

Positive Health

Martin E.P. Seligman*

University of Pennsylvania, USA

I propose a new field: positive health. Positive health describes a state beyond the mere absence of disease and is definable and measurable. Positive health can be operationalised by a combination of excellent status on biological, subjective, and functional measures. By mining existing longitudinal studies, we can test the hypothesis that positive health predicts increased longevity (correcting for quality of life), decreased health costs, better mental health in aging, and better prognosis when illness strikes. Those aspects of positive health which specifically predict these outcomes then become targets for new interventions and refinements of protocol. I propose that the field of positive health has direct parallels to the field of positive psychology, parallels that suggest that a focus on health rather than illness will be cost saving and life saving. Finally, I suggest a different mode of science, the Copenhagen-Medici model, used to found positive psychology, as an appropriate way of beginning the flagship explorations for positive health.

Je propose de créer un nouveau domaine d'investigations: la santé positive. La santé positive désigne une condition définissable et mesurable qui se situe au-delà de la simple absence de maladie. Elle peut être opérationnalisée par une combinaison de scores excellents sur les dimensions biologiques, subjectives et fonctionnelles. On peut, sur la base des études longitudinales existantes, mettre à l'épreuve l'hypothèse que la santé positive annonce une longévité accrue (ce qui renvoie à la qualité de vie), une réduction des coûts liés à la santé, une meilleure santé mentale lors du vieillissement et un pronostic plus favorable en cas de maladie. Ces facettes de la santé positive qui prédisent spécifiquement de telles conséquences deviennent des objectifs pour de nouvelles interventions et une amélioration du protocole. Je pense que le domaine de la santé positive est en liaison directe avec celui de la psychologie positive, liens qui suggèrent que le fait de se focaliser sur la santé plutôt que sur la maladie réduira les coûts tout en allongeant la vie. J'introduis en dernière analyse un nouveau type de connaissance, le modèle Copenhague-Médicis, utilisé pour fonder la psychologie positive, comme outil pertinent pour initier des travaux majeurs pour la promotion de la santé positive.

* Address for correspondence: Martin E.P. Seligman, Positive Psychology Center, 3701 Market Street, Suite 200, Philadelphia, PA 19103, USA. Email: seligman@psych.upenn.edu

This research was supported by grant no. 11286 from the John Templeton Foundation. I would like to thank Helene Finizio, Arthur Barksy, Christopher Peterson, Paul Tarini, George Vaillant, and James Fries for their help on this manuscript.

INTRODUCTION

Health is a state of complete positive physical, mental, and social well-being and not merely the absence of disease or infirmity. (Preamble to the Constitution of the World Health Organization, 1946)

The mere absence of disease is often taken to be equivalent to health. Disclaimers such as WHO's above, those in the charter of the National Institute of Health, and on the wall at the entrance of Robert Wood Johnson health-care oriented Foundation's headquarters in Princeton notwithstanding, a scientific discipline of health—beyond the mere absence of disease—barely exists. This paper is the call to such a discipline.

In this paper, I first discuss the rationale for positive health, grounded as it is in the field of positive psychology. I then outline the parallel conceptual framework within which positive health can be defined and operationalised. Thereupon I discuss the predictions—increased longevity, decreased health costs, better mental health, and better prognosis—that follow from this framework and the flagship activities for testing these predictions empirically. I then suggest a different scientific structure, the Copenhagen-Medici model for carrying out these studies expediently. I conclude with the potential novel and inexpensive interventions that successful prediction would entail.

RATIONALE

I was elected President-elect of the American Psychological Association in 1996. As I surveyed a century of accomplishments (and their lacunae), I argued that psychology and psychiatry had done reasonably well with mental illness: suffering, victims, depression, anger, substance abuse, and anxiety. But they had done very poorly with mental health: positive emotion, engagement, purpose, positive relationships, and positive accomplishment.

And it was clear that mental health was not the mere absence of mental illness. Clinically, the positive states of mental health did not reliably ensue when the disorders ended, and statistically, the correlation between “happiness” and depression is not close to what Freud and Schopenhauer (the best human beings can ever hope for is the absence of misery) would expect—minus 1.0. Rather it is closer to minus 0.35. The mental disorders, in short, somewhat impede, but do not remotely preclude, positive emotion, engagement, purpose, positive relationships, and positive accomplishment (Haidt, 2006; Lyubomirsky, 2007; Seligman, 2002).

