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Reflections on Positive Emotions and Upward Spirals

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Abstract

We reflect on Fredrickson and Joiner ((2002) Positive emotions trigger upward spirals toward emotional well-being. *Psychological Science*, 13, 172-175.) and the impact this research report has had both within and beyond psychological science. This article was both one of the first publications to provide empirical support for hypotheses based on the *broaden-and-build theory of positive emotions* and a product of the genesis of positive psychology. We highlight empirical and theoretical advancements in the scientific understanding of upward spiral dynamics associated with positive emotions, with particular focus on the new *upward spiral theory of lifestyle change*. We conclude by encouraging deeper and more rigorous tests of the prospective and reciprocal relations associated with positive emotions. Such progress is needed to better inform translations and applications to improve people's health and well-being.

Reflections on Positive Emotions and Upward Spirals

On the occasion of APS's 30th anniversary, we have been invited to reflect on our 2002 research report in *Psychological Science* entitled "Positive Emotions Trigger Upward Spirals toward Emotional Well-being." That 2002 article represents some of the first published empirical work to test hypotheses based on the *broaden-and-build theory of positive emotions* (Fredrickson, 1998, 2001). In brief, the broaden-and-build theory posits that momentary experiences of mild, everyday positive emotions broaden people's awareness in ways that, over time and with frequent recurrence, build consequential personal resources that contribute to their overall emotional and physical well-being. Through incremental broaden-and-build processes, then, positive emotions both open the mind and nourish the growth of resources. Whereas the theory itself predates the formal genesis of positive psychology, this particular paper, published in 2002, is a product of the early days of this movement. Indeed, we two co-authors first met in 1999 at the 1st Akumal Conference held to plan the creation of positive psychology. It was there, in the living room of a Mexican villa said to have been once owned by a band member of the Grateful Dead, that Fredrickson made one of her initial presentations of the broaden-and-build theory.

Some weeks after that meeting, Joiner reached out to Fredrickson to say that he had a two-wave dataset that could provide an initial test of the theory by examining the longer-term effects of everyday positive emotions and suggested a collaboration. On considering the structure of the available data, together we formulated a series of four hypotheses inspired by the broaden-and-build theory. These were:

1. That positive (but not negative) affect predicts improvements over time in broad-minded coping, a coping strategy uniquely related to creative responding.

2. That broad-minded coping predicts improvements over time in positive (but not negative) affect.
3. That initial positive affect predicts positive affect five weeks later in part through increases in broad-minded coping.
4. That initial broad-minded coping predicts broad-minded coping five weeks later in part through increases in positive affect.

The latter two hypotheses specifically test for the reciprocal relations indicative of an upward spiral dynamic. Surveys of 138 undergraduate students across two waves of data collection provided support for all hypotheses. A subsequent study, led by one of Joiner's colleague's doctoral students, replicated and extended our initial tests of these hypotheses in a two-wave study of 185 undergraduate students (Burns et al., 2008).

As we see it, the primary contribution of Fredrickson and Joiner (2002) was to demonstrate that everyday positive emotions, as fleeting as they may be, can initiate a cascade of psychological processes that carry enduring impact on people's subsequent emotional well-being. That is, beyond making people feel good in the present moment, positive emotions also appear to increase the odds – through dynamic broaden-and-build processes – that people will feel good in the future. A strength of this study was its prospective design over five weeks. A clear weakness, however, was that it only offered prospective correlations. No causal claims were appropriate at that time.

In the ensuing years, however, ample empirical evidence from multiple laboratories has advanced support for the broaden-and-build theory and suggested some of its boundary conditions. Much of this work has used randomized controlled experimental designs that support inferences about causality. Specifically, positive emotions, induced in laboratory experiments,

