

Building Resilience with Positive Emotions:  
Examining Research on Physical and Psychological Well-Being

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**Abstract**

In this paper we review the Broaden and Build Theory of Positive Emotions (Fredrickson, 1998, 2001), and the empirical work supporting this theory. The research reviewed illustrates the changes in cognition and behavior spurred by positive emotion experiences. Within the context of these changes, we discuss the beneficial psychological and physical health outcomes associated with the broadening and building effects of positive emotions, such as greater resilience and coping in the face of stress as well as physiological recovery after negative experiences. Lastly, this paper will outline past and current approaches to studying positive emotions, and will propose new methods of presenting positive emotion stimuli and measurements by using modern, mobile technology.

**Key Words:** Broaden and Build; positive emotions; mental health; physical health; well-being; resilience

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Experiences of positive emotions have many functions. Not only do they allow for individuals to feel good, but they also work to promote greater psychological and physical well-being. Emotion, defined as “a natural instinctive state of mind deriving from one’s circumstances, mood or relationships with others” (Stevenson & Lindberg, 2005), is an adaptive response elicited in order to appropriately react to one’s surrounding environment. Emotions are moderated by the central nervous system (CNS), and animals become well-adapted to their surroundings by utilizing a full spectrum of emotions (Barak, 2006). Therefore, there have been many questions raised on the tangible benefits of positive emotion beyond the hedonic qualities associated with them. We review research that builds on a prominent theory that has shaped much of the research on positive emotions: the Broaden and Build Theory (Fredrickson, 1998, 2001). This theory explains the way in which positive emotions can expand thought-action repertoires and as a result influence snowball changes in thoughts, decisions, and actions. Such effects have been noted in past research to lead to beneficial health effects such as decreased experiences of depressive symptoms, greater ability to cope with stress, and even improved immune and cardiovascular functioning.

**The Broaden and Build Theory of Positive Emotions**

The Broaden and Build Theory is comprised of both broaden and build effects apparent in individuals after experiencing positive emotions. Specifically, the *broaden* effect refers to the momentary expansion of thought-action repertoires, which increase the number of possible behavioral outcomes of a single experience or thought by spurring cognitive changes

(Fredrickson, 2001). Past research has found that after experiencing positive emotions, individuals are more likely to reflect “attentional broadening.” Participants were shown visual images with varying central-peripheral arrays. As predicted, participants who were induced to experience positive (vs. neutral, negative) emotions before stimulus presentation showed attention to a greater number of points on an image than are those who were exposed to neutral or negative emotions (Wadlinger & Isaacowitz, 2006). This attentional expansion as a result of positive mood state has been connected with the ability for people to more efficiently identify and locate supplementary, peripheral stimuli in visual tasks than those in neutral or negative mood states (Vanlessen, Rossi, De Raedt, & Pourtois, 2014). This joins the internal cognitive changes elicited by positive emotions with observable behavioral differences. Further support for the transference of attentional broadening into observable actions is provided by Xie and Zhang (2015), who found that positive emotions, when compared with negative emotions, promote holistic face processing through participants' immediate responses to a face-matching task. Each of these findings and the methods used in the studies represent and illustrate the acute, momentary nature of positive emotions' broadening effect. Besides attention, other broaden effects include increased cognitive flexibility and creativity in the use of everyday objects, as well as the appreciation and expansion of self (Conway et al., 2012; Isen, Daubman, & Nowicki, 1987; Ziv, 1976).

The *build* effect is a result of the accumulation and persistence of the aforementioned broaden effects over time, through multiple experiences and exposure to positive emotions (Fredrickson, 1998). Extending from and building off of the broaden effect, this second element to Fredrickson's theory represents the bolstering of a person's physical, psychological, cognitive, and social resources, which have many beneficial long-term effects among which is their

