

Revitalization through Self-Regulation: The Effects of Autonomous and Controlled Motivation on Happiness and Vitality

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Three studies examined the effects of experimentally induced motivational orientations on the subtly different positive affects of vitality and happiness. We hypothesized, based on self-determination theory (Deci & Ryan, 1991; Ryan & Frederick, 1997), that doing well when autonomously motivated would enhance subjective vitality relative to doing well when controlled in one's motivation, but that doing well under the two motivational states would not have differential effects on happiness. Two experiments in which motivation was induced by instructions to participants about task engagement and a third experiment using an attributional methodology yielded the hypothesized pattern of effects. Results are discussed in terms of the importance of differentiating positive outcomes in terms of their underlying motives and of giving increased attention to understanding restorative environments. © 1999 Academic Press

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Subjective vitality, or the positive feeling of having energy available to the self, is a phenomenologically salient and dynamic state. People recognize ongoing changes in the energy they possess, not only as a function of physical states such as illness or fatigue, but also as a function of psychological factors (Ryan & Frederick, 1997; Thayer, 1996). Although a number of studies have investigated covariates of these changes in subjective vitality, few experimenters have attempted to directly manipulate such states.

In the present studies we examine motivational factors expected to impact directly on subjective energy. Specifically, we argue that success at behaviors that are autonomously regulated should maintain or enhance subjective energy or

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vitality relative to success at the same actions when they are directed or controlled by forces outside the self. That is, we predict that when people are intrinsically motivated or autonomously extrinsically motivated, they will not experience their efforts as draining and may even feel their energy enhanced. We further argue that these facilitative effects of autonomy on the positive state of vitality are quite specific. Thus, although success at *either* autonomous or controlled actions may leave people feeling a sense of happiness, contentment, or being pleased with themselves, success at autonomously regulated tasks will engender greater energy or vigor than success when their task behavior is controlled. It is this differential effect of success at autonomous versus controlled tasks on vitality, and the absence of such a differential effect on happiness, that is the focus of the current research.

These hypotheses rest on two issues. First, although recognizing that positive affects are highly correlated (Watson & Tellegen, 1985), we think there is utility in differentiating between subtly different types of positive affect. Specifically, we differentiate between the positive states of vitality and happiness because vitality entails a special sense of being restorative or regenerative, which is not necessarily true of happiness. Second, we expect that differences in the motivation underlying behavior will be associated with differences in resultant vitality. If so, this is important because it would suggest that any restorative, vitalizing effects of succeeding at an activity would be differentially associated with being autonomous versus controlled in one's motivation.

To derive the current hypotheses we begin by reviewing varied approaches to the study of vitality; we then turn to the relations between vitality and autonomous versus controlled forms of motivation; and finally we review the basis for distinguishing between the positive states of vitality and happiness. Following this review, we present three studies that test the hypotheses.

Subjective Vitality and the Experience of Personal Energy

The concept of energy has been an enigma within psychology throughout its history. For example, Freud (1900) postulated an "economic model" in which psychic energy was viewed as a limited resource. He argued that energy invested in defense or resistance was therefore depleting of one's general store of energy, resulting in functional costs. Other theories in the psychodynamic tradition (e.g., Jung, 1960; Lifton, 1976; Perls, 1973) have also grappled with the energy issue, most agreeing that energy can be lost or gained depending on how one invests it. Most also suggest that psychological conflict and tension diminish available energy. Although such theories of energy have been criticized by positivist thinkers as involving an inherently vague and potentially unmeasurable construct, the concern with economic issues continues to be an important aspect of clinical formulations (Levine, 1979).

Energy concepts have also loomed large in Eastern thought. As Cleary (1991) pointed out, the predominant philosophies of the East suggest that energy can be

catalyzed by certain spiritual, meditational, or physical practices such as zazen, yoga, reiki, and acupuncture. For example, the Chinese concept of *Chi* refers to an unlimited source of energy that can be more or less accessed by individuals depending on their lifestyles and personal practices (Jou, 1981). Thayer (1996) commented that practices such as Tai Chi, Yoga, and Zen meditation produce a state of “calm energy”—a nontense state of energy, alertness, and vitality—primarily by reducing organismic states of tension and restoring feelings of positive energy.

These theoretical and practical perspectives on vitality and energy have to date received little attention in empirical studies. However, psychometricians working both in the areas of mood and well-being have identified constructs that refer to vitality, reflecting the fact that personal energy is a salient and phenomenally accessible attribute and an important indicator of wellness. For instance, McNair, Lorr, and Doppleman (1971) identified an energy/vitality factor in their studies of mood states and found it to be positively related to mental health and negatively related to feelings of fatigue. Similarly, Stewart, Hays, and Ware (1992) assessed subjective feelings of energy and demonstrated their positive relations with mental health.