have been shown to broaden the scope of individuals' awareness, with evidence coming from behavioral data (Fredrickson & Branigan, 2005; Rowe, Hirsh, & Anderson, 2007) as well as from eye-tracking (Wadlinger & Isaacowitz, 2006) and brain imaging (Schmitz, De Rosa, & Anderson, 2009). Moreover, longitudinal field experiments have shown that individuals randomized to learn skills to self-generate authentic, contextually appropriate positive emotions have shown increases in a range of personal resources ~2.5 months later (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008), including instrument-measured markers of physical health (Kok et al., 2013). Those gains in resources have in turn been found to predict gains in life satisfaction and reductions in depressive symptoms (Fredrickson et al., 2008). Such work has also demonstrated that the effects of positive emotions-training increase over time, rather than wane, consistent with the dynamics of upward spirals (Fredrickson et al., 2008; Moskowitz et al., in press). Thus, whereas the initial support offered in Fredrickson and Joiner (2002) for the broaden-and-build theory was correlational, the ensuing years have confirmed such relations to be causal (for a review of the origins of the broaden-and-build theory and 15 years of evidence for it, see Fredrickson, 2013).

Yet none of this subsequent research explains why this particular article has had so much impact, as evidenced by its high citation count. Doing so, we believe, requires both looking back to the state of psychological science in the years prior to its publication and examining the range of disciplines and sub-disciplines within which this paper has been cited.

For most of the 20th century, psychological science steered clear of topics within human behavior and experience that were deemed too ethereal or frivolous. Although the study of emotions, a concept often cast as ethereal, emerged in the dawning years of psychological science (e.g., James, 1884), emotions were deemed irrelevant and misleading epiphenomena in

the ensuing zeitgeist of behaviorism (e.g., Watson, 1913). This chilling effect on affective science severely delayed its development as an organized sub-specialty within psychological science until the mid 1980s.

Even more than a decade after emotions became an accepted topic for rigorous scientific study, the focus rarely strayed from the “serious” emotions, those of negative valence, such as fear, anger, sadness, and the like. The scientific study of positive emotions faced an additional obstacle, beyond their ethereal nature, that thwarted its development: Pleasant emotional experiences were often deemed frivolous, merely icing on the cake. The widespread study of positive emotions thus did not emerge until the turn of the century and was no doubt boosted by the emergence of positive psychology (Seligman & Csikszentmihalyi, 2000). This is one account of how psychological science could exist *for an entire century* before the serious and sustained study of positive emotions emerged.

Beginning with the start of the 21st century, positive psychology burgeoned, showing a steady increase year-by-year in total scientific publications alongside clear evidence, from 2009 onward, that empirical contributions outnumbered non-empirical contributions within the overall publication rise (Donaldson, Dollwet, & Rao, 2015). Although a formal analysis of the nearly 2000 works that have cited Fredrickson and Joiner (2002) is beyond the scope of this short reflection, an informal perusal of them shows clear impact within and bridging Fredrickson’s sub-discipline of social/personality psychology and Joiner’s sub-discipline of clinical psychology. Impact extends to other areas of psychological science as well, both those near to social/personality and clinical psychology, such as developmental, cognitive, and health psychology, and those further away, such as military psychology, sports psychology, and educational psychology. Citations also suggest impact beyond psychological science, within

organizational studies, marketing science, behavioral medicine, computer science, leisure studies, and public policy. Although we don't assume that all, or even the majority of the publications that cite Fredrickson and Joiner (2002) represent strong scientific contributions, we contend that within this degree of impact many valuable scientific contributions can be found. We highlight a handful of our own subsequent contributions below.

Beyond its influence in related fields known for their applications of psychological science, our initial evidence for upward spiral dynamics (Fredrickson & Joiner, 2002; followed by Burns et al., 2008) spurred additional basic and translational science that offered deeper and more detailed investigations of upward spiral dynamics that energize positive psychological processes. Fredrickson's team, for instance, has investigated the ordinary daily activities and experiences of individuals identified as in flourishing mental health, characterized by the lack of mental illness as well as the presence of positive functioning (e.g., purpose in life, self-acceptance; Keyes, 2005). Using the Day Reconstruction Method (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004) in Wave 2 of a three-wave study, we found that people identified in Wave 1 as in flourishing mental health generally experienced bigger "boosts" in positive emotions in response to everyday, pleasant events (e.g., interacting with others, helping, playing, learning). This greater positive emotional reactivity predicted increases in psychological resources at Wave 3 (two to three months later), which, in turn, accounted for future increases in flourishing (Catalino & Fredrickson, 2011). Other research shows that positive emotions and individual differences in emotion regulation strategies (e.g., positive reappraisal; Garland, Gaylord, & Fredrickson, 2011) reciprocally and prospectively enhance one another. Fredrickson's team has also identified biological resources, such as cardiac vagal tone (indexed as heart rate variability) that influence, and are influenced by positive emotions in an upward