capacity to be later drawn on to aid in coping with situations involving negative emotions. Each category of resources consists of a unique set of properties that all work to maintain a person's health and well-being. Physical resources generally refer to a person's physiological resilience, such as immunity to illness or infection, and especially in relation to environmental stressors. For instance, past research has operationalized the effect of positive emotions on physiological resilience by measuring the amount of time it takes for a person to reach their cardiovascular baseline after the heightened cardiovascular reactivity associated with experiencing a negative emotion, such as anxiety (Tugade & Fredrickson, 2004). In a similar fashion, psychological resources contribute to the development of psychological resilience to negative life events and can even promote optimism (Schiffrin & Falkenstern, 2012). Next, cognitive resources represent the ways in which individuals approach and process in a creative manner cognitive tasks they are faced with, which in turn increases their capacity for problem solving (Isen, Daubman, & Nowicki, 1987; Lyubomirsky, Boehm, Kasri, & Zehm, 2011; Rowe, Hirsh, & Anderson, 2007). Lastly, social resources ultimately stem from the interaction between people and their social networks and the support that family, friends, or groups can provide—interactions which are likely to become more frequent after a person experiences positive emotions (Waugh, & Fredrickson, 2006).

The building up of these personal resources (e.g., cognitive, social, and coping resources) initiates upward spirals towards greater emotional well-being. Previous research has found that experiences of positive emotions and broadened coping can reciprocally predict experiences of both at a later time (Burns et al., 2008; Fredrickson & Joiner, 2002). These “upward spirals” are contrasted with downward spirals of negativity in the same way that negative emotions function to narrow thought-action repertoires, as they trigger *specific*, single actions rather than triggering

an array of possible outcomes (Garland et al., 2010). Moreover, the aforementioned research regarding upward spirals of positive emotions suggests that they play a significant role in the continuation of positive emotional experiences and thus in the endurance of the resultant beneficial health outcomes. Further research and implications for the broaden and build effects in relation to its promotion of greater psychological and physical health and well-being will be discussed in the subsequent sections.

### **Positive Emotions and Psychological Well-Being**

**Effects of Stress on Mental Health.** Stress can originate from a variety of events and experiences. Whether they be daily experiences or one-time occurrences, such experiences can have a serious negative impact on an individual's mental health and well-being depending on the coping method used to overcome the events. For instance, because stressful situations trigger the automatic flight-or-fight response in order to abate a perceived harm or threat to an individual, the person's thought-action repertoires respectively narrow and become more specific, leading to a single-action outcome (Kok, Catalino, & Fredrickson, 2008). Without effective coping with a stressful or threatening situation, harmful effects on a person's mental health can result. Indeed, past research has noted a significant association between chronic stress and the development of anxiety and depressive symptoms (Kleppa, Sanne, & Tell, 2008; Parrish, Cohen, & Laurenceau, 2011; Steinhardt, Smith Jaggars, Faulk, & Gloria, 2011).

Researchers have investigated the potentially mediating role affect reactivity has on the relationship between experienced daily stress and depression vulnerability. Specifically, Parrish and colleagues (2011) assessed a group of college students' experiences of coping with daily stressors stemming from both interpersonal and non-interpersonal sources at two distinct times, two months apart. Depressive symptoms and history of depression were recorded at both T1 and

T2 through questionnaires before the start of daily assessment of positive affect (PA), negative affect (NA), and the number of stressors encountered as determined by a daily events checklist. Both T1 and T2 included this self-report component in the form of a daily diary completed online for seven consecutive days at each of the two points in the study (Parrish, Cohen, & Laurenceau, 2011). The researchers found that the aggregated negative affect reactivity to both interpersonal and non-interpersonal stressors at T1 significantly, positively predicted depressive symptoms at T2. This finding suggests that the narrowing scope of thought-action repertoires as well as coping methods associated with negative affect and emotions may aggravate the already negative impact stress has on mental well-being.

Similar to the adverse consequences of negative affect reactivity to stressors on the prevalence of depressive symptoms at a later time, Szabo and colleagues (2016) investigated the effects of different coping strategies in response to stress on anxiety. The study was based on the transactional model of stress and coping (Lazarus & Folkman, 1984) which describes stressful situations as internal or external environmental demands that disequilibrate a person's psychological functioning, thus leading to negative health effects. The researchers investigated the degree of *uprooting stress* experienced by a sample of international students after having left their home country, and loved ones, behind through the use of questionnaires at two different times, three months apart. Uprooting stress is generally associated with feeling alone, powerless, homesick, and depressed (Szabo, Ward, & Jose, 2016). Participants' coping strategies in response to this form of stress were assessed in regards to whether they partook in actively working through the problem by attempting to exert control over their situation (primary coping) or reappraising the stressful event positively, adapting to their environment, and ultimately reaching acceptance (secondary coping). Measures for anxiety were also included at both times. Findings

from the study showed that greater degrees of primary coping in the face of stress at T1 exacerbated the negative impact of stress on anxiety at T2, whereas greater levels of secondary coping buffered the effects on anxiety. These findings suggest that the use of broader and more positive coping strategies can indeed help to diminish the adverse mental health outcomes such as depression and anxiety caused stress and negative reactivity to stress.

