace, indeed, part of our universal human nature (Fredrickson, 1998), this finding aligns with Masten's (2001) portrayal of resilience as ordinary magic that arises from the unencumbered operation of basic human adaptational systems.

The evidence that positive emotions are critical active ingredients within trait resilience also aligns with the broaden-and-build theory of positive emotions (Fredrickson, 1998, 2001). In brief, this theory states that positive emotions are unique and adaptive because, in the moment, they broaden people's thought–action repertoires, and, over time and through such broadening, they build people's enduring physical, social, intellectual, and psychological resources. Past laboratory experiments have shown that induced positive emotions not only broaden the scopes of attention and thinking (Fredrickson & Branigan, 2002; Isen et al., 1985; Kahn & Isen, 1993) but also facilitate attention to and processing of important, self-relevant information (Reed & Aspinwall, 1998; Trope & Pomerantz, 1998). These laboratory experiments are complemented by longitudinal studies that link positive emotions to more effective coping, marked both by finding positive meaning within problems (Moskowitz, 2001) and by taking broad perspectives on those problems (Fredrickson & Joiner, 2002). Drawing on this past evidence, we suggest that the more frequent positive emotions experienced by resilient individuals in the present study broadened their attention and thinking and that this cognitive broadening in turn enabled the more effective coping that buffered against depression and fueled thriving.

It is notable that, consistent with prior research (Folkman, 1997; Tugade & Fredrickson, 2002b), we found that the experiences of resilient individuals were not exclusively positive. Just like their less resilient counterparts, they faced problems and stresses as a result of the September 11th attacks, experienced anger, fear, disgust, and contempt at least “some of the time,” and experienced sympathy “often.” Even so, relative to their less resilient peers, resilient people experienced their negative emotions and sympathy as intermixed to a greater degree with a range of positive emotions. It was not the case, then, that resilient individuals merely replaced unpleasant with pleasant feelings and exhibited no concern for the events of September 11th. Instead, the data show that resilient people offset their negative experiences with positive ones: They were deeply moved by this national tragedy but not overwhelmed by it.

Moreover, the benefits gained from thriving in the aftermath of trauma can be applied to new experiences and future events, leading to more effective subsequent functioning (Carver, 1998). That is, people who have thrived in the face of crisis may learn new skills and knowledge, gain confidence and mastery in their abilities to cope with future events (Aldwin, Sutton, & Lachman, 1996; Calhoun & Tedeschi, 1998; Park, 1998), and achieve enhanced physical health functioning (Epel, McEwen, & Ickovics, 1998). Thus, by broadening people's momentary thought–action repertoires, positive emotions not only build enduring personal resources but, in the face of traumatic events, also help rebuild resources shattered by crises and make these resources even stronger (Saakvine, Tennen, & Affleck, 1998; Tennen & Affleck, 1999). An upward spiral toward enhanced well-being and further growth then becomes more probable (Fredrickson & Joiner, 2002).

Implications

The findings reported here have a range of implications. First, they add force to recent efforts to situate positive emotions within models of stress and coping (e.g., Folkman, 1997; Folkman & Moskowitz, 2000). Classic theoretical depictions notwithstanding, positive emotions do not disappear during times of acute and chronic stress. The work reported here joins past work

(e.g., Keltner & Bonanno, 1997; Stein et al., 1997) in demonstrating that positive emotions are indeed present and functional during crises, just as they are in other circumstances. Second, together with related research (e.g., Fredrickson, Mancuso, et al., 2000; Fredrickson & Joiner, 2002), our findings suggest that efforts to cultivate and nurture positive emotions in the aftermath of crises pay off both in the short-term, by improving subjective experiences, undoing physiological arousal, and enhancing broad-minded coping, and in the long-term, by minimizing depression and building enduring resources, the hallmark of thriving.

