Genetics of Psychological Well-Being
The Role of Heritability and Genetics in Positive Psychology

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Chapter 1

Human flourishing and salutogenetics

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Human flourishing and salutogenetics: an introduction

This chapter will introduce readers to the theory and conception of psychological well-being (PWB) as consisting of the hedonic and the eudaimonic traditions. Positive psychology, the scientific study of positive human functioning and flourishing (Seligman and Csikszentmihalyi, 2000), has only recently embraced the notion of well-being as including eudaimonic approaches that articulate ways in which individuals function well in life. However, the work on flourishing, which combines the hedonic with the eudaimonic measurement of well-being, has yielded findings indicating the additional benefits of functioning well in life in addition to feeling good about life (e.g., Keyes and Annas, 2009; Keyes and Simoes, 2012). In addition to my own model of flourishing, I will review the conceptions and measurement of three newer measures of flourishing.

The public health benefits in terms of reduced mental illness and premature mortality attributable to flourishing have led to increased interest in the etiology of well-being. Behavioral genetics, with its focus on understanding the genetic and environmental etiology, has been disease-focused. When it has focused on happiness, behavioral genetics, like positive psychology, has primarily studied the hedonic facets of well-being. Yet, recent studies have shown that eudaimonic well-being is highly heritable and shares the same genetic sources as hedonic well-being (Keyes, Myers, and Kendler, 2010). As such, the field of behavior genetics could benefit from expanding its scope to include eudaimonic well-being. With this conceptual and theoretical expansion, behavioral genetics can produce important insights into positive mental (and physical) health through the study of salutogenetics. The salutogenic approach is supported by the mounting empirical evidence of the two-continua model at the phenotypic (Keyes, 2005a) and genetic (Kendler et al., 2011) levels. That is, health is more than the absence of illness and genetic risk; it is also the presence of well-being and the genetic propensity for well-being.

Pathogenesis and salutogenesis

Salus is the Latin word for the presence of health and the name for the Roman goddess of positive health. Salus is equated with, or derived from, the Greek term, Hygeia. The Greek physicians and philosophers viewed health as more than the absence of illness in distinguishing health from illness. Hart's (1965) classic article describes the origin myth of modern medicine to the cult of Asclepius, a deity in ancient Greece known as the father of medicine. The daughters of Asclepius represented the complementary branches of medicine. Panacea cured illness; Hygeia promoted good health. The snake winding itself around the staff of Asclepius symbolizes Hygeia, because snakes routinely shed their skin and thereby restore vitality. In taking the Hippocratic oath, today's medical students unwittingly swear allegiance to protecting good health and not merely treating the presence of illness. Originating in ancient Greece, salutogenesis
is the study of the etiology of positive health. Salutogenetics is therefore a branch of salutogenesis where the focus is on the genetic and environmental causes of positive health.

What determines whether an approach or field of inquiry is salutogenic? Before positive psychology, several areas of research studied positive constructs. The field of resilience, for example, studied strengths. Such strengths in the resilience literature are called protective factors, because they buffered against illness or worse-than-average development in the face of adversities such as poverty, abuse, neglect, or household turmoil. However, including individual strengths (e.g., confidence) in a study does not make an approach salutogenic. The difference between a pathogenic and salutogenic model is the outcome, not the predictive or explanatory variables.

A pathogenic approach to health measures the presence and absence of illness conditions, and views health as the absence of illness. A salutogenic approach to health measures the presence and absence of health, and conceives of health as the presence of positive attributes. For me, the rule that the dependent variable distinguishes pathogenic from salutogenic can hopefully clarify confusion surrounding the use of the term “salutogenesis.”

Scholars often refer to their work as salutogenic when they are studying illness or negative attributes as the outcome. This was sometimes true of the sociologist Aaron Antonovsky, who popularized the term salutogenesis. His pioneering contribution to the literature was his sense of coherence (SOC) construct. By the outcome criterion, Antonovsky (1979) often used a pathogenic model, because he was studying whether the dimensions of SOC—i.e., comprehensibility, manageability, and meaningfulness—were protective of illness (e.g., mortality and heart disease) in the face of stress.

