Increasing Happiness Through Cognitive Retraining

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Recent findings indicate that happiness depends not so much on objective life circumstances as on the way in which these are interpreted and evaluated, which is loosely attributed to a concept of "happiness set". Two probe experiments indicated that happiness can be improved either by a group discussion of beliefs and attitudes, or alternatively by daily rehearsal of positive feeling statements. These results can be attributed either to two different ways of influencing the happiness set, or to a non-specific placebo-type effect. That satisfactions with life areas also increased further weakens the environmental explanation of happiness, with implications for social indicators research.

Happiness is here defined as a subjective sense of well-being in which pleasurable feelings are characteristic and unpleasant feelings are rare over "the past few weeks" or "these days". It is a working assumption that how happy a person claims to be by verbal report is not only the best available index of that person's happiness, but is also a logically necessary measure of it (Bradburn, 1969; Barrow, 1980).

It has been demonstrated that self-reports on rating scales of happiness can be highly reliable and relatively free from response artifacts (Andrews & Withey, 1976; Campbell, Converse & Rodgers, 1976; Kammann, Christie, Irwin & Dixon, 1979). Since there is no obvious outside criterion by which to assess the validity of measures of subjective well-being, their meaning must be inferred from the pattern of correlations which they exhibit, as discussed next.

The popular expectation that happiness must be correlated with favourable life circumstances ("the environmental hypothesis") received a serious setback in the extensive survey data of Campbell et al. (1976) and Andrews and Withey (1976) who

demonstrated that age, sex, race, education, income, religion, occupation, employment status, and size of city produced low correlations with subjective well-being in a range from .00 to .17. An optimum combination of such predictors by multiple regression yielded an R of .33 (Campbell, 1976), accounting for only 11% of the total variance, or 14% of the reliable variance.

The environmental hypothesis has been further weakened by the finding that life stresses as defined by the Holmes-Rahe Social Readjustment Rating Scale are essentially uncorrelated with happiness[2]. Furthermore, Brickman, Coates and Janoff-Bulman (1978) found that recent lottery winners with average winnings in the vicinity of nearly half a million dollars were not above average in happiness, while paraplegic victims of car accidents were only slightly below average.

In spite of this consistent trend, there has been a recent surge of "social indicators research", as can be observed in the journal *Social Indicators Research*, in which the goal is to assess average societal satisfactions across a number of life areas (e.g., self, marriage, family, friends, job, income, housing, neighbourhood, government) with a view to influencing social and governmental policies. While trends over time in the average level of satisfaction in a life area, or comparisons between area satisfactions,

may be found to be meaningful, individual differences in satisfaction with a life area are but poorly correlated with corresponding objective circumstances. For example, the correlation between actual family income and satisfaction with financial situation is .25 (Campbell et al., 1976).

These findings agree with the classic observation of Epictetus that "People are disturbed not by things but how they view them", to which we can add the corollary that people are also *pleased* not by things but by how they view them. We give the unknown process which people use to construe or evaluate their circumstances the general and undefined label of "happiness set".

Whatever happiness set may turn out to be, it appears to be pervasive for individuals. The usual correlation between a sum of area satisfaction ratings and a global measure of well-being is on the order of .75 (Campbell et al., 1976; Andrews & Withey, 1976), in contrast to a multiple correlation of .33 for objective circumstances. Furthermore, measures of global subjective well-being have been found to have high inverse correlations in the range of $-.65$ to $-.85$ with established scales of depression, anxiety, and neuroticism (Kammann, 1979; Fazio, 1977) and correlations in the range $-.35$ to $-.50$ with small sets of psychosomatic symptoms (e.g., Bradburn, 1969; Brenner, 1975). These findings reveal a strong overlap between unhappiness and psychological maladjustment or "mental illness".

An understanding of "happiness set" might be approached from any of cognitive theory, conditioning theory, or even psychodynamic theory, among others. This paper is concerned with two probe studies testing

aspects of the cognitive approach to subjective well-being. The studies are described as "probes" in the sense that they use a simple two-groups design, and thus provide only preliminary signals on the possible causes of happiness. They do, however, comply with Wilson's (1967) recommendation that, "Studies involving direct attempts to manipulate the well-being of individuals are most desirable."[3]

Experiment 1
A Course in Erroneous Zones

The idea that unhappy or depressed people are the victims of their own irrational expectations, beliefs or attitudes has received increasing attention in recent years through the developments of rational-emotive therapy (Ellis & Greiger, 1977), cognitive therapy for depression (Beck, 1976) and less directly in the cognitive-behaviour therapies advanced by Mahoney (1976) and Meichenbaum (1977).

