ANALYTIC REVIEW

Nansook Park, PhD, Christopher Peterson, PhD†, Daniel Szvarca, BS, Randy J. Vander Molen, BA, Eric S. Kim, MS, and Kevin Collon, BA

Positive Psychology and Physical Health: Research and Applications

Abstract: *Positive psychology is the scientific study of a healthy and flourishing life. The goal of positive psychology is to complement and extend the traditional problem-focused psychology that has proliferated in recent decades. Positive psychology is concerned with positive psychological states (eg, happiness), positive psychological traits (eg, talents, interests, strengths of character), positive relationships, and positive institutions. We describe evidences of how topics of positive psychology apply to physical health. Research has shown that psychological health assets (eg, positive emotions, life satisfaction, optimism, life purpose, social support) are prospectively associated with good health measured in a variety of ways. Not yet known is whether positive psychology interventions improve physical health. Future directions for the application of positive psychology to health are discussed. We conclude that the application of positive psychology to health is promising, although much work remains to be done.*

Keywords: positive psychology; health psychology; health; well-being; positive interventions

> Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.
>
> —World Health Organization[1]

Most would agree with this statement, but over the years, it has been largely a slogan. More recently, theory, research, and applications from the perspective of positive psychology have helped articulate the meaning of health and well-being. Positive psychology is an umbrella term for the scientific study of the various contributors to a healthy and thriving life for the self and others (eg, positive emotions, life meaning, engaging work, and close relationships).[2] It is the study of strengths, assets, and positive attributes. The topics of concern to positive psychology are broad indicators of psychological, social, and societal well-being.

Research has shown that not only are physical, mental, and social well-beings important components for complete health, but they are also interconnected. Evidence is accumulating that a happy, engaged, and fulfilling psychological and social life is not just a consequence of good health, it is what leads people to live a healthy and long life.

This article provides a brief overview of what positive psychology is and addresses how theories, findings, and especially applications from positive psychology might pertain to physical health.

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What Is Positive Psychology?

Positive psychology is a perspective within psychology that studies optimal experience, people being and doing their best.[2-4] It challenges the assumptions of the disease model. Positive psychology

DOI: 10.1177/1559827614550277. Manuscript received May 29, 2012; revised April 15, 2014; accepted May 7, 2014. From the Department of Psychology, University of Michigan, Ann Arbor, Michigan. Address correspondence to Nansook Park, PhD, Department of Psychology, University of Michigan, 530 Church Street, Ann Arbor, MI 48109-1043; e-mail: nspark@umich.edu.

†Deceased.

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assumes that life entails more than avoiding or undoing problems and that explanations of the good life must do more than reverse accounts of problems. Someone without symptoms or disorders may or may not be living well. Positive psychology urges attention to what is taking place on the other side of the zero point of being problem-free. It calls for as much focus on strength as on weakness, as much interest in building the best things in life as in repairing the worst, and as much attention to fulfilling the lives of healthy people as to healing the wounds of the distressed. Research findings from positive psychology are intended to contribute to a more complete and balanced scientific understanding of human experiences and ways to foster thriving in individuals, communities, and societies.

One of the triggers for the introduction of positive psychology was the realization that since World War II, psychology as a field had devoted much of its effort to identifying, treating, and—occasionally—preventing problems such as anxiety and depression.[3] The yield of these problem-focused efforts has been impressive, but a myopic view of the human condition has resulted. It is as if psychology has viewed people as only fragile and flawed.

The goal of positive psychology is to complement and extend the problem-focused psychology, and an important idea from positive psychology is that one way to solve problems is by identifying and leveraging individual and societal strengths and assets.[5]

The topics of concern to positive psychology can be divided into 4 related topics[2,3]:

- Positive subjective experiences (happiness, gratification, fulfillment, flow)
- Positive individual traits (strengths of character, talents, interests, values)
- Positive interpersonal relationships (friendship, marriage, colleagueship)
- Positive institutions (families, schools, businesses, communities)

The value of positive psychology is to use the scientific method to sort through various claims and hypotheses about what it means to live well or poorly and to identify the relevant circumstances in each case.

