



From Ego Depletion to Vitality: Theory and Findings Concerning the Facilitation of Energy Available to the Self

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Abstract

Vitality, or the energy available to the self, is a salient and functionally significant indicator of health and motivation. Previous models (e.g., Baumeister & Vohs, 2007) have suggested how such energy can be depleted but have focused less on how it can be maintained or enhanced. In this article, we describe a model of energy and vitality based on self-determination theory (Ryan & Deci, 2000). We review substantial evidence that, whereas the self-controlling regulation of behavior depletes vitality and energy, the autonomous self-regulation of behavior does not. A growing number of experimental and field studies also suggest that vitality and energy are enhanced by activities that satisfy basic psychological needs for relatedness, competence, and autonomy. Lifestyles focused on extrinsic goals are less conducive to need satisfaction and thus engender less vitality. We conclude that social psychological factors associated with need satisfaction have important implications for health and vitality and for informing interventions.

Most models of psychological energy, both past (Freud, 1923; Selye, 1975) and present (Baumeister & Vohs, 2007), have been primarily occupied with the blocking and expenditure of energy rather than the maintenance and enhancement of it. Although these models of depletion and energy cost are informative, knowing how psychological energy can be maintained or gained is equally important.

Over the past several years, we have been exploring factors associated with the maintenance and enhancement of energy or vitality using the perspective of self-determination theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000). SDT argues that, whereas efforts to control oneself do indeed drain psychological energy and vitality, autonomous self-regulation does not. This means that autonomous or truly volitional forms of self-regulation will not result in ego depletion. Moreover, because vitality concerns the energy available to the self rather than activation per se, we predict that satisfactions associated with the basic needs of the self should maintain or enhance vitality and sustain self-regulatory capacities. SDT

therefore specifically predicts that activities that satisfy psychological needs for relatedness, competence, and autonomy will result in energy maintenance or enhancement. In this paper, we outline the model and review research showing that it explains a large amount of within-person variance in energy, productivity, and wellness, as well as such phenomena as why people can't wait for the weekends, why hanging out with friends revitalizes, why adults play video games, or why expending effort in physical activities can increase subjective energy.

Vitality

Vitality is classically defined as having physical and mental energy. When vital, people experience a sense of enthusiasm, aliveness, and energy available to the self (Ryan & Frederick, 1997). Vitality is associated with feelings of vigor (McNair, Lorr, & Droppleman, 1971), activated positive affect (Watson & Tellegen, 1985), and calm energy (Thayer, 1996), all constructs entailing positively toned, energized states. Subjective vitality differs from activation or energy per se because many forms of activation such as anger, anxiety, or arousal are either unrelated to subjective vitality, or negatively related to it (Ryan & Frederick, 1997). Instead, vitality represents energy that one can harness or regulate for purposive actions.

Although it is a salient subjective state, vitality is more than just an experiential concern: It is robustly associated with both behavioral and objective health outcomes. Subjective vitality has been linked with specific configurations of brain activation and positive response mechanisms (e.g., Barrett, Della-Maggiore, Chouinard & Paus, 2004; Rozanski, Blumenthal, Davidson, Saab, & Kubzansky, 2005). Moreover, when in vital states, people are more active and productive, cope better with stress and challenge, and report greater mental health (e.g., Penninx et al., 2000; Ryan & Frederick, 1997). In addition, growing evidence suggests that it is specifically the activated forms of positive affect associated with vitality that render people more resilient to physical and viral stressors and less vulnerable to illness (e.g., Benyamini, Idler, Leventhal, & Leventhal, 2000; Cohen, Alper, Doyle, Treanor, & Turner, 2006; Polk, Cohen, Doyle, Skoner, & Kirschbaum, 2005). These consequences make vitality an important focus of research.

Vitality is itself, however, a complex and dynamic outcome, and one that is influenced by both somatic and psychological factors. Somatic factors such as diet, exercise, sleep patterns, and smoking directly affect subjective vitality states through at least some partially known mechanisms (Rozanski et al., 2005). People's energy for controlling their behaviors and suppressing impulses has also been shown to depend, at least in part, on sufficient levels of blood glucose, which presumably supply a source of energy required for self-control (e.g., Gaillot & Baumeister, 2007). As important as such physical factors may be, however, vitality is also strongly

affected by social and psychological satisfactions or demands. Social events can leave even a well-nourished person feeling excited and energized, or stressed, anergic, and drained. Thus, psychological and physical events both impact vitality and influence changes in energy within persons over time and between-persons overall.