Why, however, in a world of suffering should one bother to work on mental health, well-being, and happiness in the first place? Perhaps, in a few hundred years when AIDS and Alzheimer's disease and suicide are all conquered, we should then turn science to the enabling of well-being. Surely

suffering trumps happiness, both in the priority for brains and for funding. There are two good reasons why this is wrong. The first is obvious: People desire well-being in its own right, and they desire it above and beyond the relief of their suffering. The second is less obvious: Bringing about well-being—positive emotion, engagement, purpose, positive relationships, positive accomplishment—may be one of our best weapons against mental disorder.

This is testable, and a substantial body of research, the best of it using prospective, random assignment, and placebo controlled designs, now suggests that interventions that build the positive states alleviate depression (Seligman, Rashid, & Parks, 2006; Seligman, Steen, Park, & Peterson, 2005). The non-tautological inference from such studies is that building mental health prevents and relieves mental illness.

The findings that have emerged from the positive psychology initiative have not been confined to positive interventions (see Peterson, 2006, for a review). Many of the findings are not of the “my grandmother already knew it” variety; among the more surprising ones:

- Women who flashed a Duchenne (genuine) smile in their yearbook positive photos as freshmen have more marital satisfaction twenty-five years later (Harker & Keltner, 2001).
- Brief raising of positive mood enhances creative thinking and makes positive physicians more accurate and faster to come up with the proper liver diagnosis (Fredrickson, 2001; Isen, 2005).
- The relation of national wealth to life satisfaction is dramatically curvilinear; after the safety net is met, increases in wealth produce less and less life satisfaction (Diener, Sandvik, Seidlitz, & Diener, 1993).
- In business meetings a ratio of greater than 2.9:1 for positive to negative statements predicts economic flourishing (Fredrickson & Losada, 2005).
- Peripheral attention is superior under positive emotion (Fredrickson & Branigan, 2005).

Some newer findings concern optimism predicting cardiovascular disease (CVD) and mortality and these studies bear directly on the likelihood that a state of positive health will increase longevity and improve prognosis:

- Giltay, Geleijnse, Zitman, Hoekstra, and Schouten (2004) followed 999 Dutch seniors for a decade: high optimism produced a remarkably low hazard ratio of 0.23 for CVD death (upper versus lower quartile of optimism, 95% confidence interval, 0.10–0.55) when controlling for age, sex, chronic disease, education, smoking, alcohol, history of CVD, body mass, and cholesterol level. Similarly, Buchanan (1995) found that among 96 men who had had their first heart attack, 15 of the 16 most pessimistic men died of CVD over the next decade, while only 5 of the 16 most optimistic died, controlling for major risk factors.

- Kubzansky, Sparrow, Vokonas, and Kawachi (2001) followed 1,306 men who were evaluated by the MMPI Optimism–Pessimism scale. In a 10-year follow-up, incidence of coronary heart disease (CHD), non-fatal myocardial infarction, fatal CHD and angina pectoris were recorded. A robust positive correlation was found between increasingly high levels of optimism and increased protection against each of the cardiovascular events and depression significantly increase the risk for cardiac events. Similarly Kubzansky and Thurston (2007) found a strong positive relationship between emotional vitality and lack of CVD.
- Optimism and positive emotions have also been linked to recovery after a major cardiac event. Leedham, Meyerowitz, Muirhead, and Frist (1995) interviewed 31 heart-transplant patients both before and after surgery. Those who reported a high level of positive expectation and good mood before the surgery were found to have greater adherence to medical regimen after surgery, as well as a better status report obtained by nursing 6 months post-operation.
- Scheier, Matthews, Owens, Magovern, Lefebvre, Abbott, and Carver (1989) investigated the effect of dispositional optimism in 51 middle-aged men who had coronary artery bypass surgery. Dispositional optimism was associated with faster recovery rates during hospitalisation, as well as a speedier return to normal living upon discharge. At the 6-month follow-up, there was a strong positive association between high optimism and good quality of life.
- Optimism and positive affect may also be protective against other physical deteriorations. Ostir, Ottenbacher, and Markides (2004) followed 1,558 initially non-frail older Mexican-Americans for 7 years. Frailty increased by 7.9% over the course of follow-up, but those men with high positive affect were found to have a significantly lower risk of frailty onset.
- Positive emotional style (PES) may also act as preventive against the onset of the common cold. Cohen, Alper, Doyle, Treanor, and Turner (2006) administered nasal drops carrying either rhinovirus or influenza to 193 healthy normal volunteers, ranging in age from 21 to 55. They found that a high level of PES was associated with a lower risk of developing either of the two conditions, manifest as upper respiratory conditions.
- In looking at more severe physiological events, positive affect and positive explanatory styles have been found to be protective against stroke (Ostir, Markides, Peek, & Goodwin, 2001), rapid progression of HIV (Taylor, Kemeny, Reed, Bower, & Gruenewald, 2000), and general mortality rates in the elderly (Cohen & Pressman, 2006; Maruta, Colligan, Malinchoc, & Offord, 2000).

