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"Thinking Positive" as a Stress Buffer: The Role of Positive Automatic Cognitions in Depression and Happiness

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To explore whether positive automatic thoughts (PATs) may function as stress buffers and mood enhancers, this study tested whether PATs and the PATs × Negative Events interaction predicted unique variance in future depression and happiness. The Life Experiences Survey, the Beck Depression Inventory, the Happiness Measures, the Hassles Scale, and both state and trait versions of the Automatic Thoughts Questionnaire and the Automatic Thoughts Questionnaire—Positive were administered to 152 undergraduate volunteers twice, with 6 weeks between testings. PATs predicted happiness, and PATs about social self-worth interacted with negative events to predict depression. For higher levels of such PATs, negative events had a weaker relation to depression.

The popular literature is replete with examples of the merits of "positive thinking," which has been touted as a means of achieving not only happiness but also health and success (Peale, 1956). Such efficacy would be cause for cheer: Who would not endeavor to think positively? Unfortunately, empirical evidence for the potency of positive thinking is scant.

In contrast, both theoretical and empirical writings have focused on negative forms of cognition. In the cognitive theory of depression (Beck, 1967; Beck, Rush, Shaw, & Emery, 1979), for example, underlying negative attitudes are proposed to confer vulnerability to depression. Once such beliefs are activated by schema-congruent negative life events (–events), statelike negative automatic thoughts (NATs) and depression ensue. For instance, a person with the schema "My worth as a person depends on perfect achievement in my work" may, upon losing a job, be tormented by NATs such as "I'm a worthless person" and become depressed.

Recent evidence suggests, however, that NATs may function not as proximate epiphenomena but as distal vulnerability factors. Stiles and Götestam (1989) found that NATs about self and future interacted with depression mood induction (which may be construed as a laboratory analogue of a –event) and that this interaction predicted subsequent depression. NATs about self and future also directly predicted depression (Stiles & Götestam, 1989). In a longitudinal study, Olioff, Bryson, and Wadden (1989) found that general NATs uniquely predicted future depression. Results of such studies indicate that NATs may foster susceptibility to depression.

Positive Thoughts as Stress Buffers

Is it possible that positive automatic thoughts (PATs) may similarly protect against depression? Such a finding could have considerable clinical significance. Cognitive therapies tend to focus on elimination of negative cognitions and on replacing maladaptive beliefs with adaptive beliefs (e.g., Beck et al., 1979); there is little focus on PATs per se. If PATs are found to uniquely buffer the effects of stress, straightforward training in generation of PATs could help to confer resilience.

There is, indeed, mounting evidence that positive schemata may be linked to psychological health and to absence of depression. In his early writings, Beck (1967) suggested that positive schemata or attitudes "form the basis for a healthy personality adjustment" (p. 276). When self-enhancing attitudes such as "I am capable" are activated, the person regards himself or herself more favorably (Beck, 1967). This argument suggests that positive schemata parallel negative schemata in form and, like negative schemata, may be activated by life stresses. Activated negative schemata are theorized to exacerbate the effects of stress and thereby to foster depression; likewise, activated positive or self-enhancing schemata may be theorized to buffer the effects of stress and thereby to confer resistance to depression. In fact, the prophylactic effects of cognitive therapy may be explained partly by enduring changes in schemata (DeRubeis & Beck, 1988), and recovery from depression may be based on progress from a negative cognitive set to a positive cognitive set (Beck, 1985).

Empirical evidence supports the existence of positive schemata. Nondepressed persons appear to have a self-enhancing bias that enables them to perceive themselves more positively than others perceive them (Lewinsohn, Mischel, Chaplin, & Barton, 1980) and to overestimate probability of success (Alloy & Ahrens, 1987). In contrast,

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depressed persons are more realistic in their self-appraisals (Alloy & Ahrens, 1987; Lewinsohn et al., 1980). In light of such findings, it has been suggested (Taylor & Brown, 1988 [cited in Dobson & Franche, 1989]) that a self-enhancing bias may be necessary for positive mental health.

The ability to "think positive" may foster such enhanced self-perceptions. PATs are known to have an inverse relation to depression (Ingram, Atkinson, Slater, Saccuzzo, & Garfin, 1990; Missel & Sommer, 1983) and to other psychological problems such as social anxiety (Heimberg, Acerra, & Holstein, 1985). Furthermore, functional persons, in comparison with dysfunctional persons, are characterized by a greater PATs/NATs ratio or a greater PATs/NATs + PATs ratio (Heimberg, Bruch, Hope, & Dombeck, 1990; Missel & Sommer, 1983; Schwartz, 1986; Schwartz & Garamoni, 1989). Ingram and Wisnicki (1988), on finding that PATs were inversely related to depression and to level of depression, hypothesized that ability to generate PATs in the presence of stress may protect persons from depression. This contention is tantamount to a "buffer hypothesis," a logical corollary of the "vulnerability hypothesis" of the cognitive theory of depression.