Positive Psychology and Health

Can physical health be clarified by a positive perspective in the same way that psychological well-being has been clarified? To return to the definition of health by the World Health Organization with which this article began,[1] a positive perspective urges us to look beyond the mere absence of disease and infirmity to define what it means to be healthy in positive terms.[6-8] *Positive health* can be characterized not only as a long and disease-free life but additionally in terms of

- Less frequent and briefer ailments
- Greater recuperative ability
- Rapid wound healing
- More physiological reserves
- Chronic but nondebilitating diseases

Familiar within the field of epidemiology are the population-level concepts of DALYs (disability adjusted life years), HALYs (health-adjusted life years), and QALYs (quality-adjusted life years), which combine measures of morbidity and mortality into the same index.[9] Along these lines, HLEs (happiness-adjusted life expectancies) measure the quality of life in a nation by forming the product of the average life expectancy and the average happiness (aka subjective well-being, life satisfaction) in that nation.[10] Positive health concerns itself with the individual-level analogues of these constructs.

The field of positive health as we envision it overlaps with allied approaches concerned with *disease prevention, health promotion*, and *wellness*. The value of positive health as an approach in its own right is that it makes explicit the need to consider good health as opposed to the absence of poor health. Studies of "wellness" often end up being studies of illness, much as studies of mental "health" are often studies of mental illness.

Concern with positive health leads to an examination of *health assets*, individual-level factors that produce positive health in one or more of the ways that it might be defined, over-and-above the frequently studied risk factors for poor health, like high cholesterol, obesity, smoking, excessive alcohol use, and a sedentary lifestyle.[8] Among the psychosocial risk factors frequently examined with respect to poor health are anger, anxiety, depression, and social isolation. By the logic of a positive perspective, the mere absence of these negative states and traits is not all that matters for physical health. Important as well are positive states and traits, and the contribution of these in their own right needs to be studied, controlling for negative states and traits as well as other usual-suspect risk factors.

There have been extensive studies on negative psychological factors such as stress, depression, hostility, and their effects on increased risk of various health problems.[11] However, less known is whether certain positive psychological factors play a protective role against health risks. Research has shown that positive and negative emotions are not opposite and are only modestly correlated.[12,13] Experiencing each of those emotions is also involved in the activation of different brain regions.[14]

For the past several years, researchers have examined the contributions of health assets, especially psychological ones, to good health, while they have controlled for established risk factors. Researchers need to examine both risk factors and health assets to understand relationships between both positive and negative psychological factors as they together contribute to health outcomes.

Carefully conducted research shows that positive health assets indeed predict good health assessed in a variety of ways.[15] Among the positive psychology health assets foreshadowing good health are

- Positive emotions[16,17]
- Life satisfaction[17,18]
- Optimism[19-22]
- Forgiveness[23]

- Self-regulation[24]
- Vitality and zest[25]
- Life meaning and purpose[26-29]
- Helping others and volunteering[30-32]
- Good social relationships[33-35]
- Spirituality and religiosity[36,37]

There has been growing evidence that positive psychological characteristics affect health and longevity using various research methods including longitudinal prospective and experimental designs.

Perhaps, among the most well-known long-term studies that showed the possible link between positive psychological assets and health outcomes is The Nun Study.[38] A group of American nuns who were members of the School Sisters of Notre Dame wrote autobiographical essays in their early 20s when they joined the Sisterhood. Six decades later, researchers who had accessed the convent archive scored the emotional content of 180 essays in terms of positivity, and investigated whether they were related to the mortality of nuns. Indeed, positive emotional content was significantly related to longevity. The nuns who expressed more positive emotions (those in the upper 25%) in their essays, strikingly, lived on average 10 years longer than those expressing fewer positive emotions (those in the bottom 25%). In other words, happier nuns lived longer than less happy (but not depressed) nuns. Putting this in context, unhealthy behavior like smoking costs on average 7 years of one's life.[2]