Especially noteworthy is the work of Thayer (1987, 1996), who has studied subjective energy and its relations to mood. He distinguished two types of energized states—calm energy and tense energy—and two low energy states—calm tiredness and tense tiredness. It is his construct of calm energy, the relaxed possession of liveliness and vigor, that corresponds to the state of vitality as we herein conceptualize it. Thayer argued that a major factor affecting the calm energy state is the degree of tension a person experiences. For example, his studies have shown that at moderate to high levels of stress or tension subjective energy is often diminished and that tension-relieving activities such as moderate exercise can enhance calm energy (Thayer, 1987).

In a particularly relevant experiment, Thayer and Moore (1972) had students engage in an intellectual task under varied levels of stress. The high-stress condition was induced by conveying that the task was a test of intelligence that would predict their future college performance, an induction referred to as ego-involvement by deCharms (1968) and found to undermine intrinsic motivation by Ryan (1982). Thayer and Moore found that this ego-involving condition resulted in greater tension but lower feelings of energy than a condition involving less evaluative pressure.¹

More recently, Ryan and Frederick (1997) examined the construct of subjective vitality, defined as a positive feeling of aliveness and of possessing personal energy. In a series of studies they showed that subjective vitality covaries with both somatic and psychological factors. On the somatic side, they showed that

¹ There was actually a third condition that was less pertinent to our current analysis. In it, the task was portrayed as unimportant, and it led to both low tension and low energy.

vitality was lower in those reporting such complaints as pain, common physical symptoms, ineffective body functioning, and symptoms of somatization.

On the psychological side, Ryan and Frederick argued that subjective vitality should be maintained or enhanced under conditions where the basic psychological needs for autonomy, competence, and relatedness are satisfied. The role of autonomy may be particularly important in the dynamics of energy. Autonomous behaviors are those that are phenomenally experienced as flowing from and expressing one's self, whereas controlled actions are experienced as demands to think, feel, or behave in specified ways and could thus feel like a drain on personal energy (Deci & Ryan, 1985; Ryan, 1995). Given that vitality is defined as a feeling of possessing energy available to one's self, Ryan and Frederick reasoned that it should be higher when successfully completing autonomously motivated actions than when successfully completing controlled ones. In support of this view, Ryan and Frederick found that, among samples from a pain clinic and a weight-loss clinic samples, those reporting more controlled reasons for being in treatment exhibited less vitality than those who were more autonomous in their participation. They also found that trait vitality was higher among persons higher in trait measures of autonomy.

The linkage between self-determined versus controlled motivations and subjective vitality has been suggested by other studies as well. Sheldon and T. Kasser (1995) found that personal strivings (Emmons, 1986) that were less self-determined were associated with lower subjective vitality. V. Kasser and Ryan (in press) found in a home for the elderly that residents' personal autonomy and their perceptions of the nursing staff's being autonomy supportive were both associated with greater vitality among the elderly residents. Sheldon, Ryan, and Reis (1996) found support for the association of self-determination and vitality in a 2-week-long diary study of college students. They found that a trait measure of autonomy was associated with subjective vitality averaged across the 14 days. In addition, controlling for trait autonomy and competence, gender, the previous day's well-being, and a number of other potential confounding influences, within-person daily changes in autonomy were significantly related to changes in vitality. A subsequent study by Reis, Sheldon, Gable, Roscoe, and Ryan (in press) similarly found that daily changes in autonomy were significantly related to daily changes in vitality after controlling for trait levels of self-determination, effectiveness, and connectedness as well as for daily levels of competence, relatedness, and the previous day's well-being.

In sum, these theoretical views and empirical findings suggest that behaviors that are autonomous or self-determined may yield better maintained or enhanced vitality relative to non-self-determined activities (e.g., being externally controlled or ego-involved), even when one controls for competence or goal success. However, most of the research to date has provided only correlational support for the hypothesized linkage between autonomy and vitality, a linkage that we examined in the present studies using both experimental and attributional approaches.

Vitality and Happiness: Semi-Distinct Positive Affects

Although considerably more attention has been paid to differentiating between negative affects, meaningful distinctions have been made among types of positive emotional experiences. Our present focus concerns the not wholly distinct positive affects of vitality and happiness.

As we have said, vitality refers to “the experience of having energy available to one’s self” (Ryan & Frederick, 1997, p. 2) and is considered equivalent to Thayer’s (1996) construct of a calm (nontense) energy. The concept of happiness has been used differently by different researchers, often referring to an undifferentiated state of positive affect and life satisfaction (e.g., Argyle, 1987). However, we define happiness herein more specifically as high pleasantness per se—as a state of contentment or satisfaction—that is theorized to follow from the attainment of a desired outcome regardless of the motivational state that yielded the outcome. Although both happiness and vitality are positive or “pleasant” states, only the later is necessarily characterized by high energy or activation. In this sense both happiness and vitality belong together under the umbrella of positive affect, but are distinguished mainly by the activation issue, with vitality being an activated positivity and happiness not necessarily carrying such an implication.