In the sole study of this buffer hypothesis, Lightsey (in press) found that, indeed, the PATs × –Event interaction predicted unique variance in concurrent depression. For more frequent PATs, –events had a weaker relation to depression. However, the cross-sectional design of Lightsey's study was not sufficient to test the essentially longitudinal buffer hypothesis, which, like the vulnerability hypothesis (Beck, 1967), requires assessment of whether pre-existing PATs interact with subsequent –events to predict future depression. One major purpose of this study, then, was to examine the hypothesis that PATs and the PATs × –Event interaction predict future depression. Although rudimentary, these theoretically grounded hypotheses parallel hypotheses regarding vulnerability to depression (e.g., Deal & Williams, 1988; Michael & Funabiki, 1985; Wise & Barnes, 1986) and are potentially fruitful at this early stage of research on PATs.

A second major aim of this study was to explore the role of specific subtypes of PATs in prediction of depression. The cognitive profile of depression, in contrast to the cognitive profile of other disorders, is characterized by negative views of self, world, and future (Beck & Weishaar, 1989); NATs about self (Lewinsohn, Larson, & Munoz, 1982; Pietromonaco & Markus, 1985; Ross, Mueller, & De La Torre, 1986) or NATs about self and future (Beck, Kovacs, & Weissman, 1975 [cited in Stiles & Götestam, 1989]) appear particularly important in depression; and nondepressed persons exhibit enhanced perceptions of self (Lewinsohn et al., 1980). For these three reasons, PATs about the self and future were hypothesized to be the most powerful predictors of depression.

As Beck has repeatedly averred, however, "cognitions do not 'cause' depression or any other psychopathological disorder" (Beck & Weishaar, 1989, p. 22); nor, in this study, are PATs or PATs × –Events interactions proffered as "*causing*" *absence of depression*. Reciprocal causal pathways may exist, both between person and environment (Bandura, 1977) and between person variables such as cognition and affect. For instance, there is evidence not only that cognition influences affect but that affect influences cognition (e.g., Bower, 1981; Krantz & Gallagher-Thompson, 1990; Madigan & Bollenbach, 1986). Although delineating such reciprocal pathways is far beyond the scope of this article, several alternative hypotheses that represented competing explanations for findings were also tested, as described in the Hypotheses section.

A final purpose of this investigation was formulated in light of evidence that study of positive affect may be at least as important as study of negative affect for the understanding of daily mood variation (e.g., Clark & Watson, 1988). Absence of depression does not necessarily correspond to psychological well-being, and studies that focus only on negative mood states may not shed light on the nature and correlates of positive functioning. For example, study of PATs and depression may have implications only for reduction of depression. In contrast, if PATs are found to uniquely predict future happiness, a clinical focus on PATs may be advisable for unhappy clients across diagnostic categories. In view of the strong evidence that positive dispositions such as optimism predict future well-being (Scheier & Carver, 1992; Scheier et al., 1989), an examination of the possibility that PATs predict happiness clearly is warranted. Therefore, hypotheses regarding PATs and PATs × Event interactions in prediction of future happiness were also examined.

Hypotheses

In light of the foregoing discussion, the following hypotheses were proposed with regard to prediction of future depression: (a) PATs account for significant incremental variance above the variance accounted for by prior depression, –events, and NATs; and (b) the PATs × –Events interaction accounts for significant incremental variance above all main effects in such a way that for greater frequency of pre-existing PATs, –events have a weaker association with depression.

In regard to prediction of future happiness, the following hypotheses were advanced: (c) PATs account for significant incremental variance above the variance accounted for by prior happiness, positive life events (+events), –events, and NATs; (d) the PATs × +Events interaction accounts for significant incremental variance above all main effects in such a way that for greater frequency of pre-existing PATs, +events have a stronger association with happiness; and (e) the PATs × –Events interaction accounts for significant incremental variance in such a way that for greater frequency of PATs, –events have a weaker association with happiness. In addition, it is hypothesized that (f) both PATs about the self and future and related interactions with –events and (in regressions with the Happiness Measures, HM, score as the dependent variable) +events account for significant incremental variance in future depression and happiness, above the variance accounted for by other PAT subtypes. Evidence has indicated that –events but not

+events pertain to negative affective states, whereas –events and +events pertain to positive affective states and satisfaction (Headey & Wearing, 1989). Therefore, tests of hypotheses involving depression included only –event ratings, whereas tests of hypotheses involving happiness included both –event and +event ratings.

Hierarchical multiple regression analysis was used in tests of hypotheses. As Cohen and Cohen (1983) pointed out, "even without a fully specified model, the hierarchical procedure is useful for extracting as much causal inference as the data allow" (Cohen & Cohen, 1983, p. 121). In regressions with Time 2 depression as the dependent variable, Time 1 depression was entered first. The test of the R^2 increment associated with subsequent predictors such as PATs thereby reflected their unique contribution to prediction of future depression, with confounding variance of earlier depression removed. Any response set associated with instrument intercorrelations was also nullified by entry of correlated independent variables earlier in regressions. Similarly, Time 1 happiness was entered first when Time 2 happiness was regressed on other variables. This procedure provided a stringent test of PATs as stress buffers. In each regression, the ratio of subjects to predictors was sufficiently high to warrant generalizability of findings to similar populations. Results probably would have been similar had analyses been conducted with a larger sample from the same population.

