

The broaden-and-build theory of positive emotions

Barbara L. Fredrickson

Department of Psychology, University of Michigan, 525 East University Avenue, Ann Arbor, MI 48109-1109, USA
(blf@umich.edu)

The broaden-and-build theory describes the form and function of a subset of positive emotions, including joy, interest, contentment and love. A key proposition is that these positive emotions *broaden* an individual's momentary thought-action repertoire: joy sparks the urge to play, interest sparks the urge to explore, contentment sparks the urge to savour and integrate, and love sparks a recurring cycle of each of these urges within safe, close relationships. The broadened mindsets arising from these positive emotions are contrasted to the narrowed mindsets sparked by many negative emotions (i.e. specific action tendencies, such as attack or flee). A second key proposition concerns the consequences of these broadened mindsets: by broadening an individual's momentary thought-action repertoire—whether through play, exploration or similar activities—positive emotions promote discovery of novel and creative actions, ideas and social bonds, which in turn *build* that individual's personal resources; ranging from physical and intellectual resources, to social and psychological resources. Importantly, these resources function as reserves that can be drawn on later to improve the odds of successful coping and survival. This chapter reviews the latest empirical evidence supporting the broaden-and-build theory and draws out implications the theory holds for optimizing health and well-being.

Keywords: positive emotions; well-being; happiness; resilience

1. INTRODUCTION

At first blush, it might appear that positive emotions are important to the science of well-being simply because positive emotions are markers of optimal well-being. Certainly, moments in people's lives characterized by experiences of positive emotions—such as joy, interest, contentment, love, etc.—are moments in which they are not plagued by negative emotions, such as anxiety, sadness, anger and the like. Consistent with this intuition, the overall balance of peoples' positive to negative emotions has been shown to contribute to their subjective well-being (Diener *et al.* 1991). In this sense, positive emotions *signal* optimal functioning, but this is far from their whole story. I argue that positive emotions also *produce* optimal functioning, not just within the present, pleasant moment, but over the long-term as well. The bottom-line message is that people should cultivate positive emotions in themselves and in those around them, not just as an end-states in themselves, but also as a means to achieving psychological growth and improved psychological and physical well-being over time.

2. HISTORY OF RESEARCH ON POSITIVE EMOTIONS

This view of positive emotions represents a significant departure from traditional approaches to the study of positive emotions. In this section I provide a brief selective review of the history of research on positive emotions.

(a) *Neglected relative to negative emotions*

Relative to the negative emotions, positive emotions have received little empirical attention. There are several inter-related reasons for this. One reason, which has plagued psychology more generally (Seligman & Csikszentmihalyi 2000), is the traditional focus on psychological problems alongside remedies for those problems. Negative emotions—when extreme, prolonged or contextually inappropriate—produce many grave problems for individuals and society, ranging from phobias and anxiety disorders, aggression and violence, depression and suicide, eating disorders and sexual dysfunction, to a host of stress-related physical disorders. Although positive emotions do at times pose problems (e.g. mania, drug addiction), these problems have often assumed lower priority among psychologists and emotion researchers. So, in part as a result their association with problems and dangers, negative emotions have captured most research attention.

Another reason positive emotions have been sidelined is the habit among emotion theorists of creating models of emotions *in general*. Such models are typically built to the specifications of those attention-grabbing negative emotions (e.g. fear and anger), with positive emotions squeezed in later, often seemingly as an afterthought. For instance, key to many theorists' models of emotion is the idea that emotions are, by definition, associated with *specific action tendencies* (Frijda 1986; Frijda *et al.* 1989; Tooby & Cosmides 1990; Lazarus 1991; Levenson 1994; Oatley & Jenkins 1996). Fear, for example, is linked with the urge to escape, anger with the urge to attack, disgust with the urge to expel, and so on. No theorist argues that people invariably act out these urges when feeling particular

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emotions, but rather, peoples' ideas about possible courses of action narrow in on a specific set of behavioural options. A key idea in these models is that having a specific action tendency come to mind is what made an emotion evolutionarily adaptive: these were among the actions that worked best in getting our ancestors out of life-or-death situations. Another key idea is that specific action tendencies and physiological changes go hand-in-hand. So, for example, when you have an urge to escape when feeling fear, your body reacts by mobilizing appropriate autonomic support for the possibility of running by redirecting blood flow to large muscle groups.

Although specific action tendencies have been invoked to describe the form and function of positive emotions as well, the action tendencies identified for positive emotions are notably vague and underspecified (Fredrickson & Levenson 1998). Joy, for instance, is linked with aimless activation, interest with attending, and contentment with inactivity (Frijda 1986). These tendencies are far too general to be called specific (Fredrickson 1998). Although a few theorists had earlier noted that fitting positive emotions into emotion-general models posed problems (Lazarus 1991; Ekman 1992), this acknowledgement was not accompanied by any new or revised models to better accommodate the positive emotions. Instead, the difficulties inherent in 'shoehorning' the positive emotions into emotion-general models merely tended to marginalize them further. Many theorists, for instance, minimize challenges to their models by maintaining their focus on negative emotions, paying little or no attention to positive emotions.

(b) *Confused with related affective states*

Perhaps because they have received less direct scrutiny, the distinctions among positive emotions and other closely related affective states, like sensory pleasure and positive mood, have often been blurred instead of sharpened. Although working definitions of emotions vary somewhat across researchers, consensus is emerging that emotions (both positive and negative) are best conceptualized as multi-component response tendencies that unfold over relatively short timespans. Typically, emotions begin with an individual's assessment of the personal meaning of some antecedent event: what Lazarus (1991) called the person–environment relationship, or adaptational encounter. Either conscious or unconscious, this appraisal process triggers a cascade of response tendencies manifest across loosely coupled component systems, such as subjective experience, facial expressions and physiological changes.

Sometimes various forms of sensory pleasure (e.g. sexual gratification, satiation of hunger or thirst) are taken to be positive emotions because they share with positive emotions a pleasant subjective feel and include physiological changes, and because sensory pleasure and positive emotions often co-occur (e.g. sexual gratification within a loving relationship). However, emotions differ from physical sensations in that emotions require cognitive appraisals or meaning assessments to be initiated. In contrast to positive emotions, pleasure can be caused simply by changing the immediate physical environment (e.g. eating or otherwise stimulating the body). Moreover, whereas pleasure depends heavily on bodily stimulation, positive emotions more often occur in the absence of external

physical sensation (e.g. joy at receiving good news or interest in a new idea). Pleasurable sensations, then, are best considered automatic responses to fulfilling bodily needs. In fact, Cabanac (1971) suggested that people experience sensory pleasure with any external stimulus that 'corrects an internal trouble'. A cool bath, for instance, is only pleasant to someone who is overheated (who thus needs to be cooled). Likewise, food is pleasant to the hungry person, but becomes less pleasant—even unpleasant—as that person becomes satiated.

Positive emotions are also often confused with positive moods. However, emotions differ from moods in that emotions are *about* some personally meaningful circumstance (i.e. they have an object), and are typically short-lived and occupy the foreground of consciousness. By contrast, moods are typically free-floating or objectless, more long-lasting, and occupy the background of consciousness (Oatley & Jenkins 1996; Rosenberg 1998). These distinctions between emotions and moods, however, are guarded more at theoretical than empirical levels. In research practice, virtually identical techniques are used for inducing positive moods and positive emotions (e.g. giving gifts, viewing comedies).