spiral dynamic (Kok et al., 2013; Kok & Fredrickson, 2010). More broadly, together with Garland and others, we have articulated how advances in affective neuroscience shed light on how upward spirals of positive emotions emerge and perpetuate. Linking upward spiral dynamics to underlying neural plasticity illuminates novel approaches to counteract downward spirals of negativity that have been implicated in psychopathologies marked by emotion dysfunction and deficits (e.g., depression, anxiety, schizophrenia; Garland et al., 2010; see also Joiner et al., 2001 for a similar analysis of the effects of positive emotions among suicidal adults). For instance, just as negative emotions both characterize depression and also promote it – a dynamic termed *negative potentiation* (Morris, Bylsma, & Rottenberg, 2009), positive emotions appear to both characterize optimal functioning and promote it. The upward spirals that our 2002 research pointed to may thus characterize a more general phenomenon of *positive potentiation* (Catalino & Fredrickson, 2011).

Joiner's research group has also developed a theory of suicidal behavior (Joiner, 2005; Van Orden et al., 2010) with some pertinence to broaden-and-build processes. Specifically, the model predicts that the maintenance of social connections and ongoing contributions to others deter the development of the desire for suicide, which may in turn avert the catastrophe that is death by suicide. Immersion in upward, interconcatenated spirals of positive emotion and coping are of clear relevance to the protective factors emphasized in this line of scholarship (see, e.g., Joiner, Hom, Hagan, & Silva, 2016 for a conceptual update; empirical support has been accumulating; e.g., Testa et al., in press).

More recently, Fredrickson's team has articulated and tested an *upward spiral theory of lifestyle change* as a framework to understand the mechanisms through which positive emotions alter people's future health behaviors. Research has shown that health behaviors experienced as

pleasant are more likely to be maintained (Rhodes & Kates, 2015; Rothman, 2000; Rothman et al., 2001; Woolley & Fishbach, 2016). The upward spiral theory unpacks this relation with emphasis on automatic, often nonconscious motives and malleable vantage resources that render people more sensitive to subsequent positive experiences (Fredrickson, 2013; Van Cappellen, Rice, Catalino, & Fredrickson, 2016). This work integrates the broaden-and-build theory with the *incentive salience theory of addiction* (Berridge, 2007; Smith, Berridge, & Aldridge, 2011), which holds that, over time, associations between pleasantness (“liking”) and cues predictive of it endow those cues with *incentive salience*, making them more likely to subsequently capture attention and trigger dopaminergic “wanting” and seeking behaviors. To the extent that positive affect is experienced during a new health behavior, the upward spiral theory posits that it creates nonconscious motives for that activity, which grow stronger over time as they are increasingly supported by vantage resources, both biological and psychological, that positive affect serves to build. The Figure depicts the recursive dynamic processes articulated by the theory.

[Insert Figure around here]

The inner loop of this spiral model identifies nonconscious motives as a central mechanism that accounts for (mediates) behavioral maintenance. It suggests that positive affect experienced during health behaviors incrementally increases incentive salience for cues associated with those behaviors. In turn, heightened incentive salience implicitly guides attention and the quotidian decisions that incrementally set people on trajectories toward healthy lifestyles. For instance, to the extent that people new to yoga find enjoyment in this practice, the others (e.g., instructor, fellow practitioners) and objects (e.g., yoga studio, yoga mat, yoga clothing) associated with this new practice may increasingly grab their attention or pop to mind in ways that subtly shape their future decisions about when to next visit the yoga studio. People also vary

– from one another and over time – in the extent to which they possess endogenous psychological and biological vantage resources that magnify the positive affect experienced during positive health behaviors. The outer loop of this spiral model represents the evidence-backed claim, based on the broaden-and-build theory, that positive affect builds a suite of such resources (Fredrickson, 2013; Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Kok et al., 2013) that can amplify (moderate) the inner loop processes to further entrench habitual allegiance to positive health behaviors. Returning to those beginning yoga practitioners, for instance, the recurrent enjoyment that they may experience in the yoga studio may serve to build their resolve to prioritize positivity when they choose to be physically active, a resolve that may serve to increase the enjoyment they are able to extract from each yoga class they take (Van Cappellen et al., 2016).