### **Coping, Resilience, and Psychological Well-Being**

Work done by Fredrickson and Joiner (2002) regarding the upward spirals of positive emotion demonstrated that experiencing positive emotions plays a large role in promoting broader coping strategies, especially in the face of stress. The researchers importantly found that experiences of PA at one point in time positively predicted greater broad-minded coping at a later time, whereas negative affect (NA) did not have the same effect (Fredrickson & Joiner, 2002). Broadened coping strategies that may arise as a result of experiencing positive emotions include the positive reappraisal of a stressful situation by reinterpreting the events in a positive way, or even reframing it in a way that makes it seem less important (Folkman & Moskowitz, 2000). Taking psychological respites from the source of one's persistent stress is another form of broader, more positive coping and includes generating positive emotions by attributing positive meaning to ordinary events (Folkman, Moskowitz, Ozer, & Park, 1997). Consequently, it has been shown that, in addition to positive emotions influencing resilience levels directly, broadened coping strategies resulting from positive emotion experiences can play a mediating role in the relationship between positive emotions and greater resilience to stress (Gloria, & Steinhardt, 2016). This may represent a potential directional interaction between all three variables, each of which contribute to greater mental health and well-being.

Research on positive affect (PA) and resilience in the context of the broaden-and-build theory has thus been dedicated to investigating the mental health benefits fostered by positive emotions and psychological resilience (Cohn, Fredrickson, Brown, Mikels, & Conway, 2009). Resilience has been previously described as effective coping and ability to efficiently recover from negative and stressful experiences such as loss or hardship (Block & Kremen, 1996). Past studies have noted a significant, positively predictive relationship of PA and dispositional resilience on mental health outcomes such as signs of flourishing, which includes life satisfaction (Cohn, Fredrickson, Brown, Mikels, & Conway, 2009), higher levels of optimism, and lower levels of experienced depressive symptoms (Schiffrin, & Falkenstern, 2012). These beneficial outcomes are all constituents of the positive psychological and cognitive personal resources that build up as a result of experiencing positive emotions, and that continue to spur greater resilience towards negative life events and encounters.

### **Positive Emotions and Physical Well-Being**

In addition to the beneficial mental outcomes of positive emotions, there are also many physical benefits to sustaining positive affect. Past research has found close ties between positive affect and general physical health (Diener & Chan, 2011; Pressman & Cohen, 2005; Steptoe, Dockray, & Wardle, 2009). While some connection between emotions and physiology has been previously established, there is still more research needed to examine the links between positive emotions and physical health benefits. Most studies in the past predominantly focused on the role of negative affect in the development of certain illnesses, including coronary heart disease (Childa & Steptoe, 2009; Kubzansky, Kawachi, Weiss, & Sparrow, 1998; Rugulies, 2002; Suls & Bunde, 2005), stroke (Jonas & Mussolino, 2000; Lambiase, Kubzansky, & Thurston, 2014), and weakened immune function (Herbert & Cohen, 1993; Stone, Cox, Validimarsdottir, Jandorf

& Neale, 1987). Positive and negative emotions are separate and distinct, such that the absence of one does not indicate the presence of another (Ryff et al., 2006). The fact that negative emotions may cause illnesses does not indicate that an absence of negative emotions would result in an absence of illnesses nor would it mean that the presence of positive emotions would result in an absence of illnesses. Therefore it is important to separately assess the impact of positive emotions on physical health.