In another experimental study, Cohen and his colleagues examined the relationships between positive emotions and the vulnerability of catching the common cold.[39] With 334 healthy adult volunteers in the community, they first measured both positive emotional experience, such as happy, pleased, lively, and relaxed, and negative emotional experiences, such as depressed, anxious, and hostile, over a few weeks using self-reports. Afterward, participants were invited to the study lab and exposed to rhinoviruses through nasal drops and monitored in quarantine for the development of the common cold. The researchers found that higher positive emotional experiences were related to lower risk of developing a cold and fewer reports of symptoms, while negative emotional experiences were not significantly related to catching a cold, but associated with reports of more symptoms. In short, this study showed that experiencing positive emotions was linked to greater resistance to developing the common cold.

The health benefits of positive psychological assets have been documented in different cultural settings as well. For instance, in Japanese culture, the most commonly used indicator of subjective well-being is the sense of "life worth living" (*ikigai*).[29] In a population-based prospective cohort study with 43, 391 adults in Ohsaki, Japan, lack of the sense of "life worth living" (*ikigai*) was significantly associated with higher risk of all-cause mortality over time. Those who reported having an *ikigai* in their life in a survey were more likely to be alive at a 7-year follow-up compared to their counterparts who did not find a sense of *ikigai*. Interestingly, the increase in mortality risk was due to an increase in mortality from cardiovascular disease and external causes such as suicide, but not to morality from cancer. Having a sense of "life worth living" (*ikigai*) often means having a purpose in life and realizing the value of being alive which could serve as a motivation for living.

In our own study with US adults, having life purpose played a protective role for heart health.[27] At a 2-year follow-up, the higher level of life purpose was prospectively related to lower risks of incidence of myocardial infarction among people with coronary heart disease at the baseline.

One of the ways to achieve a sense of life meaning and purpose is through helping others and doing regular volunteer work in communities. Research has shown that among elders, people who volunteer regularly are healthier and live longer.[30,31] In a longitudinal study with a nationally representative sample of community-dwelling older US adults, a study found that volunteerism predicted a lower risk of hypertension 4 years later.[31] That is, those who had volunteered at least 200 hours in the previous 12 months were less likely to develop hypertension risk compared to those who did not volunteer. However, lower levels of volunteering did not decrease the health risk of hypertension. It seems that dosage and intentions of volunteering matters for its health benefits. In another study, people who regularly volunteered for self-oriented motives did not exhibit lower risk for mortality 4 years later, while those who regularly and frequently volunteered for other-oriented motives showed lower risk of subsequent mortality.[32] In conclusion, it is good to be good!

One of the well-studied health-related positive psychology topics is optimism. Optimism is sometimes seen as pollyannaism, a naively rosy view of the world coupled with a "don't worry, be happy" attitude. However, optimism the way researchers study it is a disposition to an expectation that the future will entail more positive events than negative ones.[40] Optimists are neither in denial nor naive about challenges and difficulties in life. They simply attend to and acknowledge the positive.

Empirical research shows that optimism—usually assessed with self-report surveys—relates to good health and a long life. According to research, among asymptomatic men with HIV, optimism slowed the onset of AIDS over an 18-month follow-up.[41,42] Over an 8-year follow-up, optimism predicted better pulmonary function among older men, even when smoking was controlled.[43] In a longitudinal study of older men and women, optimism predicted not only better health but also lower levels of pain.[44] Our own research group recently reported a study of a large nationally representative sample of older adults (aged >50 years) in the United States showing that over a 2-year period, optimism predicted a lower likelihood of stroke, even after controlling for chronic illnesses, self-rated health, and relevant sociodemographic, biological, and psychological factors.[45]

In addition, the importance of social support and positive relationships on good health and well-being has long been documented. Supportive social relationships were associated with longevity, less cognitive decline with aging, greater resistance to infectious disease, and better management of chronic illnesses.[33-35]

Enough well-designed studies exist in support of the premise that health assets predict good health to warrant further investigation. Research so far provides compelling evidence that positive psychological health assets predict or are associated with various health outcomes and longevity among healthy populations. However, what is relatively unknown are the effects of positive health assets for recovery and long-term health outcomes among those with serious health problems such as cancer.