The ability of PATs to predict –event ratings and the ability of –events to predict PATs were also tested. If PATs and depression do not uniquely predict –event ratings and if –events fail to predict PATs, this provides evidence that person variables may not influence –event ratings and –events may not influence level of PATs. Because no gender differences were found in an earlier study of PATs and depression (Lightsey, in press), no gender-based hypotheses were made. In light of recent recommendations that analyses be conducted separately for male and female subjects, however (Handal, Gist, & Wiener, 1987), additional separate analyses were conducted for men and women.

Method

Participants

Eighty-five male and 83 female undergraduate volunteers from introductory psychology courses participated in the study. Data from 16 subjects were excluded from analyses because of invalid instrument protocols or failure of subjects to attend the second testing session. Analyses were therefore conducted on data from 152 subjects.

The mean age of the sample at Time 1 was 19.65 (SD = 1.35). One hundred six participants reported being White, 19 were Black, 14 were Asian, 3 were Asian-Indian, and 10 were Hispanic or "White/Hispanic." One hundred seventeen participants reported the United States as country of origin. No other country was listed by more than 4 persons (mode = 1).

Instruments

Beck Depression Inventory (BDI; Beck et al., 1979). The 21-item BDI assesses syndrome depression. BDI items are scored from 0 to 3; 3 signifies more depression. Item ratings are summed to produce a score that ranges from 0 to 63. Mean alpha coefficient across nine studies was .86, and test–retest reliability estimates of .90 and .62 have been reported over 2 weeks and 4 months, respectively, with undergraduates (Beck, Steer, & Garbin, 1988). A mean correlation of .60 with clinical ratings of depression in nonpsychiatric subjects has been reported (Beck et al., 1988). The BDI has been found reliable and valid as a measure of depression in college students (Bumberry, Oliver, & McClure, 1978). Mean BDI scores of 5.7 for male subjects and 6.3 for female subjects (Barnett & Gotlib, 1990) and of 9.44 (Lightsey, in press) for undergraduates have been reported.

Automatic Thoughts Questionnaire—Positive (ATQP; Ingram & Wisnicki, 1988). The ATQP, a 30-item self-report instrument, measures PATs. Items consist of statements that represent PATs; respondents rate frequency of PATs on a 5-point Likert scale ranging from 1 *(Not at all)* to 5 *(All the time).* Item ratings are summed to produce a total score.

Item–total correlations of the ATQP ranged from .42 to .75. Coefficient alpha was found to be .94, and split-half reliability was .95. Mean scores for depressed, mildly depressed, and nondepressed subjects were reported as 83.08 (SD = 15.78), 95.96 (SD = 18.63), and 107.15 (SD = 18.55), respectively (Ingram & Wisnicki, 1988). Factorial analysis of the ATQP revealed four primary factors: Factor 1 was Positive Daily Functioning, Factor 2 was Positive Self-Evaluation, Factor 3 was Others' Evaluations of the Self, and Factor 4 was Positive Future Expectations. Factor 1 items such as "I am a lucky person," "Life is exciting," and "My life keeps getting better" seem to reflect general buoyancy or enthusiasm. Factor 2 items such as "I have many good qualities" and "I am happy with the way I look" appear to reflect a positive self-image. Factor 3 items include "I have a good sense of humor" and "I'm fun to be with"; such items appear to tap a sense of social self-worth or a belief in one's ability to successfully interact with others. Factor 4 consists of the two items "My future looks bright" and "I will be successful," which reflect optimism about the future.

Because a schema should exhibit stability over time (Haaga, Dyck, & Ernst, 1991) and because the time frame of "the last week" used in the ATQP may not be adequate for measuring stable or traitlike thoughts, the original ATQP may be insufficient for testing the ability of PATs to act as stress buffers. Constructs may be reliably measured as states or traits by altering the instructions of self-report instruments (Watson, Clark, & Tellegen, 1988; Zuckerman, 1960, 1983). Therefore, in order to fully test the ability of PATs to act as stress buffers, traitlike PATs were assessed by replacing the time frame "over the last week" in ATQP instructions with the time frame "in general, that is, on average." Following the procedure of Ingram and Wisnicki (1988), ATQP items were randomly combined with Automatic Thoughts Questionnaire (ATQ) items for administration.

Automatic Thoughts Questionnaire (Hollon & Kendall, 1980). Because it was of interest to ascertain whether PATs uniquely predict depression over NATs, the ATQ was administered. The ATQ, a 30-item self-report measure, assesses frequency of NATs associated with depression (Hollon & Kendall, 1980). Items are scored on a 5-point Likert scale from 1 to 5, on which 5 indicates greater frequency of thoughts; item scores are added to produce a total score. Representative items include "I'm no good" and "I'm a loser." Split-half reliability was found to be .97, and alpha coefficient was .96 (Hollon & Kendall, 1980). Dobson and Shaw

(1986) reported mean scores of 94.6 (SD = 23.1) for depressed subjects and 38.4 (SD = 8.5) for normal control subjects; Hollon, Kendall, and Lumry (1986) reported a mean of 85.00 (SD = 23.62) for depressed subjects and 45.12 (SD = 11.02) for normal controls. As with the ATQP, instructions of the ATQ were amended so as to tap trait thoughts.