Historical and Current Theories of Vitality and Energy

Vitality is an explicit concept with meaning in most all cultures, no doubt due to its phenomenal salience (Ryan & Frederick, 1997). For example, Cleary (1991) related the concept of vitality to a variety of eastern traditions. From the Chinese concept of Chi (Jou, 1981) to the yogic concept of Prana (Cope, 1999), eastern traditions have linked vitality to mental, physical, and spiritual health and viewed it as something that can be actively cultivated or depleted.

In western scholarship, Freud (1923) provided an early *economic* model of energy in which the adaptive energy available to the ego is a limited resource that can be differentially invested in preoccupations, drained by conflicts, and diminished by intra-psychic controls and repression. Numerous other theorists who followed Freud within the psychodynamic literature, including Jung, Nunberg, Hartmann, French, Perls, Reich, Rappaport, and White, continued to speculate about factors affecting the energy available to one's ego or self. Although differing in details, they commonly suggested that stresses, preoccupations, conflicts, unresolved experiences, and repression all compromise or occupy available energy. In addition, most of these dynamic models view vitality and energy as a relatively limited resource that can be spent, depleted, or conserved, but they less explicitly address how the available energy is catalyzed, maintained, or enhanced.

In a separate tradition that emerged within the health sciences, Selye (1975) introduced a model of energy and physical health. Selye suggested that all individuals possess a limited reservoir of what he called *adaptive energy*, which he viewed as distinct from *caloric energy* and could be applied when coping with environmental and physical stressors. This adaptive energy is drained by both physical and psychological demands, and when adaptive energy is low, it can compromise people's ability to cope with stress and even their immunological responses to illness.

It is less the case that these classical viewpoints on energy and vitality have been abandoned or disregarded than that they have been awaiting further research. Currently, several strands of research are reconnecting with these perspectives by grappling with ideas of energy, vigor, and vitality. First, research in the health sciences has been exploring the relations between positive energetic states and illness. Second, research in personality and social psychology has focused on factors associated with the enhancement versus depletion of energy and vitality.

Biopsychosocial models

Thayer (1996, 2001) introduced a model of energy that embraces a holistic perspective in which subjective energy is a byproduct of both somatic and psychological factors. Thayer assesses subjective energy using a circumplex model with two bipolar dimensions: one ranging from energy to tiredness, the other from tense to calm. The positive energetic quadrant, which he calls *calm energy*, is empirically and descriptively most closely associated with vitality as discussed herein (Ryan & Bernstein, 2004). It is characterized by feeling energetic and vigorous and in control of the energy. Thayer has used this tool to explore how energy-related moods are associated with diurnal rhythms and are affected by diet, exercise, drugs, and other health-related behaviors. For example, Thayer (1987) showed how both a sugar snack and exercise can stimulate energy in the short term, but that they differ in terms of whether that energy is tense or calm and lasting or quickly depleted.

Penninx et al. (2000) developed the construct of *emotional vitality* in an attempt to define emotional vigor in studies of the health trajectories of older women with disabilities. Their construct combines feelings of personal mastery, happiness, low depressiveness, and low anxiety. They found that emotional vitality exerted protective effects against the development of new disabilities and even mortality.

Finally, Rozanski et al. (Rozanski et al., 2005; Rozanski, 2005) have suggested that subjective vitality is essential for coping with life challenges, facilitating better regulation of negative emotions, healthier reactivity to stressors (e.g., reduced output from sympathetic nervous system and hypothalamic-pituitary-adrenal axis), and improved immunological functioning. They advocate for considering the psychological causes of enhanced versus depleted vitality because of its importance as a protective factor when present and a risk factor when drained or depleted.

The ego-depletion model

In the realm of social psychology, Baumeister et al. (e.g., Baumeister, Muraven, & Tice, 2000; Baumeister & Vohs, 2007; Muraven, Tice, & Baumeister, 1998) introduced the concept of ego depletion, which directly concerns the idea of energy available to the self. Mainly a theory of what drains energy or vitality, the ego-depletion hypothesis has prompted an intriguing and generative body of experimental research.