Furthermore, before we consider interventions that deliberately encourage these assets in order to reduce morbidity and mortality and to increase physical well-being, there are issues that need to be addressed.[46]

First, assuming that health assets do play a causal role, what are the mechanisms? Research to date has often been stark, usually demonstrating an association over time but not clarifying how it happens. We assume the pathways are multiple, from biological to emotional to cognitive to behavioral to social. For example, in the case of optimism, biologically, it has been linked to better immune system functioning, and behaviorally, people who are optimistic engage in healthier behaviors. They eat healthy, exercise, do not smoke or drink, and seek medical care when they need. Socially, optimists have better and more frequent social contacts. All of these are associated with health benefits.

It is unknown which pathway bears the most traffic or whether the mechanisms vary as a function of the specific health outcome (eg, cardiovascular disease vs the common cold) or as a function of the individual's age, gender, or lifestyle. Again, the best a researcher can do is to identify plausible mechanisms in a given study and explicitly investigate their role as mediators.

Second, are health assets a cause of good health or merely a correlated marker of its real causes? Indeed, the array of positive health assets is challenging for researchers, who cannot study or control all possible assets in the same investigation. No single study relying on correlational data can be definitive, so it is the overall body of research investigating health assets that must be examined to draw causal conclusions.[17]

Third, do the apparent benefits of health assets generalize to all kinds of health outcomes? Much of the relevant research has ascertained general health and all-cause mortality, and some of this work has relied only on self-reported information about health status. When researchers look at specific health outcomes assessed in more objective ways, psychological health assets seem to be more predictive of cardiovascular health than they are of freedom from cancer. So the benefits of health assets may be disease specific. A wider variety of diseases needs to be investigated from the positive health perspective. Moreover, research is not clear about the relative contribution of health assets to disease onset, to disease progression, and/or to recovery.

Positive Psychology Interventions for Physical Health

Researchers and practitioners have begun to develop intervention strategies based on positive psychology to increase positive psychological assets such as positive emotions or life satisfaction to bolster physical health. Whether increasing positive psychological assets will turn to better health outcomes is inconclusive. These intervention efforts targeting health assets in order to lead to better health not only have practical significance but also theoretical importance because appropriately done intervention studies would strengthen the claim that health assets actually cause good health.

We refer to interventions informed by positive psychology as positive psychology interventions. Sometimes positive psychology interventions entail a specific technique, like counting one's blessings at the end of the day or using one's signature strengths of character in novels ways.[47] At other times, the intervention uses a more-elaborated therapy package that combines different techniques, such as "Well-Being Therapy,"[48] and *Quality of Life Therapy*,[49] among others.

Intervention studies allow us to conclude that interventions informed by positive psychology can indeed change positive psychological states and traits, sometimes in lasting ways.[47,48] An important qualification is that long-term benefits do not result from one-shot interventions unless these lead to a change in how someone habitually lives.[18] Perhaps, what is required is a sustained lifestyle change.

On the face of it, intervening to increase a health asset should also have benefits for physical health, given the association between health assets and health outcomes. However, this argument does not embody a syllogism. Health assets may not be direct causes of good health, and even if they are, changing them may not result in better health. Said another way, we do not yet know if the health benefits of deliberately cultivated happiness or optimism or life meaning have the same benefits as their naturally occurring counterparts.[50]

Needed is intervention research that incudes physical health as an explicitly measured outcome. While it is interesting and important to show that a positive psychology intervention increases the psychological well-being of medial patients, the more exciting issue is whether the intervention also affects their physical health. If so, how quickly would health benefits be evident? And what is the mechanism by which the intervention has an effect?