(c) *Functions linked to urges to approach or continue*

Most commonly, the function of all positive emotions has been identified as facilitating approach behaviour (Cacioppo *et al.* 1993; Davidson 1993; Frijda 1994) or continued action (Carver & Scheier 1990; Clore 1994). From this perspective, experiences of positive emotions prompt individuals to engage with their environments and partake in activities, many of which were evolutionarily adaptive for the individual, its species, or both. This link between positive emotions and activity engagement provides an explanation for the often-documented positivity offset, or the tendency for individuals to experience mild positive affect frequently, even in neutral contexts (Diener & Diener 1996; Cacioppo *et al.* 1999). Without such an offset, individuals would most often be unmotivated to engage with their environments. However, with such an offset, individuals exhibit the adaptive bias to approach and explore novel objects, people or situations.

Although positive emotions do often appear to function as internal signals to approach or continue, they share this function with other positive affective states as well. Sensory pleasure, for instance, motivates people to approach and continue consuming whatever stimulus is biologically useful for them at the moment (Cabanac 1971). Likewise, free-floating positive moods motivate people to continue along any line of thinking or action that they have initiated (Clore 1994). As such, functional accounts of positive emotions that emphasize tendencies to approach or continue may capture only the lowest common denominator across all affective states that share a pleasant subjective feel. This traditional approach leaves additional functions that are unique to positive emotions uncharted.

3. THE BROADEN-AND-BUILD THEORY OF POSITIVE EMOTIONS

Traditional approaches to the study of emotions have tended to ignore positive emotions, squeeze them into purportedly emotion-general models, confuse them with

closely related affective states, and describe their function in terms of generic tendencies to approach or continue. Sensing that these approaches did not do justice to positive emotions, I developed an alternative model for positive emotions that better captures their unique effects. I call this the broaden-and-build theory of positive emotions because positive emotions appear to *broaden* peoples' momentary thought–action repertoires and *build* their enduring personal resources (Fredrickson 1998, 2001).

I contrast this new model to traditional models based on specific action tendencies. Specific action tendencies work well to describe the form and function of negative emotions, and should be retained for models of this subset of emotions. Without loss of theoretical nuance, a specific action tendency can be re-described as the outcome of a psychological process that narrows a person's momentary thought–action repertoire by calling to mind an urge to act in a particular way (e.g. escape, attack, expel). In a life-threatening situation, a narrowed thought–action repertoire promotes quick and decisive action that carries direct and immediate benefit: specific action tendencies called forth by negative emotions represent the sort of actions that worked best to save our ancestors' lives and limbs in similar situations.

However, positive emotions seldom occur in life-threatening situations. As such, a psychological process that narrows a person's momentary thought–action repertoire to promote quick and decisive action may not be needed. Instead, positive emotions have a complementary effect: relative to neutral states and routine action, positive emotions broaden peoples' momentary thought–action repertoires, widening the array of the thoughts and actions that come to mind. Joy, for instance, creates the urge to play, push the limits and be creative; urges evident not only in social and physical behaviour, but also in intellectual and artistic behaviour. Interest, a phenomenologically distinct positive emotion, creates the urge to explore, take in new information and experiences, and expand the self in the process. Contentment, a third distinct positive emotion, creates the urge to sit back and savour current life circumstances, and integrate these circumstances into new views of self and of the world. Love—viewed as an amalgam of distinct positive emotions (e.g. joy, interest and contentment) experienced within contexts of safe, close relationships—creates recurring cycles of urges to play with, explore and savour our loved ones. These various thought–action tendencies—to play, to explore, or to savour and integrate—each represents ways that positive emotions broaden habitual modes of thinking or acting. (For descriptions of pride and elevation from the perspective of the broaden-and-build theory see Fredrickson & Branigan (2001), for a description of gratitude see Fredrickson (2004).)

In contrast to negative emotions, which carry direct and immediate adaptive benefits in situations that threaten survival, the broadened thought–action repertoires triggered by positive emotions are beneficial in other ways. Specifically, broadened mindsets carry indirect and long-term adaptive benefits because broadening builds enduring personal resources.

Take play as an example. Specific forms of chasing play evident in juveniles of a species—like running into a flexible sapling or branch and catapulting oneself in an unexpected

direction—are re-enacted in adults of that species exclusively during predator avoidance (Dolhinow 1987). Such correspondences between juvenile play manoeuvres and adult survival manoeuvres suggest that juvenile play builds enduring physical resources (Caro 1988; Boulton & Smith 1992). Play also builds enduring social resources: social play, with its shared amusement and smiles, builds lasting social bonds and attachments (Lee 1983; Simons *et al.* 1986; Aron *et al.* 2000), which can become the locus of subsequent social support. Childhood play also builds enduring intellectual resources, by increasing creativity (Sherrod & Singer 1989), creating theory of mind (Leslie 1987), and fueling brain development (Panksepp 1998). Similarly, the exploration prompted by the positive emotion of interest creates knowledge and intellectual complexity, and the savouring prompted by contentment produces self-insight and alters world views. So each of these phenomenologically distinct positive emotions shares the feature of augmenting an individual's personal resources, ranging from physical and social resources, to intellectual and psychological resources (see Fredrickson (1998, 2001) and Fredrickson & Branigan (2001) for more detailed reviews).

Importantly, the personal resources accrued during states of 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. These resources can be drawn on in subsequent moments and in different emotional states. Through experiences of positive emotions, then, people transform themselves, becoming more creative, knowledgeable, resilient, socially integrated and healthy individuals.

In short, the broaden-and-build theory describes the form of positive emotions in terms of broadened thought–action repertoires, and describes their function in terms of building enduring personal resources. In doing so, the theory provides a new perspective on the evolved adaptive significance of positive emotions. Those of our ancestors who succumbed to the urges sparked by positive emotions—to play, explore and so on—would have by consequence accrued more personal resources. When these same ancestors later faced inevitable threats to life and limb, their greater personal resources would have translated into greater odds of survival, and in turn, greater odds of living long enough to reproduce. To the extent then, that the capacity to experience positive emotions is genetically encoded, this capacity, through the process of natural selection, would have become part of our universal human nature.

4. SUMMARY OF CURRENT RESEARCH FINDINGS

Empirical support for several key propositions of the broaden-and-build theory can be drawn from multiple sub-disciplines within psychology, ranging from work on cognition and intrinsic motivation, to attachment styles and animal behaviour (reviewed in Fredrickson 1998). This evidence suggests that positive emotions broaden the scopes of attention, cognition and action, and that they build physical, intellectual and social resources. However, much of this evidence, because it pre-dated the

broaden-and-build theory, provides only indirect support for the model. Here, I briefly describe recent direct tests of hypotheses drawn from the broaden-and-build theory.

(a) *Positive emotions broaden thought–action repertoires*

Foundational evidence for the proposition that positive emotions broaden peoples' momentary thought–action repertoires comes from two decades of experiments conducted by Isen and colleagues (reviewed in Isen (2000)). They have documented that people experiencing positive affect show patterns of thought that are notably unusual (Isen *et al.* 1985), flexible (Isen & Daubman 1984), creative (Isen *et al.* 1987), integrative (Isen *et al.* 1991), open to information (Estrada *et al.* 1997) and efficient (Isen & Means 1983; Isen *et al.* 1991). They have also shown that those experiencing positive affect show increased preference for variety and accept a broader array of behavioural options (Kahn & Isen 1993). In general terms, Isen has suggested that positive affect produces a 'broad, flexible cognitive organization and ability to integrate diverse material' (Isen 1990, p. 89), effects linked to increases in brain dopamine levels (Ashby *et al.* 1999). So although Isen's work does not target specific positive emotions or thought–action tendencies *per se*, it provides the strongest evidence that positive affect broadens cognition. Whereas negative emotions have long been known to narrow peoples' attention, making them miss the forest for the trees, more recent work suggests that positive affect also expands attention (Derryberry & Tucker 1994). The evidence comes from studies that use global–local visual processing paradigms to assess biases in attentional focus. Negative states—like anxiety, depression and failure—predict local biases consistent with narrowed attention, whereas positive states—like subjective well-being, optimism and success—predict global biases consistent with broadened attention (Derryberry & Tucker 1994; Basso *et al.* 1996).