The term “happiness” has many connotations, as does the perception of how a state of happiness may be achieved. Barak (2006) researched the specific mechanisms by which positive emotions may affect the brain and the immune system, as well as how emotions play a role in keeping the body healthy. Within the brain, the medial forebrain bundle constitutes a type of reward system with the amygdala acting as the intermediary, linking this reward system to environmental stimuli (Barak, 2006). Emotions take shape through the central nervous system (CNS), which interacts with surrounding variables and the inner reward system to produce the appropriate reaction to a stimulus. Whenever experience something pleasant is experienced, such as tasting ice cream or watching a funny film, the CNS reacts and in turn alerts the reward system that we are experiencing something pleasant. Though some claim happiness cannot be fully measured, physiological activity is evident when having an enjoyable experience. Methods for measuring happiness include analyzing and interpreting cardiovascular activity, salivary cortisol levels, and EEG readings of neural activity in the brain's reward (Barak, 2006). Thus, feeling happy not only affects your state of mind but also alters your physiological reactivity.

### **Positive Emotions and the Immune System**

While it can be inferred from past research that positive affect is related to immune functioning, the specific associations with physiological systems are less clear (Matsunaga et al.

2008; Matsunaga et al. 2009; Salovey, 2000; Steptoe & Wardle, 2005). Matsunaga et al. (2008) conducted an experiment analyzing the associations between positive emotions and the central nervous, endocrine, and immune systems. Participants in the positive experimental condition were asked to watch a film featuring an actor they found attractive, while those in the experimental control group watched an emotionally neutral film (Matsunaga et al. 2008). All participants had blood samples drawn before and after film watching period so as to compare endocrine and immune activity.

Researchers measured for various physiological indicators of positive emotion, including natural killer (NK) cell activity and concentrations of dopamine, norepinephrine, and epinephrine in the blood samples (Matsunaga et al. 2008). NK cells are a subgroup of lymphocytes crucial to immune system function against foreign entities so the higher their activity levels, the better one's immune function is (Vivier et al., 2004). Blood analyses revealed dopamine levels and NK cell activity both increased in the positive condition, and further correlational analyses revealed that participants' dopamine levels were positively correlated with both NK cell activity and positive mood state. Furthermore, several brain regions showed more activity in participants in the positive condition than in the control condition and that these activities were also associated with NK cell activity. These findings indicate that the central nervous, endocrine and immune systems are all interconnected and all become activated when one experiences positive emotions (Matsunaga et al. 2008). While this study only looked at the positive emotions elicited by seeing someone you like and not other positive emotions, its findings indicate that the important role of social factors of positive emotions on immune system functioning.

Moving beyond broad interconnections, Segerstrom et al. (1998) investigated the direct relationship between mood, coping and immune changes in response to stress. The researchers

looked specifically at optimism and the health benefits it has on law students during their first semester at school. Optimism was hypothesized to impact immune function as a coping mechanism for stress and thus altering mood state and potentially altering behavior to involve healthier habits (Segerstrom et al. 1998). Data were collected through blood tests and questionnaires taken at Time 1 and 8 weeks later at Time 2. Questionnaires measured for dispositional and situational optimism, coping levels, mood state, health behavior and stressors; blood samples were tested for various immune measures including the number of cells in lymphocyte subsets as well as natural killer cell cytotoxicity (Segerstrom et al. 1998). Results indicated both dispositional and situational optimism was associated with more positive mood state and higher lymphocyte cell count at T2. Although the sample was limited in numbers and diversity, the results suggest a direct association between optimism and larger presence of immune system cells to help fight against stressors.

### **Cardiovascular and strokes**

Along with immune system functioning, another area that has shown to be associated with positive affect is cardiovascular function. In a literature review, Boehm and Kubzansky (2012) analyzed the associations between positive psychological well-being (PPWB), which consists of including eudaimonic well-being, hedonic well-being and optimism, in relation to cardiovascular function. Through literature review, Boehm and Kubzansky (2012) found studies involving participants with higher levels of PPWB are associated with lower risk of cardiovascular diseases. Studies indicate PPWB benefits cardiovascular function through the presence of restorative processes promoted by positive affect and the absence of deleterious processes generated by negative affect (Pressman & Cohen, 2005; Smith & Baum, 2003). Restorative processes include healthy eating and sleeping habits and stronger biological functions, such as

higher production of serum antioxidants; deteriorative processes include smoking, drinking and stronger biological dysfunctions, such as inflammation (Boehm & Kubzansky, 2012). By contributing to the function of daily habits and biological function, PPWB is found to be a strong protector against cardiovascular diseases, including coronary heart disease and stroke.

