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Adapting to life's slings and arrows: Individual differences in resilience when recovering from an anticipated threat ☆

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Abstract

Following highly negative events, people are deemed resilient if they maintain psychological stability and experience fewer mental health problems. The current research investigated how trait resilience [Block, J., & Kremen, A. M. (1996). IQ and ego-resiliency: Conceptual and empirical connections and separateness. *Journal of Personality and Social Psychology, 70*(2), 349–361, ER89] influences recovery from anticipated threats. Participants viewed cues ('aversive', 'threat', 'safety') that signified the likelihood of an upcoming picture (100% aversive, 50/50 aversive/neutral, or 100% neutral; respectively), and provided continuous affective ratings during the cue, picture, and after picture offset (recovery period). Participants high in trait resilience (HighR) exhibited more complete affective recovery (compared to LowR) after viewing a neutral picture that could have been aversive. Although other personality traits previously associated with resilience (i.e., optimism, extraversion, neuroticism) predicted affective responses during various portions of the task, none mediated the influence of trait resilience on affective recovery.

Keywords: Resilience; Emotion regulation; Recovery; Relief; Anticipation

1. Introduction

Man never made any material as resilient as the human spirit—Bern Williams

When anticipating a possible negative event, previous research has shown that a person's response to the occurrence of the anticipated negative event will depend in part on their trait resilience—the ability to adapt to life's ever-changing landscape and recover quickly from stressors (Block & Kremen, 1996). There is a large

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corpus of evidence that shows that resilient people adapt more successfully in response to major life events (Moskowitz, Folkman, Collette, & Vittinghoff, 1996; Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000) and traumatic experiences (Florian, Mikulincer, & Taubman, 1995; Fredrickson, Tugade, Waugh, & Larkin, 2003). However, there is little research on how people recover when anticipated negative events *do not* happen, and whether this type of recovery also interacts with trait resilience.

Although trait resilience encompasses the capacity to respond effectively to change, very few investigators have focused on the recovery from the anticipation of a negative event that then does not occur. It is, however, an important question to investigate. Part of being able to adapt to ever-changing circumstances is the ability to allocate emotional (as well as physical and intellectual) resources efficiently (Block & Kremen, 1996), by employing these limited resources (Muraven & Baumeister, 2000) only during demanding situations for which they are needed to cope. Coping with the anticipation of a possible negative event involves employing attentional resources to detect the threat (Ohman, Flykt, & Esteves, 2001), and physiological resources to prepare the body to respond to the threat (Paterson & Neufeld, 1987). Recovering successfully when that threat is unrealized may replenish these resources (Muraven & Baumeister, 2000), thus fueling coping efforts for the next demanding situation.

We propose that trait resilience is associated with this ability to efficiently regulate emotional resources, thereby leading to quick and efficient recovery when anticipated negative events do not occur. In the rest of this introduction, we outline the logic and support for this proposition.

1.1. Resilience

Psychology researchers have long understood that trauma and major life stressors can lead to poor mental health, social functioning, and even psychopathology. Less well understood is the fact that most people experience trauma and major life stressors and do not develop poor mental health and psychopathology (Bonanno, 2004). In some circumstances, people even seem to thrive despite their difficult experiences (Tedeschi & Calhoun, 2004). For example, in a longitudinal study of Kauai children spanning five decades, researchers found that on the whole, children who grew up in poverty were more likely to have poor health and development outcomes. However, a striking finding was that within this subset of 'at-risk' children, a certain percentage never developed problems, and indeed seemed to thrive in their environments and became very successful (Werner & Smith, 1992, 2001). These individuals were dubbed 'resilient' because they were able to adapt to life's stressors and thrive despite them (Block & Kremen, 1996).

Research on resilience has blossomed in the last several years, in large part due to its relevance for mental health. Bonanno et al. (2002) found that those people who describe themselves as resilient before their loved one passed away were less likely to have enduring grief symptoms at and 4 and 18 months after the loved one's death. They did experience cognitions consistent with grieving (e.g., thoughts of loss, rumination), but unlike nonresilient people, were able to continue functioning in their lives (Bonanno et al., 2002). Klohnen (1996) derived a self-report measure of resilience based on the work of Block and Block (1980), and found that it correlated highly with global adjustment, work and social adjustment, and psychological/physical health adjustment (Klohnen, 1996).

In the current research, we treat resilience as a stable and enduring psychological trait. Our definition of trait resilience follows closely with that of Block and Kremen (1996) who describe a continuum of resilience, on which high ego-resilient people are characterized by their ability to exert appropriate and dynamic self-regulation, whereas low ego-resilient people (i.e., ego-brittle) tend to rigidly under or over self-regulate. This ability to dynamically and appropriately self-regulate allows high trait resilient people to adapt more quickly to changing circumstances. Conceptualizing resilience as a personality trait contrasts with an alternative view of resilience as an ordinary, universal component of personality (Bonanno, 2004; Bonanno, Wortman, & Nesse, 2004; Bonanno et al., 2002; Masten, 2001). According to this line of thought, most people have within themselves the ability to be resilient, and that resilience itself is the result of normal adaptive functioning. However, while most individuals may exhibit resilient behavior at one time or another in their lives, treating resilience as a trait accounts for significant individual differences in the capacity to adapt in the face of trauma and stress given the same risks (e.g. low SES; Werner & Smith, 1992, 2001), or a similarly extreme negative life event (e.g. combat, Florian et al., 1995), as well as the fact that these individual differences may be present as early as birth (Caspi et al., 2003).

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1.2. Recovery

Factors associated with resilience are associated with successful recovery from negative events. In a study examining the duration of people's emotional response to a negative video, people high in extraversion and emotional stability (traits related to resilience; Fredrickson et al., 2003) showed quicker affective recovery than people low in these traits (Hemenover, 2003). In another study, those participants with greater asymmetry of left-brain activation at baseline, shown to be associated with well-being (Urry et al., 2004) and positive affectivity (Davidson, 1992), recovered more quickly to an aversive picture as measured by their attenuated startle blink magnitude at the offset of the picture (Jackson et al., 2003).

Recovering from negative experiences may be one avenue through which resilient people are able to actively maintain homeostasis in the face of adversity. Note that we define recovery broadly, as the return to homeostasis after any disrupting event, whether that event causes significant psychopathology or not. In this way, resilient people may experience normal levels of negative emotions and physiological distress in response to stressful situations (Tugade & Fredrickson, 2004), but for them to actively maintain homeostasis, they would need to recover from these normal stress responses. This notion is similar to the idea of allostasis—maintaining stability through change (McEwen, 2003). According to McEwen (2003), physiological systems such as glucocorticoids (e.g. cortisol; Sapolsky, Romero, & Munck, 2000), adrenaline, and cytokines can produce changes in physiology that are adaptive in the short term. Yet if these processes are not turned off, they can lead to allostatic load, the process by which tissue can become damaged through chronic activation of these hormones (McEwen, 1998). In this case, recovery and resilience are part and parcel of the same system. Namely, that part of resilience (maintaining stability through change) is the successful recovery from stressors. Doing so allows physiological and emotional systems to reset, which subsequently prevents allostatic load, tissue damage, and psychopathology.