These findings provide initial empirical footing for the hypothesis, drawn from the broaden-and-build theory, that distinct types of positive emotion serve to broaden peoples' momentary thought–action repertoires, whereas distinct types of negative emotions serve to narrow these same repertoires. Together with Christine Branigan, I tested this broaden hypothesis by showing research participants short emotionally evocative film clips to induce the specific emotions of joy, contentment, fear and anger. We also used a non-emotional film clip as a neutral control condition. Immediately following each film clip, we measured the breadth of participants' thought–action repertoires. We asked them to step away from the specifics of the film and imagine being in a situation themselves in which similar feelings would arise. Given this feeling, we asked them to list what they would like to do right then. Participants recorded their responses on up to 20 blank lines that began with the phrase 'I would like to...'.²

Tallying the things each participant listed, we found support for the broaden hypothesis. Participants in the two positive emotions conditions (joy and contentment) identified more things that they would like to do right then relative to those in the two negative emotion conditions (fear and anger), and, more importantly, relative to those in the neutral control condition. Those in the two negative

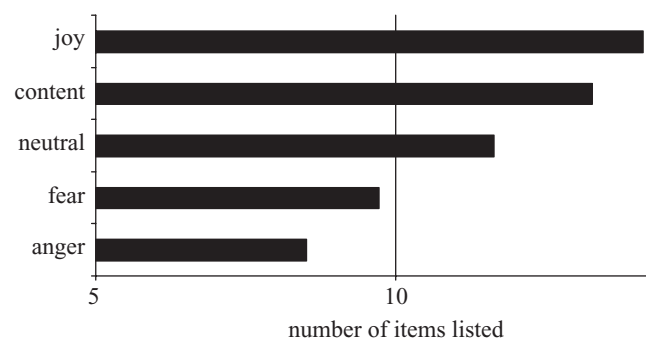


Figure 1. Breadth of the thought–action repertoire by emotion (Fredrickson & Branigan 2004).

emotion conditions also named fewer things than those in the neutral control condition (figure 1; Fredrickson & Branigan 2004).

In several other experiments, we assessed broadened thinking by measuring the degree to which people see the 'big picture' or focus on smaller details. We do this by using what are called global–local visual processing tasks. An example item from one such task is shown in figure 2. A participant's task is to judge which of two comparison figures (bottom) is more similar to a standard figure (top). Neither choice is right or wrong. But one comparison figure resembles the standard in global configuration (lower left), and the other in local detail elements (lower right). Using this and similar measures, we have found that, compared with those in negative or neutral states, people who experience positive emotions—as assessed either by self-report or by electromyographic signals coming from the face—show evidence of broadened thinking (Fredrickson & Branigan 2004; K. J. Johnson, C. E. Waugh, B. L. Fredrickson, and T. Wager, unpublished data).

These data provide preliminary evidence that two distinct types of positive emotion—a high activation state of joy and a low activation state of contentment—each produces a broader attentional scope and thought–action repertoire than does a neutral state. Likewise, two distinct types of negative emotion—fear and anger—each produces a narrower attentional scope and thought–action repertoire than does a neutral state. This pattern of results supports a core proposition of the broaden-and-build theory: that distinct positive emotions widen the array of thoughts and actions that come to mind. By contrast, distinct negative emotions, as models based on specific action tendencies would suggest, would shrink this same array. So far, seven different studies from our laboratory support the broaden hypothesis (Fredrickson & Branigan 2004; K. J. Johnson and B. L. Fredrickson, unpublished data; K. J. Johnson, C. E. Waugh, B. L. Fredrickson, and T. Wager, unpublished data; C. E. Waugh and B. L. Fredrickson, unpublished data). Supportive evidence from other laboratories is also emerging (Gasper & Clore 2002; Bolte *et al.* 2003).

(b) *Positive emotions undo lingering negative emotions*

Evidence for the broaden hypothesis has clear implications for the strategies that people use to regulate their experiences of negative emotions. If negative emotions narrow the momentary thought–action repertoire, and positive emotions broaden this same repertoire, then positive

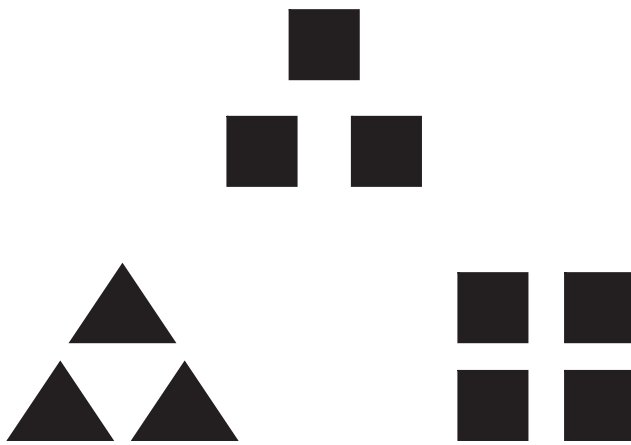


Figure 2. Sample item from a global–local choice task (Fredrickson & Branigan 2004).

emotions ought to function as efficient antidotes for the lingering effects of negative emotions. In other words, positive emotions might ‘correct’ or ‘undo’ the after effects of negative emotions; we call this the *undo hypothesis* (Fredrickson & Levenson 1998; Fredrickson *et al.* 2000). The basic observation that positive emotions (or key components of them) are somehow incompatible with negative emotions is not new, and has been demonstrated in earlier work on anxiety disorders (e.g. systematic desensitization; Wolpe 1958), motivation (e.g. the opponent–process theory; Solomon & Corbit 1974) and aggression (e.g. the principle of incompatible responses; Baron 1976). Even so, the precise mechanism ultimately responsible for this incompatibility has not been adequately identified. The broaden function of positive emotions may play a role. By broadening a person’s momentary thought–action repertoire, a positive emotion may loosen the hold that a negative emotion has gained on that person’s mind and body by dismantling or undoing the preparation for a specific action.

One marker of the specific action tendencies associated with negative emotions is increased cardiovascular activity, which redistributes blood flow to relevant skeletal muscles. In the context of negative emotions, then, positive emotions should speed recovery from—or undo—this cardiovascular reactivity, returning the body to more mid-range levels of activation. By accelerating cardiovascular recovery, positive emotions create the bodily context suitable for pursuing the broader array of thoughts and actions called forth.

My collaborators and I tested this undo hypothesis by first inducing a high-activation negative emotion in all participants (Fredrickson & Levenson 1998; Fredrickson *et al.* 2000). In the latter study, we used a time-pressured speech preparation task. In just 1 minute, participants prepared a speech on ‘why you are a good friend’ believing that their speech would be videotaped and evaluated by their peers. This speech task induced the subjective experience of anxiety along with increases in heart rate, peripheral vasoconstriction and systolic and diastolic blood pressure. Into this context of anxiety-related sympathetic arousal, we randomly assigned participants to view one of four films. Two films elicited mild positive emotions (joy and contentment) and a third served as a neutral control condition. Notably,

these three films, when viewed after a resting baseline, elicit virtually no cardiovascular reactivity (Fredrickson *et al.* 2000). So the two positive films used in this study are indistinguishable from neutrality with respect to cardiovascular changes. Our fourth film elicited sadness. We chose sadness as an additional comparison because, among the negative emotions, it has not been definitively linked to a high-energy action tendency, and thus could be a contender for speeding cardiovascular recovery.