While it is possible to develop a number of theoretical distinctions between and even within these models, the present experiment (by S. L.) focussed on Ellis' basic proposition that feelings do not result automatically from stimulus events, but rather from the evaluation of these events according to demands which Ellis categorizes as rational or irrational beliefs. However, Ellis' survey of such beliefs or expectations seemed neither as rich in contexts nor as understandable for a cross-section of adults as Dyer's similar thesis in his popular paperback, *Your erroneous zones* (1977). Although Dyer's variation on the rational-emotive theme has no formal standing, it is entirely compatible with the cognitive therapy literature.

The idea of this experiment was to find out whether or not a discussion course around Dyer's list of irrational beliefs (or "erroneous zones") would lead to an increase in subjective well-being compared with a no-treatment control group.

Three dependent measures were used in this study. The first was a Likert scale of pro-happy and anti-happy beliefs derived from Dyer's principles which provided a manipulation check on the effectiveness of the course, as well as a correlational test of the relevance of such beliefs to happiness. Happiness before and after the course was

Table 1
Pro-Happy and Anti-Happy Beliefs[a]

Each of the sentences below describes *how you may think about yourself.* For each sentence, circle
the abbreviation which shows *to what extent you think about yourself in that way:*

SA = Strongly Agree
A = Agree
D = Disagree
SD = Strongly Disagree

Be as frank and honest as you can.

	1.	I choose my emotions and feelings.	SA	A	D	SD
	2.	I feel good about myself.	SA	A	D	SD
[b](−)	3.	My feelings are controlled by other people's approval and disapproval	SA	A	D	SD
(−)	4.	I believe my personality is fixed.	SA	A	D	SD
(−)	5.	I feel guilty about things I've said or done	SA	A	D	SD
(−)	6.	I worry about future events or the future.	SA	A	D	SD
(−)	7.	I get angry at people or things that happen.	SA	A	D	SD
	8.	I am ready to try out new experiences.	SA	A	D	SD
	9.	I can "fail" at a task without feeling bad (blaming myself).	SA	A	D	SD
(−) 10.		I find fault with others.	SA	A	D	SD
	11.	I am not afraid to be unconventional when I want to be.	SA	A	D	SD
(−) 12.		I demand I get justice and fairness.	SA	A	D	SD
	13.	I can act independently on my own feelings and beliefs.	SA	A	D	SD
	14.	I am (ready to be) emotionally open and close to somebody.	SA	A	D	SD
	15.	I enjoy my present moments.	SA	A	D	SD

[a] The caption on the questionnaire used was "Attitudes and Beliefs".
[b] On the original questionnaire, anti-happy beliefs did not show a minus sign (−) as they do here.

measured by Affectometer 1 which was the best available measure of subjective well-being in terms of reliability, validity, and absence of skewness (Kammann et al., 1979). Finally, a sum of rated satisfactions score was obtained across a well-chosen set of 20 life areas or "domains". This last score provided a way of testing the hypothesis that specific satisfactions depend on the same kind of beliefs or happiness set hypothesized to mediate the global sense of well-being.

Method

Subjects

In response to a newspaper advertisement, 36 Dunedin, New Zealand adults volunteered for "an interesting research study on how habits of thinking influence a person's satisfactions with life". The volunteers were screened by six clinical psychologists[4] who disqualified candidates scoring as clinically depressed on the Short Form of the Beck Depression Inventory, currently receiving medication or psychotherapy, or judged to show signs of clinical pathology. These restrictions

were required by the Psychology Department Ethics Committee following advice by the two resident clinicians. (Affectometer 1 was also administered during the screening.)

The screening left 27 subjects who were randomly divided into Learning Group 1 and the waiting-list Control Group. Four subjects dropped out after learning more about the experiment and the schedule, leaving 10 (with 5 males) in Learning Group 1 and 13 (with 4 males) in the Control Group. Age was not recorded, but in both groups the ages seemed to be spread evenly across the range from 20 to 60 years old.

Dependent Measures

Pro-happy Beliefs. Twenty-eight pro-happy and anti-happy beliefs were derived from *Your erroneous zones* and cast into a questionnaire with response options of strongly agree/agree/disagree/strongly disagree for each item. Since some of these statements were paraphrases of others, only the 15 primary items are shown in Table 1. These were also the 15 items used as discussion topics in the course.