From this perspective, the energy for self-regulation is 'like a muscle' in that the regulation of behavior requires energy that is depleted by exertion. Baumeister et al. have argued that, because all acts of volition and self-control are effortful, require inhibition, and draw on a limited resource, engaging in them results in a state they refer to as *ego depletion* (Baumeister, Bratslavsky, Muraven, & Tice, 1998). They defined ego

depletion as 'a temporary reduction in the self's capacity or willingness to engage in volitional action (including controlling the environment, controlling oneself, making choices, and initiating action), caused by prior exercise of volition' (p. 1253).

Supporting this view, experiments have shown that behaviors involving self-controlling actions deplete energy, as manifest in decrements in performance or persistence at subsequent tasks. For example, participants who were told to suppress reactions to evocative, sad, or humorous films performed worse on subsequent cognitive (e.g., anagram) or physical (e.g., hand grip) tasks than those not told to alter their emotional states (Baumeister et al., 1998; Muraven et al., 1998). Similarly, resisting cookies or candy caused participants to give up more quickly on subsequent tasks (Baumeister et al., 1998; Vohs & Heatherton, 2000). Most recently, evidence has suggested that self-control can even deplete blood glucose levels, and, conversely, that restoring blood glucose can enhance capacities for self-control (Gailliot & Baumeister, 2007; Gailliot et al., 2007).

Several studies have also linked ego depletion to self-regulation defined as overriding impulses. Baumeister et al. (1998) told participants to cross out each letter *e* in a page of text. Later, they were told to do so unless doing so violated one of several rules (e.g., do not cross out an *e* that is adjacent to a vowel). The new rules presumably required participants to over-ride their pre-existing impulse to simply cross off every *e*. Presumably because the new *e* task required self-control, participants had less energy to engage in the subsequent task. In another study, Wallace and Baumeister (2002) showed that working on a Stroop task, which also requires an abstract form of self-control, impaired performance on a subsequent test of self-control relative to a comparison group. Studies have also shown that suppression of thoughts (e.g., telling participants not to think of a white bear) can cause ego depletion (Muraven et al., 1998).

Finally, in an attempt to show that all acts of self-regulation deplete, Baumeister et al. (1998) argued that even making choices, typically a highly volitional act, depletes energy. In an experiment, they showed that participants who had to make an active choice to engage in a target activity suffered depletion relative to those simply given no choice over the task. This finding is one that is counterintuitive from the perspective of SDT, a topic to which we shall return.

Some summary and conclusions

Past and current models of vitality or energy suggest that energy of the self is related to both somatic and psychological factors. Research in health psychology suggests that positive energy can be affected by diet and exercise and reduced by stress. Psychological factors, such as having to exert self-control, also seem to deplete energy. Evidence also suggests that suppression of thoughts or feelings, or resisting urges and temptations,

may cost energy. All of these models make excellent contributions to our understanding of vitality and vigor, for they have tied the subjective state of vitality to outcomes from health status, to physical activity, to emotional well-being. They also suggest that at least some forms of self-control may be very costly to vitality.

A Self-Determination Theory Model of Vitality

As previously noted, the major focus of energy models has been on (a) the positive consequences of energy or vitality and (b) the factors that drain, block, or inhibit energy. In a somewhat different vein, over a decade ago, we began exploring factors that might be associated with energy maintenance or enhancement, using the theoretical framework of SDT. This work began when we were studying exercise and sport motivation, as vitality was a frequently mentioned consequence of intrinsically motivated physical activities (Frederick & Ryan, 1993). We were intrigued by early evidence that the same activities that could catalyze energy when volitional could be draining when driven by more external motives. We then developed subjective and behavioral measures of vitality for further inquiries and began some programmatic research.

The SDT model of vitality that follows is organized around several central hypotheses that include the following: First, more autonomous self-regulation, because it involves less inhibition and control, is less depleting than the same activities when controlled by external or internal forces. In attribution terms, the more the *perceived locus of causality* (de Charms, 1968) for actions is external to the self, the more doing that activity would drain energy. Second, activities that satisfy SDT's *basic psychological needs* should provide nutriment to the self, which would be manifest as maintained or enhanced vitality. More specifically, activities and events that thwart needs for competence, relatedness, or autonomy should drain energy, whereas activities within which these needs are satisfied should maintain or enhance energy. This hypothesis is applicable at both within and between person levels of analysis because it explains variation in vitality over time and across people. Third, lifestyles focused on *intrinsic goals* will be associated with more vitality because they facilitate basic need satisfactions, whereas those focused on extrinsic goals will not be.