The undo hypothesis predicts that those who experience positive emotions on the heels of a high-activation negative emotion will show the fastest cardiovascular recovery. We tested this by measuring the time elapsed from the start of the randomly assigned film, until the cardiovascular reactions induced by the negative emotion returned to baseline levels. In three independent samples, participants in the two positive emotion conditions (joy and contentment) exhibited faster cardiovascular recovery than those in the neutral control condition, and faster than those in the sadness condition, which exhibited the most protracted recovery (figure 3; Fredrickson & Levenson 1998; Fredrickson *et al.* 2000).

Recalling that the two positive emotion films and the neutral film did not differ in what they *do* to the cardiovascular system, these data suggest that they do differ in what they can *undo* within this system. Two distinct types of positive emotion—mild joy and contentment—share the ability to undo the lingering cardiovascular after-effects of negative emotions. Although the precise cognitive and physiological mechanisms of this undo effect remain unknown, the broaden-and-build theory suggests that broadening at the cognitive level mediates undoing at the cardiovascular level. Phenomenologically, positive emotions may help people place the events in their lives in broader context, lessening the resonance of any particular negative event.

(c) *Positive emotions fuel psychological resiliency*

Evidence for the undo effect of positive emotions suggests that people might improve their psychological well-being, and perhaps also their physical health, by cultivating experiences of positive emotions at opportune moments to cope with negative emotions (Fredrickson 2000). Folkman and colleagues have made similar claims that experiences of positive affect during chronic stress help people cope (Lazarus *et al.* 1980; Folkman 1997; Folkman & Moskowitz 2000). Evidence supporting this claim can be drawn from experiments showing that positive affect facilitates attention to negative, self-relevant information (Trope & Neter 1994; Reed & Aspinwall 1998; Trope & Pomerantz 1998; for a review see Aspinwall 1998). Extrapolating from these findings, Aspinwall (2001) describes how positive affect and positive beliefs serve as resources for people coping with adversity (see also Aspinwall & Taylor 1997; Taylor *et al.* 2000).

It seems plausible that some individuals, more than others, might intuitively understand and use the benefits of positive emotions to their advantage. One candidate individual difference is psychological resilience. Resilient individuals are said to ‘bounce back’ from stressful experiences quickly and efficiently, just as resilient metals bend, but do not break (Lazarus 1993; Carver 1998).

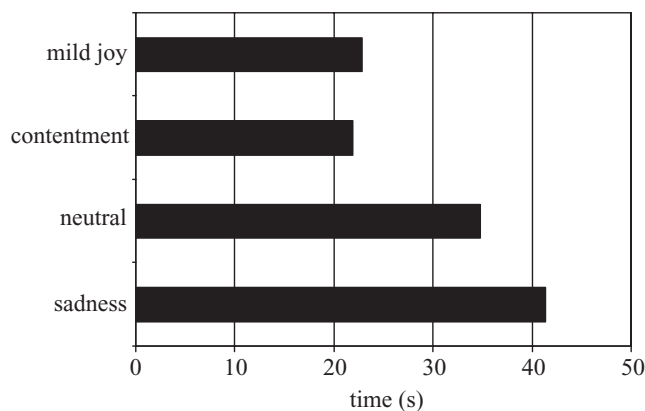


Figure 3. Speed of cardiovascular recovery by emotion (Fredrickson *et al.* 2000).

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 (Block & Kremen 1996; Klohnen 1996). Although positive emotions are no doubt at times an outcome of resilient coping (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 humour (Werner & Smith 1992; Wolin & Wolin 1993; Masten 1994), creative exploration (Cohler 1987), relaxation and optimistic thinking (Murphy & Moriarty 1976; Anthony 1987) 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. Strikingly, resilient people not only cultivate positive emotions in themselves to cope, but they are also skilled at eliciting positive emotions in others (i.e. caregivers early in life and companions later on), which creates a supportive social context that also facilitates coping (Demos 1989; Werner & Smith 1992; Kumpfer 1999).

Conceptualizing resilience as the ability to ‘bounce back’ after adversity suggests that, relative to their less resilient peers, resilient individuals would exhibit faster cardiovascular recovery following a high-activation negative emotion. Additionally, the broaden-and-build theory suggests that this ability to ‘bounce back’ to cardiovascular baseline may be fuelled by experiences of positive emotion.

Michele Tugade and I tested these two hypotheses about resilient individuals, using the same time-pressured speech preparation task (described earlier) to induce a high-activation negative emotion. We measured psychological resilience using Block & Kremen’s (1996) self-report scale. Interestingly, resilience did *not* predict the levels of anxiety that participants reported experiencing during the speech task, or the magnitude of their cardiovascular reactions to the stressful task, both of which were considerable. Resilience did, however, predict participants’ reports of positive emotions. Before the speech task was even introduced, more resilient individuals reported higher levels of

pre-existing positive affect on an initial mood measure. When later asked how they felt during the time-pressured speech preparation phase, more resilient individuals reported that, alongside their high anxiety, they also experienced higher levels of happiness and interest.

As predicted by the theoretical definition of psychological resilience, more resilient participants exhibited significantly faster returns to baseline levels of cardiovascular activation following the speech task. Moreover, as predicted by the broaden-and-build theory, this difference in time to achieve cardiovascular recovery was accounted for by differences in positive emotions (Tugade & Fredrickson 2004).

These data suggest that positive emotions may fuel psychological resilience. In effect, then, resilient individuals may be—wittingly or unwittingly—expert users of the undo effect of positive emotions (Tugade & Fredrickson 2002). A prospective field study of American college students before and after the terrorist attacks of 11 September 2001 provided consistent evidence. Relative to their less resilient peers, resilient individuals were less likely to become depressed and more likely to experience post-crises growth after the attacks. More importantly, the greater positive emotions that resilient people experienced fully accounted for each of these beneficial effects (Fredrickson *et al.* 2003).

(d) *Positive emotions build personal resources*

Evidence suggests, then, that positive emotions may fuel individual differences in resilience. Noting that psychological resilience is an enduring personal resource, the broaden-and-build theory makes the bolder prediction that experiences of positive emotions might also, over time, build psychological resilience, not just reflect it. That is, to the extent that positive emotions broaden the scopes of attention and cognition, enabling flexible and creative thinking, they should also augment peoples’ enduring coping resources (Isen 1990; Aspinwall 1998, 2001; Fredrickson & Joiner 2002).

Together with my students, I recently completed an experimental test of the build effect of positive emotions. Each evening for one month, college students logged on to a secure Web site, reported the emotions they had experienced in the past 24 hours, and then wrote about the best, worst or a seemingly ordinary event of their day (topics randomly assigned within participants). Using a between-groups design, we induced a subset of these students to feel more positive emotions over the month by asking them to find the positive meaning and long-term benefits within their best, worst and seemingly ordinary experiences each day. At the end of the month, compared with those who did not make this daily effort to find positive meaning, those who did, showed increases in resilience. Moreover, these increases in resilience were completely accounted for by the greater positive emotions garnered by the daily habit of finding positive meaning (Fredrickson *et al.* 2004). These data support the causal direction posited by the broaden-and-build theory: that positive emotions produce increments in personal resources. Beyond providing the first direct evidence for this causal claim, this new finding is important for two additional reasons. First, our past work has shown that resilience, as measured in this experiment, is a consequential trait that predicts both psychological

well-being and growth, and physiological recovery (Fredrickson *et al.* 2003; Tugade & Fredrickson 2004). Second, it suggests how people might begin to harness the beneficial effects of positive emotions to optimize their own well-being: by regularly finding positive meaning within the daily ups and downs of life (Fredrickson 2000).

