

Positive Epidemiology?

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*The Dictionary of Epidemiology*¹ defines epidemiology as “the study of the distribution and determinants of health-related states and events.” The definition given by the WHO appends to this the phrase “(including disease).”² In both definitions, it is health, not disease, that is the focus. However, in actual practice, epidemiologic research focuses on diseases and on risk factors for disease, rather than on health and health assets. The time has come for this to change. The study of diseases and risk factors should be supplemented with a “positive epidemiology” focused on health assets and a broader range of health-related states.

Neglecting positive health assets³ gives an impoverished picture of the distribution and determinants of health and disease at the population level. Exposures that elevate risk of disease are important: poor nutrition, lack of exercise, pollution, discrimination, inadequate sleep, smoking, and so forth. However, these conventional environmental, behavioral, and social risk factors are only part of the picture of the forces that shape health. Such factors often cannot provide insight as to why some individuals are resilient, managing to thrive even in adverse circumstances, whereas others are not.^{4,5} Increasingly rigorous research has demonstrated that a range of positive social, psychological, and environmental factors powerfully affect physical and mental health, often with effect sizes of comparable magnitude to what is observed with conventional risk factors. For example, parental warmth in childhood affects a wide range of health and well-being outcomes.^{5–7} Participation in religious communities, both in childhood and in adulthood, is associated with better health including reduced risk for mortality, depression, substance abuse, and suicide.^{8,9} In prospective studies, education and employment are reliably associated with lower likelihood of mental health problems and higher likelihood of better physical health.^{10–12} Marriage predicts greater longevity and lower risk of depression.^{13–15} These assets powerfully contribute to health and may help offset or mitigate the adverse consequences of other harmful exposures from past or present experience. Several of these assets have been identified by the important work within social epidemiology,¹⁶ although often this subdiscipline too, like epidemiology more generally, is focused on harmful risk factors.

Evidence likewise indicates that positive psychological states—such as having a sense of purpose, being satisfied with life, or having a sense of optimism—are associated with good physical and mental health. These positive psychological states do not merely reflect the absence

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of poor mental health. Measures of psychological well-being independently predict less subsequent mental illness, controlling for baseline measures of mental illness.¹⁷ Increasing evidence has also demonstrated that psychological well-being is prospectively associated with better physical health, even after accounting for baseline health status. For example, meta-analyses of longitudinal studies have found that purpose in life and life satisfaction are each associated with reduced mortality risk (risk ratio (RR)_{purpose} = 0.83; 95% confidence interval [CI] = 0.75, 0.91; RR_{lifesatisfaction} = 0.88; CI = 0.83, 0.94) after accounting for a broad range of confounders.^{18,19} Numerous large rigorous longitudinal studies have likewise indicated that optimism is associated with decreased mortality rates and reduced risk of incident cardiovascular and other chronic diseases,^{20–23} and progress has been made in identifying potential mechanisms including via biological alterations (e.g., healthy lipid profiles) and better health behaviors (e.g., physical activity).^{24–27} Many of these positive psychological states may be considered life skills, rather than traits per se, and as such are modifiable.^{28,29} For example, a meta-analysis of 39 randomized trials of positive psychological interventions found that these were associated with modest but important effects on subjective well-being (standardized effect size: 0.34; 95% CI = 0.22, 0.45) and depression (standardized effect size: 0.23; 95% CI = 0.09, 0.38), with associations persisting at 3- or 6-month follow-up.³⁰

Failing to consider positive health assets—either positive psychological states or positive relational and communal factors—can impoverish our understanding of population health and trends in population health. As an example, there has been considerable recent discussion and concern over the increasing suicide rates in the United States. The US Centers for Disease Control and Prevention released a report indicating a rise in suicide rates in the United States from 10.5 per 100,000/yr in 1999 to 13.0 per 100,000/year in 2014.³¹ The causes for these trends are no doubt numerous. Most of the discussion has focused on harmful risk factors, such as rising prevalence of depression. Additional insight might be gained by considering the role of potential protective factors and if their prevalence is declining. One example is participation in religious community. Several rigorous longitudinal studies suggest very strong associations between attendance and lower suicide rates with effect sizes ranging from three- to six-fold reductions for those attending weekly.^{32,33} A recent Gallup poll indicates that over the same 15 years in which suicide rates have been rising, weekly religious service attendance declined from 43% to 36%.³⁴ If one were to extrapolate results from a cohort study to the general US population, it would suggest that approximately 40% of the increase in suicide rates from 10.5 per 100,000/yr in 1999 to 13.0 per 100,000/yr in 2014 could be attributed to declining participation in religious communities.³⁵

To ignore population trends and changes in these positive factors and focus only on the distribution of, and changes in, predisposing factors, is to be blind to the full sweep of forces that shape population health. Health assets and positive

psychological states should be a part of our understanding of the distribution and determinants of health and disease. However, positive psychological states and good community and relationships are desired, not only, nor even principally, because of their contributions to physical health. Rather, they are also desirable in their own right. This brings us to our second point.