Life Experiences Survey (LES; Sarason, Johnson, & Siegel, 1978). The 57-item LES assesses degree of perceived positive and negative stress. Forty-seven LES items represent general events, 10 items deal with academic stresses, and three blank spaces are provided for respondents to write in unique events. Each LES item constitutes an event; the respondent is asked to rate the degree of impact of events that he or she has experienced in the past year. Impact ratings are made on a 7-point scale that ranges from *extremely negative* (−3) to *extremely positive* impact (3). A negative stress score is derived by adding negative item ratings, and a positive stress score is derived by adding positive item ratings. The authors of the LES (Sarason et al., 1978) considered the instrument germane for a student population. Some general LES items (e.g., "trouble with employer," "change of residence," "breaking up with boyfriend/girlfriend") and all items of the student section (e.g., "academic probation" and "failing an important exam") clearly are pertinent to students.

The following data are based on studies of the LES with undergraduates. Test–retest reliability estimates over 5–6 weeks were found to be .19 and .53 for positive stress and .56 and .88 for negative stress (Sarason et al., 1978). As the authors pointed out, intervening events would have lowered reliability estimates. Because perceived stress and stressful events are expected to vary across time, high test–retest coefficients would not necessarily be expected. Mean negative change scores for male and female college students were 6.22 (SD = 6.28) and 7.04 (SD = 7.90) within a 1-year time frame. Score ranges of 0–36 for male subjects and 0–22 for female subjects within a 1-month time frame were reported (Barnett & Gotlib, 1990).

The negative stress score was found to correlate .46 ($p < .001$) with state anxiety and .29 ($p < .01$) with trait anxiety; positive stress was not correlated with anxiety (Sarason et al., 1978). The negative stress score was correlated .64 ($p < .001$; Lightsey, in press) and .42 ($p < .001$; Barnett & Gotlib, 1990) with BDI score and predicted future BDI score over the predictive ability of prior depression (Barnett & Gotlib, 1990). For Time 2 administration of this study, instructions of the LES were amended to read "Please circle those events which you have experienced in the past six weeks." Studies have shown that "the single most salient component to defining the stressful impact of an event appears to be the perception of the event as aversive by the person" (McGrath & Burkhart, 1983). Because severity ratings, as opposed to frequency counts of events, capture the meaning and salience of events (Lazarus, DeLongis, Folkman, & Gruen, 1985) and because severity ratings are used in many studies (Barnett & Gotlib, 1990), severity ratings were used in this study as well.

Hassles Scale (HS; Kanner, Coyne, Schaefer, & Lazarus, 1981). In order to lend greater credence to results, and as a precaution lest there be insufficient variance in LES scores over the 6-week time span used in this study, the HS was also administered. The 117-item HS assesses the impact of "irritating, frustrating, distressing demands that to some degree characterize everyday transactions with the environment" (Kanner et al., 1981, p. 3). Representative HS items include "Problems getting along with fellow workers" and "Too many things to do." Respondents rate each event experienced in the past month on a 3-point Likert scale ranging from *somewhat severe* (1) to *extremely severe* (3). The summed, or cumulated, severity score was used in this study.

An average 1-month test–retest correlation of .79 was reported for the frequency score. The mean frequency score over 9 months was significantly correlated with mean scores on measures of negative affect (r = .34), life events (significant among women only; r = .36), and psychological symptoms (r = .60). In addition, in multiple regressions, HS frequency score was superior to the score on a life events measure in prediction of concurrent Hopkins Symptom Checklist score (Kanner et al., 1981). A correlation of .95 between frequency score and severity scores suggests that these data may be relevant to severity scores. In the present study at Time 2, respondents were instructed to circle events that had occurred "in the past six weeks" rather than "in the past month."

Happiness Measures (Fordyce, 1972 [cited in Fordyce, 1988]). The HM, a self-report measure of emotional well-being, consists of two items: a measure of happiness, rated on an 11-point Likert scale from 0 *(extremely unhappy)* to 10 *(extremely happy),* and an estimate of the percentages of time spent happy, unhappy, and neutral. According to Fordyce (1988), the HM provides the widest range of response and variance of any established well-being scale. Diener (1984) cited evidence that the HM, in comparison with other measures of well-being, has the strongest correlations with daily affect and life satisfaction. Test–retest coefficients of the HM range from .98 over 2 days to .86 or .88 over 2 weeks to .81 over 1 month (Fordyce, 1972 [cited in Fordyce, 1988]). Because of its stronger reliability and validity, the combination score ([scale score × 10, + happy time percentage]/2) was used in this study.

Procedure

Subjects were recruited by posted sign-up sheets. Volunteers were informed that the purpose of the study was to "explore the relationships between mood and other variables." Volunteers participated in two testing sessions approximately 6 weeks apart, held late in the semester in order to maximize occurrence of stress. A follow-up session, held 3 months after the second session, was also scheduled.