Happiness. Subjective global well-being was assessed by the 48-item short form of Affectometer 1 (Scales ADEF). Examples of Affectometer 1 items are: (a) I feel things are going my way; (b) I wish I could change some parts of my life; (c) successful; (d) miserable, in which items (a) and (c) reflect positive affect and (b) and (d) negative affect. All items in Affectometer 1 have been found to correlate, in two or more samples, with direct self-ratings of happiness (Kammann et al., 1979). The subject responds to each item on the Affectometer by indicating how frequently the subject felt as the item says "over the past

week" (in this study), with the response options of not at all/occasionally/some of the time/often/ all of the time, scored from 0 to 4. The overall Affectometer score, called Net All, is the mean frequency response across positive affect items minus the mean frequency across negative affect tiems, with a possible scoring range from −4 to 4.

Domain Satisfactions. Of the 20 domain satisfactions questionnaire, 18 were taken from Andrews and Withey (1976) to represent a best set of well-being predictors as revealed in their Chapters 2 and 4. Two other items were taken from Campbell, Converse and Rodgers (1976) to complete the list. The 20 items covered satisfactions in such domains as self, family, marriage, friends, education, income, job, religion, health, and government. The subjects' task was to rate how satisfied they were "these days" with each of those domains by one of the response options: delighted/pleased/mostly satisfied/mixed/ mostly dissatisfied/unhappy/terrible, scored from 6 to 0. The exact items used were Andrews and Withey's Exhibit 2.1 items 2, 3, 6, 7, 14, 16, 20, 22, 28, 30, 75, 83, 85, 88, 90, 101, 103, 111 and Campbell et al.'s items H3 and E4 rated also on the delighted-terrible scale. The sum of satisfactions had a possible scoring range from 0 to 120.

Procedure

In the screening procedure, all subjects completed Affectometer 1 and the Beck Depression Inventory, both in Short Form. Subjects in both groups completed the Pro-Happy Beliefs schedule, Affectometer 1, and Domain Satisfactions on the first and last days of the course.

The course for Learning Group 1 ran for eight 2-hour sessions over four weeks. In the course, the 15 Dyer principles (pro-happy and anti-happy beliefs—see Table 1) were introduced one at a time in 5-minute mini-lectures, followed by a 20 to 30 minute class discussion on how the principle would work in everyday life. Sometimes the adult students were asked to do homework exercises, such as listing situations which made them angry, or made them worry, among others. A brief role-play was occasionally used to bring a point home.

A six-week follow-up on the three dependent measures was achieved by mail; one subject in Learning Group 1 moved away, and one did not reply, reducing that group from 10 to 8 for the follow-up.

The course was re-run 16 weeks after the end of the first course for Learning Group 2 which consisted of the seven subjects from the Control Group who were still available, plus three additional volunteers. For Learning Group 2, there was a new course leader, and the post-test questionnaires were filled out individually at home and mailed back rather than filled out in class as with Learning Group 1; otherwise the course procedure was the same.

Results

Properties of Affectometer 1. The high internal reliability of Affectometer 1 (Short

Table 2
Pre-test, Post-test, and 6-Week Follow-up Means, (SDs) and Ns for Experiment 1

Group	Pre-test	Post-test	6 weeks
Beliefs			
Learning 1	57 (5.3)	66 (8.0)	70 (7.5)
Control	57 (8.3)	58 (10.5)	59 (9.8)
Learning 2	58 (5.3)	72 (8.4)	
Happiness (Affectometer 1)			
Learning 1	2.2 (.9)	2.7 (1.1)	2.9 (.8)
Control	2.1 (1.3)	2.1 (1.5)	1.9 (1.5)
Learning 2	1.9 (.6)	2.7 (.8)	
Sum of 20 Domain Satisfactions			
Learning 1	81 (10)	95 (10)	98 (16)
Control	80 (12)	80 (21)	81 (12)
Learning 2	76 (9)	87 (16)	
Number of Subjects			
Learning 1	10	10	8
Control	13	13	13
Learning 2	10	10	

Form) was confirmed with an alpha coefficient of .96 for Net All scores on the pre-test of the 24 subjects in both groups. The (N = 13) Control Group produced a test-retest stability r of .94 over the four weeks from pre-test to post-test, and of .93 over the 10 weeks from pre-test to follow-up.