We need a positive epidemiology that takes as its object not only disease but also health in its fullest sense. The World Health Organization (WHO) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”³⁶ This is a broad and expansive definition of health, one that extends beyond the health of the body, to the health or wholeness of the entire person, to a state of flourishing. The set of outcomes that might be included are potentially quite broad including not only mental and physical health but also happiness and life satisfaction, having a sense of meaning and purpose, having close relationships, and having strengths of character.^{37,38} These other outcomes should also arguably be studied as rigorously as we study physical health. Said another way, we should expand efforts to focus on not only positive exposures but also a broad range of positive outcomes, both positive physical health²² and psychosocial well-being.^{37,38}

To more adequately examine numerous health and well-being outcomes, we have advocated elsewhere for an “outcome-wide” approach to epidemiology^{39,40} wherein, for each exposure examined, its effects on numerous subsequent outcomes are assessed simultaneously. This approach, illustrated in recent analyses,^{7,9,41} has the advantage of being able to identify exposures, phenomena, or potential interventions that affect not only a single health or well-being outcome, but those that have effects on many. Moreover, for exposures that have beneficial effects on some outcomes and detrimental effects on others, such designs can uncover this phenomenon and allow for a more nuanced set of public health recommendations. These outcome-wide designs, in addition to having the potential of bringing research closer to the vision of health conceived by the WHO, are also able to allow for a more rapid expansion of knowledge as evidence for numerous outcomes is included in a single study.^{39,40}

Failure to consider a broad array of outcomes can lead to conclusions of questionable public health relevance. For example, a study published in 2017 that examined divorce as the exposure and body mass index and diet quality as outcomes concluded that “marital transitions after menopause are accompanied by modifiable health outcomes/behaviors that are more favorable for women experiencing divorce/separation than those entering a new marriage.”⁴² The article generated news with headlines such as “Women Who Stay Single or Get Divorced Are Healthiest”⁴³ or “Why Divorced Postmenopausal Women Are Healthier Than Those Still Married.”⁴⁴ Such headlines appear without due attention to the range of outcomes that might be considered as “health” and without consideration of

well-documented detrimental association of divorce with depression, loneliness, lower happiness, and higher all-cause mortality,^{45,46} and potential adverse effects on children.⁴⁷ Although there was not necessarily anything wrong scientifically with the study, and some of the issue was with the media reporting, a broader consideration of a full range of health and well-being outcomes would provide a more holistic picture.

More generally, we need a positive epidemiology because people care about things beyond just physical health behaviors and physical health—they care also about being happy, having a sense of meaning and purpose, being a good person, and having good relationships. Coming to a deeper understanding of the distribution and determinants of these other positive outcomes would constitute a valuable contribution to public health and to humanity. It is remarkable how much more we know empirically about the determinants of cardiovascular disease than we do about the determinants of having a sense of meaning and purpose in life, despite purpose being a desired outcome for almost everyone (not to mention purpose's contributions to physical health¹⁸). Through epidemiologic research, we have made tremendous advances in our understanding of the determinants of physical health and disease states. It is time now to turn the same set of empirical research methods to examine other positive outcomes as well, to examine health in its fullest sense, and to do so rigorously.

And this brings us to our third and final point. We need a positive epidemiology because of epidemiology's profound contribution to methodology, toward understanding causality, and toward the uncovering of determinants and mechanisms. We need an exporting of epidemiologic methods to other disciplines that study positive outcomes. Different disciplines have different strengths. The capacity and frequency with which the discipline of psychology has been able to implement randomized trials is astounding, even surpassing the already impressive work carried out in the biomedical sciences. However, certain exposures such as marriage or parental warmth cannot be randomized. In psychology, when randomized trials are not available, much of the research still relies on cross-sectional data; as a result, issues of temporality and causal ordering are left unaddressed. These designs and analyses are problematic. Cross-sectional studies can very rarely provide any evidence at all for causality. For example, marriage and happiness are correlated, but with cross-sectional data we do not know whether this is because marriage causes happiness or rather it is because happy people are more likely to subsequently become married. In fact, there is evidence for both,⁴⁸ but only with longitudinal data are we able to provide evidence for causal relationships.