The overriding theme to emerge from a decade of positive psychology research is that mental health (consisting of positive emotion, engagement, purpose,

positive relationships, and positive accomplishments) is something over and above the absence of mental illness, and it is quantifiable and predictive. It predicts lack of depression, higher achievement, and—intriguingly—better positive physical health. The most important theme that runs through the tantalising positive physical health outcomes is a link between positive psychology and positive health: Subjective well-being, as measured by optimism and other positive emotions, protects one from physical illness. I take up this rationale again when I discuss the operationalisation of positive health into high status on combinations of subjective, biological, and functional measures.

CONCEPTUAL FRAMEWORK

In formulating the conceptual framework for positive psychology, we took the scientifically unwieldy notion of “happiness” and broke it down into several more quantifiable aspects: positive emotion (the pleasant life), engagement (the engaged life), and purpose (the meaningful life). Similarly, I believe that the global notion of positive health—beyond the absence of illness—can be broken down into three kinds of independent variables: subjective, biological, and functional. Each of these realms is quantifiable, and the combination of these can be used to predict health targets of interest: longevity, health costs, mental health, and prognosis. The biological measures for the most part will vary with the medical disorder under study. The subjective measures will be similar for all disorders under study. The functional measures may be a combination of measures developed specifically for a disorder and measures that will be used across all of the disorders.

- Subjective—when a person feels great, defined by high ends of measures of several psychological states. These states are (a) a sense of positive physical well-being. The individual enjoys a sense of energy, vigor, vitality, robustness (as opposed to a sense of vulnerability to disease, tenuousness of health status, health-related anxiety); (b) the absence of *bothersome* symptoms, measured, for example by the Somatic Symptom Inventory; (c) a sense of durability, hardiness, and confidence about one’s body (as opposed to a sense of fragility, susceptibility to disease); (d) an internal health-related locus of control so that the individual feels a measure of control over health; (e) optimism, measured for example by the Attributional Style Questionnaire and by content analysis of verbatim materials, and confidence about one’s future health (as opposed to anxiety, bodily preoccupation, disease fear); (f) high life satisfaction, as measured for example by Quality of Life Enjoyment and Satisfaction Questionnaire (Q-LES-Q); and (g) positive emotion, minimal and appropriate negative emotion, high sense of engagement and meaning

(see the panoply of measures at www.authentic happiness.org). This domain quantifies the link between positive physical health and mental health and builds on the contribution that Positive Psychology has begun.

- **Biological**—the positive ends of physiological function and anatomical structure distributions. There are biological variables relevant to health generally, such as body mass index, blood pressure, temperature, pulse rate, complete blood count, lipids/cholesterol, urine analysis, liver function tests, blood sugar, and electrolytes. For the most part, however, biological variables are specific to specific disorders, and here, for example, are ones specific to the four candidate disorders on which I suggest the new field first concentrate:
 1. Biological measures of coronary heart disease and/or congestive heart failure: exercise tolerance test results, cardiac ultrasound, cardiac catheterisation results (including ejection fraction).
 2. Biological measures of chronic obstructive pulmonary disease; pulmonary function test (spirometry) results (including forced expiratory volume, vital capacity), arterial oxygen saturation, and chest X-ray.
 3. Biological measures of osteoarthritis: skeletal X-rays, erythrocyte sedimentation rate, inflammatory cytokines, joint examination.
 4. Biological measures in diabetes mellitus: blood sugar, hemoglobin A-1c, renal function (BUN, proteinuria), cardiac function (electrocardiogram), visual acuity.
- **Functional**—how well does the individual function? This category includes two classes of data: first the high ends of *laboratory test data*, such as speed of gait and choice reaction time. Such laboratory measures of positive physical capacity include exercise tolerance in cardiac disease, balance and lower extremity sensation in diabetes, activity level in pulmonary disease, flexibility, walk time and grip strength in arthritis. The second class of data is situated in the individual's *personal ecology*, the "person–environment fit"—the optimal state of adaptation between one's bodily function and the positive physical requirements and demands of one's chosen lifestyle: work, love, and play. This entails the absence of impediments in meeting all of the demands of one's job, family and social life, chosen activities and vocations and the presence of excellent positive physical and mental strength, energy, endurance to permit success at the chosen positive physical and mental tasks of one's life. There are a number of scales to choose from and to map into clinical records, including:
 1. Short Form-36 (SF-36 Health Survey) which assesses self-reported behavioral functioning and limitations in social and role activities due to poor health (Anderson, Laubscher, & Burns, 1996).