1.3. Recovery when an anticipated negative does not occur

Evidence is beginning to accrue to suggest that trait resilience is also associated with successful recovery when an anticipated negative event does not occur. In a study investigating physiological recovery from stress, people anticipated having to give a speech and were then informed that they did not have to give the speech. Those participants identified as high on trait resilience had faster cardiovascular recovery times (returns to baseline) compared to low trait resilient participants (Tugade & Fredrickson, 2004). In a neuroimaging study, high trait resilient participants exhibited less duration of activity (than low trait resilient participants) in the insula, a brain region associated with negative emotion, after anticipating a possible aversive picture, but viewing a neutral picture instead (Waugh, Wager, Fredrickson, Noll, & Taylor, 2008).

The goal of the current research was to extend these studies to investigate whether this physiological recovery translates into affective recovery. Affective recovery has been traditionally more elusive to measure than physiological recovery. Physiological changes are usually tracked continuously, allowing investigators to readily define a pre-event baseline and measure the system's return to that baseline. Affect, on the other hand, is usually measured at discrete time points, and the measurement of affective recovery has followed suit (Hemenover, 2003; Jackson et al., 2003). In the current study, we attempted to mimic physiological measurements by having participants continuously rate their affect throughout all portions of the trial, a procedure previously shown to exhibit strong coherence with other aspects of emotional experience including physiology (Gottman & Levenson, 1985; Mauss, Levenson, McCarter, Wilhelm, & Gross, 2005).

In both of the previously mentioned studies, the anticipation of the pending negative experience played an important role in the differential recovery shown by low and high resilient participants. In the cardiovascular study, more positive emotions while anticipating having to give a speech mediated the influence of resilience on faster recovery (Tugade & Fredrickson, 2004). In the neuroimaging study, activation in the lateral orbitofrontal cortex, a brain region associated with negative expectations (Ursu & Carter, 2005), predicted the duration of the activation in the insula when the negative experience did not occur (Waugh et al., 2008). However, neither of these studies measured anticipatory affect directly; it was measured either retrospectively (Tugade & Fredrickson, 2004), or not at all (Waugh et al., 2008). Another goal of the current study was to go beyond these previous studies to measure anticipatory affect continuously, aided by the continuous affective rating measure.

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Our first and main hypothesis was that people high in trait resilience would demonstrate more complete affective recovery when an anticipated negative event does not occur. To examine this hypothesis, participants were presented with one of three cues: the 'safety' cue indicated that a neutral picture would follow, the 'threat' cue indicated that either a neutral or aversive picture would follow, and the 'aversive' cue that indicated that an aversive picture would follow. Participants used a rating dial to continuously rate their affect from negative to positive throughout each portion of the task. This method allowed us to measure anticipation of and recovery from threat, as well as their interaction with trait resilience.

Our second hypothesis was that high trait resilient participants would more quickly learn to adapt to the demands of the task. More specifically, compared to low trait resilient participants, those high in trait resilience would show the affective recovery effect earlier in the task. To test this hypothesis, the task was comprised of two sessions separated by a 1-min rest period, which allowed for the analysis of learning effects across sessions. Quicker adaptation for high resilient people may present itself as one of two patterns in the current study. If the particular demands of this task are high enough that it takes all participants several trials to show any evidence of learning, then high and low trait resilient participants may appear similar in their recovery for the first session, and then diverge during the second session (with high trait resilient participants becoming better at recovering). An alternative possibility exists if the demands of this task are low enough that high trait resilient participants are able to quickly learn and adapt, thus exhibiting greater recovery during the first session; whereas it may take low trait resilient participants until the second session to 'catch up' and show similarly good recovery.

Trait resilience is often treated as a personality profile (Block & Kremen, 1996) related to high optimism, extraversion, openness to experience, and low neuroticism (Block & Kremen, 1996; Fredrickson et al., 2003; Klohnen, 1996). We also included these personality scales to assess whether any effects of this profile of trait resilience on recovery might be mediated by these more 'core' personality traits.

2. Method

2.1. Participants

Of the 72 participants (45 females), 43 participants were recruited through flyers advertising a study on "personality and emotion", and 29 participants were recruited through introductory psychology subject pool at a large Midwestern university. Participants recruited through the flyer completed a web-based prescreening in which they completed a measure of resilience, the ER89 (Block & Kremen, 1996; see description under Section 2.2). Participants recruited through the introductory psychology subject pool completed a shortened 7-item version of the ER89 in class. We oversampled the ends of the distribution on the ER89 to ensure that the sample sufficiently represented participants at both tails of trait resilience (very high to very low), and to more closely resemble the upper and lower quartile selection techniques used in previous studies (Waugh, Wager, Fredrickson, Noll, & Taylor, 2008). Within each sample, a greater proportion of participants were invited from the upper ($n = 21$; flyer sample: 14; subject pool: 7) and lower ($n = 19$; flyer sample: 11; subject pool: 8) quartiles than would have otherwise been sampled ($n = 32$ from the middle two quartiles; flyer sample: 18; subject pool: 14).[1]

2.2. Materials

2.2.1. Resilience

We used Block and Kremen's (1996) ego-resiliency scale (ER89) to assess trait variation in psychological resilience. Participants were asked to indicate the degree to which they agreed with 14 statements (e.g. "I quickly get over and recover from being startled," and "I enjoy dealing with new and unusual situations.") on a scale from 1 (*does not apply at all*) to 4 (*applies very strongly*). The ER89 has been shown to be a valid measure of trait resilience as reflected by high correlations with both self and observer-generated ratings of

[1] The flyer sample and the subject pool did not differ on the ER89, or any of the affective recovery variables. These groups will not be discussed any further.

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adaptability to life events (Block & Kremen, 1996; Klohnen, 1996). The test–retest reliability (for those who completed the full 14-item version; $n = 43$[2]) was $r = .78$; and the internal reliability for the version completed at the experiment was $\alpha = .72$ ($n = 71$).

2.2.2. Optimism

Optimism was measured using the revised version of the Life Orientation Test (LOT; Scheier & Carver, 1985; revised LOT-R, Scheier, Carver, & Bridges, 1994). The LOT-R consists of 10 statements of which six comprise the optimism scale (e.g. "In uncertain times, I usually expect the best"; "If something can go wrong for me, it will") and four are fillers. Participants responded to these statements on a scale from 0 (*strongly disagree*) to 4 (*strongly agree*). Internal reliability for the current sample was $\alpha = .86$.

2.2.3. Extraversion, neuroticism, openness

We used a shortened version of the NEO five-factor personality inventory (Costa & McCrae, 1992) designed to assess extraversion, neuroticism, and openness to experience—traits found to be linked with resilience (Block & Kremen, 1996; Fredrickson et al., 2003). There were 12 items for each scale, resulting in 36 total items to which participants responded on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The coefficient alphas for neuroticism, extraversion, and openness were .91, .75, & .74, respectively.

2.2.4. Trait emotion regulation

We used the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003) to measure participants' dispositional proclivity to use *reappraisal* ("I control my emotions by changing the way I think about the situation I'm in") and *suppression* ("I control my emotions by not expressing them") strategies to regulate their emotions. Participants responded to 10 statements (6 in reappraisal subscale, 4 in suppression subscale) from 1 (*strongly disagree*) to 7 (*strongly agree*). Coefficient alphas for the reappraisal and suppression subscales were .72 and .75, respectively.