The correlation (r) between Affectometer 1 and the Beck Depression Inventory was −.70 for 25 candidates undergoing screening for the experiment. (Data from the other 11 candidates were incomplete.)

Correlations Among Dependent Measures. The pre-testing yielded r = .80 (N = 24) between Beliefs and the Affectometer, r = .79 between the Affectometer 1 and Domain Satisfactions, and r = .61 between Beliefs and Domain Satisfactions.

Effects of the Course. The means and SDs for pre-test, post-test and six-week follow-up are shown in Table 2 for Learning Group 1, the Control Group, and Learning Group 2 (no follow-up).

The significance of improvements, as measured by t test for the difference in pre-to-post change scores, is given in Table 3. While the comparison between Learning Group 1 and the Control Group is straightforward, there was no control group for Learning Group 2. Therefore the original Control Group data were used as a pseudo-control for Learning Group 2, although the Control Group was run 20 weeks earlier and consisted of some of the same people appearing in Learning Group 2.

Table 3
Significance of Course Change Results in Experiment 1

	Cognitive Goals		Affecto-meter 1		Satis-factions		
Comparisons	*t*	*p*	*t*	*p*	*t*	*p*	*df*
LG-1 vs CG							
Pre-post change scores	2.37	.05	2.44	.05	2.69	.02	21
Pre-6-week change scores	3.47	.01	3.85	.002	4.32	.001	19
LG-2 vs CG (pseudo-control)							
Pre-post change scores	3.43	.01	6.42	.001	1.95	.10	21

For Learning Group 1, improvements from pre-test to post-test were significant relative to the Control Group on all three dependent measures, and reached still higher significance levels for the changes from pre-test to six-week follow-up. For Learning Group 2, the Belief scale and Affectometer showed significant gains relative to the original Control Group (treated as an independent group), but differential changes in Satisfactions were not quite significant at the .05 level.

Figure 1 shows the results when both learning groups are pooled, with the means on all three measures standardized against their mean *SDs* (derived from all groups and testings).

Inspection of the size of changes for individual Belief items, Satisfaction items, and Affectometer items did not reveal any meaningful systematic differences in degree of change as a function of the semantic content of the items.

Correlations Among Change Scores. The assumption that gains in happiness arise from the advocated changes in beliefs requires at least evidence of a correlation between the degree of change on both variables. While change scores are doubly unreliable, reflecting error variance in both the pre-test and post-test, this is not a serious

obstacle with the highly reliable measures used in the present study.

The combined 20 subjects in Learning Groups 1 and 2 yielded $r = .75$ between pre-post change in Beliefs and changes in Affectometer 1, $r = .50$ between changes in Affectometer 1 and Satisfaction changes, and $r = .60$ between changes in Beliefs and changes in Satisfactions.

Experiment 2

Rehearsal of Positive Feeling Statements

In the preceding experiment, beliefs and expectations were ostensibly changed through a group process of reflection and reasoning about principles. An alternative possibility for applying a general cognitive therapy model to well-being is the induction of a positive mood by the imaginative rehearsal of positive feeling statements. The plausibility of this method arises from Velten's (1968) demonstration that a positive or negative mood can be so induced, at least for half an hour or more.

Coleman (1975) has further shown that such induced moods can only be partly simulated by a role-playing control group. In particular, chronically depressed role-playing subjects could not fully simulate the elevated mood induced by the positive rehearsal treatment given to similarly unhappy subjects; chronically happy role-players could not match the depressed mood induced by the negative treatment condition for other usually happy subjects. These results suggest that the mood induction effect is not merely a shift in linguistic responses.

The purpose of the present experiment (by K. H.) was to determine whether or not daily rehearsal of positive self-feeling statements over a period of two weeks can enhance the sense of global well-being as
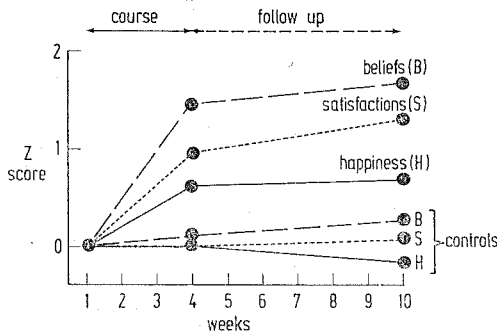

Figure 1. Standardized scale means over time.

compared with a no-treatment Control Group.