Seeking these alluring payoffs begs the question of how to cultivate positive emotions in crises. Noting that emotions cannot be instilled directly (Fredrickson, 2000), and drawing on recent work by Folkman and colleagues (Folkman, 1997; Folkman & Moskowitz, 2000; Park & Folkman, 1997), we suggest that finding positive meaning may be the most powerful leverage point for cultivating positive emotions during times of crisis. Holding spiritual or religious beliefs or otherwise appreciating the meaning of life on philosophical levels can increase people's likelihood of finding positive meaning (Folkman, 1997; Frankl, 1959; Fredrickson, 2002a; Park & Folkman, 1997). Yet with or without the infusion of religion, people can find positive meaning in daily life by reframing adverse events in a positive light, infusing ordinary events with positive value, and pursuing and attaining realistic goals (Folkman, 1997). And in contexts of therapy, clinicians might cultivate positive emotions by training clients in relaxation (Fredrickson, 2000, 2002b), assigning them to engage in their favorite pleasant activities (Fredrickson, 2002b; Lewinsohn & Gotlib, 1995), and asking patients to discuss their past best of times (Joiner et al., 2001), clinical efforts that appear to accelerate the treatment process.

Concluding Remarks

Because positive emotions are subtle and fleeting experiences, it is often difficult to envision them as having much importance. Yet, as Folkman (1997) has argued, positive emotions “may not need to be intense or prolonged to produce beneficial effect” (p. 1218). Indeed, here we saw that amidst the emotional turmoil generated by the September 11th terrorist attacks, subtle and fleeting experiences of gratitude, interest, love, and other positive emotions appeared to hold depressive symptoms at bay and fuel postcrisis growth. It is our hope that these findings, together with the broaden-and-build theory more generally, might elevate people's assessm0ent of positive emotions, allowing them to see positive emotions as active ingredients within trait resilience and within the human quest to thrive and flourish despite adversity and attack.

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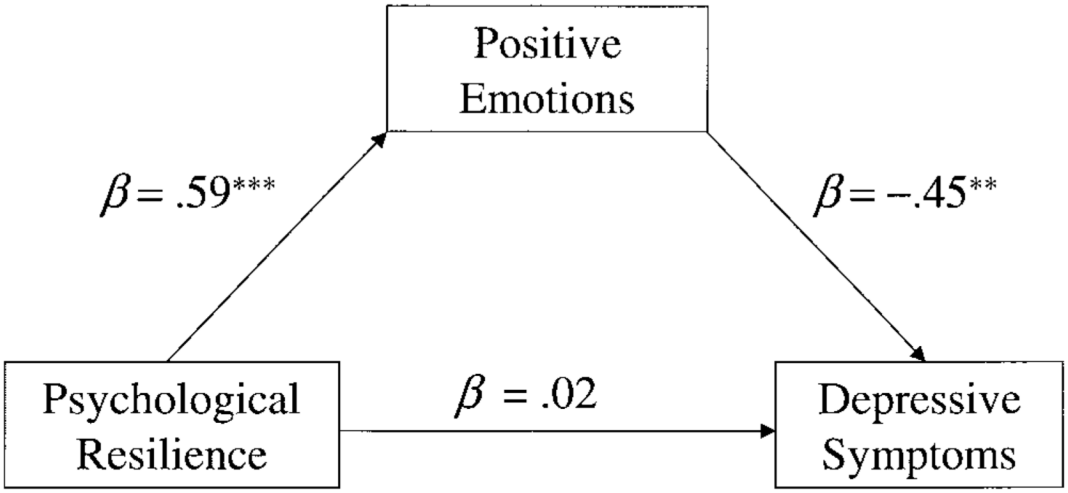

Figure 1.
Beta coefficients for the pathways among precrisis resilience, postcrisis positive emotions, and depressive symptoms. ** $p < .01$. *** $p < .001$.