2.2.5. Continuous affective rating and recovery

Participants rated their affect continuously throughout the task with a rating dial (Mauss et al., 2005), a modification of previously validated continuous affective rating procedures (Levenson & Gottman, 1983; Fredrickson & Kahneman, 1993). The rating dial is an apparatus that features a knob with a 'finger' pointing to an affective scale (0–9) that subtends a 180 degree arc. The knob is attached to a voltage potentiometer that translates the angle of the knob into discrete integers (0–9), which are then averaged into 1-s bins. There were labels for 'negative', 'positive', and for each number from 0 to 9. There was no label for 'neutral'; however, neutral implicitly corresponds to a rating of about 4.5.

2.2.6. Post-task ratings

After the task (described below), participants were asked to rate different components of the task. First, participants made estimations of the frequency of uncertain aversive to uncertain-neutral pictures. Estimates were anchored to the threat cue:

> Question: "Please estimate the frequency of negative to neutral pictures you saw *after seeing the ▲ cue*. In other words, after you saw the ▲ cue—how often did you see a negative picture? Please be as accurate as possible."
>
> Response: "I saw a negative picture _____% of the time after seeing the ▲ cue."

[2] Test–retest reliability could not be calculated for the 7-item version of the ER89 that the subject pool participants completed because prescreening rules prevented us from identifying any given participant's actual score, only the third of the sample in which they belonged.

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These questions served as a proxy for expectations during anticipation of the possible aversive pictures. Second, participants rated how they felt "after receiving each of the cues" for all three cues on −5 (highly unpleasant) to +5 (highly pleasant) bipolar scales. Lastly, participants rated their negative and positive affect in response to the four types of pictures (Certainty: high, low; Valence: negative, neutral) on two separate unipolar scales (0—not pleasant [unpleasant]; 10—highly pleasant [unpleasant]).

2.3. Task design

Participants saw one of three cues: *safety, threat, aversive* (Fig. 1). The *safety* and *aversive* cues signaled to the participant that they would next see a neutral or aversive picture (respectively) 100% of the time. The *threat* cue signaled to the participant that they would next see either a neutral or aversive picture (50/50 probability). Participants were unaware of the actual probability of each picture occurring after the threat cue. Instead, they were told that "some of the time you will see an aversive picture, some of the time a neutral picture." Each trial consisted of three components: cue (6 s), picture presentation (3 s), and recovery period (4 s). There were 25 trials each for the certain neutral (safety cue → neutral picture), certain aversive (aversive cue → aversive picture), uncertain neutral (threat cue → neutral picture), and uncertain aversive (threat cue → aversive picture) conditions for a total of 100 trials. These 100 trials were separated into sessions 1 and 2 by a 1-min rest interval after participants completed 50 trials.

2.4. Recovery

Recovery from a stressor can be measured multiple ways including the latency with which the physiological/affective index of interest returns to the pre-stressor baseline, the steepness of the post-stressor recovery slope, or the degree to which physiology/affect resembles some contrast level, usually pre-stressor, after a set period of time (Haynes, Gannon, Orimoto, & O'Brien, 1991). We adopt this last approach in measuring recovery. The current design did not include pre-stressor levels against which to compare affective recovery (the anticipation period is part of the proposed stressor), therefore, we use the certain-neutral condition as the contrast, and the post-picture recovery period as the time period of comparison. Recovery will be measured as the degree to which participants' affect after viewing neutral pictures that could have been aversive resembles their affect after viewing expected neutral pictures.

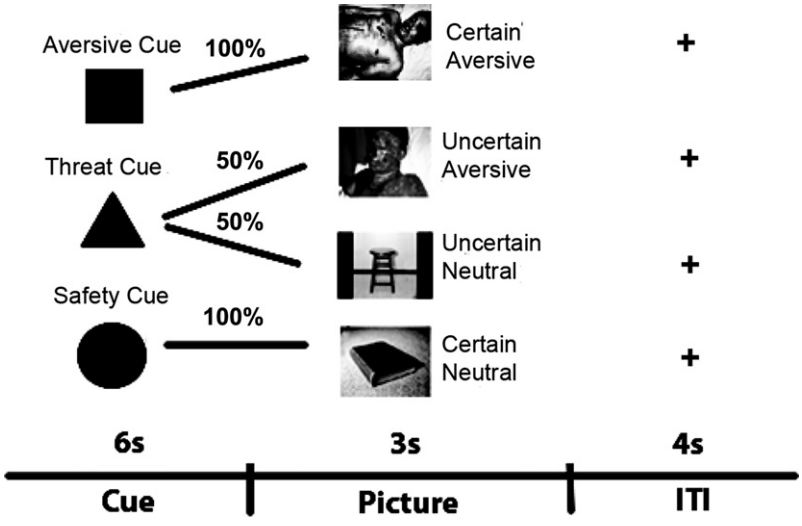

Fig. 1. Diagram of the task. Participants received one of three cues; an 'aversive' cue indicated than an aversive picture will appear (1.0 probability); a 'safety' cue signified that the participants would see a neutral (certain) picture (1.0 probability); a 'threat' cue indicated that either an aversive (0.5 probability, unknown to participants), or neutral picture (0.5 probability) might appear.

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Table 1
Means for high and low resilient participants on personality variables

Personality variable	High resilient		Low resilient	
	M	*SD*	*M*	*SD*
ER89	3.2_a	.16	2.6_b	.26
Optimism	2.8_a	.65	2.4_b	.63
Extraversion	3.7_a	.41	3.2_b	.48
Neuroticism	2.6_a	.81	2.9_a	.76
Openness	3.5_a	.58	3.3_a	.48
ERQ: Reappraisal	5.1_a	.75	4.6_b	.87
ERQ: Suppress	3.6_a	1.3	3.4_a	1.1

Note: Means in the same row that have different subscripts are significantly different from each other at $p < .05$.

2.5. Procedure

After participants gave their informed consent to participate in the study, they completed a questionnaire packet consisting of the trait resilience (ER89), optimism (LOT-R), extraversion, neuroticism, openness (NEO) and emotion regulation (ERQ) scales. Next, participants were given an overview of the structure of the task, and were instructed to rate their affect continuously throughout the task. To ensure that the participants understood that they could freely and continuously move the rating dial, they were asked to rate their own mood for 1 min during a pre-task baseline period. Next, they completed the anticipation task, after which the participants did the post-task ratings, were debriefed, and received compensation for their participation ($10 for participants recruited by flyer; class credit for subject pool participants).

3. Results

To analyze the effects of resilience in the following analyses, we formed two groups, high and low resilience, by performing a median split on the participants' responses on the pre-task ER89 ($Mdn = 3.00$). This median split was necessary because we oversampled the tails of the distribution on the ER89, thus violating the assumption of normality required for regression analyses ($K–S = .14$, $p < .01$). As a result of equipment malfunctions, of the 72 participants recruited for the study, baseline rating dial data will be analyzed for only 60 participants (32 high resilient, 28 low resilient), and task rating dial data will be analyzed for only 67 participants (36 high resilient, 31 low resilient). See Table 1 for means and standard deviations for these two resilience groups on the ER89 as well as the other personality variables.

3.1. Baseline ratings

During the 1-min baseline period, participants rated their mood as slightly positive, ($M = 5.13$, $SE = .18$), although the modal response was slightly negative (4.00). There was a wide range in participant's ratings: from very negative (1.41) to very positive (7.97), and the degree to which participants moved the dial during the baseline rating period (within-subject variance ranged from .00 (no movement) to 1.24). There was no significant difference between high and low resilient participants for average mood (Ms = 5.27 and 4.96, respectively), or mood variance (Ms = .37 and .35, respectively).