(e) Positive emotions fuel psychological and physical well-being

By broadening peoples' mindsets and building their psychological resources, over time positive emotions should also enhance peoples' emotional and physical well-being. Consistent with this view, studies have shown that people who experience positive emotions during bereavement are more likely to develop long-term plans and goals. Together with positive emotions, plans and goals predict greater psychological well-being 12 months post-bereavement (Stein *et al.* (1997); for related work, see Bonanno & Keltner (1997) and Keltner & Bonanno (1997)). One way in which people experience positive emotions in the face of adversity is by finding positive meaning in ordinary events or within the adversity itself (Affleck & Tennen 1996; Folkman & Moskowitz 2000; Fredrickson 2000). Importantly, the relationship between positive meaning and positive emotions is considered reciprocal: finding positive meaning not only triggers positive emotion, but also positive emotions—because they broaden thinking—should increase the likelihood of finding positive meaning in subsequent events (Fredrickson 2000).

These suspected reciprocal relations among positive emotions, broadened thinking and positive meaning suggest that, over time, the effects of positive emotions should accumulate and compound: the broadened attention and cognition triggered by earlier experiences of positive emotion should facilitate coping with adversity, and this improved coping should predict future experiences of positive emotion. As this cycle continues, people build their psychological resilience and enhance their emotional well-being.

The cognitive literature on depression had already documented a *downward spiral* in which depressed mood and the narrowed, pessimistic thinking it engenders influence one another reciprocally, over time leading to ever-worsening moods, and even clinical levels of depression (Beck 1979; Peterson & Seligman 1984). The broaden-and-build theory suggests a complementary *upward spiral* in which positive emotions and the broadened thinking they engender also influence one another reciprocally, leading to appreciable increases in emotional well-being over time. Positive emotions may trigger these upward spirals, in part, by building resilience and influencing the ways that people cope with adversity. (For a complementary discussion of upward spirals, see Aspinwall (1998, 2001).)

Together with Thomas Joiner, I conducted an initial prospective test of the hypothesis that, through cognitive broadening, positive emotions produce an upward spiral towards enhanced emotional well-being. We assessed positive and negative emotions, as well as a concept that we call broad-minded coping, at two time points, five weeks apart. Broad-minded coping was tapped by items such as 'think of different ways to deal with the problem' and 'try to step back from the situation and be more objective'.

Our data revealed evidence for at least a fragment of an upward spiral. Individuals who experienced more positive emotions than others, over time became more resilient to adversity, as indexed by increases in broad-minded coping. These enhanced coping skills, in turn, predicted increased positive emotions over time (Fredrickson & Joiner 2002). These findings suggest that positive emotions and broad-minded coping mutually build on one another: positive emotions not only make people feel good in the present, but also—by broadening thinking and building resources—positive emotions increase the likelihood that people will feel good in the future.

What are the long-term consequences of such upward spirals? A recent longitudinal study that spanned seven decades suggests the pay-off may be longer lives. The data come from a study of 180 Catholic nuns who pledged their lives not only to God but also to science. As part of a larger study of ageing and Alzheimer's disease, these nuns agreed to give scientists access to their archived work and medical records (and to donate their brains at death). The work archives included autobiographies hand written when the nuns were in their early twenties. Researchers scored these essays for emotional content, recording instances of positive emotions; like happiness, interest, love and hope, and negative emotions; like sadness, fear and disinterest. No association was found between negative emotional content and mortality, perhaps because it was rather rare in these essays. But a strong association was found between positive emotional content and mortality: those nuns who expressed the most positive emotions lived on average 10 years longer than those who expressed the least positive emotions (Danner *et al.* 2001). This is not an isolated finding. Several other researchers have found the same solid link between feeling good and living longer, even when accounting for age, gender, health status, social class and other possible confounds (Ostir *et al.* 2000, 2001; Levy *et al.* 2002; Moskowitz 2003).

5. COMPLEX DYNAMICS TRIGGERED BY POSITIVE EMOTIONS

The broaden-and-build theory challenges existing paradigms because it casts positive emotions in a far more consequential role in the story of human welfare. Whereas traditional perspectives have suggested that positive emotions *mark* or *signal* health and well-being (Kahneman 1999; Diener 2000), the broaden-and-build theory suggests that positive emotions also *produce* health and well-being (Fredrickson 2001). Put differently, to the extent that the broaden-and-build effects of positive emotions accumulate and compound over time, positive emotions carry the capacity to transform individuals for the better, making them healthier and more socially integrated, knowledgeable, effective and resilient. In short, the theory suggests that positive emotions fuel human flourishing.

Flourishing describes a state of optimal human functioning, one that simultaneously implies growth and longevity, beauty and goodness, robustness and resilience, and generativity and complexity (Keyes 2003; B. L. Fredrickson and M. Losada, unpublished data). Flourishing can be contrasted, not just with pathology, but also with languishing, which has been described as a disorder on the mental health continuum experienced by people who describe

their lives as ‘hollow’, empty’ or ‘stuck in a rut’. Although distinct from mental illness, languishing has been linked with comparable levels of emotional distress, limitations in daily activities, psychosocial impairment and economic cost from lost workdays (Keyes 2003). Building on my past work, I argue that positive emotions—by broadening peoples’ mindsets and building their enduring resources—can alleviate human languishing and seed human flourishing.

How much positivity is needed to flourish? A nonlinear dynamical model developed to describe flourishing business teams suggests an answer. Losada (1999) observed 60 management teams in 1 hour meetings as they crafted their annual strategic plans. Behind one-way mirrors, trained coders rated every speech act on three opposing pairs: positive–negative, inquiry–advocacy and other–self. Utterances were coded as ‘positive’ if speakers showed support, encouragement or appreciation, and as ‘negative’ if they showed disapproval, sarcasm or cynicism. They were coded as ‘inquiry’ if they offered questions aimed at exploring or examining a position, and as ‘advocacy’ if they offered arguments in favour of the speaker’s viewpoint. They were coded as ‘self’ if they referred to the person speaking, the group present or the company, and as ‘other’ if they referenced a person or group not present or not part of the company.

Later, Losada identified which teams were flourishing, defined as showing uniformly high performance across three indicators: profitability, customer satisfaction, and evaluations by superiors, peers and subordinates. Other teams had mixed or uniformly low performance. Analyses of the time-series of the observed data, as well as their lead–lag relationships, led Losada (1999) to develop a nonlinear dynamics model to capture the interaction patterns observed within the different levels of team performance.

The complex dynamics of flourishing business teams followed the classic ‘butterfly’ trajectory of the Lorenz system, first discovered in the 1960s to represent the complex dynamics underlying weather patterns (Losada 1999; Losada & Heaphy 2004). For flourishing teams, the dynamic structure showed the highest ratio of positivity to negativity and the broadest range of inquiry and advocacy.

The dynamics of medium performance teams were different. Although they begin with a complex butterfly structure that mirrored the flourishing teams, albeit at a much lower positivity ratio and a narrower range of inquiry and advocacy, they did not show enough behavioural flexibility to be resilient to adversity. In fact, the dynamics of medium performance teams calcified after any encounter with extreme negativity. After peak negativity, these teams lost behavioural flexibility and their ability to question and ended up languishing in a limit cycle centred on self-absorbed advocacy (Losada 1999; Losada & Heaphy 2004).