2. Psychosocial Adjustment to Illness Scale (PAIS) which assesses psychosocial adjustment to current medical illness and the sequelae of previous illness (Derogatis, 1986).
3. Sickness Impact Profile (SIP) which assesses the patient's perception of the degree of impact health status and illness has on positive physical, psychosocial, and role function (Bergner, Bobbitt, Pollard, Martin, & Gilson, 1976).
4. Functional Status Questionnaire (FSQ) which was developed for use in ambulatory medical populations; this scale assesses role impairment in intermediate activities of daily life, social activities, work (Jette, Davies, Cleary, Calkins, Rubenstein, Fink, Kosecoff, Young, Brook, & Delbanco, 1986).
5. Global Assessment of Functioning (GAF) (Startup, Jackson, & Bendix, 2002).
6. Social and Occupational Functioning Assessment Scale (SOFAS) (Morosini, Magliano, Brambilla, Uglioni, & Pioli, 2000).
7. Global Assessment of Relational Functioning (GARF) (Dausch, Miklowitz, & Richards, 1996).

These latter three scales (based on DSM-IV) are usually attended to for degrees of poor functioning, but they also have high status ends, usually ignored, but important to the measurement of high status for person–environment fit.

Notice that high status on the subjective dimension, when combined with high status on the work and social items of the functional dimension, approximates closely the core meaning of *positive mental health* (Seligman, 2002). This is important, because it means that positive mental health (PMH) will serve not only as an independent variable for predicting positive physical health targets such as longevity and prognosis, but PMH itself can also be a target. The methods I propose are entirely symmetrical for positive physical and positive mental health; it is arbitrary in causal modeling which variables go on the left hand versus the right hand side of the equation. We will operationalise both these concepts using the ingredients above, and then use them both as predictors as well as longitudinal targets of prediction.

Four parallel questions will be illuminated in this way:

1. We can ask if high status on positive physical health—over and above absence of positive physical illness—predicts longevity, costs, and prognosis when illness strikes.
2. We can ask if high status on positive physical health—over and above the absence of positive physical illness—predicts excellent mental health as one ages.
3. We can ask if high status on mental health—over and above the absence of mental illness—predicts longevity, costs, and prognosis when illness strikes.

4. We can ask if high status on mental health—over and above the absence of mental illness—predicts excellent mental health as one ages.

One should, of course, test for all interactions, for example, to see if the combination of positive mental health and positive physical health—beyond the absence of illness—is particularly predictive of longevity, later mental health, health costs, and prognosis. In just this operational way, the discipline of positive health dissolves the dichotomous thinking of mental *versus* positive physical illness.

These three classes describe the independent variables that constitute positive health. They can be measured across all domains yielding “global” positive health as above. They can also be assessed within a domain, e.g. rheumatology: combining biological X-ray measures, subjective measures of stiffness and mobility, and functional measures of movement. These three classes of variables are non-exclusive and they can be statistically combined (e.g. linearly, as in the APGAR measure, or in weighted form once they are used to causally model the target dependent variables below). Similarly, the target dependent variables are non-exclusive, and they, too, can be statistically combined and along with the independent variables can be causally modeled. I am aware that the health variables may not be monotonically related to good outcomes. Body mass index, for example, likely entails morbidity at both the very fat and very thin ends of the continuum, so researchers must be prepared to model curvilinear relationships between independent variables and health targets (Lusky, Barell, Lubin, Kaplan, Ani, Shohat, Lev, & Wiener, 1996).

What then might positive health, so measured, predict? What are the target dependent variables of interest?

- Longevity. How long individuals go on to live.
- QALY's & DALY's. Quality adjusted life years and/or disability adjusted life years that individuals go on to live.
- Health Costs. Does it cost less for health and illness among individuals in positive health?
- Prognosis. Within a domain, the progression of disease: heart failure, the course of arthritis, duration of remission from cancer. This also includes reserve, how well an individual responds to the challenges of disease and trauma.
- Mental Health. Is high status on the subjective, as well as the social and work functional variables, as one ages, predicted by the independent variables?

These dependent variables are non-exclusive, and they can be statistically combined and along with the independent variables, they can be causally modeled. This kind of analysis can be conducted for global health (e.g. longevity

adjusted for quality of life) or for specific diseases (e.g. what set of predictive positive health variables augur good prognosis for CVD after heart failure).