The discipline of epidemiology has a long tradition of thinking deeply about study designs to assess etiology with observational data, and about methods and conceptual frameworks to address questions of causation.^{49–52} The array of observational study designs to address causation could be of benefit in other disciplines, and for outcomes beyond disease states. Conceptual frameworks such as potential

outcomes^{49,51,52} and causal diagrams,^{50–52} which epidemiology has employed, would be of value in other disciplines and for other outcomes. Likewise, the methodological toolkit developed within epidemiology concerning methods for time-varying exposures,^{52,53} approaches to causal mediation analysis,⁵⁴ a nuanced understanding of interaction and spillover effects,^{51,54} methods for bias analysis,^{51,55,56} all grounded in counterfactual theory, provide a powerful set of resources for understanding causality. These tools are beginning to be adopted within psychology and sociology,^{57–60} but they are not yet in widespread use. Although analyses of mediation and moderation are common in psychology, which has developed its own set of statistical tools, these statistical methods have not historically been tied to formal causal frameworks.^{54,60} As a result, confounding assumptions are often ignored, which can result in erroneous conclusions and severe bias.⁵⁴ Epidemiology has a great deal to contribute methodologically to the study of positive outcomes, and a great deal to learn from other disciplines that have already been studying these outcomes for some time. The development of a positive epidemiology could ultimately facilitate the exporting of powerful epidemiologic methods and causal frameworks to settings in which they are very much needed, bringing insights from multiple disciplines together.

Yet another methodologic strength of the discipline of epidemiology that could be leveraged to study a broad range of positive outcomes is the large multiuse cohort infrastructure. Large studies of tens of thousands of participants, followed carefully over decades, with rich data on social, demographic, and health-related variables have been the source of tremendous advances in our knowledge of the determinants of physical and mental health. By inserting into these cohort studies a variety of other positive outcomes beyond physical health, these same data resources could be leveraged to propel forward our understanding of the determinants of other aspects of well-being. To that end, we have previously proposed a brief set of items capturing “flourishing” across a range of six domains including^{37,38}: (1) happiness and life satisfaction; (2) self-rated physical and mental health; (3) meaning and purpose; (4) character and virtue; (5) close social relationship; and (6) financial security. Two items were selected for each domain based principally on widespread use and validation in the existing well-being literature^{37,61}; these are given in the Table. These items could be inserted in existing cohort studies to make use of the already rich data resources to better and more rigorously study numerous aspects of human well-being. Such inclusion could facilitate a rapid development and expansion of a robust positive epidemiology both in studying etiology and in surveillance and tracking of these positive outcomes. Even the tracking and surveillance of these positive outcomes would be a substantial contribution as we currently have almost no tracking of these in the United States.

The discipline of epidemiology has made tremendous advances in our understanding of health and disease. The discipline likewise has a great deal to contribute to the study of

TABLE. Flourishing Measure^{37,38} and Questions

Domain	Question/Statement ^a
D1. Happiness	Q1. Overall, how satisfied are you with life as a whole these days?
D1. Happiness	Q2. In general, how happy or unhappy do you usually feel?
D2. Mental and physical health	Q3. In general, how would you rate your physical health?
D2. Mental and physical health	Q4. How would you rate your overall mental health?
D3. Meaning and purpose	Q5. Overall, to what extent do you feel the things you do in your life are worthwhile?
D3. Meaning and purpose	Q6. I understand my purpose in life
D4. Character	Q7. I always act to promote good in all circumstances, even in difficult and challenging situations
D4. Character	Q8. I am always able to give up some happiness now for greater happiness later
D5. Close social relationships	Q9. I am content with my friendships and relationships
D5. Close social relationships	Q10. My relationships are as satisfying as I would want them to be
D6. Financial stability	Q11. How often do you worry about being able to meet normal monthly living expenses?
D6. Financial stability	Q12. How often do you worry about safety, food, or housing?

Cronbach's alpha for the flourish measure taken as a sum of the responses is 0.86.⁶¹ The flourish measure is copyrighted under a Creative Commons License, but can be used without permission for noncommercial purposes if proper citation is given.^{37,38} Further scoring information is available at: <https://hfh.fas.harvard.edu/measuring-flourishing>.

^aEach question or statement is evaluated 0–10. Anchors are: Q1 (0 = not satisfied at all, 10 = completely satisfied); Q2 (0 = extremely unhappy, 10 = extremely happy); Q3 and Q4 (0 = poor, 10 = excellent); Q5 (0 = not at all worthwhile, 10 = completely worthwhile); Q6, Q9, and Q10 (0 = strongly disagree, 10 = strongly agree); Q7 and Q8 (0 = not true of me, 10 = completely true of me); Q11 and Q12 (0 = worry all of the time, 10 = do not ever worry).

other positive outcomes such as happiness, purpose, character, and relationships. We need a positive epidemiology to understand the full range of health assets, and not only traditional risk factors. We need a positive epidemiology because people care about more than just physical health. We need a positive epidemiology because, both with respect to data and to methodology, the discipline has so much potential to contribute yet further to the flourishing of all humanity.

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