Boehm and Kubzansky (2012) demonstrated that there are relations between positive emotion and cardiovascular function although, similar to the immune system, they could not confirm the direct associations. Matsunaga et al. (2009) conducted an experiment analyzing whether positive emotions, brain, and cardiovascular function were all interrelated. Similar to their study on the associations between positive emotions and immune functioning, participants in the positive group were asked to watch a romantic film while researchers simultaneously recorded various related parameters, including positive and negative mood state, brain activity, blood pressure, heart rate and heart rate variability (Matsunaga et al. 2009). Mood states were determined through self-evaluation on a visual analogue scale (VAS), brain activity was measured by PET scans before and after film viewing and cardiovascular activity was measured by non-invasive finger arterial blood pressure (FINAP) (Matsunaga et al., 2009). There was a significant interaction between positive condition and heart rate variability, which indicates parasympathetic nervous system activity; additionally there was significant activity in several brain regions, including the thalamus, hypothalamus and the medial prefrontal cortex (MPCF), for participants in the positive condition (Matsunaga et al. 2009). These results suggest that when one experiences positive emotion, the brain, the CNS and the cardiovascular system all react in response to the corresponding emotions elicited. This in turn suggests interconnectivity between these regions, supporting the theory that positive emotion is able to influence cardiovascular function. Together, these findings indicate that evoking positive emotions can influence our

health and wellbeing through the modulation of our body's endocrine and immune functions.

Thege et al. (2015) investigated the relations between positive emotions and specific cardiovascular parameters, including arterial stiffness, peripheral and central blood pressure, and heart cycle function. Participants were divided into two groups: those in the "healthy group" showed no cardiovascular problems, whereas those in the "unhealthy group" were generally hospitalized with existing cardiovascular issues. Through mood state questionnaires and measured cardiorespiratory variables, Thege et al. (2015) found an association between higher life satisfaction, one sign of flourishing, and lower mean arterial pressure as well as peripheral systolic blood pressure in the unhealthy condition. Within the healthy group, the researchers found a significant relation between optimism and lower aortic systolic blood pressure in the healthy group. Although there were no significant relationships found between positive emotions and the other cardiovascular parameters, the aforementioned significant findings may in fact demonstrate a direct relationship between positive emotions and cardiovascular health.

Because high blood pressure has been found to increase the chance of having a stroke (Tikhonoff et al., 2009), it is also important to view to relationship between positive emotions and stroke risk. It is has been hypothesized that because positive emotions are associated with negatively impacting cardiovascular function, it may also be associated with stroke risk; however there has been little research done on this area Lambiase et al. (2015) conducted a study to investigate the association between emotional vitality and stroke risk using data from the National Health and Nutrition Examination Survey (NHANES I). Emotional vitality was defined as "a sense of positive energy, the ability to effectively regulate emotions and behavior and positive well-being" (Kubzansky & Thurston, 2007). Data from the NHANES I included a complete medical examination and a completed General Well-Being Schedule (GWB) for each

participant. The researchers also collected follow-up stroke occurrences for each participant by contacting hospitals and nursing homes discharge reports/death certificates. Researchers calculated the emotional vitality of each participant by selecting and combining specific subscales of the GWB data, with higher scores indicating higher emotional vitality. By correlating emotional vitality, stroke incidences, and general physical condition the researchers found that higher emotional vitality scores were significantly associated with lower risk of stroke during follow-up data.

While the associations of positive emotions and multiple physical ailments have been demonstrated through the previous studies, it is important to question how positive emotions are able to influence the development of such serious physical issues. As the Broaden-and-Build theory states, the impacts of positive emotions have the ability to habituate in an individual's thought-action repertoire (Tugade, Fredrickson & Barrett, 2004). Sustained positive affect can improve cognitive broadening and in turn improve overall well-being by being stored as a personal resource and then utilized immediately as a coping resource (Fredrickson, 2000). Additionally, the broadening effects of positive emotions allow for the "undoing" of effects of negative emotions on individual well-being. Known as the "undoing hypothesis", it is believed that positive emotions have the ability to return the body to cardiovascular equilibrium following the impact of negative emotions (Tugade, Fredrickson & Barrett, 2004). The elimination of the harmful effects of negative emotions may further lead to physical well-being, as indicated earlier all the physical ailments associated with negative emotions. It is the broadening of thought-action repertoire and building a reserve of resiliency that allows positive emotion to contribute to physiological well-being and combat the detrimental impact of negative emotions.