The following hypotheses can be tested within this framework:

- Is the concept of positive health definable and measurable?
- Does positive health measured operationally in this way predict longevity (adjusted for disability and quality of life), health costs, mental health, and prognosis?

Notice that the hypotheses mostly concern people who are all illness free (and are judged “healthy” by the usual disease-free criterion) at baseline, but some of them are high on the three classes of positive health measures, and others are low. In our choice of datasets to analyse we will look for samples of such healthy, disease-free individuals. Longevity, adjusted for QALY’s and DALY’s, mental health, and health costs will be the primary target for these analyses.

The Choice of Flagship Target Disorders

The same kind of analysis that we will do for longevity and medical costs among samples of disease-free individuals will also be done for prognosis in specific disorders. In selecting the specific disorders to study, several factors must be taken into account. First, the disorders selected should be directly and closely associated with the target dependent variables. This means that the disorder should be serious enough to affect longevity, it should be costly in terms of medical care and its course, and prognosis should be variable. Second, in order to be able to generalise our findings, the disorders should be a significant public health problem; should be prevalent; should be impairing and disabling; should have measures already developed to quantify severity and morbidity; should have longitudinal studies available for analysis; and should cover the spectrum from progressive and degenerative disorders on the one hand to those that are relapsing and remitting on the other.

Four disorders meet all these criteria well: coronary heart disease and congestive heart failure, diabetes mellitus, chronic obstructive pulmonary disease/emphysema, and osteoarthritis. Other candidate disorders that could be selected for study at a later point would include examples that are particularly disabling (such as blindness, dementia, or paraplegia), or particularly expensive (end stage renal disease or rare diseases with extraordinarily expensive therapies such as Gaucher’s disease or some forms of breast cancer).

FLAGSHIP STUDIES

Imagine a cross-disciplinary steering committee whose job was to carry out the flagship studies of a positive health endeavor. What would it do? Much

of its early work would be taken up with the definition, operationalisation, and selection of measures in the subjective, biological, and functional realms of positive health. Within each of these three realms there are a large variety of measures the steering committee will review, bringing in relevant experts, and then choosing from. At the same time, the steering committee will start to digest the 10 or more existing datasets, which will allow for flagship tests of the major predictions.

Part of the choice will rest on the amenability of these datasets to analysis in terms of the independent variable candidates. So, for example, in the Grant study of 200 Harvard graduates of the classes of 1939–43, followed until death, positive physical and mental health was well measured every five years (Vaillant, 2002). So this is a candidate dataset since longevity, quality of life, mental health, health care costs, and prognosis once illness has occurred, are all known.

The thornier issue is analysis of the independent variables within the framework, because the measures taken in the 1940s do not map all that well into modern measures. Consider optimism. No optimism questionnaires were administered, but verbatim essays were written at several points. These essays can be reliably and validly content analysed for optimism (Peterson, Luborsky, & Seligman, 1983), as well as for some of the other subjective variables. So close examination of the datasets will allow the steering committee to decide what independent variables to choose, as well as which datasets will be most fruitful.

I do not expect that any single dataset will be close to adequate. Nor do I expect that even the sum total of the datasets will exhaustively test the predictions. Nor are we unaware that combining data from different studies is a difficult problem. So the most time-consuming activity will be the mining of the datasets. The framework also points to the creation of an ideal battery of measures to be easily incorporated into new or ongoing longitudinal studies.

THE COPENHAGEN-MEDICI MODEL IN POSITIVE PSYCHOLOGY AND POSITIVE HEALTH

Some scientific advance can be carried out in the traditional vertical laboratory structure of academia, or by routine collaboration between two such laboratories. Defining a field of positive health, and carrying out the flagship research to demonstrate its viability, is not such an endeavor. The knowledge, skill sets, opinion-making, and scientific tools do not sit in the laboratory of any one or two investigators. This is truly cross-disciplinary work and is an endeavor best done by a group of very senior investigators, whose skills and knowledge complement one another, and who are put in very close touch with each other. In this regard, I have come to take seriously a new model of doing science.

This article is the first place I report on the success of a new way of doing science and its promise for forging the field of positive health. Mihaly Csikszentmihalyi, Ed Diener, Christopher Peterson, George Vaillant, and I carried out just such an endeavor at the outset of positive psychology. We called it the *Copenhagen-Medici model*, after the intellectual and social framework that gave us the Renaissance under Cosimo (the “Great”) Medici and later gave us the structure of the atom under Niels Bohr. It began informally in 2000 under a grant from Atlantic Philanthropies (then anonymous) when I created a steering committee of scientists to chart the course of positive psychology and to carry out the flagship work. It came to fruition under a generous grant from the Templeton Foundation in 2004–07.