Because randomization of instrument orders increases random error or variance (W. D. Schafer, personal communication, October 31, 1990), two orders of instruments were used; this enabled empirical assessment of order effects. Half of the subjects assigned a particular instrument order during Testing 1 received the same order at Testing 2; the other half received the other order. Thus there were four possible orders over the first two testing sessions. Approximately half of the male subjects and half of the female subjects in the sample received each order. Additional instruments pertaining to another study were administered in a randomized manner after instruments involved in this study. Because the HM was central to hypothesis tests of both studies, however, and because of other logistical constraints, the HM was administered after other instruments reported in this study, in a randomized manner with other instruments.

At the beginning of each testing session, subjects received a test packet containing a consent form, a demographic questionnaire, instruments for this study, and measures for another study. General directions were read aloud to participants, who were then instructed to read written instructions for each instrument carefully. At the end of the second testing session, subjects were given a form describing campus mental health services and a credit slip for meeting research participation requirements.

Beginning 2 weeks before the follow-up, subjects were reminded by phone calls or letters about this session and were notified that they would receive theater passes and refreshments for participation. Participants in the third testing session received the said inducements and were provided with a written description

of the study. However, because only 14 persons participated in the follow-up, these data were not used in analyses. All protocols were then perused by the experimenter for proper completion. Subsequently, data were entered from test protocols by professional data entry personnel.

Results

Preliminary Analyses

Internal consistency estimates for the Time 1 trait forms of the Automatic Thoughts Questionnaire—Positive and Automatic Thoughts Questionnaire were .94 and .95, respectively. These estimates are comparable with the .95 coefficient alpha of both original instruments. Mean interitem correlations of trait ATQP and ATQ were .33 and .38, in comparison with .40 and .39 of the original ATQP and ATQ. Test–retest correlations for trait versions of the ATQP and ATQ were .65 and .64, respectively, whereas test–retest correlations of the original ATQ and ATQP were .55. State and trait versions of Time 1 ATQP and ATQ correlated .85 and .89, respectively.

Correlational data and descriptive statistics are presented in Table 1. Instrument means were generally within expected ranges; correlations are in expected directions. Scores on the LES –event rating at Time 2, however, were somewhat higher than anticipated and were similar to mean scores reported for a 1-year period (Sarason et al., 1978). Thus range restriction on the LES does not appear to be an issue, and results may be generalized to similar populations. Twenty-one events listed on the LES were reported as having occurred in the preceding 6 weeks by 20 or more participants, while five events were reported by more than 50 participants. The most frequently reported events included "Major change in social activities" (n = 88) and "Failing an important exam" (n = 73). Test–retest correlations for –events and +events, respectively, were .55 (p < .001) and .37 (p < .001), which were within the range of correlations reported in the validation study of Sarason et al. (1978), who also tested undergraduate subjects. Moderate test–retest correlations may be expected, because different life events are expected to occur over different periods.

Instrument score ranges were as follows: 0 *(nondepressed)* to 40 *(severely depressed)* for Time 2 BDI, 7.50–99.50 for Time 2 HM, 39–128 for the ATQP, 30–122 for the ATQ, 0 to –37 for the LES negative life stress score, 0–21 for the LES positive life stress score, and 2–145 for Time 2 HS score. Score ranges were within expected limits; scores on the BDI, the LES, and the HS were skewed. However, in multiple regression tests of hypotheses, the distribution of each dependent variable was sufficiently normal for each fixed value of independent variables.

Repeated measures multivariate analysis of variance revealed no differences between subgroup means across race (White/non-White categories, and White/African-American/Asian/Hispanic/Asian Indian categories), instrument order, country of origin (North American/non-North American), or gender. However, although results across all instruments, considered together, did not vary by gender, scores on the LES and the BDI differed by gender. Mean scores on these instruments for male and female subjects, respectively, were 7.49 (SD = 6.14) and 10.03 (SD = 7.03) for Time 1 BDI, 6.82 (SD = 6.78) and 8.78 (SD = 6.90) for Time 2 BDI, –9.09 (SD = 6.96) and –12.07 (SD = 8.82) for Time 1 –events score, and –6.31 (SD = 6.48) and –7.60 (SD = 6.14) for Time 2 –events score.

In hierarchical regressions for exploring possible confounds, neither –events nor hassles predicted Time 1 PATs; this finding suggests that PATs are not caused or affected by –events or hassles. Similarly, neither pre-existing PATs nor NATs predicted Time 2 –events or +events. Although NATs and PATs predicted Time 2 HS score, and although Time 1 depression predicted –event ratings, each of these independent variables became nonsignificant when the corresponding Time 1 life stress measure was entered first in these regressions. This suggested that earlier life stress was the actual predictor of later life stress; person variables attained predictive ability only by virtue of variance shared with earlier events. PATs, NATs, and depression per se did not appear to affect subsequent life stress ratings.