Volition and vitality

Within SDT, a primary focus is on the distinction between autonomy or volition and controlled or heteronomous forms of behavior regulation. Autonomy is defined as the self-endorsement of one's actions, or the extent to which one assents to or feels a sense of choice concerning one's behaviors. Put differently, autonomous acts are characterized by being in accord with one's values or interests. We therefore assumed that when

behavioral regulation is autonomous, it is both harmonious and efficient, requires the least inhibition, and entails the least conflict. In contrast, controlled motivation is often associated with pressure and tension and requires greater resources. Thus, we expected that volitional action would be associated with maintained or enhanced vitality, whereas controlled or heteronomous motives would be associated with lower vitality.

Nix, Ryan, Manly, and Deci (1999) performed three experiments to examine the differential impact of autonomous versus non-autonomous regulations on changes in vitality and happiness. Based on SDT, Nix et al. hypothesized that doing well when autonomously motivated at activities would maintain or enhance vitality, whereas doing well at controlled regulation would not. They specifically differentiated vitality from *happiness*, (i.e., contentment, being satisfied, pleased, etc.), which they suggested would attend all conditions where people did well. In a first experiment, participants were either self-directed in a task performance, or they enacted the identical behaviors of another agent through external directives via a yoking procedure. Whereas other-directed participants showed significant drops in vitality, self-directed participants evidenced maintained vitality pre- to post-experiment. In a second study, participants were given either a *task-involving* induction intended to support intrinsic motivation and autonomy, or an *ego-involving* induction. The former was intended to support autonomy, and the latter was intended to induce a self-controlling form of regulation (Ryan, 1982). All participants succeeded at the tasks and received very positive feedback. As predicted, whereas changes in happiness were comparable across conditions, there was more positive change in vitality in the autonomy-supportive than the controlling condition. A third study examined people's imagined reactions to success in a class they either had voluntarily taken or were required to take. As in the two experimental studies, both groups in this study reported similar happiness with the outcome, but the autonomous group reported more vitality.

Kasser and Ryan (1999) subsequently examined the relations of vitality to autonomous regulation in a field study within a nursing care environment for older adults. They assessed the vitality of the residents using an adaptation of the Ryan and Frederick (1997) inventory, along with a variety of health and social indicators. They found that residents reporting more autonomous regulation of their daily activities had more vitality. Unlike the experimental study, however, autonomy may have been as much a correlate of vitality as a cause. Yet importantly, perceived nursing care staff autonomy support was also strongly associated with vitality.

These studies were consistent with the view that not all forms of self-regulation are associated with depletion. However, in the studies reviewed thus far, researchers had not directly used the depletion measures used by Baumeister et al., nor directly tested our predictions within the ego-depletion paradigm.

Autonomous versus controlled regulation and depletion

Although SDT draws a clear distinction between self-regulation (i.e., autonomous regulation) and self-control (i.e., controlled regulation), the two terms are used interchangeably in the ego-depletion literature (Baumeister et al., 1998; Muraven & Baumeister, 2000; Schmeichel, Vohs, & Baumeister, 2003). For instance, Muraven et al. (1998) made that equation in stating, 'if *self-regulation* conforms to an energy or strength model, then *self-control* should be impaired by prior exertion' (p. 774). Moreover, Baumeister et al. (1998; Study 2) made the claim that even choice, typically a hallmark of autonomous action, is also depleting. In fact, in one experiment, those investigators contrasted what they labeled a 'high choice' condition with a no-choice condition and showed that the high-choice condition was more depleting, a claim that on the surface seems to contradict our view that autonomous regulation would not deplete relative to controlled regulation. Yet, what Baumeister et al. called 'high choice' was a manipulation by the experimenter that we expected most participants would view as controlling. Specifically, Baumeister et al.'s high choice participants were explicitly told that although they had a choice, it 'would be helpful' for the experimenter if they would do x. In fact, this manipulation was very close to one used by Pittman, Davey, Alafat, Wetherill, and Kramer (1980) as a controlling condition, intended to create an external perceived locus of causality.