3.2. Affective recovery

Upon examination of the data (see Fig. 2), it was clear that participants moved the rating dial very little within the cue and recovery periods,[3] so to simplify analyses, we averaged the 6 s of the cue period into

[3] The plateaus that characterize affective ratings during anticipation and recovery period suggest that participants only moved the rating dial when something occurred (e.g. presentation of a cue or picture), a pattern of results that seems to be consistent with previous studies that have used this rating dial procedure for measuring continuous affect over longer intervals (on the order of minutes; Gottman & Levenson, 1985; Mauss et al., 2005).

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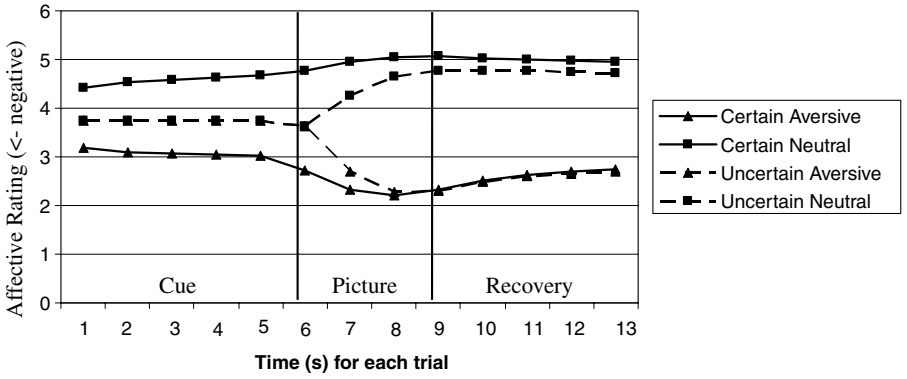

Fig. 2. Ratings for each trial type across the entire length of the trial (13 s in 1 s bins). Lower values on the *Y* axis signify more negative affective ratings. The points on each line are significantly different from the corresponding points on all other lines except for time bins 8–13 for the aversive trials (uncertain and certain). Lower values on the *Y* axis signify more negative affective ratings.

one overall cue period mean, and averaged the 4 s of the recovery period into one overall recovery period mean.

3.2.1. Neutral trials

The main hypothesis was that trait resilience would interact with affective recovery from threats that do not occur, therefore our initial analyses focused on affective responses to the picture and during the post-picture recovery period. To examine the picture and recovery periods, we ran a 2 (Certainty; Certain, Uncertain) × 4 (Trial period: 1st second of picture period, 2nd second of picture period, 3rd second of picture period, Recovery period mean) × 2 (Resilience; High, Low) mixed ANOVA with the participants' affective rating as the dependent variable. There were main effects of certainty, $F(1,65) = 41.11$, $p < .001$, and trial period, $F(1,65) = 31.05$, $p < .001$, which were qualified by an interaction between certainty and trial period, $F(3,63) = 31.26$, $p < .001$. As each recovery period unfolded, participants increased their affective responses during the uncertain-neutral trials to converge with their affective responses during the certain-neutral trials (Fig. 2). However, these responses did not completely converge; there remained a persistent affective difference between certain and uncertain-neutral trials during the recovery period, $t(66) = 3.50$, $p < .001$, suggesting that participants failed to completely recover from threat. As predicted, resilience moderated this failure to recover effect. Resilience interacted with certainty, $F(1,65) = 6.29$, $p < .05$, and examination of this interaction revealed that only low resilient participants showed a persistent affective difference between their certain and uncertain-neutral trials during the recovery period, $t(30) = 3.62$, $p < .001$ (see Fig. 3).[4]

3.2.2. Aversive trials

For completeness, we also performed the above analysis for the aversive trials. Similar to the neutral trials, there was a main effect of trial period, $F(3,63) = 9.58$, $p < .001$, which was qualified by an interaction between trial period and certainty, $F(3,63) = 39.68$, $p < .001$. The pattern was similar to that for the neutral trials but in the opposite direction, responses to the certain-aversive trials became more negative as the recovery period unfolded (Fig. 2). Unlike the neutral trials, affective responses during the certain and uncertain trials completely converged, $t(66) = 1.19$, *ns*, and there was no interaction with resilience.

[4] Visual examination of this interaction effect may suggest that the effect is driven by low resilient participants (compared with high resilient participants) being both more positive during the certain neutral recovery period and less positive during the uncertain neutral recovery period. However, high and low resilient participants do not significantly differ on either of these measures alone (both *t*s < .6, *ns*), only in their interaction. In any case, this pattern of findings does seem to suggest that for the neutral trials, perceptions of certainty may make more impact on the differential affective recovery of low resilient participants than high resilient participants.

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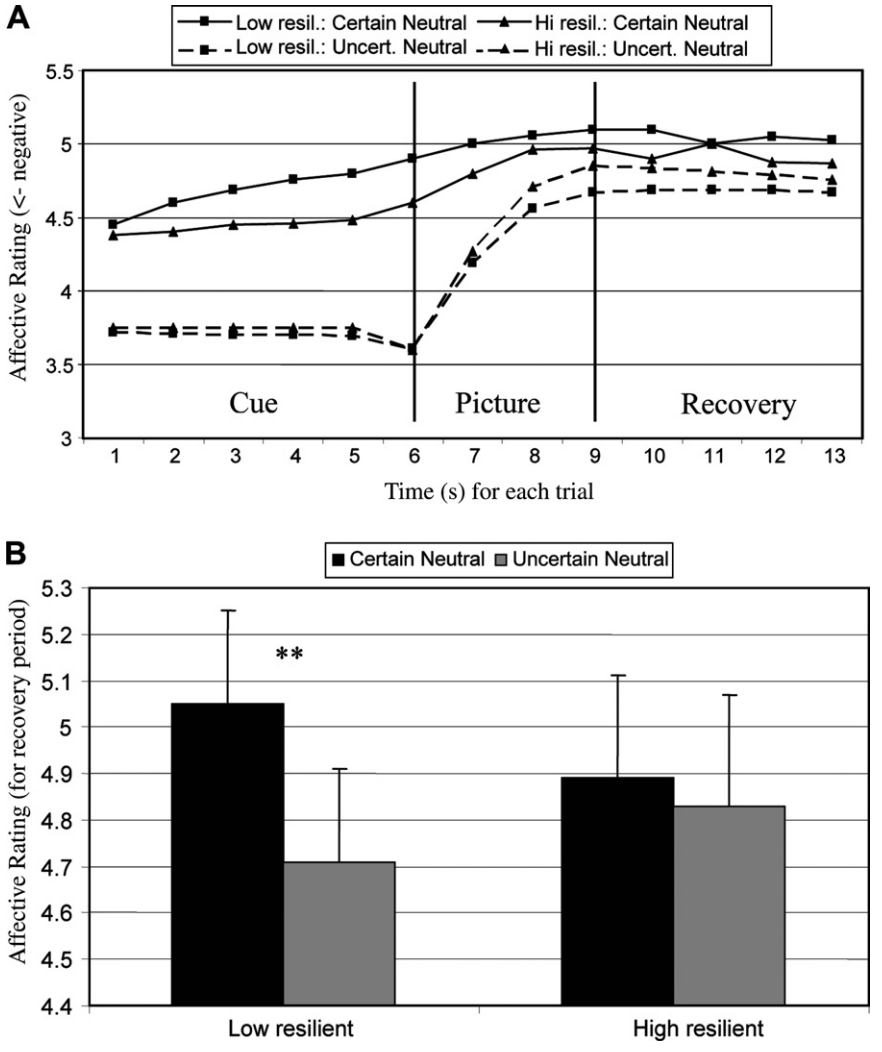

Fig. 3. (A) Resilience differences in the neutral trials across all time bins. High resilient show greater recovery as measured by a smaller difference between uncertain and certain-neutral trials during the recovery period. (B) Mean responses during the recovery period for the neutral trials. The difference between neutral trials for low resilient participants is significant ($p < .001$), and interaction between resilience and Certainty of neutral picture is also significant ($p < .05$).