Similarly, positive psychology is not always “positive” per se. It is tempting to view the constructs in the two primary handbooks of positive psychology (David, Boniwell, and Ayers, 2013; Lopez and Snyder, 2009) as solely positive and therefore salutogenic. Positive psychology can be salutogenic and pathogenic, and the latter justifies the former. The salutogenic mission of positive psychology seems more justified when positive constructs are shown to ameliorate, mitigate, or prevent social problems such as stress, illness, and mortality. That is, it seems even more important to study the origins of hope when hope is shown to prevent mental illness. To me, then, the positive and the negative—both salutogenesis and pathogenesis—are should be intimately connected.

Indeed, for many years, health has been seen as more than the absence of illness; it is, to quote Sigirest, "something positive" (Sigirest, 1941, p. 100). In 1948 the World Health Organization (WHO, 1948) adopted the definition of health as the presence of a positive state of human capacities and functioning, and not merely the absence of illness. In proffering this definition, the WHO implicitly relied on the two-continua model of health and illness. However, there was no scientific evidence supporting the two-continua model, because there were no measures of positive mental or physical health. Indeed, there was little interest in positive health throughout most of the twentieth century, because modern medicine created the zeitgeist of the single continuum where health was the absence of illness.

The underpinnings of positive psychology

Many may credit positive psychology with moving forward the science of the study of positive health and human strength. While positive psychology has certainly brought attention and resources to the study of good health, strengths, and virtues, I would argue that seven scientific trends that occurred in the wake of World War II made it possible for the emergence of positive psychology.

World War II woke the world and psychology to the need to understand what people were feeling and thinking. As such, introspection through self-report once again became a legitimate
method of data collection. Gordon Allport declared that "[i]t is not enough to know how man reacts: we must know how he feels, how he sees his world, ... why he lives, what he fears, for what he would be willing to die. Such questions of existence must be put to man directly" (Severin, 1965, p. 42). Second, the study of quality of life moved beyond objective and negative indicators such as crime and poverty to include large-scale surveys that asked citizens how happy and satisfied they felt about their lives (Gurin, Veroff, and Feld, 1960). Third, the humanistic psychology championed, among other things, the study of self-actualization and human potential (Maslow, 1968), which counterbalanced the prevailing Freudian and Behaviorist views of humans as faulty and reactive.

Fourth, the study of risk factors expanded to include resilience (Werner and Smith, 1977), where scholars brought attention to strengths and assets that permitted individuals to develop normally despite exposure to adversity. Fifth, the study of stress expanded to include individuals' capacity to cope with stress and the fact that perception of stressors could mitigate the event if viewed as a challenge rather than a threat (Lazarus and Folkman, 1984). Sixth, the study of person-environment fit emerged and brought attention to positive mental states (e.g., flow) that resulted from the matching individual skill and environmental challenge (Csikszentmihalyi, 1975). The study of flow counterbalanced the prevailing focus on negative mental states and problems of person-environment fit. Last, as life expectancy and longevity increased, gerontologists began to study the process of successful aging (Baltes, 1987), which countered the prevailing view of aging as inevitable declines in health and functioning.

Two scholars published seminal articles in the 1980s that brought the study of well-being and its two traditions into the mainstream of psychology. The first was Ed Diener's (1984) review article of the state of the first generation of research and theory on subjective well-being (SWB), which had focused mainly on hedonic—or emotional—well-being, defined by the combination of high life satisfaction, and high positive and low negative affect. Diener (1984) encouraged greater attention to top-down models of SWB, where personality and individual attributes were viewed as potential causes of SWB. Moreover, Carol Ryff (1989) operationalized the theory of PWB consisting of six facets (autonomy, self-acceptance, positive relations with others, personal growth, environmental mastery, and purpose in life). Ryff (1989) was the first to champion "eudaimonic" well-being as a neglected approach to research on well-being. Together, Diener and Ryff brought the two streams of research on well-being first reviewed by Gurin, Veroff, and Feld (1960) and Jahoda (1958) into mainstream psychology.