Another way of considering the subtlety of the distinction between happiness and vitality as herein defined is through the bipolar model of Watson and Tellegen (1985). They identify two orthogonal higher order dimensions of affect, namely: (a) positivity or pleasantness and (b) negativity or unpleasantness. When considering happiness and vitality, Watson and Tellegen’s model implies that these two positive states are closely associated, but, in their bipolar space, what we call vitality is both slightly more negative and slightly more positive than what we call happiness. Our concept of happiness is most closely related to what they label “pleasantness” (which appears at about the “10 o’clock” position in their circumplex model), whereas our concept of vitality is most closely related to what they label “high positive affect” (which appears at about “noon”). Research using the bipolar model has shown that vitality-related affects (e.g., peppy, active, enthusiastic) and happiness (e.g., content, happy, satisfied) are typically strongly enough correlated to be aggregated as a single construct of positive affect. Thus, although dimensionalists such as Watson and Tellegen do not dismiss finer distinctions among positive affects, they point out that such differentiations may not be warranted in many contexts.

Although we agree that it is both difficult and typically unnecessary to distinguish among such closely related positive affects, we are herein making such a distinction between vitality and happiness because we believe it is necessary to clarify the theoretically and practically important relations between motivational processes and vitalization. Because our theoretical interests concern the influence of different motivational states on vitality, happiness represents an appropriate comparative affect because it is positive but yet not expected to be strongly influenced by one’s motivational orientation. Thus, by

using happiness as the comparative affect, we can protect against a positivity bias as we attempt to relate these subtly different affects to different types of motivation. In doing so we draw from a number of predecessors in the study of discrete emotions.

Early empirical support for distinguishing vitality from happiness came from the pioneering work on mood states by Nowlis and Green (1964). They factor-analyzed self-reported affects and found that items such as active, energetic, and vigorous formed a factor they labeled Vigor. It was noteworthy that these vigor items did not load on a factor labeled Elation that consisted of adjectives such as elated, overjoyed, and pleased, terms that fall closer to our current conception of happiness. Similarly, in factor analyses presented in the manual for the *Profile of Mood States* (McNair et al., 1971), contented, happy, and satisfied did not load on a factor labeled Vigor that included items such as lively, active, energetic, full-of-pep, and vigorous.

Analyses of affect terms using multidimensional scaling techniques have also demonstrated distinctions between vitality and happiness. Purcell (1982) had participants sort affect terms into groups of similar feelings. Both dimensional representations and cluster analyses indicated that vitality items (e.g., activated, peppy, energetic, vigorous, lively) did group together and were distinct from happiness items (e.g., pleased, elated, overjoyed). Similarly, Shaver, Schwartz, Kirson, and O'Connor (1987) had participants sort affect terms and found that vitality (e.g., enthusiasm, zeal, zest, exhilaration) and happiness (e.g., cheerfulness, joy, delight, happiness, satisfaction) formed separate, though closely related, clusters.

Studies of changes in affect over time using the P-factor analysis also have resulted in the identification of separate factors for vitality and happiness. P-factor analysis assesses covariation among items for one person across many occasions, rather than covariation among items across subjects at a single time as in traditional R-factor analysis (Cattell, 1952). Lebo and Nesselrode (1978) P-factor-analyzed daily ratings of mood from five pregnant women over a 120-day period. Although they identified considerable differences in factor patterns across subjects, they also found certain factors emerging to some degree for each participant, including what they called Energy (vigorous, energetic, active) and Well-being (cheerful, happy, comfortable, pleased).

Thus, although starting from different theories, lists of affects, and methods, various investigators have identified a distinction between vitality and happiness. These studies are consistent with the dimensional view in finding that vitality and happiness are highly correlated constructs, but they also reveal that these two positive states appear to differing degrees under different circumstances and are present for some people more often than for others. Our view is consistent with the position taken by Lazarus (1991), who argues that distinct affects can be catalyzed by different contextual factors, some of which we manipulate in the present studies.

Distinctions between Motivations

Although motivation is a general term that refers to people being “moved” to do something, people can be moved to action by quite different types of forces. For example, a person can be motivated to act by external compulsion or, alternatively, out of inwardly endorsed motives such as personal interests or values. Much recent work in the field of motivation suggests that the quality and persistence of motivation varies considerably as a function of what type of force is perceived by the actor as giving rise to behavior. When people act with an internal perceived locus of causality (deCharms, 1968; Ryan & Connell, 1989)—that is when people experience their actions as self-determined or autonomous—they will tend to be more invested and to have more positive experiences than when they experience them to be caused by forces outside the self.

Self-determination theory (Deci & Ryan, 1985, 1991) directly addresses the perceived locus of causality issue by contrasting autonomous motivation, which is characterized by a sense of agency or personal causation, with controlled motivation, which involves feeling coerced or pressured to behave in specific ways by inter- or intrapersonal forces. Deci and Ryan argue that intrinsically motivated behaviors are by definition autonomous, which means that they are experienced as emanating from one’s self, whereas extrinsically motivated activities vary in the degree to which they are autonomous versus controlled. To the extent that an extrinsic motivation has been fully integrated and thus is self-endorsed, it assumes an internal perceived locus of causality and is autonomous. On the other hand, to the extent that an extrinsic motivation has not been integrated to the self, it retains an external perceived locus of causality and is controlled.