3.3. Anticipatory affect

3.3.1. Response to cues

To examine the possible influence of resilience on affect during anticipation, we ran a mixed ANOVA with resilience as a between-subjects factor and cue type (Safety, Aversive, Threat) as the within-subjects factor. There was a main effect of cue type, $F(2, 64) = 28.05$, $p < .001$. Paired t-tests revealed that participants rated the aversive cue period ($M = 3.06$, $SE = .17$) as significantly more negative than the threat cue period ($M = 3.73$, $SE = .13$; $t(67) = 6.6$, $p < .001$), which was in turn rated more negative than the safety cue period ($M = 4.57$, $SE = .15$; $t(67) = 6.13$, $p < .001$). There was no interaction with resilience.

3.3.2. Anticipation and recovery

Next, we examined whether affective responses during the anticipation (cue) period influenced affective recovery. To represent 'affective recovery', affective responses to the uncertain-neutral trials (during the recov-

ery period) were subtracted from the corresponding responses to the certain-neutral trials. We created homologous 'affective difference' measures for the cue and picture periods by subtracting affective responses during the uncertain-neutral cue (e.g. threat) and picture periods from the corresponding affective response during the certain-neutral cue (e.g. safety) and picture periods.

To examine whether resilience moderated the relationship between anticipation and recovery, we ran a regression equation with affective recovery as the dependent variable, and anticipatory affect, resilience, and resilience × anticipatory affect interaction term as predictors. In a second step, affect during the picture periods were entered as covariates. Results revealed that the resilience × anticipatory affect interaction was significant, $\beta = -.46$, $p < .01$, when not controlling for affect during the picture period and marginally significant when controlling for the picture period, $\beta = -.10$, $p = .065$. To explore this interaction, we ran separate regression analyses for low and high resilient participants and found that for low resilient participants, greater affective difference during the cue predicted decreased affective recovery, $\beta = .37$, $p < .01$. For high resilient participants, this relationship was reversed, $\beta = -.38$, $p < .05$. As shown in Fig. 4, for both groups, affective responses during the cue period were highly correlated with the immediately subsequent trial period (first second of picture). Affective responses during the cue period remained highly correlated with affective responses throughout the rest of the trial for low resilient participants, whereas this relationship became nonexistent (and then reversed slightly) for high resilient participants.

3.4. Session differences in recovery

Our second hypothesis was that high resilient participants would be better learners, which would result in one of two possible patterns of data: (1) high and low resilient do not differ in session 1, but high resilient participants recover more quickly in session 2 or (2) high resilient participants recover more quickly during session 1, while low resilient participants do not recover until session 2. To examine this hypothesis, we performed separate ANOVAs for sessions 1 (first 50 trials) and 2 (second 50 trials) with certainty (uncertain neutral, certain neutral) as the within-subjects factors and resilience as the between-subjects factor. Consistent with the prediction that high resilient participants learn more quickly, only for session 1 was there a certainty × resilience interaction, $F(1, 65) = 6.76$, $p = .016$. The certainty × resilience interaction was not significant for session 2, $F(1, 65) = 1.6$, *ns*. Examination of the data for sessions 1 and 2 revealed that for session 1, high resilient participants recovered more completely than low resilient participants, $t(65) = 2.64$, $p < .01$; whereas for session 2, high and low resilient participants did not differ in their affective recovery, $t(65) = 1.18$, *ns* (Fig. 5). Moreover, paired *t*-tests showed that the affective difference (i.e., recovery) between uncertain and certain neutral was only significant for low resilient participants during session 1, $t(30) = 3.94$, $p < .001$. These results suggest that high resilient participants more quickly learned to adapt to the task and

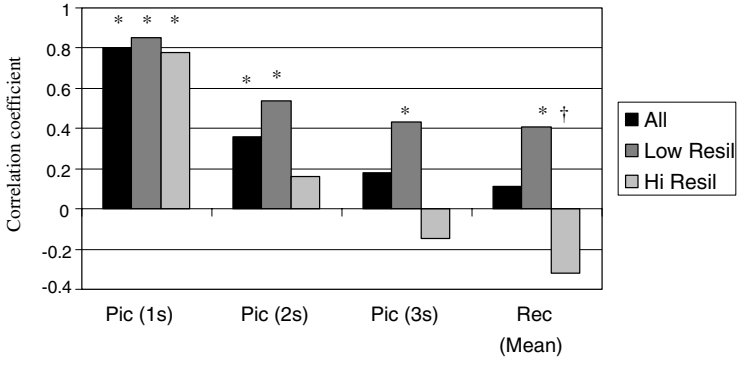

Fig. 4. Correlation coefficients between anticipation (safety–threat cues) and picture response (certain–uncertain; for each second of the picture period, and the mean of the recovery period) for all participants, and then high and low resilient participants separately. Note how correlations between anticipation and picture response remain high throughout the trial for low resilient participants, but not for high resilient participants ($^{*}p < .05$, $^{\dagger}p < .1$).

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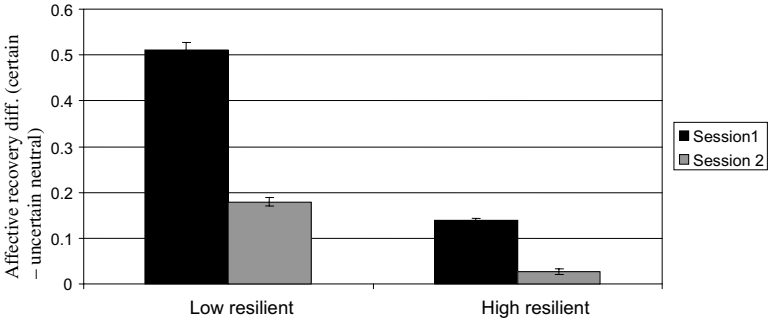

Fig. 5. Session effects for the recovery difference between low and high resilient participants. Note that affective recovery (attenuated difference between uncertain and certain neutral) is immediately apparent in session 1 for high resilient participants, but does not become apparent until session 2 for low resilient participants.

subsequently exhibited complete recovery from threat by the end of session 1, whereas low resilient participants learned to adapt more slowly, and did not recovery completely until session 2.