The dynamics of low performance teams were different still. They never showed the complex and generative dynamics of high performance teams, but instead were stuck in self-absorbed advocacy from the start. But worse than being stuck in the endless loop of a limit cycle, their dynamics showed the properties of a fixed point attractor: they eventually lost behavioural flexibility altogether as they spiralled down to a dead stop.

The nonlinear dynamical system that emerged from Losada’s in-depth study of business teams resonates well with the broaden-and-build theory (B. L. Fredrickson and

M. Losada, unpublished data). Just as predicted by the broaden-and-build theory, Losada’s work shows that higher levels of positivity are linked with: (i) broader behavioural repertoires; (ii) greater flexibility and resilience to adversity; and (iii) optimal functioning or flourishing. Losada also found that higher levels of positivity are linked with greater social resources, as indexed by the degree of connectivity among team members (Losada & Heaphy 2004).

In fact, the most potent single variable within Losada’s mathematical model is the ratio of positivity to negativity. If this ratio is known, the model can predict whether the complex dynamics of flourishing will be evident. Developing Losada’s mathematical model further, B. L. Fredrickson and M. Losada (unpublished data) identified the positivity ratio at which the dynamical structure bifurcates between a limit cycle of languishing and the complex dynamics of flourishing. This turns out to be a ratio of positivity to negativity of about 3 : 1. We hypothesize that only at or above this ratio is positivity in sufficient supply to seed human flourishing (B. L. Fredrickson and M. Losada, unpublished data).

We sought to test this hypothesis with observed data on human flourishing at multiple levels of analysis. We first drew from archival data gathered by Fredrickson *et al.* (2004) in which college students first took a survey to identify flourishing mental health (Keyes 2002). Participants who scored above the median on six out of 11 symptoms of positive psychological and social functioning were classified as flourishing, and the remaining were classified as languishing. Then, each day for a month, participants indicated the degree to which they experienced each of several positive and negative emotions. We calculated the ratio of positive to negative emotions experienced over the month. This ratio for flourishing individuals was 3.2 : 1, whereas for languishing individuals it was 2.3 : 1. As predicted, these ratios fall on either side of the hypothesized ratio of about 3 : 1 (B. L. Fredrickson and M. Losada, unpublished data).

Data from Gottman’s longitudinal studies of marriage are also relevant. He and his colleague observed 79 couples, married an average of 5 years, as they discussed an area of continuing conflict in their relationship. They measured positivity and negativity using two coding schemes: one focused on positive and negative speech acts, and another focused on observable positive and negative emotions. Gottman (1994) reported that among marriages that last and that both partners find to be satisfying—what we call flourishing marriages—the mean positivity ratio was 4.9. By contrast, among marriages identified as being on cascades towards dissolution—languishing marriages at best—the mean positivity ratio was 0.8. These ratios also flank the predicted ratio of about 3 : 1 (B. L. Fredrickson and M. Losada, unpublished data).

At three levels of analysis—for flourishing individuals, flourishing marriages and flourishing business teams—we find positivity ratios above 3 : 1. Likewise, for individuals, marriages or business teams that do not function so well, for those we identify as languishing, we find positivity ratios below 3 : 1. Remarkable coherence has thus emerged among theory, mathematics and observed data for positivity and human flourishing. First, Fredrickson’s (1998, 2001) broaden-and-build theory of positive emotions describes the psychological mechanisms through which positivity can fuel human flourishing. Second, Losada’s

nonlinear dynamic model (B. L. Fredrickson and M. Losada, unpublished data; Losada 1999; Losada & Heaphy 2004) describes the mathematical relationship between certain positivity ratios and the complex dynamics of human flourishing. And third, fine-grained empirical observations at three levels of analysis—within individuals, within couples and within business teams—support Fredrickson's theory and Losada's mathematics.

6. CONCLUDING REMARKS

The broaden-and-build theory underscores the ways in which positive emotions are essential elements of optimal functioning, and therefore an essential topic within the science of well-being. The theory, together with the research reviewed here, suggests that positive emotions: (i) broaden people's attention and thinking; (ii) undo lingering negative emotional arousal; (iii) fuel psychological resilience; (iv) build consequential personal resources; (v) trigger upward spirals towards greater well-being in the future; and (vi) seed human flourishing. The theory also carries an important prescriptive message. People should cultivate positive emotions in their own lives and in the lives of those around them, not just because doing so makes them feel good in the moment, but also because doing so transforms people for the better and sets them on paths toward flourishing and healthy longevity.

When positive emotions are in short supply, people get stuck. They lose their degrees of behavioural freedom and become painfully predictable. But when positive emotions are in ample supply, people take off. They become generative, creative, resilient, ripe with possibility and beautifully complex. The broaden-and-build theory conveys how positive emotions move people forward and lift them to the higher ground of optimal well-being.

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REFERENCES

- Affleck, G. & Tennen, H. 1996 Construing benefits from adversity: adaptational significance and dispositional underpinnings. *J. Personality* **64**, 899–922.
- Anthony, E. J. 1987 Risk, vulnerability, and resilience: an overview. In *The invulnerable child* (ed. E. J. Anthony & B. J. Cohler), pp. 3–48. New York: Guilford.
- Aron, A., Norman, C. C., Aron, E. N., McKenna, C. & Heyman, R. E. 2000 Couple's shared participation in novel and arousing activities and experienced relationship quality. *J. Personality Social Psychol.* **78**, 273–284.
- Ashby, F. G., Isen, A. M. & Turken, A. U. 1999 A neuropsychological theory of positive affect and its influence on cognition. *Psychol. Rev.* **106**, 529–550.
- Aspinwall, L. G. 1998 Rethinking the role of positive affect in self-regulation. *Motivation and Emotion* **22**, 1–32.
- Aspinwall, L. G. 2001 Dealing with adversity: self-regulation, coping, adaptation, and health. In *The Blackwell handbook of social psychology*, vol 1. (*Intraindividual processes*) (ed. A. Tesser & N. Schwarz), pp. 591–614. Malden, MA: Blackwell.
- Aspinwall, L. G. & Taylor, S. E. 1997 A stitch in time: self-regulation and proactive coping. *Psychol. Bull.* **121**, 417–436.
- Baron, R. A. 1976 The reduction of human aggression: a field study of the influence of incompatible reactions. *J. Appl. Social Psychol.* **6**, 260–274.
- Basso, M. R., Schefft, B. K., Ris, M. D. & Dember, W. N. 1996 Mood and global-local visual processing. *J. Int. Neuropsychol. Soc.* **2**, 249–255.
- Beck, A. T. 1979 *Cognitive therapy of depression*. New York: Guilford.
- Block, J. & Kremen, A. M. 1996 IQ and ego-resilience: conceptual and empirical connections and separateness. *J. Personality Social Psychol.* **70**, 349–361.
- Bolte, A., Goschke, T. & Kuhl, J. 2003 Emotion and intuition: effects of positive and negative mood on implicit judgments of semantic coherence. *Psychol. Sci.* **14**, 416–421.
- Bonanno, G. A. & Keltner, D. 1997 Facial expressions of emotion and the course of conjugal bereavement. *J. Abnormal Psychol.* **106**, 126–137.
- Boulton, M. J. & Smith, P. K. 1992 The social nature of play fighting and play chasing: mechanisms and strategies underlying cooperation and compromise. In *The adapted mind: evolutionary psychology and the generation of culture* (ed. J. H. Barkow, L. Cosmides & J. Tooby), pp. 429–444. New York: Oxford University Press.
- Cabanac, M. 1971 Physiological role of pleasure. *Science* **173**, 1103–1107.
- Cacioppo, J. T., Priester, J. R. & Berntson, G. G. 1993 Rudimentary determinants of attitudes. II. Arm flexion and extension have differential effects on attitudes. *J. Personality Social Psychol.* **65**, 5–17.
- Cacioppo, J. T., Gardner, W. L. & Berntson, G. G. 1999 The affect system has parallel and integrative processing components: form follows function. *J. Personality Social Psychol.* **76**, 839–855.
- Caro, T. M. 1988 Adaptive significance of play: are we getting closer? *Trends Ecol. Evol.* **3**, 50–54.
- Carver, C. S. 1998 Resilience and thriving: issues, models, and linkages. *J. Social Issues* **54**, 245–266.
- Carver, C. S. & Scheier, M. F. 1990 Origins and functions of positive and negative affect: a control-process view. *Psychol. Rev.* **97**, 19–35.
- Clare, G. L. 1994 Why emotions are felt. In *The nature of emotion: fundamental questions* (ed. P. Ekman & R. Davidson), pp. 103–111. New York: Oxford University Press.
- Cohler, B. J. 1987 Adversity, resilience, and the study of lives. In *The invulnerable child* (ed. A. E. James & B. J. Cohler), pp. 363–424. New York: Guilford.
- Danner, D. D., Snowdon, D. A. & Friesen, W. V. 2001 Positive emotions in early life and longevity: findings from the nun study. *J. Personality Social Psychol.* **80**, 804–813.
- Davidson, R. J. 1993 The neuropsychology of emotion and affective style. In *Handbook of emotion* (ed. M. Lewis & J. M. Haviland), pp. 143–154. New York: Guilford.
- Demos, E. V. 1989 Resiliency in infancy. In *The child of our times: studies in the development of resiliency* (ed. T. F. Dugan & R. Cole), pp. 3–22. Philadelphia, PA: Brunner/Mazel.
- Derryberry, D. & Tucker, D. M. 1994 Motivating the focus of attention. In *The heart's eye: emotional influences in perception and attention* (ed. P. M. Neiderthal & S. Kitayama), pp. 167–196. San Diego, CA: Academic.
- Diener, E. 2000 Subjective well-being: the science of happiness and a proposal for a national index. *Am. Psychol.* **55**, 34–43.
- Diener, E. & Diener, C. 1996 Most people are happy. *Psychol. Sci.* **7**, 181–185.
- Diener, E., Sandvik, E. & Pavot, W. 1991 Happiness is the frequency, not the intensity, of positive versus negative affect. In *Subjective well-being: an interdisciplinary perspective* (ed. F. Strack), pp. 119–139. Oxford: Pergamon Press.