The Positive Psychology Center of the University of Pennsylvania created an infrastructure of collaborations between the most promising young scientists (Templeton Junior Fellows), visiting consultants, and the steering committee of Templeton Senior Fellows. We lived together in Philadelphia for four to six weeks a year and met daily around five projects:

- How positive emotion, engagement, and meaning build life satisfaction, productivity, and health (directed by Peterson and Seligman).
- The development of national well-being indicators to supplement economic indicators (directed by Diener).
- The study of spirituality in successful lives (directed by Vaillant).
- The study of Psychological Capital (directed by Csikszentmihalyi).
- The development of mirror Chinese and Spanish websites for www.authentic happiness.org (directed by Peterson and Seligman).

In the 11 months between each of the three residency periods, we carried out these projects back in our home laboratories.

It worked. By subjective report, this grizzled group of senior scientists called it the “best intellectual experience of their lives”, and the junior fellows concurred. By objective deliverables, it was enormously productive. By opinion-making, news of its scientific progress was reported extensively by major media around the world. The success of this model was due to the ongoing interaction among the participants, which enriched each of the projects as well as stimulated new collaborations.

I suggest that a Copenhagen-Medici scientific structure might well work for positive health. It would consist of six people whose interdisciplinary skill set and knowledge would span

- Measurement
- Longitudinal studies
- Health economics
- Mental illness
- Prognosis

- Well-being
- Cardiovascular systems
- Fitness and energy
- Aging
- Stress

The two direct deliverables would be the (a) conceptualisation and measurement of positive health, including an ideal battery of measures to be grafted onto existing longitudinal health studies and future ones, and (b) discovery of confirming and disconfirming evidence within existing longitudinal studies of the effects of positive health on longevity, health costs, mental health, and prognosis.

But the most important implication will be interventions and refinements of protocol. The predictive studies will, if successful, find specific subjective, functional, and biological variables that appear by causal modeling to mediate longevity, lower health costs, and better prognosis.

There is a methodology which both isolates causality and is of enormous health care benefit: random assignment placebo controlled intervention studies. At this point we can only guess which variables will be good predictors and therefore good candidates for interventions and refinement of protocols, but the logic of intervention that follows from those specific discoveries can be stated. What surprising interventions and refinements of protocol might follow from identifying biological, functional, and subjective components of positive health—which in turn were discovered to predict longevity, health costs, mental health, and prognosis?

Here are some not implausible, hypothetical examples:

- *Subjective Main Effects.* Assume that we find that a high (upper 10%) sense of “engagement” (flow, time stopping, and loss of self-consciousness), very low depressive symptoms (bottom 5%) and upper 10% of “life satisfaction” predict prognosis in heart failure. Inexpensive, replicated web-based exercises exist for increasing engagement. When individuals identify their signature strengths (www.authentic happiness.org VIA test) and use their highest strengths in a new way at work, life satisfaction increases and depression decreases, with 6-month follow-up. The mechanism seems to be greater engagement at work and the exercise is self-sustaining. This suggests that this engagement-building intervention will improve prognosis in cardiovascular disease (CVD).
- *Subjective Interactions.* Assume we find that for females being in the upper 10% on marital satisfaction predicts good prognosis in early stage lung cancer (while work satisfaction has null predictive power), but for men being in the upper 10% on work satisfaction (but not marital satisfaction) predicts good prognosis in early stage lung cancer. Learning active-constructive responding (ACR) to good events reported

by a mate or by a co-worker increases marital and work satisfaction, respectively. ACR interventions (these are scripted and inexpensive) targeted toward mates should be carried out with women and ACR interventions targeted toward co-workers should be carried out with men in early stages of lung cancer (Gable, Reis, Impett, & Asher, 2004).