3.5. Post-task ratings

After the task, participants rated their emotional reactions to each of the trials. For the most part, the results mirror the continuous rating findings (see Table 2). Participants reported greater negative affect during the aversive cue than the threat cue, $t(57) = 5.0$, $p < .001$, and greater negative affect to the threat cue than the safe cue, $t(57)$, 8.4, $p < .001$. In response to the pictures, participants reported equivalent negative affect to the two types of aversive pictures (certain and uncertain), and these ratings were more negative than to the two types of neutral pictures, all ts above 8.0, ps $< .001$. In turn, participants rated their emotional reactions as equivalently positive to the two neutral pictures, but more positive than to the negative pictures, all ts > 2.5, ps $< .01$. Interestingly, participants reported feeling more positive affect to the uncertain-aversive pictures than the certain-aversive pictures, $t(54) = 2.9$, $p < .01$. There were no significant differences in any of these ratings between low and high resilient participants, although there was a marginally significant result consistent with the rating dial data; high resilient participants rated their affect as more positive to the uncer-

Table 2
Post-task ratings of felt affect during the task

	M	*SE*
Cues[a]		
Aversive	−2.67	.29
Threat	−1.16	.22
Safety	1.67	.21
Pictures: Positive ratings		
Certain aversive	2.36	.44
Uncertain aversive	3.42	.42
Certain neutral	5.14	.33
Uncertain neutral	4.98	.29
Pictures: Negative ratings		
Certain aversive	7.12	.38
Uncertain aversive	7.18	.29
Certain neutral	2.48	.32
Uncertain neutral	3.02	.29

[a] Cues were rated on a scale from −5 (high unpleasant) to +5 (highly pleasant), whereas pictures were rated on separate positive and negative affect scales from 1 (not unpleasant/pleasant) to 10 (highly unpleasant/pleasant).

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tain-neutral pictures ($M = 5.49$, $SE = .37$) than low resilient participants ($M = 4.42$, $SE = .44$), $t(64) = 1.89$, $p = .064$.

After the task, participants estimated the frequency of aversive pictures (following threat cue) to serve as a measurement proxy for expectations during anticipation. Consistent with previous evidence, participants overestimated the frequency of aversive pictures ($M = 55.9\%$ [actual = 50%], $SE = 1.84\%$), $t(65) = 3.21$, $p < .01$. High and low resilient participants did not differ in their overestimation of the frequency of aversive pictures (Ms = 56.6 and 55.1, respectively).

3.6. Other personality correlates

Resilience is a meta-construct comprised of different personality constructs. As such, we examined whether other personality traits such as optimism, emotion regulation, neuroticism, extraversion, and openness predicted the same or similar patterns of results as did resilience. We ran correlation analyses with these personality traits and the before mentioned variables of interest (i.e., affective responding, affective recovery, frequency estimation of aversive pictures) and only include here those results that were robust and consistent.

First, optimism was correlated with an overall more positive affective response during the three cue periods (rs = .26, .30, .33 for the safety, threat and aversive cue periods, respectively). This optimism-related positivity only continued throughout the neutral trials (all rs > .25 for picture and recovery periods during the certain and uncertain-neutral trials).

Second, neuroticism was significantly correlated with the affective response during the threat and aversive cues, as well as throughout all of the trial periods of the aversive trials (both certain and uncertain). As one would expect, these correlations were negative (all rs < −.28), meaning that people high in neuroticism showed a greater negative affective response during any trial that contained elements of aversiveness.

One final interesting result was that the suppression subscale of the Emotion Regulation Questionnaire (Gross & John, 2003) was only significantly correlated with affective response during the uncertain-neutral trials (all rs > .27). People who reported the tendency to suppress emotions showed a more positive affective response when presented with a neutral picture that could have been aversive. Interestingly, the reappraisal subscale of the ERQ did not predict these or any other affective responses. These results are contradictory to the previous findings that showed that participants who tended to use reappraisal strategies to regulate emotion reaped the affective benefits of emotion regulation (e.g. decreased negative responses; Gross, 1998; Gross & John, 2003).

Importantly, while optimism, neuroticism, and emotional suppression were correlated with various measures of affective reactivity, none of these personality measures were correlated with differential recovery for certain and uncertain-neutral trials as was found with resilience. This dissociation between resilience and other personality measures reinforces the idea that resilience is mostly characterized by adaptive affective recovery from a negative (or negatively anticipated) event rather than the initial affective responding to that event.

3.7. ER89 as a continuous variable

Although our resilience measure (ER89) was non-normally distributed, we examined whether the ER89 as a continuous variable predicted our main DV of interest (differential recovery between neutral trials). The ER89 did not correlate with this recovery measure, $r(67) = -.08$, *ns*. To reconcile this finding with the above findings that treated the non-normal ER89 as a dichotomous variable, we split the ER89 into quartiles and found that those participants in the 3rd quartile ($M = -.75$, $SE = .19$) showed the greatest recovery effect in a contrast test (1 1 −3 1), $t(63) = 2.5$, $p < .02$. The other three quartiles were not significantly from each other (Ms = −.07, .44, −.05 for 1st, 2nd and 4th quartiles, respectively). This nonlinear effect should be interpreted with caution, though. The tails of this distribution had been oversampled, so the cutoffs for these quartile groups may not be representative of the cutoffs of the ER89 in the population.

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4. Discussion

The main finding from this study was that high[5] trait resilient participants showed more complete affective recovery when presented with a neutral picture after anticipating a possible aversive picture. This finding replicates previous findings showing more efficient recovery for resilient people (Tugade & Fredrickson, 2004), but also extends these findings in two important ways. First, recovery was operationalized as the degree to which responses on the uncertain-neutral trials resembled responses on the certain trials. As a result of this operationalization, the current study showed that recovery can occur very quickly, and can be measured on a relatively small time-scale (< 7 s). Second, in this study, resilient participants demonstrated *affective* recovery as opposed to cardiovascular recovery. It remains unclear how the affect and cardiovascular systems are connected, although researchers have debated this issue for many years (e.g. Cannon, 1927; James, 1884; Levenson, Ekman, & Friesen, 1990). The current pattern of results, in conjunction with the findings from Tugade and Fredrickson (2004), suggests that affective recovery may at least coincide with or precede cardiovascular recovery. By regulating the affect system, people may subsequently regulate the cardiovascular system. This is an interesting hypothesis that merits future testing, and is supported by previous findings on the effects of emotion regulation on the cardiovascular system (Gross, 1998).

We hypothesized that high trait resilient participants would be able to learn to adapt to the demands of the task more quickly and subsequently show the recovery effect sooner than low resilient participants. The current results supported this hypothesis and showed that the recovery effect was present earlier for high trait resilient participants (during first and second half of trials) than for low trait resilient participants (during second half of trials only). This finding is consistent with a review of resilience (Charney, 2004) that posited that in the midst of situations ambiguously related to threat and safety, resilient people may be quicker to learn the cues associated with safety, and less likely to overgeneralize negative outcomes to innocuous situations. The important conclusion manifest both within Charney's (2004) review and within the current study is that low resilient participants do learn to recover effectively, but they learn more slowly than high resilient participants. This differential rate of learning may have important implications in day to day activities, when contingencies may change too rapidly for low resilient people to ever properly learn them. Indeed, it is in these constantly changing environments where the greatest adaptability differences between resilient and nonresilient people emerge (Block & Kremen, 1996).

Another aim of the study was to examine how anticipatory affect might affect recovery, and how these processes might interact with trait resilience. High and low resilient participants showed no difference in their anticipatory affect. However, the relationship between anticipatory affect and subsequent recovery was different for high and low resilient participants. For high resilient participants, when presented with a neutral picture that could have been aversive, they successfully regulated their anticipatory affect, which limited the effect of this affect on their subsequent affective responses. However, low resilient participants seemed unable to regulate their anticipatory affect, and by consequence it permeated their subsequent affective responses. These findings further support our hypothesis that resilience is associated with dynamic and appropriate self-regulation. When the threat of a negative experience was relevant, high and low resilient participants did not differ from one another; it was when that threat was no longer relevant that high resilient participants regulated their affect.