Table 1
Mean Instrument Scores and Correlations

Item	*M*	*SD*	1	2	3	4	5	6	7	8
1. T1 ATQP-T	89.91	19.32	—	–13	–26**	–16	–10	19*	21*	21*
2. T1 ATQ-T	58.88	19.25		—	62**	48**	–17	–10	–26**	–19*
3. T1 BDI	8.74	6.69			—	62**	–27**	–03	–26**	–31**
4. T2 BDI	7.79	6.89				—	–45**	04	–21*	–32**
5. T2 LESN	–6.95	6.32					—	–27**	14	20*
6. T2 LESP	4.02	4.17						—	02	–07
7. T1 HM	55.01	16.31							—	26**
8. T2 HM	57.80	15.82								—

Note. N = 152. Values in correlation matrix are fractional. T1 = Time 1; T2 = Time 2; ATQP-T = Automatic Thoughts Questionnaire—Positive, trait form; ATQ-T = Automatic Thoughts Questionnaire, trait form; BDI = Beck Depression Inventory; LESN = Life Experiences Survey Negative Events Rating; LESP = Life Experiences Survey Positive Events Rating; HM = Happiness Measures.

* p < .01. ** p < .001 (one-tailed).

Tests of Hypotheses

Tables 2 and 3 contain results of hierarchical multiple regression analyses that test primary hypotheses. In regressions with Time 2 BDI score as the dependent variable, one outlier with a standardized residual more than 4 standard deviations from the mean was excluded from analyses. Neither PATs nor the PATs × –Events interaction predicted future depression for the entire sample, for male subjects, or for female subjects. PATs did, however, predict future happiness for the entire sample, although not for male or female subgroups. The higher the frequency of initial PATs, the greater the later happiness. Neither the PATs × –Events interaction nor the PATs × +Events interaction was significant in prediction of happiness.

No PATs subtype predicted significant variance in future depression. However, the Factor 3 × –Event interaction was significant, R^2 change = .02, $F(1, 151) = 5.05$, $p < .05$, for the entire sample. This interaction remained significant when entered after all other Factor × –Events interactions. Indeed, it appears to have greater predictive ability when thus entered last in regressions, R^2 change = .04, $F(1, 138) = 11.50$, $p = .001$, which suggests that another ATQP factor or a Factor × –Event interaction acted as a suppressor variable (Cohen & Cohen, 1983). Plotting of this interaction indicated that the slope of the regression line of Time 2 depression on –events was less steep at higher values of Factor 3; that is, higher Factor 3 scores were associated with a weaker relation between –events and depression.

Although Factors 1, 2, and 4 were significant in prediction of future happiness, no factor predicted significant, unique variance in happiness over any other factor. No PATs Subtype × Life Events interactions were significant in prediction of future happiness for the entire sample. The Factor 4 × –Events interaction was significant for male subjects, R^2 change = .06, $F(1, 67) = 6.70$, $p < .05$. Similarly, Factor 1 directly predicted happiness for male subjects, R^2 change = .06, $F(1, 71) = 5.74$, $p < .05$, and Factor 4 predicted happiness for female subjects, R^2 change = .06, $F(1, 69) = 4.73$, $p < .05$. Both NATs and the NATs × –Events interactions were significant in prediction of depression for the entire sample and for male subjects. Similarly, the NATs × +Events interaction was significant in prediction of future happiness for the entire sample and for male subjects, whereas NATs directly predicted future happiness for male subjects.

Because results for male and female subjects appeared to differ, gender was dummy coded and included after other terms in additional hierarchical regressions, followed by Gender × Independent Variable interactions and Gender ×

Table 2
Hierarchical Regression Results With Time 2 Beck Depression Inventory Score as the Dependent Variable

Variable	R	R^2	Adjusted R^2	F_{eqn}	p	R^2 change	F_{ch}	p	β
				Total sample[a]					
T1 BDI	.64	.41	.40	101.46	.00	.41	101.46	.00	.64
T2 LESN	.69	.48	.47	67.80	.00	.07	20.71	.00	–.28
T1 ATQ-T	.70	.50	.49	48.09	.00	.02	5.01	.03	.17
T1 ATQP-T	.71	.50	.49	36.39	.00	.00	1.14	.29	–.07
ATQ-T × LESN	.72	.52	.50	31.06	.00	.02	5.38	.02	–.46
ATQP-T × LESN	.72	.52	.50	25.93	.00	.00	0.65	.42	.25
				Men[b]					
T1 BDI	.73	.54	.53	86.56	.00	.54	86.56	.00	.73
T2 LESN	.76	.58	.57	51.54	.00	.05	8.21	.01	–.23
T1 ATQ-T	.79	.63	.61	41.32	.00	.05	9.31	.00	.30
T1 ATQP-T	.79	.63	.61	30.70	.00	.00	0.20	.66	–.03
ATQ-T × LESN	.81	.66	.64	27.65	.00	.03	6.34	.01	–.53
ATQP-T × LESN	.82	.67	.64	23.27	.00	.01	1.13	.29	.38
				Women[c]					
T1 BDI	.53	.29	.28	29.22	.00	.29	29.22	.00	.54
T2 LESN	.62	.39	.37	22.48	.00	.10	11.49	.00	–.32
T1 ATQ-T	.62	.39	.36	14.79	.00	.00	0.03	.87	–.02
T1 ATQP-T	.63	.39	.36	11.25	.00	.01	0.78	.38	–.09
ATQ-T × LESN	.63	.40	.35	8.95	.00	.00	0.23	.63	–.20
ATQP-T × LESN	.63	.40	.34	7.36	.00	.00	0.04	.85	–.11