- Dolhinow, P. J. 1987 At play in the fields. In *The natural history reader in animal behavior* (ed. H. Topoff), pp. 229–237. New York: Columbia University Press.
- Ekman, P. 1992 An argument for basic emotions. *Cogn Emotion* **6**, 169–200.
- Estrada, C. A., Isen, A. M. & Young, M. J. 1997 Positive affect facilitates integration of information and decreases anchoring in reasoning among physicians. *Org. Behav. Hum. Decision Processes* **72**, 117–135.
- Folkman, S. 1997 Positive psychological states and coping with severe stress. *Social Sci. Med.* **45**, 1207–1221.
- Folkman, S. & Moskowitz, J. T. 2000 Positive affect and the other side of coping. *Am. Psychol.* **55**, 647–654.
- Fredrickson, B. L. 1998 What good are positive emotions? *Rev. Gen. Psychol.* **2**, 300–319.
- Fredrickson, B. L. 2000 Cultivating positive emotions to optimize health and well-being. *Prevention and Treatment* **3**. <http://journals.apa.org/prevention/volume3/pre0030001a.html>. Accessed 17 September 2003.
- Fredrickson, B. L. 2001 The role of positive emotions in positive psychology: the broaden-and-build theory of positive emotions. *Am. Psychol.* **56**, 218–226.
- Fredrickson, B. L. 2004 Gratitude, like other positive emotions, broadens and builds. In *The psychology of gratitude* (ed. R. A. Emmons & M. E. McCullough), pp. 145–166. New York: Oxford University Press.
- Fredrickson, B. L. & Branigan, C. 2001 Positive emotions. In *Emotion: current issues and future directions* (ed. T. J. Mayne & G. A. Bonnano), pp. 123–151. New York: Guilford.
- Fredrickson, B. L. & Branigan, C. 2004 Positive emotions broaden the scope of attention and thought-action repertoires. *Cogn Emotion*. (In the press.)
- Fredrickson, B. L. & Joiner, T. 2002 Positive emotions trigger upward spirals toward emotional well-being. *Psychol. Sci.* **13**, 172–175.
- Fredrickson, B. L. & Levenson, R. W. 1998 Positive emotions speed recovery from the cardiovascular sequelae of negative emotions. *Cogn Emotion* **12**, 191–220.
- Fredrickson, B. L., Mancuso, R. A., Branigan, C. & Tugade, M. 2000 The undoing effect of positive emotions. *Motivation and Emotion* **24**, 237–258.
- Fredrickson, B. L., Tugade, M. M., Waugh, C. E. & Larkin, G. 2003 What good are positive emotions in crises?: a prospective study of resilience and emotions following the terrorist attacks on the United States on 11 September 2001. *J. Personality Social Psychol.* **84**, 365–376.
- Fredrickson, B. L., Brown, S., Cohn, M. A., Conway, A., Crosby, C. & McGivern, M. & Mikels, J. 2004 Finding positive meaning and experiencing positive emotions builds resilience. Symposium presented at *The Functional Significance of Positive Emotions: Symposium presented at the fifth annual meeting of the Society for Personality and Social Psychology, Austin, Texas, 29–31 January 2004* (Chairs S. Brown & K. J. Johnson).
- Frijda, N. H. 1986 *The emotions*. Cambridge University Press.
- Frijda, N. H. 1994 Emotions are functional, most of the time. In *The nature of emotion: fundamental questions* (ed. P. Ekman & R. Davidson), pp. 112–122. New York: Oxford University Press.
- Frijda, N. H., Kuipers, P. & Schure, E. 1989 Relations among emotion, appraisal, and emotional action readiness. *J. Personality Social Psychol.* **57**, 212–228.
- Gaspar, K. & Clore, G. L. 2002 Attending to the big picture: mood and global versus local processing of visual information. *Psychol. Sci.* **13**, 34–40.
- Gottman, J. M. 1994 *What predicts divorce: the relationship between marital processes and marital outcomes*. New York: Lawrence Erlbaum.
- Isen, A. M. 1990 The influence of positive and negative affect on cognitive organization: some implications for development. In *Psychological and biological approaches to emotion* (ed. N. Stein, B. Leventhal & T. Trabasso), pp. 75–94. Hillsdale, NJ: Erlbaum.
- Isen, A. M. 2000 Positive affect and decision making. In *Handbook of emotions*, 2nd edn (ed. M. Lewis & J. M. Haviland-Jones), pp. 417–435. New York: Guilford.
- Isen, A. M. & Daubman, K. A. 1984 The influence of affect on categorization. *J. Personality Social Psychol.* **47**, 1206–1217.
- Isen, A. M. & Means, B. 1983 The influence of positive affect on decision-making strategy. *Social Cogn* **2**, 18–31.
- Isen, A. M., Johnson, M. M. S., Mertz, E. & Robinson, G. F. 1985 The influence of positive affect on the unusualness of word associations. *J. Personality Social Psychol.* **48**, 1413–1426.
- Isen, A. M., Daubman, K. A. & Nowicki, G. P. 1987 Positive affect facilitates creative problem solving. *J. Personality Social Psychol.* **52**, 1122–1131.
- Isen, A. M., Rosenzweig, A. S. & Young, M. J. 1991 The influence of positive affect on clinical problem solving. *Med. Decision Making* **11**, 221–227.
- Kahn, B. E. & Isen, A. M. 1993 The influence of positive affect on variety seeking among safe, enjoyable products. *J. Consumer Res.* **20**, 257–270.
- Kahneman, D. 1999 Objective happiness. In *Well-being: the foundations of hedonic psychology* (ed. D. Kahneman, E. Diener & N. Schwarz), pp. 3–25. New York: Russell Sage.
- Keltner, D. & Bonanno, G. A. 1997 A study of laughter and dissociation: distinct correlates of laughter and smiling during bereavement. *J. Personality Social Psychol.* **73**, 687–702.
- Keyes, C. L. M. 2002 The mental health continuum: from languishing to flourishing in life. *J. Hlth Social Behav.* **43**, 207–222.
- Keyes, C. L. M. 2003 Complete mental health: an agenda for the 21st century. In *Flourishing: positive psychology and the life well-lived* (ed. C. L. M. Keyes & J. Haidt), pp. 293–312. Washington, DC: American Psychological Association.
- Klohn, E. C. 1996 Conceptual analysis and measurement of the construct of ego-resiliency. *J. Personality Social Psychol.* **70**, 1067–1079.
- Kumpfer, K. L. 1999 Factors and processes contributing to resilience: the resilience framework. In *Resilience and development: positive life adaptations* (ed. M. D. Glantz & J. L. Johnson), pp. 179–224. New York: Kluwer/Plenum.
- Lazarus, R. S. 1991 *Emotion and adaptation*. New York: Oxford University Press.
- Lazarus, R. S. 1993 From psychological stress to the emotions: a history of changing outlooks. *A. Rev. Psychol.* **44**, 1–22.
- Lazarus, R. S., Kanner, A. D. & Folkman, S. 1980 Emotions: a cognitive-phenomenological analysis. In *Theories of emotion* (ed. R. Plutchik & H. Kellerman), pp. 189–217. New York: Academic.
- Lee, P. C. 1983 Play as a means for developing relationships. In *Primate social relationships* (ed. R. A. Hinde), pp. 82–89. Oxford: Blackwell.
- Leslie, A. M. 1987 Pretense and representation: the origins of ‘theory of mind’. *Psychol. Rev.* **94**, 412–426.
- Levenson, R. W. 1994 Human emotions: a functional view. In *The nature of emotion: fundamental questions* (ed. P. Ekman & R. Davidson), pp. 123–126. New York: Oxford University Press.
- Levy, B. R., Slade, M. D., Kunkel, S. R. & Kasl, S. V. 2002 Longevity increased by positive self-perceptions of aging. *J. Personality Social Psychol.* **83**, 261–270.