I would argue that nearly all of the topics in the handbooks of positive psychology could be traced back to one or more of these trends. As such, all of us who now enjoy the umbrella of positive psychology owe much in recognition to the pioneers who brought us subjective quality of life, humanism, resilience, stress perception, coping, flow, successful aging, and happiness distinctions. The last contribution—the distinctions and study of kinds of happiness—is central to this chapter and the argument for a salutogenic approach in behavioral genetics. I therefore turn next to the topic of the two faces of happiness, or rather PWB, which is used in this edited book as the general term for well-being of human mind and soul (to be distinguished from Ryff's specific concept of PWB).

The two faces of psychological well-being

Social and psychological scientists have created a variety of self-report measures to tap into people's subjective sense of the quality of their lives. Although research shows that people use multiple criteria to evaluate their subjective experiences, there are two general lines of research that have
evolved. According to one line of well-being research, evaluations of the degree of positive feelings (e.g., happiness) experienced and perceptions (e.g., satisfaction) toward one’s life overall constitute well-being (Diener et al., 1985). A second stream of well-being research specifies dimensions of positive functioning (Ryff, 1989) and social well-being (Keyes, 1998). Overall, PWB consists of two broad domains: hedonic and eudaimonic well-being (see Huta and Waterman, 2013 for an excellent review of various approaches to these two traditions).

Hedonic well-being

The emotional well-being cluster of symptoms reflects the presence and absence of positive feelings about life operationalized as evaluations of happiness and satisfaction with life, and the balance of positive to negative affect experiences over a time period. Thus, emotional well-being can be conceptualized as the balance of feelings (positive and negative) experienced in life (Bradburn, 1969), and the perceived feelings (happiness and satisfaction) (Andrews and Withey, 1976). Most single-item measures of life satisfaction are adaptations of Cantril’s (1965) Self-anchoring Scale, which asks respondents to “rate their life overall these days” on a scale from 0 to 10, where 0 meant the “worst possible life overall” and 10 meant “the best possible life overall.” Variants of Cantril’s (1965) measure have been used extensively in numerous studies worldwide, and have been applied to the measurement of avowed happiness with life (Andrews and Withey, 1976). Single-item indicators and multi-item scales of life satisfaction and happiness have also been developed and employed extensively (see Diener, 1984, p. 546 for a list of measures of emotional well-being).

Most measures of positive and negative affect investigate the frequency or the duration of time that a respondent reports the experience of symptoms of positive and negative affect. For example, individuals are often asked to indicate how much of the time during the past 30 days they have felt six types of negative (e.g., blue) and six types of positive (e.g., calm and peaceful) indicators of affect. Response choices for the negative affect and positive affect items are usually “all,” “most,” “some,” “a little,” or “none of the time.” Estimates of internal reliability of the multi-item scales of satisfaction and happiness and positive and negative affect usually exceed .80 (see e.g., Diener, 1994). Studies also support a proposed factor structure of emotional well-being with a cognitive domain of avowed life satisfaction and an affective domain of happiness (Bryant and Veroff, 1982).

In sum, hedonic well-being consists of two dimensions. The first dimension reflects declared emotion, where individuals indicated “this is what I typically feel” as measured by the positive affect items. The second dimension is evaluative, where individuals think about their lives and then use emotion words to evaluate how they feel about their lives. Because the evaluative dimension emphasizes how people think about their lives, it is sometimes referred to as the “evaluative” or “cognitive” aspect.

Eudaimonic well-being

As mentioned earlier, Ryff’s (1989) article was an important milestone for the field of happiness. Drawing inspiration from Aristotle’s view of happiness as eudaimonia and Jahoda’s (1958) review of perspectives on positive mental health, Ryff (1989) argued that happiness is not only about feeling good about life, but it is also about functioning well in life. In Ryff’s PWB model, positive functioning encompasses six dimensions: self-acceptance, positive relations with others, personal growth, purpose in life, environmental mastery, and autonomy.
Self-acceptance requires the maintenance of esteem for one's self, while facing complex and sometimes unpleasant personal aspects of the self. In addition, individuals accumulate a past and have the capacity to recall and remember themselves through time. Healthy individuals perceive themselves positively across the life-course and accept all parts of themselves. Positive relations with others consist of the ability to cultivate warm, intimate relationships with others. It also includes the presence of satisfying social contacts and relations. Autonomy measures the degree to which people seek self-determination and personal authority, in a society that at times requires obedience and compliance. However, healthy individuals seek to understand their own values and ideals. In addition, healthy individuals see themselves guiding their behavior and conduct from internalized standards and values.