- *Functional Main Effect.* The person–environment fit—the optimal state of adaptation between one’s bodily function and the positive physical requirements and demands of one’s chosen lifestyle: work, love, and play given that person’s choice of lifestyle—is central to measuring how well a person functions. (I choose to play serious bridge, which requires night time stamina.) Assume we find that the upper 10% of this fit in leisure predicts good prognosis in CVD. Moving my night time stamina into the upper 10% will improve my leisure, person–environment fit. And hence my CVD prognosis.
- *Biological Main Effect.* Assume that we found that extremely low triglyceride level predicted good prognosis in CVD. This implies that driving normal triglyceride levels into the extreme low range would be life-saving.
- *Biological Subjective Interaction.* Assume we find that for people with poor body mass, high optimism predicts good prognosis in diabetes, but for individuals with excellent body mass, high optimism has no predictive power for prognosis. This implies that optimism enhancing interventions (Seligman, 2002) should be used for poor body mass, but would not be useful for excellent body mass individuals.
- *Prioritising Interventions.* Assume we find that for women only, high marital satisfaction has three times the predicted benefit for CVD than body mass. This implies that ACR with mates should take priority over weight loss. Prioritising interventions systematically takes cost (ACR is also cheaper than weight loss) and efficacy (ACR likely lasts longer) into account.

In conclusion, I suggested that the exploration of positive mental health, as opposed to mere absence of mental illness, has proved fruitful in positive psychology. Positive health, as opposed to mere absence of positive physical illness, has long been ignored scientifically. Positive health is not only a desirable in its own right, however; it is also a likely buffer against physical and mental illness. I believe that positive health can be defined and operationalised. Once operationalised, positive health is a potential predictor of longevity, health costs, mental health in aging, and prognosis when illness strikes. These flagship predictive studies will, if successful, find specific subjective, functional, and biological variables that mediate longevity, mental health, and lower health costs in general, and better prognosis in specific disorders. I believe the definitional and predictive studies will provide the necessary groundwork

for an expansive exploration of positive health. The most expansive and important implication of these flagship studies will be the interventions and refinements of protocol that follow; novel and inexpensive interventions that build the specific elements of positive health become candidates for the treatment and prevention of both positive physical and mental illness.

REFERENCES

- Anderson, C., Laubscher, S., & Burns, R. (1996). Validation of the Short Form 36 (SF-36) health survey questionnaire among stroke patients. *Stroke*, *27*, 1812–1816.
- Bergner, M., Bobbitt, R.A., Pollard, W.E., Martin, D.P., & Gilson, B.S. (1976). The sickness impact profile: Validation of a health status measure. *Medical Care*, *14*, 57–67.
- Buchanan, G.M. (1995). Explanatory style and coronary heart disease. In G.M. Buchanan & M.E.P. Seligman (Eds.), *Explanatory style* (pp. 225–232). Hillsdale, NJ: Erlbaum.
- Cohen, S., Alper, C.M., Doyle, W.J., Treanor, J.J., & Turner, R.B. (2006). Positive emotional style predicts resistance to illness after experimental exposure to rhinovirus or Influenza A virus. *Psychosomatic Medicine*, *68*, 809–815.
- Cohen, S., & Pressman, S.D. (2006). Positive affect and health. *Current Directions in Psychological Science*, *15*, 122–125.
- Dausch, B.M., Miklowitz, D.J., & Richards, J.A. (1996). Global Assessment of Relational Functioning Scale (GARF): II. Reliability and validity in a sample of families of bipolar patients. *Family Process*, *35*, 175–189.
- Derogatis, L.R. (1986). The Psychological Adjustment to Illness Scale (PAIS). *Functional Psychosomatic Research*, *30*, 77–91.
- Diener, E., Sandvik, E., Seidlitz, L., & Diener, M. (1993). The relationship between income and subjective well-being: Relative or absolute? *Social Indicators Research*, *28*, 195–223.
- Fredrickson, B.L. (2001). The role of positive emotions in positive psychology: The broaden and build theory of positive emotions. *American Psychologist*, *56*, 218–226.
- Fredrickson, B.L., & Branigan, C.A. (2005). Positive emotions broaden the scope of attention and thought–action repertoires. *Cognition and Emotion*, *19*, 313–332.
- Fredrickson, B.L., & Losada, M. (2005). Positive affect and the complex dynamics of human flourishing. *American Psychologist*, *60*, 678–686.
- Gable, S.L., Reis, H.T., Impett, E.A., & Asher, E.R. (2004). What do you do when things go right? The intrapersonal and interpersonal benefits of sharing positive events. *Journal of Personality and Social Psychology*, *87*, 228–245.
- Giltay, E.J., Geleijnse, J., Zitman, M., Hoekstra, F.G., & Schouten, E.G. (2004). Dispositional optimism and all-cause and cardiovascular mortality in a prospective cohort of elderly Dutch men and women. *Archives of General Psychiatry*, *61*, 1126–1135.
- Haidt, J. (2006). *The happiness hypothesis: Finding modern truth in ancient wisdom*. New York: Basic Books.