Method

Subjects

Forty-eight (48) volunteer students were recruited from Introductory Psychology at the University of Otago, and were divided randomly in a Treatment Group (N = 25) and a waiting-list Control Group (N = 23).

Dependent Measures

The three measures used were the short forms of Affectometer 1 and the Beck Depression Inventory, and a 26-item Satisfaction scale that was identical in format and similar in content to the Schedule used in Experiment 1 (some items were arbitrarily changed, and a few others added, while still providing a well-chosen set in the sense of Andrews and Withey, 1976). Satisfaction scores could range from 00 to 156.

Procedure

The stimulus materials for the daily rehearsal of positive self-feeling statement were three lists of 18 statements each of which were chosen to be opposite to the feelings which, according to the clinical literature, are characteristic of clinical depression. The three lists represented three different levels of intensity of positive feelings, Mild, Medium, and Strong. To illustrate, the Mild list contained the item, "I don't consider myself a bad person at all", the Medium list contained the version, "I think I'm a good sort of person", while the corresponding Strong item was, "I feel good about myself". The complete list of Strong statements is given in Table 4.

Both groups filled out the dependent measures at the start of the two-week treatment period, and again at the end. The Treatment Group was taken through preparatory instructions and the

Table 4
Positive Self-Statements, Level 3 (+ + +)

(Please read daily instructions before you begin)
I feel good about myself.
I've got a lot of fine qualities.
I'm loved and trusted by those close to me.
I'm looking really great today.
I have confidence in my decisions.
I prefer to make decisions carefully, but promptly.
Today looks great.
I have a feeling that the future is going to bring good things.
I have no control over some of life's misfortunes.
I accept the fact that I have my weaknesses, but I can do something about them.
I can't wait to get started on something.
It's better to get unpleasant jobs out of the way right now.
I love being alive!
Up to a point I like being independent.
I feel great about myself as a person.
I get a lot of pleasure out of everything I do.
I'm feeling close and loving about the people around me.
I'm feeling in a great mood.

Mild list of self-statements at the first meeting, and were instructed to repeat both steps at home every morning, choosing whichever of the three sets of statements they felt would work best for them. The preparatory instructions read as follows:

"Put aside 10 minutes *every* morning, either before or after breakfast, in which to read these self-statements. Choose a time that you can be by yourself in a quiet place. Take time to relax your body and clear your mind of everything that might distract your attention. Try taking a few deep breaths before you begin. Spend as much time as you want to on each statement.

Please read the following instructions every day just before you read the self-statements.

"My success will depend on my willingness to be open, and to respond to the ideas in each statement. I will allow each idea, each feeling, to act upon me without interference. I will concentrate my full attention on these statements. I will go over each statement again and again in my head with the desire to really believe in it. I will experience each idea and identify myself with it. I will move myself towards holding that same attitude. I will visualise a scene in which I could use these suggestions. I will experience the idea and move further and further into it, until I do feel the way the statement suggests.

I might even find that memorizing certain statements and saying them to myself during the day will help me.

I will train myself into adopting this outlook, this healthy way of thinking, into my everyday life. I will let these suggestions act upon me. I will become a happier person because I am feeling good about myself and my life. I will be able to get myself out of low moods by reading these statements to myself. I will be better able to control my moods."

Subjects in both groups filled out an elation-depression mood scale (Wessman & Ricks, 1966) every night before retiring to describe their feelings that day. The Treatment Group also kept a diary sheet showing which of the three lists they chose each day, leaving a blank for any days missed.

Results

Correlations Among Measures. Correlations among the measures over all 48 subjects on the pre-test yielded $r = -.72$ between happiness and depression, $r = .81$ between happiness and domain satisfactions, and $r = -.65$ between depression and satisfactions, all confirming the strong relationships observed in Experiment 1.

Treatment Effects. The pre-test and post-test means and SDs are given in Table 5 along with the t values for the difference between the Treatment and Control Groups' change scores; all ts were significant beyond the .001 level.