Environmental mastery is the active engagement of the environment to mold it to meet one's needs and wants. Healthy individuals recognize personal needs and desires and also feel capable of taking, and permitted to take, an active role in getting what they need from their environments. Purpose in life captures the adult's perception of having direction in life, even when the world offers none or provides unsatisfactory alternatives. Healthy individuals see their daily lives as fulfilling a direction and purpose, and therefore, they view their personal lives as meaningful. Last, personal growth is the ability and desire to enhance existing skills and talents, and to seek opportunities for further personal development. In addition, healthy individuals are open to experience and have the capacity to identify challenges in a variety of circumstances.

Social well-being

Keyes (1998) has asserted that positive functioning includes social challenges and tasks, and proposed five dimensions of social well-being. Whereas Ryff's PWB model (and its component, positive relations with others) represents more private and personal criteria for evaluation of one's functioning, social well-being epitomizes the more public and societal criteria, whereby people evaluate their functioning in life. Put simply, Ryff's PWB model is premised on the pronouns "I" and "Me," while social well-being is premised on the pronouns "We" and "Us." These societal dimensions consist of social coherence, social actualization, social integration, social acceptance, and social contribution.

Social integration is the evaluation of the quality of one's relationship to society and community. Integration is therefore the extent to which people feel they have something in common with others who constitute their social reality (e.g., their neighborhood), as well as the degree to which they feel that they belong to their communities and society. Social contribution is the evaluation of one's value to society. It includes the belief that one is a vital member of society, with something of value to give to the world. Social coherence is the perception of the quality, organization, and machinations of society, and it includes a concern for knowing about the world. Social coherence is the obverse of a sense of meaninglessness, and involves appraisals that society is discernible, sensible, and predictable.

Social growth, sometimes referred to as social actualization, is the evaluation of the potential and the trajectory of society. This is the belief in the positive evolution of society and the sense that society has potential that is being realized through its institutions and citizens. Social acceptance is the construal of society through the character and qualities of other people in general. Individuals must function in a public arena that consists primarily of strangers. Individuals who illustrate social acceptance trust others, think that others are capable of kindness, and believe that people can be industrious. Socially accepting people hold favorable views of human nature and feel comfortable with others.
Newer approaches to the measurement of flourishing

Table 1.1 shows the dimensions of hedonic and eudaimonic well-being and the items measuring the four dominant models of flourishing. In what follows, strong agreement means that at least three of the four models measured the same (or similar) dimensions. Modest agreement means that two of the four models measured the same (or similar) dimensions. There are some distinctive dimensions that will be mentioned last.

There is strong agreement that hedonic well-being consists of positive emotions and interest in (or engagement with) life. There is strong agreement that eudaimonic well-being consists of self-acceptance (or self-respect or self-esteem), a sense of personal mastery (or competence), warm interpersonal relationships, purpose in life, and optimism, where optimism can be directed toward the future in general or the future improvement of society.

I have separated personal growth and accomplishment, because the former refers to improving oneself, while accomplishment is either about reaching goals (for Seligman) or a sense of accomplishment (for Huppert). Yet, a case could be made that growth and accomplishment belong to the same dimension, in which case one could argue that here, too, is strong consensus across models. In turn, there is modest agreement that eudaimonic well-being includes contribution.

In terms of distinctiveness, only Huppert's model includes a hedonic dimension that reflects what might be called vitality (calm and peaceful, and a lot of energy). Moreover, in terms of eudaimonic well-being, Huppert includes resilience, or the ability to get back to normal after challenges in life. My own model is distinctive in including autonomy, acceptance of others, and social coherence. Overall, then, there is considerably more agreement than distinctions in terms of dimensions that reflect hedonic and eudaimonic well-being. However, even where there is strong to moderate agreement, each model provides unique questions to operationalize each dimension. There have been no studies that have empirically examined some or all of the proposed measures of flourishing, so it is not possible yet to assess how much overlap exists among the four models.