Note. $F_{eqn} = F$ for the overall equation at each step; $F_{ch} = F$ test for the R^2 change; T1 = Time 1; T2 = Time 2; BDI = Beck Depression Inventory; LESN = Life Experiences Survey Negative Events Rating; ATQ-T = Automatic Thoughts Questionnaire, trait form; ATQP-T = Automatic Thoughts Questionnaire—Positive, trait form.

[a] Residual degrees of freedom (Rdf) = 144; root-mean-square residual (RMS Resid) = 22.57. [b] Rdf = 70, RMS Resid = 16.69. [c] Rdf = 67, RMS Resid = 28.37.

Table 3
Hierarchical Regression Results With Time 2 Happiness Measures Score as the Dependent Variable

Variable	R	R^2	Adjusted R^2	F_{eqn}	p	R^2 change	F_{ch}	p	β
				Total sample[a]					
T1 HM	.26	.07	.06	10.64	.00	.07	10.64	.00	.26
T2 LESN	.30	.09	.08	7.76	.00	.03	4.63	.03	.17
T2 LESP	.31	.10	.08	5.19	.00	.00	0.14	.71	−.03
T1 ATQ-T	.33	.11	.08	4.44	.00	.01	2.06	.15	−.12
T1 ATQP-T	.36	.14	.11	4.79	.00	.03	5.63	.02	.19
ATQ-T × LESN	.38	.15	.11	4.18	.00	.01	1.14	.29	.28
ATQ-T × LESP	.42	.18	.14	4.48	.00	.03	5.49	.02	.69
ATQP-T × LESN	.42	.18	.13	3.89	.00	.00	0.00	.99	−.00
ATQP-T × LESP	.43	.19	.13	3.59	.00	.01	1.15	.29	.49
				Men[b]					
T1 HM	.31	.10	.09	8.19	.01	.10	8.19	.01	.31
T2 LESN	.35	.12	.10	5.13	.01	.02	1.96	.17	.15
T2 LESP	.37	.14	.10	3.81	.01	.01	1.15	.29	.13
T1 ATQ-T	.45	.20	.15	4.48	.00	.06	5.74	.02	−.26
T1 ATQP-T	.49	.24	.18	4.37	.00	.04	3.35	.07	.20
ATQ-T × LESN	.49	.24	.17	3.59	.00	.00	0.01	.92	−.03
ATQ-T × LESP	.58	.34	.27	5.10	.00	.11	11.09	.00	1.41
ATQP-T × LESN	.58	.34	.26	4.41	.00	.00	0.05	.82	−.12
ATQP-T × LESP	.59	.34	.25	3.88	.00	.00	0.09	.76	.23
				Women[c]					
T1 HM	.20	.04	.03	3.12	.08	.04	3.12	.08	.20
T2 LESN	.27	.07	.05	2.77	.07	.03	2.37	.13	.18
T2 LESP	.33	.11	.07	2.99	.04	.04	3.24	.08	−.20
T1 ATQ-T	.34	.12	.07	2.33	.06	.01	0.43	.52	.08
T1 ATQP-T	.38	.14	.08	2.27	.06	.02	1.90	.17	.16
ATQ-T × LESN	.41	.17	.10	2.32	.04	.03	2.37	.13	.75
ATQ-T × LESP	.42	.17	.09	2.01	.07	.00	0.26	.61	−.24
ATQP-T × LESN	.42	.17	.07	1.74	.11	.00	0.05	.83	.16
ATQP-T × LESP	.43	.19	.07	1.67	.12	.01	1.07	.31	.67

Note. $F_{eqn} = F$ for the overall equation at each step; $F_{ch} = F$ test for the R^2 change; T1 = Time 1; T2 = Time 2; HM = Happiness Measures; LESN = Life Experiences Survey Negative Events Rating; LESP = Life Experiences Survey Positive Events Rating; ATQ-T = Automatic Thoughts Questionnaire, trait form; ATQP-T = Automatic Thoughts Questionnaire—Positive, trait form.
[a] Residual degrees of freedom (Rdf) = 142; root-mean-square residual (RMS Resid) = 216.78. [b] Rdf = 67; RMS Resid = 213.26. [c] Rdf = 65; RMS Resid = 198.91.

Independent Variable × Independent Variable interactions. In this procedure, the F test for the R^2 increment associated with each Gender × Independent Variable interaction provides a statistical test of gender differences associated with each independent variable. No true gender differences were found with regard to PATs. NATs, however, accounted for significantly more variance in future depression for male subjects, whereas the NATs × +Event interaction accounted for significantly more variance in prediction of happiness.