An interesting case in point is introjection (Ryan & Connell, 1989), which is a regulatory process within the person that is experienced as a pressure or demand. A classic form of introjection is ego-involvement in which a person performs an activity because of a pressure to maintain self-esteem (Nicholls, 1984; Ryan, 1982). A person who completes a task in order to prove his or her intelligence would be ego-involved by this definition. According to self-determination theory, ego-involvement or introjection is a controlled form of behaving and is not likely to enhance subjective vitality.

Types of Motivation and Their Relations to Positive Affects

Within self-determination theory autonomous motivations such as task-involvement have been linked with the positive affects of interest and enjoyment (Deci & Ryan, 1985; Reeve, 1989). In contrast, controlled motivations such as ego-involvement and introjection have been linked with feelings of pressure and tension (Ryan, 1982). In fact, Ryan, Koestner, and Deci (1991) showed in a series of experiments that task-involved versus ego-involved inductions produced different types of persistence: task-involved persistence was accompanied by interest, whereas ego-involved persistence was accompanied by pressure and tension. Similarly, Sansone, Sachau, and Weir (1989) identified two different

“process” factors associated with aroused task engagement. One that they called flow mood corresponds well with our vitality construct, consisting of the adjectives energetic, interested, and excited. The second factor was labeled tense mood, and consisted of the adjectives clutched up, frustrated, and angry. Only the flow factor was positively associated with greater intrinsic enjoyment of the activity. Thus, people who are performing the very same activity may experience quite different levels and types of energy depending on their motivational orientation (e.g., task-involved versus ego-involved).

It follows then that different motivational orientations may have a quite different impact on people’s resultant energy. As mentioned previously, Ryan and Frederick’s (1997) organismic model implied that success at an autonomous activity would be energy maintaining or enhancing relative to success at ego-involving activities because the latter actions involve inner pressure and conflict. Success at an ego-involving activity would, nonetheless, yield a positive affective state, for the person would have achieved a goal and relieved a source of stress. It should therefore result in pleasantness or happiness, but it would not be expected to be restorative or to enhance feelings of vitality.

Thayer’s (1996) theory of moods yields a parallel prediction, suggesting that the tension involved in what we label ego-involvement or, more generally, controlled motivations may be more energy-draining than the nontension state of task involvement. In his terms, task involvement entails calm energy, whereas ego-involvement entails tense energy, so, subsequently, one might expect individuals who succeed at a task when ego-involved to experience less resultant vitality relative to those who succeeded at the activity when task-involved.

To test the hypothesis that being autonomously motivated for a task would lead to greater maintenance or enhancement of vitality but equal levels of happiness relative to being controlled in one’s motivation, we conducted three experiments. In the first, we manipulated the perceived locus of causality for engaging in a cognitive task by contrasting self-direction with other-direction in a laboratory setting. In the second, we manipulated participants’ motivational set by creating conditions conducive to autonomous (task-involved) versus controlled (ego-involved) success. Finally, in a third study we presented participants with vignettes describing circumstances conducive to either an internal or an external perceived locus of causality and then examined participants’ attributions of the vitality and happiness that would result. In all three studies it was our hypothesis that vitality would be better maintained or enhanced under conditions conducive to autonomous motivation, compared to those characterized by control, whereas effects on happiness would not differ in the two motivational conditions.

EXPERIMENT 1

This study focused on whether conditions conducive to an autonomy or an internal perceived locus of causality would enhance feelings of vitality relative to

conditions conducive to an external perceived locus of causality. These two conditions were not expected to differentially affect happiness. To test this we contrasted the effects of self-direction and other-direction as participants worked on the Wisconsin Card Sort (WCS), a cognitive problem-solving task. In the self-directed (SD) condition, participants were allowed to freely work on WCS solutions, each of which required a number of discrete behaviors. In the other-directed (OD) condition, participants were yoked to the previous same-sex subject from the SD condition. Instead of being allowed to freely pursue the problems, each of the yoked participants were directed by the experimenter to carry out, in the same sequence, behaviors that had been performed by the previous SD participant. That is, in the OD condition participants engaged in externally organized behaviors, conducing to an external perceived locus of causality, whereas in the SD condition participants were able to self-organize behavior, conducing toward an internal perceived locus of causality. Both happiness and vitality were measured before and after the activity so within-subject changes could be examined.

Methods

Participants were 93 undergraduates at a private university (52 males, 41 females), recruited from psychology courses and given course credit for participating. Participants reported one at a time for prearranged appointments at the laboratory.