Seligman proposed his flourishing model in his 2012 book (Seligman, 2012). The acronym of Seligman's model is PERMA, which refers to the core features of flourishing that consist of positive emotions, engagement, relationships, meaning, and accomplishment. The items in Table 1.1 for Seligman's model are from the PERMA-Profiler (PERMA-P) by Butler and Kern (2013). The first peer-reviewed article on the psychometrics of the PERMA-P appeared in July of 2014 (Kern et al., 2014). Items were administered to a sample of 516 Australian male students from a private Anglican boys' school. Factor analysis confirmed the presence of four of the five factors: positive emotions, engagement, relationships, and accomplishment (PERA). The items reflecting the meaning component (e.g., my life has purpose, and what I do is valuable and worthwhile) loaded on the "relationship" factor.

In contrast to the PERMA-P items (three items per domain) in Table 1.1, Kern et al. (2014) investigated a wider array of potential items in their study. The positive emotions factor consisted of 13 positive emotions (cheerful, joyful, energetic, delighted, proud, fearless, calm, happy, excited, active, daring, strong, lively). The engagement factor consisted of six items (When I am reading or learning something new, I often lose track of how much time has passed; I often become completely absorbed in what I am doing; I get so involved in activities that I forget about everything else; When I see beautiful scenery, I enjoy it so much that I lose track of time; How often have you felt interested?; and, How often have you felt alert?). The relationship factor consisted of nine items (My relationships are supportive and rewarding; I actively contribute to the happiness and well-being of others; I generally feel that what I do in my life is valuable and worthwhile; When
### Table 1.1 Models and measure of human flourishing

<table>
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<tr>
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<th>Keyes</th>
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<th>Diener</th>
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<tbody>
<tr>
<td>Hedonic Well-Being</td>
<td>During the past month, how often did you feel (1–5; never to every day)</td>
<td>In general, how often have you felt (1–5; never to every day)</td>
<td>Response options: 1–7; strongly disagree to strongly agree</td>
<td>Taking all things together, how happy would you say you are? (0–10; extremely unhappy to extremely happy)</td>
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<td>Positive Affect</td>
<td>satisfied, happy</td>
<td>joyful, positive, contented, and happy*</td>
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<td>Vitality</td>
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<td>Interest, Engagement</td>
<td>interested in life</td>
<td>excited and interested in things</td>
<td>I am engaged and interested in my daily activities</td>
<td>I love learning new things (1–5; strongly agree to strongly disagree)</td>
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<td></td>
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<td>absorbed in what you are doing</td>
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<td></td>
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<td>like you have lost track of time while doing something you enjoy</td>
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<tr>
<td>Eudaimonic Well-Being</td>
<td>Response options: same as above</td>
<td>Two response options: never to always; not at all to completely, both 0–10</td>
<td>Response options: same as above</td>
<td>Response options: 1–5; strongly disagree to strongly agree</td>
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<tr>
<td>Self-acceptance,</td>
<td>that you liked most parts of your personality</td>
<td>I am a good person and live a good life</td>
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<td>In general, I feel very positive about myself</td>
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<td>Respect, Esteem</td>
<td></td>
<td>People respect me</td>
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<td>Competence, Mastery</td>
<td>good at managing the responsibilities of your daily life</td>
<td>How often are you able to handle your responsibilities (0–10; never to always)</td>
<td>I am competent and capable in the activities that are important to me</td>
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<td>Table 1.1 (continued) Models and measure of human flourishing</td>
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<td><strong>Keyes</strong></td>
<td><strong>Seligman</strong></td>
<td><strong>Diener</strong></td>
<td><strong>Huppert</strong></td>
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<tr>
<td>Warm, Good, Intimate Relationships</td>
<td>you had warm and trusting relationships with others</td>
<td>To what extent have you been feeling loved</td>
<td>My social relationships are supportive and rewarding</td>
<td>There are people in my life who really care about me</td>
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<td>How satisfied are you with your personal relationships</td>
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<td>To what extent do you receive help and support from others when you need it</td>
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<td>Personal Growth</td>
<td>you had experiences that challenged you to grow and become a better person</td>
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<td>Accomplishment</td>
<td>How much of the time do you feel you are making progress toward accomplishing your goals</td>
<td>Most days I feel a sense of accomplishment from what I do</td>
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<td></td>
<td>How often do you achieve the important goals you have set for yourself</td>
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<td>Resilience</td>
<td></td>
<td>When things go wrong in my life it generally takes me a long time to get back to normal (reverse score)</td>
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<tr>
<td>Autonomy, Confidence</td>
<td>confident to think and express your own ideas and opinions</td>
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<td>Purpose in Life</td>
<td>your life has a sense of direction or meaning to it</td>
<td>In general, to what extent do you lead a purposeful and meaningful life</td>
<td>I lead a purposeful and meaningful life</td>
<td>I generally feel that what I do in my life is valuable and worthwhile</td>
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<td>In general, to what extent do you feel that what you do in your life is valuable and worthwhile</td>
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<td>To what extent do you generally feel you have a sense of direction in your life</td>
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Table 1.1 (continued) Models and measure of human flourishing