In studying the mechanisms by which a positive psychology intervention influences physical health, the role played by mundane behavior should not be neglected.[46] There are

well-documented "healthy" ways of behaving,[51] including sleeping 8 hours a night, eating balanced meals, not smoking, not drinking to excess, and exercising regularly.

We suspect that positive psychology interventions, when successful, lead people not only to think and feel in more positive ways but also to behave in more healthy ways.[40,46] For example, optimistic people are more actively engaged with the world and are better problem solvers than their pessimistic counterparts. They have more frequent and higher quality social contacts as well as more social support. All of these factors may lead to healthier behaviors and habits and eventually to better health.

Positive psychology intervention studies for better health outcomes are in their infancy. So far, nearly all positive psychology interventions primarily targeted changing health-related behaviors such as physical activity, not the health outcome directly. Researchers have shown that positive psychology interventions influence some of the biological and behavioral processes implicated in good health. For example, inducing positive emotions speeds cardiovascular recovery following a stressful event.[52] Training in mindfulness meditation can boost immune function.[53] Psychosocial resilience training targeting positive emotions, cognitive flexibility, social support, life meaning, and active coping reduces total cholesterol among middle-aged adults.[54] Researchers have begun to investigate how positive affect and affirmation influence physical activity and medication adherence among patients with coronary artery disease,[55] asthma,[56] and hypertension.[57] The next step in each case is to show that such interventions also increase good health as opposed to its possible precursors.

Using a randomized controlled clinical trial, a group of researchers recently developed an intervention strategy that enhances positive affect and self-affirmation (PA/SA) and applied it to 3 different high-risk clinical populations (eg, hypertension, asthma, coronary artery disease) to change their health-related behaviors.[55-57]

In each clinical trial, patients were randomly assigned to either the patient education (PE) control group or the positive-affect/self-affirmation (PA/SA) intervention group. For the control group, each patient received an educational workbook, a pedometer, and a behavior contract for a physical activity goal. For the intervention group, each received PE control components and additionally, a PA/SA workbook chapter, bimonthly induction of PA/SA by telephone, and small mailed gifts. Patients in the PA intervention group were taught how to self-induce positive affect and self-affirmation using a workbook chapter, received bimonthly inducement of PA/SA by telephone, and unexpected small gifts (PA) mailed bimonthly several weeks before follow-up calls. During PA/SA induction phone calls, patients were told to "think about things that make you feel good" and take a moment each day to enjoy positive thoughts (PA), and to think about "proud moments" in their personal lives if they have a difficult time exercising (SA). For both groups, data were collected through a standardized bimonthly telephone follow-up for 12 months.

Using this research design, researchers conducted 3 parallel studies. In study 1,[55] patients were recruited right after percutaneous coronary intervention to increase physical activity among people with coronary artery disease. Compared to the control group, patients in the intervention group engaged in significantly more physical activities. In study 2,[56] physical activity among asthma patients who participated in the study was improved without differences between control and intervention groups. There was no significant effectiveness of intervention. In study 3,[57] the intervention effect on enhancing medication adherence among hypertensive African Americans was examined. Patients in both control and intervention groups received a culturally appropriate hypertension self-management workbook, a behavioral contract, and bimonthly telephone calls to help them better handle barriers to medication adherence. In addition, patients in the PA/SA intervention group received small gifts and bimonthly telephone calls to help them utilize positive thoughts into their daily routine and foster self-affirmation. At the 12-month follow-up, the intervention group showed a significantly higher level of medication adherence compared to the control group (42% vs 36%). The reduction of blood pressure was found among participants without significant differences across groups.

Mixed results from these intervention studies leave questions that need to be clarified with more studies to better understand the effectiveness of a positive psychology intervention on the different health outcomes before they are implemented in health practices.