### **Methods for Studying Positive Emotions**

Research methods investigating positive emotions and their role in health, their ability to counteract stressful events, improve self-regulation and self-control, and build up personal resources have taken various forms in the past. Some studies, such as the series conducted by Tice et al. (2007), and others (Shmueli & Prochaska, 2012; Schmeichel & Vohs, 2009; Tyler & Burns, 2008) concerned resilience to stress and its effect on self-regulation and self-control. These studies conducted single laboratory sessions in which participants were exposed to a stressful situation and either presented with positive stimuli, such as a funny video, or neutral stimuli after which they had to complete specific tasks that tested self-control and self-regulation. The goal of these types of experiments was to determine the buffering effect of positive emotions, as assessed at two different times through self-report measures such as the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) and the Profile of Mood States questionnaire (POMS; McNair, Lorr, & Droppleman, 1971), on stressful experiences.

Additional methods for measuring positive emotions are taking the form of mobile technology. In addition to using retrospective questionnaires to assess positive mood states and affect reactivity, momentary self-report measures in the form of diary entries sent to participants over the internet can be used (Parrish, Cohen, & Laurenceau, 2011), expanding the ecological validity of studies through the use of experience-sampling methods. Experience-sampling extends typical laboratory procedures into the context of participants' daily lives by providing the opportunity for them to record their momentary behaviors, thoughts, and feelings (Christensen et al., 2003). New approaches to studying positive emotions may even be able to use more readily available and user-friendly technology like smart phones and personal tablets to disseminate surveys, and in the case of positive intervention research, positive or neutral stimuli

meant to elicit corresponding emotions in the person receiving them. The use of computerized methods for experience sampling has been suggested by researchers as a convenient and valid means to accurately study topics such as emotion-related processes where participants are asked to report their momentary emotional experiences (Barrett, 2004) as well as coping strategies (Schwartz et al., 1999). In fact, past studies noted no significant difference in the extent and intensity of emotional expression through computer-mediated interactions (CMC, predominantly typewritten) or face-to-face interactions (F2F) (Derks, Fischer, & Bos, 2008; Sasaki & Ohbuchi, 1999; Walther & D'Addario, 2001). For example, previous research which asked participants to rate the tone (positive or negative) and intention of an emotional interaction with a confederate found that positive emotions are in fact expressed to the same extent in CMC as in F2F interactions (Sasaki & Ohbuchi, 1999).

### **Conclusions and Future Directions**

Past studies have shown the significant impacts positive emotions can have on psychological and physiological health. By examining the Broaden-and-Build theory of positive emotions (Fredrickson, 1997, 2001) as framework, we understand that positive emotions can allow for momentary expansion of an individual's thought-action repertoire, with changes in cognitive processing. Cognitive processing changes not only include broadening of visual stimuli but also the creativity and flexibility of thought processes. These changes can allow for more effective coping methods and problem-solving solutions to improve mental, physical and social resiliency. If experiences of positive emotion are maintained for a long period of time, these broadened effects can become habitual and become an individual's automatic thought-action repertoire in the face of stress. Resiliency can become strengthened over time, such that coping methods become more effective in a time of stress. More successful coping methods then lead to

healthier mental and physical states. In addition to broadening and building effective coping methods, positive emotions can also undo the harmful effects of negative emotions and return the body to homeostasis faster after a period of stress. An increase in positive emotions in daily life can therefore improve not only mental health by strengthening coping strategies but also physical health by improving the function of the immune and cardiovascular systems.

While research has indicated the beneficial functions of positive emotions, it is unclear whether all positive emotions have the same effect on mental and physical health. Many of the studies focused on either one positive emotion (Matsunaga et al., 2008; Matsunaga et al., 2009) or positive emotion in general (Lambiase, Kubzansky & Thurston, 2015; Thege et al., 2005), making it difficult to determine whether one type of positive emotion could have stronger effects over another. Future research may focus on differentiating between different positive emotions and analyzing the varying levels and types of impacts it can have on individuals (Tugade, 2011). Additionally, different positive emotions may have various impacts on different kinds of stressors. Further differentiation within positive emotions and daily stressors may lead to an improvement on coping mechanisms, building resilience and improving well-being.

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