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<tr>
<td>Contribution (to Others or Society)</td>
<td>you had something important to contribute to society</td>
<td>I actively contribute to the happiness and well-being of others</td>
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<td>Social Integration</td>
<td>you belonged to a community (like a social group, school, neighborhood, etc.)</td>
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<tr>
<td>Optimism (Self or Society)</td>
<td>our society is a good place, or is becoming a better place, for all people</td>
<td>I am optimistic about my future</td>
<td>I am always optimistic about my future</td>
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<td>Acceptance of Others</td>
<td>that people are basically good</td>
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<tr>
<td>Social Coherence</td>
<td>that the way our society works made sense to you</td>
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*Happiness is measured by asking, “Taking all things together, how happy would you say you are?” (0–10, not at all to completely)

something good happens to me, I have people in my life that I like to share the good news with; I have friends that I really care about; There are people in my life who really care about me; When I have a problem, I have someone who will be there for me; I feel that I am loved; and, I feel that my life has a purpose). Last, accomplishment included six items (I finish whatever I begin; Once I make a plan to get something done, I stick to it; I am a hard worker; I keep at my schoolwork until I am done with it; Most days I feel a sense of accomplishment from what I do; and, During the past two weeks, I have been pleased about completing something that was hard to do).

The four PERA scales correlated positively with life satisfaction, hope, gratitude, school engagement, growth mindset, spirituality, physical vitality, and physical activity. The four PERA scales correlated negatively with somatic symptoms, depression, and anxiety. Clearly, scale development is under way, but at early stages. At the moment, only scores on each factor and a total score are reported, with a higher score on the total scale reflecting greater levels of flourishing.

Diener and colleagues (Diener et al., 2010) published the first paper on their new flourishing scale. As seen in Table 1.1, the flourishing scale (FS) consists of eight items that measure positive functioning. Although Diener includes a scale of positive emotions and negative emotions, the hedonic aspects of well-being are not used in the assessment of flourishing. The FS has shown excellent reliability and, to some degree, construct validity (the latter being a matter of time for more studies to be done using that measure). Diener et al. (2010), however, correlated the FS with PWB, the latter being a key component of my own (Keyes, 2002; Keyes, Shmotkin, and Ryff, 2002) assessment of flourishing. The correlation of the FS with total PWB (all six scales summed
together) was either .73 or .78 (it was not clear from the article which correlation referred to FS and PWB or FS and the Basic Needs Satisfaction scale).