We examined the possibility that other personality traits such as optimism, extraversion, and neuroticism might mediate the relationship between resilience and recovery. There were interesting patterns concerning these personality variables and various components of the task; optimism predicted more positive affect to the cues and during the neutral pictures/recovery period; whereas neuroticism predicted more negative affect to the aversive and threat cues, and the aversive pictures/recovery period. These results are consistent with previous findings that people high in optimism can reinterpret events in a positive light (Scheier et al., 1994), and that people high in neuroticism are especially reactive to negative stimuli (Larsen & Ketelaar, 1989). Importantly, however, these personality variables did not pattern or mediate the relationship between

[5] We use the terms 'high' and 'low' trait resilient here to represent the participants who responded in the upper and lower halves, respectively, of the ER89, thus providing a parallel to our main analyses.

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resilience and affective recovery. These results suggest that trait resilience, at least as measured by the ER89 (Block & Kremen, 1996), may not be reducible to these other personality traits, and may uniquely predict affective recovery from threat.

Exploratory analyses suggest that the relationship between the ER89 and recovery from anticipatory threat was driven mainly by those whose scores were 'medium–high' on the ER89. Although this effect should be interpreted with caution given the non-normal distribution on the ER89, it does raise the possibility that there is a non-linear relationship between resilience as measured by the ER89 and affective recovery. This non-linear relationship may be akin to Block and Kremen's (1996) notion that resilience as 'optimal ego-control' lies in the flexibility to be just controlled enough to accomplish a task, but not so over-controlled as to be rigid. Although the ER89 was designed to measure this flexibility, it may be that the benefits of flexibility reside in a similar optimal range. This non-linear relationship is also similar to work showing that those with medium–high levels of happiness are more successful in some domains, such as income and education, than those with the very-high levels of happiness (Oishi, Diener, & Lucas, 2007). Further work with different recovery outcomes should test whether there is indeed a non-linear 'cap' to the benefits of resilience as measured by the ER89.

4.1. Limitations

One practical limitation of the current study was that the rating dial measured negative and positive affect on a unipolar scale. Given previous findings (Fredrickson et al., 2003; Tugade & Fredrickson, 2004), resilient participants may have been feeling both negative and positive affect simultaneously, both of which could not be measured with a unipolar rating dial. In future work, it would be useful for participants to be able to provide separate positive and negative affective ratings, perhaps by rating positive affect and negative affect in separate blocks.

Another limitation of the current study is the limited operationalization of 'resilience'. We conceptualized resilience as a personality trait and operationalized that trait as responses on a questionnaire, the ER89 (Block & Kremen, 1996). More importantly, we studied 18- to 25-year-old college students without asking them if they have ever experienced extreme stress and adversity. Resilience is typically thought of as a combination of protective factors that serve to allow people to grow *in the midst of adversity* (Luthar & Cicchetti, 2000; Masten, Best, & Garmezy, 1990). Some researchers have specifically noted that resilience cannot be thought of as just a personality trait (Luthar & Cicchetti, 2000; Rutter, 1999), and must be thought of in terms of multifaceted avenues through which a person can adapt to a major stressor (Johnson & Wiechelt, 2004; Masten, 2001). We do not refute these definitions of resilience, but instead note that instead of measuring 'established' resilience, we measured enduring personality traits that could predict whether someone would be resilient in the face of a future crisis. For example, participant's responses on the ER89 *before* the terrorist attacks on 9/11 predicted greater positive emotions that buffered them from depressive symptoms *after* 9/11 (Fredrickson et al., 2003). Also, new evidence suggests that one's genetic structure, present before birth, has large predictive power for how one responds to adversity. The presence of at least one long allele for the gene 5HTT predicted decreased depressive symptoms in response to major life events (Caspi et al., 2003). Nevertheless, future work should focus on gaining access to those people who have proved themselves either resilient or nonresilient in the face of trauma to see whether the recovery differences reported here replicate in such samples.

4.2. Implications

The results of this study bear on findings that resilient people tend to experience fewer depressive symptoms (Fredrickson et al., 2003) and a decreased likelihood of becoming chronically depressed (Bonanno et al., 2004). Research on depression has shown that depressed people tend to ruminate—the process of repeatedly focusing on one's negative emotions (Nolen-Hoeksema, 2000), and this rumination may be in part caused by an inability to inhibit negative information (Joormann, Hertel, Brozovich, & Gotlib, 2005). The current study showed that resilient people successfully inhibited anticipatory affect in the service of recovering when a threat was not realized. This ability to successfully inhibit negative affect may be linked with a decreased tendency to ruminate and thus be one contributing factor in their decreased likelihood of experiencing enduring depressive symptoms (Nolen-Hoeksema, 2000).

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An important contribution of this study is its attempt to show that resilient people recover from potentially negative events more quickly and completely than do less resilient people. Recovery is the return to a homeostatic baseline (Carver, 1998). Returning to homeostasis helps prevent allostatic load—the tissue damage associated with chronic stress (Carver, 1998; McEwen, 1998, 2003). In addition to preventing tissue damage, returning to homeostasis also allows the body (and mind) the energy and recuperation necessary to face future stressors (Carver, 1998; McEwen, 1998, 2003). Chronic stress (Sapolsky, 1996) and daily hassles (Kohn, Lafreniere, & Gurevich, 1991) have both been shown to affect health, suggesting that returning to homeostasis quickly and completely may also allow resilient people to enjoy better physical health.

4.3. Conclusion

This study represents one of the first attempts to understand how people recover emotionally when anticipated negative events fail to occur. These situations may occur quite frequently, so understanding how people cope with them may shed light on how they adapt to the ever-changing whims of life.

References

Block, J., & Block, J. H. (1980). The role of ego-control and ego-resiliency in the origination of behavior. In W. A. Collings (Ed.). *The minnesota symposia on child psychology* (Vol. 13, pp. 39–101). Hillsdale, NJ: Erlbaum.

Block, J., & Kremen, A. M. (1996). IQ and ego-resiliency: Conceptual and empirical connections and separateness. *Journal of Personality and Social Psychology, 70*(2), 349–361.

Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist, 59*(1), 20–28.

Bonanno, G. A., Wortman, C. B., Lehman, D. R., Tweed, R. G., Haring, M., Sonnega, J., et al. (2002). Resilience to loss and chronic grief: A prospective study from preloss to 18-months postloss. *Journal of Personality and Social Psychology, 83*(5), 1150–1164.

Bonanno, G. A., Wortman, C. B., & Nesse, R. M. (2004). Prospective patterns of resilience and maladjustment during widowhood. *Psychology and Aging, 19*(2), 260–271.

Cannon, W. B. (1927). The James–Lange theory of emotions: A critical examination and an alternative theory. *American Journal of Psychology, 39*, 106–124.

Carver, C. S. (1998). Resilience and thriving: Issues, models, and linkages. *Journal of Social Issues, 54*(2), 245–266.

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., et al. (2003). Influence of life stress on depression: Moderation by a polymorphism in the 5-HTT gene. *Science, 301*(5631), 386–389.

Charney, D. S. (2004). Psychobiological mechanisms of resilience and vulnerability: Implications for successful adaptation to extreme stress. *American Journal of Psychiatry, 161*(2), 195–216.

Costa, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO personality inventory. *Psychological Assessment, 4*(1), 5–13.