Procedure. Participants were seated at a table and asked to fill out several questionnaires assessing demographics as well as their baseline subjective vitality, perceived choice, and happiness. They were then introduced to one of two experimental conditions in which they were to engage in the Wisconsin Card Sort (WCS; Berg & Grant, 1980). This cognitive task involves sorting a series of cards according to dimensions of color, shape, and number in order to identify a patterned concept. Participants sorted each card into a dimension and then received feedback about the correctness of that sort. Sorting criteria change regularly, making cognitive flexibility a key component of WCS performance. Our interest in the WCS was not, however, in participants' performance. Instead, the task lent itself to the self- and other-directed manipulations, as the sorting activities of participants in the SD condition could be easily translated into external directives for participants in the OD condition. In the SD condition, the experimenter began the card sort and then asked participants to "sort the remainder cards into piles. . . . After each card, I'll tell you if it was sorted correctly." In the OD condition participants were yoked to the previous same-sex subject and were told to:

sort the remaining cards into piles. . . . There is an assigned order to how the cards are placed based on how someone else chose to sort the cards. The task here is to follow my instructions exactly until all the cards have been placed. After each card I'll tell you if it was sorted correctly.

Thus, OD participants performed the same overt actions as their SD counterparts, but they had no opportunity for initiative or self-regulation over either their actions or outcomes.

Measures. Participants' vitality was assessed with the Subjective Vitality Scale (SVS; Ryan & Frederick, 1997), a 7-item survey assessing feelings of aliveness and energy (e.g., "I feel alive and vital") on 9-point Likert-type scales. It can be completed in either state or trait formats, though only the state format was used for this research ($\alpha = .91$ in this sample). The SVS has been extensively validated, showing both high reliability and covariation with both somatic and psychological factors (Ryan & Frederick, 1997). It was measured in the present study both before and after the experimental task. For most analyses we used an SVS change score resulting from the regression of the time 2 (postexperimental) rating onto the time 1 (preexperimental) rating.

Happiness was also assessed both before and after the experimental task. Participants rated four items tapping happiness (pleasant, comfortable, satisfied, and content) on a 9-point scale. The α for this ad hoc scale was .82.

Perceived Choice was assessed with five items ($\alpha = .80$) reflecting subjects' perception of freedom and choice (e.g., "I believe I had some choice about doing this activity"). These items were taken from the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989; Ryan, 1982; Ryan, Mims, & Koestner, 1983) for use herein as a manipulation check.

Results

We first examined gender main effects and interactions on all dependent variables. No significant effects emerged, so the data were collapsed across gender for all subsequent analyses. A one-way ANOVA was performed on the perceived choice measure after averaging item scores. Results revealed the significant effects of the SD versus OD conditions on perceived choice, $F(1, 92) = 9.81, p < .01$, indicating that the manipulation was effective.

The primary hypothesis concerned the effects of condition (SD versus OD) on changes in subjective vitality, relative to changes in happiness. Specifically we predicted that vitality would be differentially influenced by type of motivation, whereas happiness would not. A mixed-design ANOVA was conducted with type of motivation as the between-participant independent variable and type of affect (change in vitality versus change in happiness) as the within-participant factor. The significant interaction, $F(1, 91) = 6.68, p = .01$, indicated that the effects of motivation were indeed different on vitality and happiness, thus supporting our principle hypothesis.

To clarify this effect, we examined T1 to T2 changes in the mean levels of vitality and of happiness for the two motivational conditions. The data indicate that vitality was maintained in the SD condition (T1 = 5.28, T2 = 5.18, mean change = $-.10, SD = .86$), whereas it dropped markedly in the OD condition (T1 = 4.66, T2 = 4.21, mean change = $-.48, SD = .88$). A *t* test indicated a significant difference in the mean changes for the SD versus OD conditions

[$t(91) = 2.08, p < .05$]. However, happiness did not change in either the SD ($T1 = 2.82, T2 = 2.83, \text{mean change} = -.01, SD = .52$) or the OD ($T1 = 2.61, T2 = 2.64, \text{mean change} = -.03, SD = .51$) condition. Thus, the hypothesis that conditions conducive to an internal versus an external perceived locus of causality would lead to differences in subjective vitality, but not happiness, was supported.

EXPERIMENT 2

In this study we manipulated perceived locus of causality by creating ego-involved versus task-involved conditions. When ego-involved, one performs in order to meet an evaluative pressure with self-esteem implications (deCharms, 1968; Ryan, 1982), whereas when task-involved one is focused on the properties of the task per se and is typically intrinsically motivated.

Whereas in the previous study, we assessed both pre- and postexperimental affect with a standard self-report questionnaire, in this study we used a disguised measure of affect (DMA) for the premeasure. This was done to prevent the possibility that the premeasure would sensitize participants to the affects of interest in the research and thus bias the responses. That is, we used the DMA so participants would not know what was being assessed and thus could not respond to the postmeasure on the basis of their implicit theorizing about the study. Finally, in this study we drew on the work of Thayer to use an adjective checklist method of assessing vitality rather than using the Ryan and Frederick measure. The intent of these modifications was to test the cross-method generalizability of our findings.

Methods

Participants. Sixty-four undergraduates (30 male and 34 female) were recruited as in Experiment 1. They reported individually for a self-scheduled experimental session.