Accordingly, Moller, Deci, and Ryan (2006) presented three experiments testing the hypothesis that, whereas conditions they called controlled choice (which were essentially identical to the one Baumeister et al. called 'high choice') would be ego depleting, conditions that represented autonomous choice would not. In Experiment 1, an autonomous-choice condition was contrasted with both a no-choice control group and the condition called controlled choice. The findings showed significantly greater persistence in the autonomous-choice condition than in the controlled-choice condition (which Baumeister et al., 1998 had called 'high choice'), and the no-choice control group fell between the other two. The fact that the autonomous-choice condition led to significantly greater persistence than the controlled-choice condition indicates that autonomous choice was not depleting. In Experiment 2, Moller et al. replicated the critical differences observed in the first experiment using an alternative measure of ego depletion that included objective performance and physically demanding persistence. Again, participants in a controlled-choice condition were significantly more ego depleted (i.e., they persisted less and performed worse) than those in an autonomous-choice condition. In a third experiment, they extended this research by employing yet another dependent measure of ego depletion. The general effect was again replicated: Those in the autonomous-choice condition were less ego depleted than those in the controlled-choice condition, persisting longer and performing

better on an e-hunting task. Experiment 3 also showed significant mediation by perceived self-determination of the relation between the choice condition (autonomous vs. controlled) and ego depletion as measured by performance.

Conceptually, it is important to note that Moller et al. were focused on true choice because in many real world settings opportunities to choose what one will do allow the individual to act more in line with his or her interests and values and thus to be more autonomous. There are paradigms, however, in which choice is defined not in terms of volitional assent, but merely as the act of deciding among alternatives that may be of little values and not appreciably different. Schwartz (2004), for example, discussed how too many choices can be draining and confusing. There, the concept of choice merely referred to the presence of alternatives, and insofar as such choices are meaningless, undesired, or imposed they should not, according to SDT, have an enhancing effect on vitality or one's capacity to exert self-control.

More recently, three papers by Muraven et al. support the view that, whereas self-controlled behaviors deplete, autonomously self-regulated behaviors do not. First, Muraven, Rosman, and Gagné (2007) presented three experiments in which participants were given either performance-contingent rewards to exert self-control or non-contingent rewards. According to SDT, non-contingent rewards do not undermine autonomy, whereas performance-contingent rewards are often experienced as controlling (Deci, Koestner, & Ryan, 1999; Ryan, Mims, & Koestner, 1983). Results showed that those who received performance-contingent rewards performed more poorly on a subsequent test of self-control than participants given non-contingent rewards. There were no differences in mood, arousal, or anxiety between groups; however, feelings of autonomy were related to performance during a subsequent self-control period. Based on these findings, Muraven et al. concluded that:

Self-control that feels more externally determined is more depleting than self-control that feels more personally chosen. . . . it appears that even small changes in feelings of autonomy surrounding the activity can affect how depleting the task is.

In another paper, Muraven (forthcoming) directly explored whether autonomous motivation would moderate the ego-depletion effect. He used a physical grip task at baseline and follow-up, and participants were asked to not eat cookies in between the two tasks. Muraven then asked them for their reasons for resisting the cookies, using an SDT-based assessment to gage their relative autonomy. Those who had controlled reasons for resisting showed the depletion effect whereas those with autonomous reasons did not.

Finally, Muraven, Gagné, and Rosman (forthcoming) reported three experiments in which they used autonomy-supportive versus controlling

instructions to induce self-control in participants. Results confirmed that controlling inductions diminished subsequent performance at activities requiring self-control, and they diminished subjective vitality when compared with autonomy supportive instructions. Additional analyses showed that the ego-depletion effect was mediated by subjective vitality. This result is important because it suggests that subjective vitality (Ryan & Frederick, 1997) and behavioral assessments of ego depletion are tapping into the same phenomenon.

Collectively, these studies provide strong support for recognizing the distinction between autonomous self-regulation and self-controlling regulations and their differential relations with ego depletion. The ego depletion effect in the literature appears to be based on what in SDT we refer to as controlled forms of regulation, whereas autonomous self-regulation maintains or enhances energy or vitality.

Basic Psychological Needs and Vitality

The demonstrations that autonomous or volition regulation maintains or enhances energy relative to controlled regulation supports the idea that self-organized actions are more energy efficient. Yet, an important question concerns what accounts for rises (and falls) in vitality more generally. Within the SDT view, insofar as vitality represents *energy available to the self*, psychological nutrients to the self should enhance energy – that is, they should make energy more available to the self. We thus expected that vitality would correspond with activities or contexts that engender basic psychological need satisfactions. In SDT, basic psychological needs are those for *competence* (i.e., feeling effective), *relatedness* (i.e., feeling significant and connected), and *autonomy* (i.e., feeling volitional rather than controlled; see Deci & Ryan, 2000 for a comprehensive argument for these as basic needs). In what follows, we review several strands of evidence concerning the relation of basic psychological need satisfactions to the experience of vitality.