Huppert (Huppert and So, 2013) used existing measures of well-being and also created items that were intended to be the obverse of mental disorder. She identified ten items for a well-being module in the European Social Survey administered to a representative sample of 43,000 Europeans aged 15 years or older. Exploratory factor analysis yielded two factors underlying the ten items shown in Table 1.1. The first factor, called “positive characteristics,” consisted of item 1 (calm and peaceful), item 2 (how happy?), item 3 (a lot of energy), item 5 (positive about myself), item 8 (takes a long time to get back to normal), and item 10 (optimistic about my future). The second factor, called “positive functioning,” included item 4 (love learning new things), item 6 (people love and care for me), item 7 (sense of accomplishment), and item 9 (what I do is valuable and worthwhile). A categorical assessment was devised that required a high level of happiness (item 2: how happy?) combined with high levels on at least four of the remaining five items reflecting positive characteristics and at least three of the four items reflecting positive functioning. Results showed the highest prevalence of flourishing at 40.6% in Denmark compared with the lowest prevalence of 9.3% in Portugal (Huppert and So, 2013). There was no evidence provided for the construct validation the European Social Survey (ESS) scale of flourishing, although the scale has good face validity. The authors correlated it with an item measuring life satisfaction, and performed factor analyses on the flourishing items and included life satisfaction. When life satisfaction was not included, factor analysis yielded the two-factor solution described earlier. When including life satisfaction, Huppert and So (2013) found a three-factor solution that they called positive emotions, positive characteristics, and positive functioning, which is about the equivalent of the Mental Health Continuum "short form" (MHC-SF) questionnaire's components of emotional, psychological, and social well-being. But, national differences in the rates of a measure said to reflect flourishing and a measure correlated with life satisfaction do not equal the standard of construct validation.

In terms of scoring, two models provide categorical assessments of flourishing (Huppert, Keyes) and two used continuous scores without cut-points. Like the MHC model (Keyes 2002), Huppert (Huppert and So, 2013) provides an algorithm for computing a categorical diagnosis of flourishing that consists of hedonic and eudaimonic facets of well-being. Seligman’s and Diener’s scales are continuous measures of flourishing, with no proposed cut-point or norms for determining flourishing categorically. However, as mentioned earlier, no studies proposing new scales of flourishing have included other measures of flourishing to determine distinctiveness of the news scales and what each contributes to this growing literature that was not measured by existing scales of flourishing.

Hone and colleagues (Hone et al., 2014) have published a review of my model of flourishing with three more recently proposed models by Diener (Diener and Biswas-Diener, 2008), Huppert (Huppert and So, 2013), and Seligman (Seligman, 2012). Hone and colleagues (2014) note that all four models use the distinction of hedonic and eudaimonic well-being and share many commonalities in terms of indicators of flourishing. According to Hone et al. (2014). The most striking difference between the four [models] lies in the imbalance between the substantial body of cross-cultural empirical evidence supporting the psychometric properties and utility of Keyes’ model, and the relative paucity of published research behind the three more recently developed models. (p. 72)

With time and continued research, we will come to the best approach to flourishing, which is the one that scientifically best serves people and population mental health. Thus, in what follows, I
review the literature on flourishing that uses my model, not because I want to be narrow in my review, but because this is the primary body of empirical knowledge on the construct to date.

**From subjective well-being to mental health**

Mental health can be operationalized salutogenically under the rubric of SWB, or individuals’ evaluations of the quality of their lives. When such well-being is measured comprehensively, studies support the tripartite model consisting of emotional, psychological, and social well-being in U.S. adults (Gallagher, Lopez, and Preacher, 2009), college students (Robitschek and Keyes, 2009), and adolescents (Keyes, 2005b), as well as in various cultures. Thus, mental health can be measured in terms of the presence and absence of positive feelings toward one’s life and the presence and absence of positive functioning in various facets of life.

The MHC-SF was created to address the problem of the diagnostic threshold and to create a version more efficiently administered in epidemiological surveillance. The MHC-SF derives from the MHC “long form” (MHC-LF) used in the Midlife in the United States (MIDUS) study (Keyes, 2002). While the MHC-LF consisted of 40 items, the MHC-SF consists of 14 of the most prototypical items representing the construct definition for each facet of well-being. Three items (happy, interested in life, and satisfied) indicate emotional well-being, six items measure the six dimensions of Ryff’s PWB, and five items represent the five dimensions of social well-being. The response option for the short form was changed to measure the frequency (from “never” to “every day”) with which respondents experienced each sign of mental health during the past month, which provides a clear standard for the assessment and a categorization of levels of mental health that is similar to the survey assessment of mental Major Depressive Episode according to DSM-criteria.