Procedure. Participants were placed before a personal computer, which administered the entire experiment. Because the computer randomly assigned participants to condition, the experimenter remained naive to condition. The computer informed participants that the purpose of the study was to examine how subliminal perception related to the perception of hidden words. This was done because the Disguised Measure of Affect (described below) was portrayed as a subliminal perception task. Participants then completed the premeasure of affect using the DMA and received the motivation manipulations before being instructed (again by the computer) to turn to hard copies of the sample and practice puzzles, which were available in well-labeled folders within the participants' work space. The puzzles were drawings by Al Hirschfeld in which the word "NINA" was hidden several times. These puzzles have been used in a number of prior experiments on motivation (e.g., Harackiewicz, 1979; Ryan, 1982).

Participants in the task-involving condition were told that these tasks are cartoon-style puzzles, and they were given information about the artist and the

drawings. They were told to find as many NINAs as they could, without any emphasis being put on performance pressure or evaluation. The ego-involving manipulation, similar to ones used in past studies (e.g., Plant & Ryan, 1985; Ryan, 1982), involved telling participants that these puzzles are increasingly being used as measures of intelligence, for example by the Air Force to screen pilots and on several new intelligence tests for children, as they involve "perceptual organization" abilities. The computer then guided participants through a practice trial. Positive feedback was given to all participants on the practice trial, and they were informed that they would be completing several more trials like the one just completed. A four-item manipulation check questionnaire, asking about the extent to which they felt free versus compelled, was given to assess the effectiveness of the motivation induction. Participants then worked on three puzzles and received feedback that reinforced both perceptions of success and the motivational inductions (e.g., "You're really doing great" in task-involvement and "You've really got what it takes" in ego-involvement). Participants then completed the primary dependent variables, which were self-reports of vitality and happiness. Finally, participants were assessed for suspicion and thoroughly debriefed.

The Disguised Measure of Affect (DMA; Hass, Katz, Rizzo, Bailey, & Moore, 1992; Nix, 1997) is a computer-administered measure designed to assess affect while keeping participants unaware of the true purpose of the procedure. An extensive cover story involves testing subliminal perception, and a misattribution technique is used to distract participants from the true purpose of the procedure. Participants are told that a subliminally presented message will influence how they are feeling. The computer flashes (below perceptual threshold) a nonsense syllable on screen, which participants think is a subliminal message. It then asks them to rate themselves on either a distractor term (e.g., dizzy) or an affect adjective. Measure-development studies indicate that DMA-obtained scores are highly correlated with and have similar internal reliabilities with scores obtained from questionnaires. The DMA is seen as a technique for obtaining self-reports of current affect; the content of the items varies as a function of the needs of the experiment. In this study, the focus was on vitality (three items; $\alpha = .60$) and happiness (two items; $\alpha = .71$).

The postexperimental measure of affect was obtained by having participants rate the extent to which they were currently experiencing 35 affect adjectives on 9-point scales, anchored by "Not at all" and "Extremely." Order of presentation of the items was randomized. Five items measured vitality (active, energetic, lively, vigorous, vital; $\alpha = .85$) and four happiness (happy, content, pleased, satisfied; $\alpha = .86$). The happiness items were the same as those in Experiment 1 except for the replacement of the item "pleasant" with "happy." Items for vitality were taken from Thayer's (1996) calm-energy construct, except that his item "full-of-pep" was replaced with the item "vital," as the definition of "pep" was questioned by several pilot participants.

Results and Discussion

We first examined gender differences and interactions. As none were in evidence, subsequent analyses collapse across gender. The effectiveness of the manipulation was tested by averaging responses to the four manipulation check questions. A one-way ANOVA indicated that participants in the task condition experienced more self-determined and less controlled motivation than those in the ego condition, $F(1, 62) = 4.50, p < .05$.

As in Experiment 1, the primary hypothesis was that vitality and happiness would be differentially influenced by type of motivation. To test this we applied the mixed-design ANOVA procedure with type of motivation as the between-participant independent variable and type of affect (change in vitality versus change in happiness) as the within-participant factor. The significant interaction, $F(1, 62) = 6.60, p = .01$, indicated that the effects of motivation were indeed different on vitality and happiness.

As a follow-up analysis, we examined changes in levels of vitality and happiness in the two motivational conditions. Analyses showed a greater rise in vitality in task-involvement ($T1 = 3.57, T2 = 5.08$; mean change = 1.51, $SD = 1.49$) than in ego-involvement ($T1 = 4.42, T2 = 5.06$; mean change = 0.65, $SD = 1.53$); $t(62) = 2.28, p < .05$. In contrast, levels of happiness were raised to the same extent in both task-involvement ($T1 = 4.96, T2 = 5.50$; mean change = .54, $SD = 1.62$) and ego-involvement ($T1 = 5.00, T2 = 5.83$, mean change = .83, $SD = 1.89$); $t(62) = 0.65, ns$.

The results of this study are consistent with those of Experiment 1 regarding the differential patterns of effects stemming from more controlled versus autonomous motivations, despite using a different manipulation of PLOC, a different task, a different dependent measure of vitality, and a disguised premeasure of affect. The findings revealed that under success conditions, autonomous motivation led to a greater enhancement of vitality relative to controlled motivation. In contrast, happiness was not differentially affected by the task-versus-ego manipulation.