One approach to studying how fluctuations in vitality relate to basic need satisfactions is to use experience-sampling methods. Several studies have specifically examined daily variations in vitality at both between- and within-person levels of analysis. In one study, Sheldon, Ryan, and Reis (1996) found that both trait competence and trait autonomy predicted individual differences in vitality. Moreover, at a within-person level of analysis, competence was strongly associated with vitality, and autonomy marginally so. Yet, there was a large weekend effect on vitality, which was associated with the much greater autonomy that participants experienced on weekends. When not controlling for this weekend effect, autonomy was a substantial predictor of vitality, along with competence. A subsequent study by Reis, Sheldon, Gable, Roscoe, and Ryan (2000) was similarly suggestive. They examined all three basic needs (i.e., autonomy, competence,

and relatedness) at both between- and within-person levels of analysis using a diary method. At a between-person level of analysis, autonomy was associated with greater vitality. At a within-person level, all three need satisfactions uniquely predicted vitality. Here, a large weekend effect for vitality was again evident.

Because both of these studies were with college students, Ryan, Bernstein, and Brown (forthcoming) more recently examined the relations of need satisfaction and vitality in a diary study of an adult working population, with a specific interest in 'the weekend effect'. In these adults, controlling for numerous individual differences, daily variations in vitality were uniquely associated with fluctuations in each of SDT's three basic needs. Thus, people felt more energy whenever they experienced more competence, relatedness, or autonomy in their daily activities. Also as expected, vitality was higher on the weekends, an effect that was fully mediated by autonomy and relatedness. In short, these working adults felt more energy on weekends due to the enhanced freedom and connectedness experienced on those days.

These experience-sampling studies suggest that the pursuit of need satisfying contexts and activities enhances energy. This may in part explain why people seek out weekends and vacation times for restoration and rejuvenation. It also may explain the appeal of forms of recreation such as video games or arduous sports that require active engagement. For example, in an experimental study of motivation for video games, Ryan, Rigby, and Przybylski (2006) examined the effects of need satisfaction on changes in vitality from pre- to post-play. The simple platform video games they used provided little opportunities for relatedness or autonomy within play, but multiple opportunities for feelings of competence or mastery. Participants, most of whom were novices at such games, on average showed a decline in vitality or energy pre- to post-play. Yet, those who experienced competence satisfactions maintained their vitality, whereas those who had low levels of perceived competence showed diminished vitality after play. In another study, Gagné, Ryan, and Bargmann (2003) followed elite level female gymnasts over several weeks of practice. Ratings of vitality were obtained both pre- and post-practice, as well as the degrees to which relatedness, competence, and autonomy were experienced during practice. Results showed that daily changes in vitality from pre- to post-practice were affected by all three variables. On days where these girls felt more autonomy, effectiveness, and connection, they came away with more energy, although they had engaged in physically demanding and calorie-draining activities.

The fact that basic need satisfactions lead to vitality is suggestive of the idea that different lifestyles may be more or less conducive to feeling this sense of aliveness and energy. Kasser and Ryan (1993, 1996) have assessed lifestyles by assessing the different life goals people are pursuing over the long term. In their studies (e.g., Grouzet et al., 2005; Kasser & Ryan, 1996,

2001), they have differentiated between people who focus on *extrinsic life goals* or aspirations (such as money, fame, or image) versus those who are focused on *intrinsic life goals* (such as relationships, personal growth, and community). In this view, intrinsic goals are ones that are closely linked with satisfaction of the basic needs for autonomy, competence, and relatedness, whereas extrinsic goals are at best indirectly related to these satisfactions and, in many cases, preclude them (see Ryan, Sheldon, Kasser, & Deci, 1996). Accordingly, on the basis of SDT, this suggests that people who place more importance on extrinsic goals would have less vitality than those who are more centered on intrinsic, need-satisfying goals.