When HS score was substituted for the LES score, results for tests of primary hypotheses were similar: Neither PATs nor the PATs × Life Event interactions predicted depression, but PATs predicted happiness for the entire sample, although not for male or female subjects separately. The Factor 3 × Hassles interaction did not, however, predict depression.

Discussion

Results for the overall sample confirmed the hypothesis that PATs predict future happiness: Higher frequency of pre-existing PATs was associated with greater future happiness. This finding suggests that PATs have an impact not only on immediate well-being, as suggested by Goodhart (1985), but also on future well-being.

Contrary to hypotheses, however, the overall PATs × Stressful Event interaction did not predict either depression or happiness. Unexpectedly, a subtype of PATs—PATs about social self-worth—behaved in a manner consistent with a stress buffer role: The interaction of PATs about social self-worth with stressful events predicted unique variance in depression, above the variance accounted for by other Factor × Stress interactions. For more frequent PATs about social self-worth, there was a weaker relation between

–events and future depression. Thus PATs about social self-worth may function as the stress buffer intimated by Beck (1967) and hypothesized by Ingram and Wisnicki (1988) and Lightsey (in press), although this conclusion should be viewed as tentative in light of the failure of such thoughts to interact with HS score and the lack of cross-validation.

Although it is beyond the scope of this article to address this finding in detail, it is important to note that for male subjects, NATs and the NATs × –Event interaction predicted future depression, whereas the NATs × +Events interaction predicted future happiness. Gender differences associated with NATs and NATs × +Events were statistically significant. These results are readily summarized: More frequent NATs were associated with greater depression, and the lower the frequency of recent +events, the more pronounced the relation between NATs and future happiness. +Events may help reduce the effects of NATs, although reasons why this would occur only for male subjects are not readily apparent.

In view of these findings, counselors would do well to focus on increasing clients' PATs, which may help to increase happiness across clinical problem areas. A focus on reducing NATs, too, may be important for directly alleviating depression and for reducing the impact of –events, at least for male clients. However, helping the client augment PATs about his or her social worth may go still further toward alleviating the effects of stress. Of course, PATs about social self-worth do not exist in a vacuum: The counselor should also pay attention to social support, to the client's actual effects on others, and to variables such as social skills that shape others' reactions to the client.

Interpretations of the results of this study should take into account the nonexperimental design of this study, which does not enable detection of causality. Indeed, several authors have raised concerns about tautology in correlational studies of mood and cognitions, because emotion and cognition are conceptually related and are often measured by instruments whose contents overlap (Costello, 1992; Coyne, 1982; Coyne & Gotlib, 1983, 1986). In this correlational study, happiness and PATs are conceptually related; is it not, then, a fait accompli that PATs predict happiness?

No, it is not. A logical or postulated relationship does not guarantee an empirical relationship: Data inform theory, and statistical relations help clarify conceptual issues. In this study, Time 1 PATs correlated .21 with both Time 1 happiness and Time 2 happiness. This was a significant but modest correlation: PATs and happiness do not share a large amount of variance. Furthermore, in hierarchical multiple regression (which allows for extraction of potential causal information with correlated independent variables), Time 1 PATs predicted unique variance in future happiness, independently of the variance shared between Time 1 PATs and Time 1 happiness. This finding indicates that PATs predict future happiness beyond any logically necessary relation between the two, inasmuch as the "logically necessary" relationship, reflected in the correlation between Time 1 positive thoughts and Time 1 happiness, would be eliminated with the entry of Time 1 happiness first in the regressions. The same argument applies to the logical relation between NATs and depression and to the logical inverse relation between PATs and depression.

Other limitations of this study bear mention. Generalizability of results to clinical populations, to other assessment methods, or to time frames other than 6 weeks may not be assumed without empirical evidence. In addition, the number of regressions may have led to some chance findings, and the obtained R^2 increments were not large. Entering Time 1 depression and happiness first in regressions, although necessary to reduce confounds, may have resulted in underestimation of interaction effects associated with PATs (see Zuroff, Igreja, & Mongrain, 1990, for a discussion of such underestimation). The general nature of the interactions studied also may have contributed to the effect sizes: Study of more specific Event Subtype × PATs Subtype interactions may result in larger R^2 increments.

PATs accounted, however, for approximately 3% of the variance in future happiness, a proportion that is typically considered meaningful in outcome studies of medical treatments (Rosenthal, 1990). Thus although the percentage of variance accounted for is small in absolute terms, results of this study may be considered both significant and meaningful.

In extensions of this study, investigators may wish to use alternative methods of assessing thoughts and to use time frames other than 6 weeks in order to demonstrate generalizability. Because the BDI measures syndrome depression rather than nosologic or clinical depression (Kendall, Hollon, Beck, Hammen, & Ingram, 1987), replication with clinically depressed samples is warranted. In clinical studies, researchers could investigate whether increasing PATs enhances treatment effectiveness above the effects of decreasing NATs. Explication of the relation between PATs and such constructs as self-efficacy, positive affect, and optimism is also highly desirable in light of potential variable overlap.

This study has provided evidence that PATs may be germane both to depression and to happiness. Further elucidation of the role of PATs in mood regulation awaits future studies.

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