- Harker, L., & Keltner, D. (2001). Expressions of positive emotion in women's college yearbook pictures and their relationship to personality and life outcomes across adulthood. *Journal of Personality and Social Psychology, 80*, 112–124.
- Isen, A.M. (2005). A role for neuropsychology in understanding the facilitating influence of positive affect on social behavior and cognitive processes. In C.R. Snyder & S.J. Lopez (Eds.), *Handbook of positive psychology* (pp. 528–540). Oxford: Oxford University Press.
- Jette, A.M., Davies, A.R., Cleary, P.D., Calkins, D.R., Rubenstein, L.V., Fink, A., Kosecoff, J., Young, R.T., Brook, R.H., & Delbanco, T.L. (1986). The Functional Status Questionnaire: Reliability and validity when used in primary care. *Journal of General Internal Medicine, 1*, 143–149.
- Kubzansky, L.D., Sparrow, D., Vokonas, P., & Kawachi, I. (2001). Is the glass half empty or half full? A prospective study of optimism and coronary heart disease in the normative aging study. *Psychosomatic Medicine, 63*, 910–916.
- Kubzansky, L.D., & Thurston, R. (2007). Emotional vitality and incident coronary heart disease. *Archives of General Psychiatry, 64*, 1393–1401.
- Leedham, B., Meyerowitz, B.E., Muirhead, J., & Frist, W.H. (1995). Positive expectations predict health after heart transplantation. *Health Psychology, 14*, 74–79.
- Lusky, A., Barell, V., Lubin, F., Kaplan, G., Ani, V.L., Shohat, V., Lev, B., & Wiener, M. (1996). Relationship between morbidity and extreme values of body mass index in adolescents. *International Journal of Epidemiology, 25*, 829–834.
- Lyubomirsky, S. (2007). *The how of happiness: A scientific approach to getting the life you want*. New York: Penguin.
- Maruta, T., Colligan, R.C., Malinchoc, M., & Offord, K.P. (2000). Optimists vs. pessimists: Survival rate among medical patients over a 30-year period. *Mayo Clinic Proceedings, 75*, 140–143.
- Morosini, P.L., Magliano, L., Brambilla, L., Uglioni, S., & Pioli, R. (2000). Development, reliability and acceptability of a new version of the DSM-IV Social and Occupational Functioning Assessment Scale (SOFAS) to assess routine social functioning. *Acta Psychiatrica Scandinavica, 101*, 323–329.
- Ostir, G.V., Markides, K.S., Peek, M.K., & Goodwin, J.S. (2001). The association between emotional well-being and the incidence of stroke in older adults. *Psychosomatic Medicine, 63*, 210–215.
- Ostir, G.V., Ottenbacher, K.J., & Markides, K.S. (2004). Onset of frailty in older adults and the protective role of positive affect. *Psychology and Aging, 19*, 402–408.
- Peterson, C. (2006). *A primer in positive psychology*. New York: Oxford University Press.
- Peterson, C., Luborsky, L., & Seligman, M.E.P. (1983). Attributions and depressive mood shifts: A case study using the symptom-context method. *Journal of Abnormal Psychology, 92*, 96–103.
- Preamble to the Constitution of the World Health Organization (1946). *Official Records of the World Health Organization, 2*, 100.
- Scheier, M.F., Matthews, K.A., Owens, J.F., Magovern, G.J., Lefebvre, R.C., Abbott, R.A., & Carver, C.S. (1989). Dispositional optimism and recovery from coronary artery bypass surgery: The beneficial effects on positive physical and psychological well-being. *Journal of Personality and Social Psychology, 57*, 1024–1040.

- Seligman, M.E.P. (2002). *Authentic happiness*. New York: Free Press.
- Seligman, M.E.P., Rashid, T., & Parks, A.C. (2006). Positive psychotherapy. *American Psychologist, 61*, 774–788.
- Seligman, M.E.P., Steen, T.A., Park, N., & Peterson, C. (2005). Positive psychology progress: Empirical validation of interventions. *American Psychologist, 60*, 410–421.
- Startup, M., Jackson, M., & Bendix, S. (2002). The concurrent validity of the Global Assessment of Functioning (GAF). *British Journal of Clinical Psychology, 41*, 417–422.
- Taylor, S.E., Kemeny, M.E., Reed, G.M., Bower, J.E., & Gruenewald, T.L. (2000). Psychological resources, positive illusions, and health. *American Psychologist, 55*, 99–109.
- Vaillant, G.E. (2002). *Aging well: Surprising guideposts to a happier life from the landmark Harvard Study of Adult Development*. New York: Little, Brown.