This expectation has been supported in several studies. Kasser and Ryan (1993) showed that the relative importance of financial success within one's array of life goals was negatively associated with individual differences in vitality. Kasser and Ryan (1996, 2001) extended this finding to a broader array of extrinsic goals including fame and attractiveness. Kim, Kasser, and Lee (2003) found similar effects on vitality in South Korean samples. More recently, Vansteenkiste et al. (2007) presented two studies of working adults showing that intrinsic versus extrinsic orientations were differentially associated with vitality, and, moreover, that these relations were, as the authors predicted, mediated by SDT's basic psychological need satisfactions.

In short, when people seek out opportunities to engage in activities that satisfy basic psychological needs for autonomy, competence, and relatedness, their vitality is maintained or enhanced. Recreational tasks that provide need satisfactions, from challenging video games to skilled sports, can foster vitality, as can most intrinsically motivated actions, explaining in part why people are revitalized by weekends, vacations, and other occasions for recreation. Moreover, the pursuit of meaningful activities, especially those associated with intrinsic goals, maintains or enhances vitality. These activities do not simply relax the self-regulatory muscle; rather, they can satisfy psychological needs and thus rekindle the energies lost from the more depleting conditions that are so pervasive in many people's daily lives.

Summary and Conclusions

The depletion of human energy and vitality has long been a focus of interest in psychology, and recent work in social psychology has reinforced the idea that social and motivational variables can affect the depletion process. Less well understood is how people catalyze or gain energy. Working from an SDT standpoint, we have derived and tested the ideas that (i) autonomous activities, which are those that one does willingly and congruently, are not depleting, and (ii) to the extent that activities satisfy SDT's basic psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000; Ryan, 1995), they maintain or enhance vitality. Studies

based on multiple methodologies, both in the lab and in the field, and at both within- and between-person levels of analysis, support these propositions.

The implications of this are manifold. When we consider that vitality and energy have been associated with greater performance and persistence, as well as psychological and physical wellness, it is clear that vitality represents an important resource whose promotion has multiple benefits. Given this, opportunities to support autonomy versus control behavior play an important role in developing this inner resource, as do supports for basic psychological need satisfactions. This means that in applied settings including organizations, schools, and sport, when managers, teachers, and coaches support the psychological needs of their charges, vitality, and the positive effects on performance, persistence, and health associated with it, can be enhanced. Furthermore, these results suggest that, as individuals, our pursuit of autonomous activities, especially those reflected in intrinsic goals, may represent pathways to greater vitality. As this research develops further, we may continue to find new paths to enhanced feelings of aliveness, which, after all, is perhaps the most basic satisfaction of all.

Short Biographies

Richard M. Ryan is a clinical psychologist and a Professor of Psychology, Psychiatry, and Education at the University of Rochester. He is a co-founder of the Self-Determination Theory and has published well over 200 scholarly articles in the areas of human motivation, personality development, and applied psychology. In addition to basic research on motivational processes, Ryan studies health psychology, sport and exercise, education, organizations, and psychotherapy. He is an award-winning educator and researcher and has given addresses in over 50 universities around the globe. He has also been a visiting scientist at the Max Planck Institute, a James McKeen Cattell fellow, and a recipient of numerous grants. His current research interests include the following: the acquisition and impact of materialism and other extrinsic goals; facilitation versus undermining of intrinsic motivation and self-determination; the determinants of vitality and energy; and the sources of within-person variability in attachment, well-being, and life satisfaction. Ryan is a fellow of the American Psychological Association and is currently editor-in-chief of *Motivation and Emotion*.

Edward L. Deci is Professor of Psychology and Gowen Professor in the Social Sciences at the University of Rochester. For more than 35 years, he has been engaged in a program of research on human motivation. Much of this work has led to and been organized by the Self-Determination Theory, which he co-founded with Richard M. Ryan. Deci has published in the top journals in psychology and has authored and edited several books, including *Intrinsic Motivation and Self-Determination in Human Behavior* (co-authored with Ryan, 1985) and *The Handbook of Self-Determination*

Research (co-edited with Ryan, 2002). A grantee of the National Institute of Mental Health, the National Institute of Child Health and Human Development, the National Science Foundation, the Institute for Education Sciences, and the Bill & Melinda Gates Foundation, he is a fellow of the American Psychological Association and the Association for Psychological Science. Deci has lectured widely and has consulted for organizations and government bureaus related to education, health-care, psychotherapy, work, and recreation throughout the United States and abroad.

Endnote

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