Another line of positive psychology intervention research that attracted significant attention in recent years is applications of mindfulness meditation. It is assumed that meditations induce positive affect and lead to good health. A study led by a neuroscientist, Richard Davidson, demonstrated that mindfulness meditation produces changes in brain and immune function in a positive way.[53] In this study, 25 healthy employees at a work site received an 8-week intensive clinical training in mindfulness meditation. A weekly training class met for about 3 hours, and a silent 7-hour retreat was held during week 6 of the training. In addition, participants were instructed to perform home meditation practices for 1 hour each day, 6 days a week with the guided audiotapes. Brain electrical activity was measured at the baseline, the end of training, and 4 months after training. Also at the end of training, participants were vaccinated with influenza vaccine. Results from the meditation group were compared to those of the wait-list control group. Among the meditation group, brain activity in the left-sided anterior, associated with positive affect, was significantly increased. They also found significant increases in antibody concentrations to influenza vaccine in

the meditation group. Interestingly, the size of increase in left-sided activation predicted the size of antibody concentration rise to the vaccine.

In sum, the effects of positive psychology interventions on health outcomes are inconclusive. As stated before, positive psychology interventions seem to be more effective on reducing health risks among healthy individuals in the short term. However, its long-term health effects, especially, on a population with different health problems, is not clear.

Conclusions

Positive psychology is a perspective that urges scientific attention to strengths and assets that contribute to health and a flourishing life. We have described what positive psychologists have learned about the relationships between positive psychological assets and physical health in the past decade.

To date, the application of positive psychology to health is promising, although much work remains to be done. On the positive side, research shows that what we call positive psychological health assets (eg, positive emotions, life satisfaction, optimism, positive relationships, life purpose) are prospectively associated with good health measured in a variety of ways. Also on the positive side, interventions have been developed that increase these assets; lasting effects require a lifestyle change.

Not yet known is whether positive psychology interventions improve physical health, reducing morbidity and mortality, speeding recovery from illness, and so on. Investigators are beginning to study the health effects of such interventions. Studies to date suggest that positive psychology interventions reduce some of the biological and behavioral processes that affect health, but the next step is to study good health per se.

We urge an open mind about the eventual success of such interventions. It is important not to get too far ahead of the data. Perhaps these interventions will work as intended, perhaps not. For example, the lesson from studies of psychological interventions targeting negative states and traits such as anger and depression in the hope of reducing cardiovascular disease, with which they are associated, is instructive. The success of these interventions is checkered at best.[46] Whether the deliberate cultivation of positive health assets such as positive emotions or life purpose will be more successful in promoting good health than the reduction of psychological risk factors is not known, but is a question worth addressing.

In conclusion, growing evidence suggests that positive psychological assets are linked to health and longevity. However, more studies are necessary to learn more about when, why, how, and for whom positive psychological assets plays a role in good health and whether interventions that enhance these assets will yield health benefits. We urge a skeptical yet fair-minded attitude on the part of researchers and practitioners and that they pay particular attention to underlying mechanisms. Meanwhile, freedom from disease and longevity are not the only goals of life. Quality of life matters in addition to quantity of life. It is clear from research that experiencing frequent positive emotions, having sense of life purpose, paying attention to what is positive in life, and living a more socially integrated life is linked to one's quality of life across the lifespan. Thus, helping people cultivate positive psychological and social assets in life has potential for leading to happier, more meaningful, and healthier lives.

Acknowledgments

Christopher Peterson unexpectedly died on October 9, 2012, during the revision of this article. We are deeply indebted to his scholarly contributions and mentorship not only to this work but also to the foundation of positive psychology and its applications to various fields. His intellectual and personal contributions will continue to inspire and guide the positive psychology and positive health community.

Support for the preparation of this article was provided by the Robert Wood Johnson Foundation's Pioneer Portfolio, which supports innovative ideas that may lead to breakthroughs in the future of health and health care. The Pioneer Portfolio funding was administered through a Positive Health grant to the Positive Psychology Center at the University of Pennsylvania, Martin Seligman, Director. AJLM

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