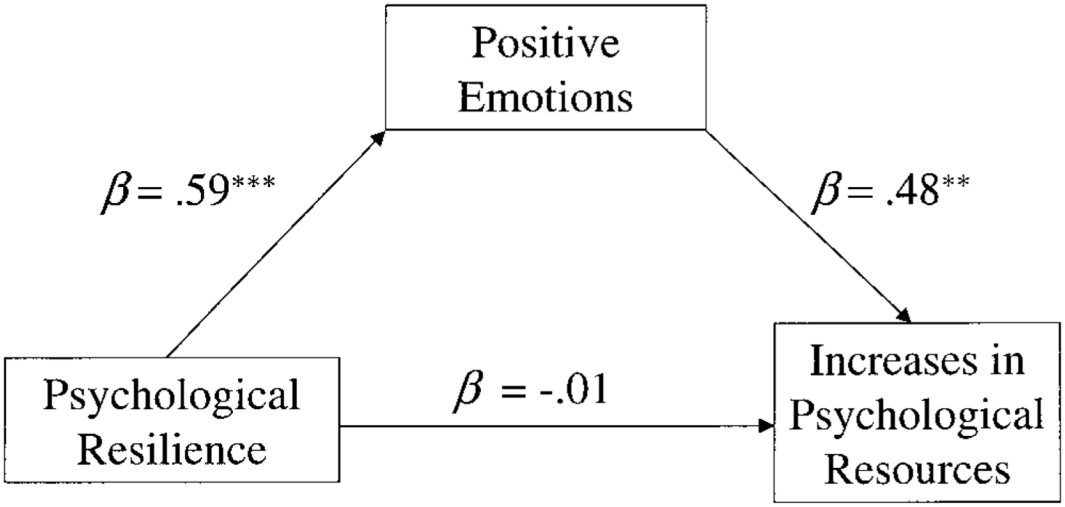

Figure 2.
Beta coefficients for the pathways among precrisis resilience, postcrisis positive emotions, and postcrisis growth in psychological resources. ** $p < .01$. *** $p < .001$.

Table 1

Pre- and Postcrisis Correlates of Resilience

Variable	*M*	*SD*	Zero-order correlation with resilience
	Precrisis measures		
Resilience	41.13	5.93	
Neuroticism	2.91	0.66	−.50***
Extraversion	3.45	0.48	.60***
Openness	3.59	0.58	.49***
Life satisfaction	5.55	0.58	.35**
Optimism	2.33	0.68	.41**
Tranquility	2.22	0.85	.33*
	Postcrisis measures		
Life satisfaction	4.80	1.32	.32*
Optimism	2.43	0.67	.35**
Tranquility	2.21	0.92	.50***
Positive meaning	1.68	0.66	.44***
Mood valence	0.41	1.53	.32*
Positive emotions	2.25	0.57	.59***
Negative emotions	1.58	0.53	−.25*
Depressive symptoms	25.34	10.95	−.24*

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2

Frequency of Discrete Emotions Experienced in the Aftermath of the September 11th Attacks and Their Correlations With Resilience

Emotion terms	*M*	*SD*	Zero-order correlation with resilience
	Negative emotions		
Angry/irritated/annoyed	2.32	0.72	−.44***
Sad/downhearted/unhappy	1.98	0.94	−.29*
Scared/fearful/afraid	1.89	1.05	−.19
Disgust/distaste/revulsion	1.77	0.96	−.09
Contemptuous/scornful/disdainful	1.56	1.05	−.14
Embarrassed/self-conscious/blushing	1.19	0.95	−.08
Repentant/guilty/blameworthy	0.77	0.81	.16
Ashamed/humiliated/disgraced	0.77	0.73	−.03
	Positive emotions		
Grateful/appreciative/thankful	2.89	0.86	.13
Interested/alert/curious	2.51	1.02	.46***
Love/closeness/trust	2.47	1.02	.16
Amused/fun-loving/silly	2.26	0.85	.18
Glad/happy/joyful	2.17	0.76	.52***
Hopeful/optimistic/encouraged	2.13	0.80	.40**
Sexual/desiring/flirtatious	2.11	1.05	.52***
Proud/confident/self-assured	1.96	0.95	.41**
Content/serene/peaceful	1.79	1.02	.47***
Awe/wonder/amazement	1.68	1.00	.06
	Other emotions		
Sympathy/concern/compassion	3.15	0.86	−.07
Surprised/amazed/astonished	2.00	1.00	.10

Note. Frequency of emotions experienced was rated on an anchored 5-point scale on which 0 = *never* and 4 = *most of the time*. Emotions, within category, are listed here in the order of their rated frequency across the entire sample.

* $p < .05$.

** $p < .01$.

*** $p < .001$.