Table 5

Pre-test and Post-test Means, (SD), and Significance for Experiment 2

	Pre-test	Post-test	t	p
	Affectometer 1			
Treatment	.4 (1.2)	1.5 (1.1)		
			5.72	.001
Control	1.0 (.9)	1.1 (1.0)		
	Beck Depression Inventory			
Treatment	6.1 (2.3)	2.3 (4.8)		
			3.88	.001
Control	5.2 (4.1)	4.1 (4.0)		
	Satisfactions			
Treatment	92 (16)	107 (17)		
			5.31	.001
Control	97 (14)	98 (12)		

Mean daily mood scores over the two weeks were inspected to see whether the maximum mood effect occurred early, in the middle, or late in the treatment period, or followed some other trend. As the Treatment Group had a lower pre-test mean than the Control Group on Affectometer 1, pre-test Affectometer scores were used to make a constant covariance adjustment to mean daily mood. With this correction applied, the mean daily mood of the Treatment Group was distinctly constant at close to 1 *SD* above the mean daily mood of the Control Group; there was no trend up or down over the two weeks. A possible explanation of this constancy could be that the Treatment Group subjects progressively stepped up the strength of the "psychological dosage". Initially about half chose the Mild and half chose the Medium strength lists to rehearse, while by the end of two weeks, about half were using the Medium and half the Strong self statements.

Correlations Among Change Scores. Correlation between the change scores (post-test minus pre-test) on the three measures yielded $r = -.75$ between Beck and Affectometer changes, $r = .63$ between Affectometer and Satisfaction changes, and $r = -.42$ between Beck and Satisfaction changes.

General Discussion

It is possible that each of the two experiments reported here reflects a different way of inducing a happiness set through manipulation of cognitive assumptions or attitudes. An alternative interpretation is that the two experiments worked through some non-specific process such as a placebo, demand characteristic, or group support effect (inapplicable to Experiment 2). The fact that Fordyce (1977) has also demonstrated a similar improvement in happiness using his "14 fundamentals" does not bear strongly on this question, since Fordyce's principles partly overlap the Dyer principles used in Experiment 1.

Circumstantial evidence for the concept of specific cognitive mediation of happiness occurs in the high correlation between Dyer-type Beliefs and Happiness in Experiment 1, and again in the high correlation between the change scores on both measures. An alternative explanation for these correlations might be that the two types of measures (Beliefs and Affectometer) contain semantically similar items. This is only patently true, however, for Beliefs numbered 2 and 15, and to a lesser extent Beliefs 5 and 6 (Table 1). Otherwise, the Belief items refer to what the subject "can do" or "usually does", whereas the Affectometer items refer to what the subject "has been feeling over the past week". To say that the two types of items have the same underlying semantic content is to claim that Dyer's principles merely describe happiness rather than explain its basis in attitudes and beliefs. This may be true, but it is certainly not self-evidently so.

A second piece of circumstantial evidence for the specific cognitive hypothesis is the persistence of the treatment effect in Experiment 1 over a period of six weeks after the completion of the course. If the gain in happiness depended merely on group atmosphere, demand characteristics, or experimenter suggestion, some dissipation of the effect might be expected on the follow-up questionnaire filled out in the privacy of the subject's home six weeks later.

The argument in favour of a placebo or demand characteristic effect is supported by the fact that the present experiments and Fordyce's have all worked about equally well in producing a before-after treatment effect. This could mean that the important manipulation lies outside the ostensible treatment procedures. For example, it could be that any plausible ritual (from a health food diet to primal screaming) which subjects are told will enhance their happiness will do so at least for a while. But this is

still an effect, however transient it may prove to be.

The skeptical alternative to both the specific and nonspecific hypotheses is that there were no real changes in feelings at all, but only changes in verbal behaviour on the self-report scales. Until a measure of feelings is devised which by passes self-report, this conjecture is difficult to test, although direct manipulation of demand characteristic variables may prove instructive. In the meantime, we note that some of the people who report that they are thinking of suicide actually make the attempt, and some succeed; consequently it does not seem very likely to us that self-reports of feelings are entirely spurious.

The fact that domain satisfactions increased substantially in both experiments is consistent with the concept of a happiness set, and further weakens the environmental hypothesis. To the extent that social indicators research attempts to measure the "objective" quality of life circumstances through rated domain satisfactions, it has adopted a debatable strategy.

The report of the present findings is not meant to encourage a proliferation of Erroneous Zone courses or Velten techniques as panaceas for unhappiness. Rather we interpret the results as sufficiently encouraging to warrant more sophisticated multi-group research designs[5] to determine the critical training principles that will permit desirous people to develop consistently satisfying and enjoyable lives without prolonged stress, self-defeating expectations, and psychophysiological deterioration.

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5. The simplistic two-group design used in the present studies was not based upon research naivete, but upon constraints of experimenters' time and available research funds.

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