Davidson, R. J. (1992). Emotion and affective style: Hemispheric substrates. *Psychological Science, 3*(1), 39–43.

Florian, V., Mikulincer, M., & Taubman, O. (1995). Does hardiness contribute to mental health during a stressful real-life situation? The roles of appraisal and coping. *Journal of Personality and Social Psychology, 68*(4), 687–695.

Fredrickson, B. L., & Kahneman, D. (1993). Duration neglect in retrospective evaluations of affective episodes. *Journal of Personality and Social Psychology, 65*(1), 45–55.

Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology, 84*(2), 365–376.

Gottman, J. M., & Levenson, R. W. (1985). A valid procedure for obtaining self-report of affect in marital interaction. *Journal of Consulting and Clinical Psychology, 53*, 151–160.

Gross, J. J. (1998). Antecedent and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology, 74*, 224–237.

Gross, J. J., & John, O. P. (2003). Individual differences in two emotion regulation processes: Implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology, 85*(2), 348–362.

Haynes, S. N., Gannon, L. R., Orimoto, L., & O'Brien, W. H. (1991). Psychophysiological assessment of poststress recovery. *Psychological Assessment, 3*(3), 356–365.

Hemenover, S. H. (2003). Individual differences in rate of affect change: Studies in affective chronometry. *Journal of Personality and Social Psychology, 85*(1), 121–131.

Jackson, D. C., Mueller, C. J., Dolski, I., Dalton, K. M., Nitschke, J. B., Urry, H. L., et al. (2003). Now you feel it, now you don't: Frontal brain electrical asymmetry and individual differences in emotion regulation. *Psychological Science, 14*(6), 612–617.

James, W. (1884). What is an emotion? *Mind, 9*(188–205).

Johnson, J. L., & Wiechelt, S. A. (2004). Introduction to the special issue on resilience. *Substance Use & Misuse, 39*(5), 657–670.

Please cite this article in press as: Waugh, C. E. et al., Adapting to life's slings and arrows: Individual differences ..., *Journal of Research in Personality* (2008), doi:10.1016/j.jrp.2008.02.005

Joormann, J., Hertel, P. T., Brozovich, F., & Gotlib, I. H. (2005). Remembering the good, forgetting the bad: Intentional forgetting of emotional material in depression. *Journal of Abnormal Psychology, 114*(4), 640–648.

Klohnen, E. C. (1996). Conceptual analysis and measurement of the construct of ego-resiliency. *Journal of Personality and Social Psychology, 70*(5), 1067–1079.

Kohn, P. M., Lafreniere, K., & Gurevich, M. (1991). Hassles, health, and personality. *Journal of Personality and Social Psychology, 61*(3), 478–482.

Larsen, R. J., & Ketelaar, T. (1989). Extraversion, neuroticism and susceptibility to positive and negative mood induction procedures. *Personality and Individual Differences, 10*(2), 1221–1228.

Levenson, R. W., Ekman, P., & Friesen, W. V. (1990). Voluntary facial action generates emotion-specific autonomie nervous system activity. *Psychophysiology, 27*, 363–384.

Levenson, R. W., & Gottman, J. M. (1983). Marital interaction: Physiological linkage and affective exchange. *Journal of Personality and Social Psychology, 45*(3), 587–597.

Luthar, S. S., & Cicchetti, D. (2000). The construct of resilience: Implications for interventions and social policies. *Development and Psychopathology, 12*(4), 857–885.

Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist, 56*(3), 227–238.

Masten, A. S., Best, K. M., & Garmezy, N. (1990). Resilience and development: Contributions from the study of children who overcome adversity. *Development and Psychopathology, 2*(4), 425–444.

Mauss, I. B., Levenson, R. W., McCarter, L., Wilhelm, F. H., & Gross, J. J. (2005). The tie that binds? Coherence among emotion experience, behavior, and physiology. *Emotion, 5*(2), 175–190.

McEwen, B. S. (1998). Stress, adaptation, and disease. Allostasis and allostatic load. *Annals of the New York Academy of Sciences, 840*, 33–44.

McEwen, B. S. (2003). Interacting mediators of allostasis and allostatic load: Towards an understanding of resilience in aging. *Metabolism, 52*(10 Suppl. 2), 10–16.

Moskowitz, J. T., Folkman, S., Collette, L., & Vittinghoff, E. (1996). Coping and mood during AIDS-related caregiving and bereavement. *Annals of Behavioral Medicine, 18*, 49–57.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin, 126*(2), 247–259.

Nolen-Hoeksema, S. (2000). The role of rumination in depressive disorders and mixed anxiety/depressive symptoms. *Journal of Abnormal Psychology, 109*(3), 504–511.

Ohman, A., Flykt, A., & Esteves, F. (2001). Emotion drives attention: Detecting the snake in the grass. *Journal of Experimental Psychology: General, 130*(3), 466–478.

Oishi, S., Diener, E., & Lucas, R. E. (2007). The optimal level of well-being: Can people be too happy? *Perspectives on Psychological Science, 2*(4), 346–360.

Paterson, R. J., & Neufeld, R. W. J. (1987). Clear danger: Situational determinants of the appraisal of threat. *Psychological Bulletin, 101*(3), 404–417.

Rutter, M. (1999). Resilience concepts and findings: Implications for family therapy. *Journal of Family Therapy, 21*, 119–144.

Sapolsky, R. M. (1996). Why stress is bad for your brain. *Science, 273*(5276), 749–750.

Sapolsky, R. M., Romero, L. M., & Munck, A. U. (2000). How do glucocorticoids influence stress responses? Integrating permissive, suppressive, stimulatory, and preparative actions. *Endocrine Reviews, 21*(1), 55–89.

Scheier, M. F., & Carver, C. S. (1985). Optimism, coping, and health: Assessment and implications of generalized outcome expectancies. *Health Psychology, 4*(3), 219–247.

Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the life orientation test. *Journal of Personality and Social Psychology, 67*(6), 1063–1078.

Taylor, S. E., Kemeny, M. E., Reed, G. M., Bower, J. E., & Gruenewald, T. L. (2000). Psychological resources, positive illusions, and health. *American Psychologist, 55*(1), 99–109.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry, 15*(1), 1–18.

Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology, 86*(2), 320–333.

Urry, H. L., Nitschke, J. B., Dolski, I., Jackson, D. C., Dalton, K. M., Mueller, C. J., et al. (2004). Making a life worth living: Neural correlates of well-being. *Psychological Science, 15*(6), 367–372.

Ursu, S., & Carter, C. S. (2005). Outcome representations, counterfactual comparisons and the human orbitofrontal cortex: Implications for neuroimaging studies of decision-making. *Cognitive Brain Research, 23*(1), 51–60.

Waugh, C. E., Wager, T. D., Fredrickson, B. L., Noll, D. C., & Taylor, S. F. (2008). The neural correlates of trait resilience when anticipating and recovering from threat. Unpublished manuscript.

Werner, E. E., & Smith, R. S. (1992). *Overcoming the odds: High risk children from birth to adulthood*. Cornell University Press.

Werner, E. E., & Smith, R. S. (2001). *Journeys from childhood to midlife: Risk, resilience, and recovery*. Cornell University Press.

Please cite this article in press as: Waugh, C. E. et al., Adapting to life's slings and arrows: Individual differences ..., *Journal of Research in Personality* (2008), doi:10.1016/j.jrp.2008.02.005