- Losada, M. 1999 The complex dynamics of high performance teams. *Math. Comput. Model.* **30**, 179–192.
- Losada, M. & Heaphy, E. 2004 The role of positivity and connectivity in the performance of business teams: a nonlinear dynamics model. *Am. Behav. Sci.* **47**, 740–765.
- Masten, A. S. 1994 Resilience in individual development: successful adaptation despite risk and adversity. In *Educational resilience in inner-city America: challenges and prospects* (ed. M. C. Wang & E. W. Gordon), pp. 3–25. Hillsdale, NJ: Erlbaum.
- Moskowitz, J. T. 2003 Positive affect predicts lower risk of AIDS mortality. *Psychosomatic Med.* **65**, 620–626.
- Murphy, L. B. & Moriarty, A. 1976 *Vulnerability, coping and growth: from infancy to adolescence*. New Haven, CT: Yale University Press.
- Oatley, K. & Jenkins, J. M. 1996 *Understanding emotions*. Cambridge, MA: Blackwell.
- Ostir, G. V., Markides, K. S., Black, S. A. & Goodwin, J. S. 2000 Emotional well-being predicts subsequent functional independence and survival. *J. Am. Geriatrics Soc.* **48**, 473–478.
- Ostir, G. V., Markides, K. S., Peek, K. & Goodwin, J. S. 2001 The associations between emotional well-being and the incidence of stroke in older adults. *Psychosomatic Med.* **63**, 210–215.
- Panksepp, J. 1998 Attention deficit hyperactivity disorders, psychostimulants, and intolerance of childhood playfulness: a tragedy in the making? *Curr. Directions Psychol. Sci.* **7**, 91–98.
- Peterson, C. & Seligman, M. E. P. 1984 Causal explanations as a risk factor for depression: theory and evidence. *Psychol. Rev.* **91**, 347–374.
- Reed, M. B. & Aspinwall, L. G. 1998 Self-affirmation reduces biased processing of health-risk information. *Motivation Emotion* **22**, 99–132.
- Rosenberg, E. L. 1998 Levels of analysis and the organization of affect. *Rev. Gen. Psychol.* **2**, 247–270.
- Seligman, M. E. P. & Csikszentmihalyi, M. 2000 Positive psychology: an introduction. *Am. Psychol.* **55**, 5–14.
- Sherrod, L. R. & Singer, J. L. 1989 The development of make-believe play. In *Sports, games and play* (ed. J. Goldstein), pp. 1–38. Hillsdale, NJ: Lawrence Erlbaum.
- Simons, C. J. R., McCluskey-Fawcett, K. A. & Papini, D. R. 1986 Theoretical and functional perspective on the development of humor during infancy, childhood, and adolescence. In *Humor and aging* (ed. L. Nahemow, K. A. McCluskey-Fawcett & P. E. McGhee), pp. 53–77. San Diego, CA: Academic.
- Solomon, R. L. & Corbit, J. D. 1974 An opponent-process theory of motivation. I. Temporal dynamics of affect. *Psychol. Rev.* **81**, 119–145.
- Stein, N. L., Folkman, S., Trabasso, T. & Richards, T. A. 1997 Appraisal and goal processes as predictors of psychological well-being in bereaved caregivers. *J. Personality Social Psychol.* **72**, 872–884.
- Taylor, S. E., Kemeny, M. E., Reed, G. M., Bower, J. E. & Gruenewald, T. L. 2000 Psychological resources, positive illusions, and health. *Am. Psychol.* **55**, 99–109.
- Tooby, J. & Cosmides, L. 1990 The past explains the present: emotional adaptations and the structure of ancestral environments *Ethol. Sociobiol.* **11**, 375–424.
- Trope, Y. & Neter, E. 1994 Reconciling competing motives in self-evaluation: the role of self-control in feedback seeking. *J. Personality Social Psychol.* **66**, 646–657.
- Trope, Y. & Pomerantz, E. M. 1998 Resolving conflicts among self-evaluative motives: positive experiences as a resource for overcoming defensiveness. *Motivation Emotion* **22**, 53–72.
- Tugade, M. M. & Fredrickson, B. L. 2002 Positive emotions and emotional intelligence. In *The wisdom of feelings: psychological processes in emotional intelligence* (ed. L. Feldman-Barrett & P. Salovey), pp. 319–340. New York: Guilford.
- Tugade, M. & Fredrickson, B. L. 2004 Resilient individuals use positive emotions to bounce back from negative emotional arousal. *J. Personality Social Psychol.* **86**, 320–333.
- Werner, E. & Smith, R. S. 1992 *Overcoming the odds: high risk children from birth to adulthood*. Ithaca, NY: Cornell.
- Wolin, S. J. & Wolin, S. 1993 *Bound and determined: growing up resilient in a troubled family*. New York: Villard.
- Wolpe, J. 1958 *Psychotherapy by reciprocal inhibition*. Stanford University Press.