EXPERIMENT 3

Experiment 3 explored whether people have a sufficient understanding of the differential impact of motivational processes on vitality and happiness such that when asked to imagine themselves under autonomous versus controlled conditions they would make attributions of vitality and happiness that parallel the patterns of effects we observed in Experiments 1 and 2.

Participants read a vignette that either asked them to imagine taking a course for autonomous reasons or asked them to think about taking it for controlled reasons. They were further asked to imagine that they got an "A" on an exam in the imagined class and they then rated how they would feel. It was hypothesized that students who imagined being autonomously motivated to take a course would report that they would experience more vitality after success than those imagining a required course. No differences for happiness were expected across these

conditions. Differences in attributed affects would indicate that the distinction between vitality and happiness is phenomenally salient for individuals.

Methods

Participants were 141 college students (86 females, 55 males). Some were recruited using the same procedure as in Experiments 1 and 2, and others were recruited through public solicitation of students on campus. All participants completed the surveys in small group administrations.

The experimenter explained that the purpose of the study was to examine people's reactions to success. After signing a consent form, participants were handed a packet of forms. The forms contained directions so the experimenter would not have to play any further role in administering the study and could thus remain naive to each participant's experimental condition.

Before reading their vignette, participants were asked to clear their minds and relax for a few moments. Then they were asked to read one of two instructional sets. Participants in the autonomous condition read the following induction:

Imagine that you are enrolled in a class that is not required for your major but which you have always wanted to attend. The subject has always intrigued you, but you have never had a chance to investigate it. Although the course is not required, you find the material challenging and want to do well at it. You realized when you signed up for the course that the material would be entirely new to you, but this was the only chance you would get for the next several semesters to take this course and you really wanted to give it a try now. In short, you are taking this course only because you are interested in learning and you find the material intriguing.

Participants in the controlled condition read:

Imagine that you have enrolled in a class that is required for your major but which you don't want to attend. The subject does not interest you and you see no use for the material being taught. However, because the course is required for your major, you must do well at it. You realized when you signed up for the course that the material would be entirely new to you, but this was the only chance you would get for the next several semesters to take this course and you really need to take it now. In short, you are taking this course only because you have to and you feel a lot of pressure to do well.

All participants were then asked to imagine that although the material was difficult, they scored 47 of 50 on a midterm exam, doing better than 92% of their classmates. They were instructed to image successfully meeting the challenge, grasping complex concepts, getting a handle on the material, and feeling successful. Participants were then asked to close their eyes and make the scene as real and vivid as possible.

A five-item manipulation check assessed motivation (e.g., "I took this course because I had to take it") using a 7-point Likert scale. Participants were also given a list of trait adjectives and asked to check all the words that would describe their experience following receipt of the "A" on their midterm. Adjectives were in

alphabetical order and included the items for happiness and vitality used in the previous study. Other items were culled from existing scales, previous research, and a thesaurus. The number of items checked across the five target vitality items and across the four target happiness items were used as the vitality and happiness scores, respectively.

Results and Discussion

A preliminary check was made to examine gender main effects and interactions. None appeared, so subsequent analyses collapsed across gender.

The effectiveness of the vignettes to induce motivational orientations was assessed by averaging responses concerning feelings of autonomy with respect to taking the course. The ANOVA results indicated that participants in the nonrequired condition experienced more autonomy than those in the required condition, $F(1, 139) = 43.2, p < .001$, suggesting that participants read the vignettes and understood the imagined conditions.

To test the primary hypothesis that there would be differential effects for motivational conditions on imagined vitality but not on imagined happiness, a 2×2 mixed-design ANOVA was conducted with type of motivation (nonrequired versus required) as the between-participant factor and type of affect (vitality versus happiness) as the within-participant factor. The significant interaction, $F(1, 139) = 4.26, p < .05$, indicated that the pattern of results across motivational conditions was different for vitality and happiness, as predicted. Follow-up t tests revealed that participants in the nonrequired condition (mean = 2.30, $SD = 1.45$) checked marginally more adjectives indicating vitality than those in the required condition (mean = 1.85, $SD = 1.54$), $t(139) = 1.81, p = .07$. Regarding happiness, there was no difference between the nonrequired (mean = 2.81, $SD = 1.26$) and required (mean = 2.85, $SD = 1.08$) conditions, $t(139) = 0.57, ns$.

GENERAL DISCUSSION

In three studies we tested the hypothesis that conditions designed to foster an internal perceived locus of causality would result in greater maintenance or enhancement of subjective vitality relative to conditions conducive to an external perceived locus of causality, whereas these contrasting motivational sets would not have a differential effect on the positive affect of happiness. All three studies, which tested the hypothesis in different ways, provided support.

In Experiment 1 we tested whether self-directed versus other-directed activities would result in different levels of vitality but not different happiness using the Ryan and Frederick (1997) measure of subjective vitality and an ad hoc measure of happiness. Results supported the hypothesis, with self-directed participants showing maintained vitality, whereas other-directed participants showed a loss of subjective energy. No differential pattern emerged for happiness.