Initial evidence to support the inner loop of the upward spiral theory comes from research that assesses nonconscious motives (i.e., incentive salience) as the relative pleasantness of activity-related thoughts that spontaneously come to mind (Rice & Fredrickson, 2016a; 2016b). Positive spontaneous thoughts about physical activity have been found, in a 12-week diary study, to mediate the association between positive affect experienced during physical activity and the subsequent frequency and duration of physical activity (Rice & Fredrickson, 2016b, Study 2). Laboratory experiments have also tested and found support for the hypotheses that (a) experienced positive affect causes positive spontaneous thoughts (Rice & Fredrickson, 2016a, Study 2), and (b) perceiving one's own spontaneous thoughts about a physical activity as notably positive is sufficient to alter subsequent behavioral intentions for that activity (Rice & Fredrickson, 2016a, Study 3). This nascent line of research suggests that positive affective

experiences initiate a cascade of nonconscious processes that may orient individuals to repeat previously enjoyed behaviors.

Initial evidence to support the outer loop of the upward spiral theory comes from research that has tested the degree to which cardiac vagal tone, an index of autonomic flexibility, functions as a biological vantage resource. In a longitudinal field experiment, mid-aged adults were randomly assigned to attend a six-week workshop that taught the positive health behavior of meditation (focused on loving-kindness) or to serve in a control group (Kok et al., 2013). All participants reported their levels of ten distinct positive emotions daily. Participants' high-frequency heart rate variability (HF-HRV), an index of cardiac vagal tone, was measured at baseline and at the end of the study. Results indicated that baseline HF-HRV moderated the positive affective responses to meditation, such that individuals with higher cardiac vagal tone showed greater increases in positive emotions in response to the intervention. In turn, HF-HRV showed improvements over time to the extent that participants' meditation practice evoked positive affect. In addition, as a correlate of cardiorespiratory fitness (Buchheit & Gindre, 2006), HF-HRV also stands both to enhance positive affect experienced during physical activity, and to be further augmented by repeated decisions to be physically active. Cardiac vagal tone thus appears to be one biological vantage resource that may leverage upward spiral dynamics. Together with evidence on psychological vantage resources (e.g., prioritizing positivity; Catalino, Algoe, & Fredrickson, 2014; Datu & King, 2016), these findings offer initial evidence that the outer loop of the model modulates the inner loop, and in doing so illuminates when and for whom vantage resources predict *increasing* enjoyment of positive health behaviors.

Despite the advances since 2002 in understanding the prospective and reciprocal relations associated with positive emotions, by our assessment the scientific study of such upward spiral

processes remains ripe for further development. For instance, additional evidence is needed to rigorously test the various causal pathways posited in the upward spiral theory of lifestyle change, both from tightly-controlled laboratory experiments and from randomized controlled trials that target health-relevant behaviors (e.g., physical activity) with long-term follow-up. Moreover, statistical tools that provide rigorous and simultaneous test of between-person and within-person effects over time have only recently been developed (e.g., group iterative multiple model estimation, see Beltz, Wright, Sprague, & Molenaar, 2016; latent curve models with structured residuals, see Curran, Howard, Bainter, Lane, & McGinley, 2014). Advanced statistical tools like these, however, typically require larger samples (e.g., $N = 250$) and more frequent repeated measures (e.g., $T = 5$) than were available to us in our 2002 paper and in subsequent tests of upward spiral processes (e.g., Kok et al., 2013). As such, the proverbial additional research is still needed. We encourage others to join us in our efforts to advance scientific understanding and application of the reciprocal dynamics set in motion by people's day-to-day experiences of positive emotions. Much yet remains to be uncovered about such endogenous resources that people might tap to energize upward spiral processes that improve their health and well-being.

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Author Contributions

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Figure 1. Model articulated by the *upward spiral theory of lifestyle change* (Fredrickson, 2013; Van Cappellen et al., 2016).