Experiment 2 used a different measure of vitality adapted from Thayer (1996), different motivation inductions (viz., a task-involvement versus ego-involvement manipulation), and a more interesting hidden-figures task. Further, we used a

disguised premeasure of affect to guard against sensitizing participants to the target variables. It was found that the task-involved condition, conducive to an internal perceived locus of causality, led to a greater enhancement of vitality relative to an ego-involved condition, conducive to a more external perceived locus of causality. Again, happiness was not differentially affected by these inductions. This discriminant finding supports our reasoning concerning the motivational dynamics of subjective energy.

Experiment 3 extended the results of Experiments 1 and 2 by examining the same differential hypothesis using an attributional method. Here, rather than directly manipulating motivation, we asked participants to imagine one of two motivational circumstances. Both scenarios involved an imagined success at an exam in a course that was taken either out of interest (an internal perceived locus of causality) or as a requirement (an external perceived locus of causality). Replicating the pattern of findings from the first two experiments, when participants imagined attaining the desired outcome of an excellent exam grade, they attributed different levels of vitality but not different levels of happiness as a function of their reasons for taking the course.

These results therefore suggest that engaging in an autonomous, or truly self-regulated, activity can help maintain or enhance subjective vitality relative to engaging in more controlled activity, a finding important to those concerned with fostering feelings of energy and well-being. It is our view that the dynamics of energy revealed by these experimental results are commonly observed in daily life. For example, Rovniak, Blanchard, and Koestner (1998) recently assessed people's reasons for exercising as they were entering a fitness center for a workout. They included in their assessment introjected or ego-involved reasons for exercising, as well as more autonomous reasons related to the personal value of exercise. Results indicated that those with more autonomous reasons felt more refreshed and revitalized postworkout, whereas those with more introjected reasons did not. Similarly, V. Kasser and Ryan (in press) showed relations between perceived autonomy among nursing home residents and greater ongoing subjective vitality.

It is of course the case that many factors besides autonomy can affect subjective vitality. Other psychological variables that we suggest may might engender vitality include feelings of love and intimacy (Reis et al., in press), contact with nature (Kaplan & Kaplan, 1989), and feelings of competence (Sheldon et al., 1997), and we have begun to examine how these factors may yield their restorative effects. Regarding competence, we specifically believe that negative feedback or failure experiences will detract from subjective vitality, though the present studies do not address that hypothesis. In addition, we believe that somatic factors also bear on subjective vitality, with factors such as illness (Ryan & Frederick, 1997) and diurnal fatigue (Thayer, 1987) diminishing it. Thus, although the current research focuses on how autonomously regulated activities affects people's sense of aliveness and energy, continuing research will undoubt-

edly identify additional factors of diverse sorts that could enhance versus diminish vitality.

Another important implication of the current research is that indices of well-being and satisfaction may themselves be differentially reactive to different kinds of circumstances. A specific distinction that is receiving increasing attention in the well-being literature is between happiness and eudaimonia. Whereas happiness is often defined by the mere satisfaction of desires, eudaimonia refers to the satisfaction that results from self-realization (Waterman, 1993; Ryff, 1995). As Ryan and Frederick (1997) argued, vitality appears to be a central indicant of eudaimonia, whereas the positive affect of happiness, which can result from attaining a goal or getting what one wants (Argyle, 1987), does not require pursuing goals that are conducive to growth or self-realization and does not require being autonomous in pursuing one's goals. The current research may be another basis by which researchers can begin to differentiate between different "positive" outcomes and their connections with growth, health, and well-being.

Despite confirming the differential connections between motivation and the states of vitality and happiness, the present research had several limitations that warrant consideration. First, the participants were college students, whose responses may not be generalizable to other age or cultural subgroups. A second concern is that our dependent variables were self-report based. Although our differential predictions help guard against a simple positivity bias explanation for the results, it will be important in future studies to tie indices of both happiness and vitality to observable variables such as facial expressions or behavioral manifestations. Finally, there are still other ways the perceived locus of causality variable could be experimentally manipulated that remain worthy of exploration.

An unexplored issue concerns the relations of the emotions of interest and enjoyment to our target variables of vitality and happiness. Interest and enjoyment are both emotions that have been said to characterize intrinsic motivation (Deci & Ryan, 1985). However, as Ryan et al. (1991) and others have argued, enjoyment is not unique to intrinsic motivation, as it can accompany positive outcomes of many kinds, including success at extrinsically motivated behaviors. Relatedly, Reeve (1989) has shown in experimental work that, whereas interest corresponds to active, collative motivation, enjoyment seems to be heightened mainly by positive performance outcomes. It may be that interest dynamics will parallel those for vitality, and enjoyment those for happiness. However, these differential affects were not directly treated in the current studies.

In sum, we examined how variations in autonomy versus control differentially influenced the positive affects of happiness and vitality. The research points toward the restorative vitalizing potential of self-regulated action, relative to the potential for drained or diminished vitality when one's activity is controlled. Although we are still far from an understanding of the dynamics of energy within modern psychology, the burgeoning interest in factors affecting subjective vitality and the energetic resources of the self may be an important contributor to that understanding.

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