Hundreds of studies have investigated the correlates and causes of life satisfaction, positive affect, happiness, PWB, and social well-being separately. There are many justifiable reasons for focusing on specific aspects of well-being. However, I have been more interested in the concept of mental “health,” and health, like illness, does not consist solely of either feelings or functioning. It is the merger of feeling good about a life in which individuals are functioning well that constitutes the presence of good mental health (Keyes, 2002). In the same way that depression requires symptoms of anhedonia, mental health consists of symptoms of hedonia. But, feeling good, in the same way as only feeling sad or losing interest in life, is not sufficient for the diagnosis of a clinical state. Rather, and in the same way that major depression consists of symptoms of mal-functioning, mental health must also consist of symptoms of positive functioning.

The continuum of mental health ranged from languishing, to moderate, to flourishing mental health. Individuals with flourishing mental health report feeling at least one measure of hedonic well-being plus six or more of the measures of positive functioning almost every day or every day during the past month. Individuals with languishing mental health, however, report feeling at least one measure of hedonic well-being with six or more measures of positive functioning never or maybe once or twice during the past month. Languishing is the absence of mental health—a state of being mentally unwell—which is tantamount to being stuck and stagnant, or feeling empty or that life lacks interest and engagement. Individuals who are neither flourishing nor languishing are diagnosed with moderate mental health.

Lamers and colleagues (Lamers et al., 2012) published a study that evaluated the measurement invariance of the MHC-SF using data from a representative sample of 1,932 Dutch adults who completed the MHC-SF at four time points over nine months. This study used item response theory and analytic techniques to examine differential item functioning (DIF) across demographics,
health indicators, and time points. The results indicated differences in the performance of one item (social well-being) for educational level, one item (social well-being) for sex, and two items (PWB) for age. However, none of the items with differential performance was large enough to affect any mean comparisons. The MHC-SF is highly reliable over time, as there was no DIF on ten of the items across demographics, health indicators, and over several time points. The four items with DIF were low and did not affect mean comparison after appropriate adjustments, and the means and reliabilities of the subscales were consistent over time. The MHC-SF is a highly reliable and valid instrument to measure positive aspects of mental health.

Joshanloo and colleagues (Joshanloo et al., 2013) found support for the factor structure (emotional, psychological, and social) and full metric invariance of the MHC-SF across three cultures: the Netherlands, South Africa, and Iran. Metric invariance means that the strength of the relationships between the MHC-SF items and latent factors are equivalent across groups and populations. Therefore, the relationship between the latent factors of the MHC-SF and other concepts (e.g., physical health) can be reliably compared across groups. Put simply, differences in the MHC-SF score and diagnosis between groups can be attributed to the group rather than the fact that the items function differently (i.e., the items mean different things to different people/groups) across groups. Moreover, differences in how the MHC-SF score and diagnosis predicts outcomes such as physical health by group can be attributed to group differences rather than the fact that the items function differently within each group.

From measurement to the two-continua model

The importance of measuring mental health in the same way as mental illness cannot be overstated, because it allows us to finally adequately test the hypothesis that mental health and illness belong to two separate continua. Indeed, the argument for promoting mental health is premised on the two-continua model, because good mental health is presumed to belong to a separate continuum from mental illness. Yet, the studies that did exist on the subject have only measured the emotional aspects of life satisfaction or happiness (Greenspoon and Saklofske, 2001; Heday, Kelley, and Wearing, 1993; Huppert and Whittington, 2003; Masse et al., 1998; Suldo and Shaffer, 2008; Veit and Ware, 1983). Numerous studies in mainstream psychology of emotion have shown that positive and negative emotions belong to separate continua (e.g., Bradburn, 1969; Watson and Clark, 1997), but as mentioned earlier, emotional disturbance or emotional vitality do not, in themselves, constitute states of mental illness or mental health.

Findings using the long and short forms of the MHC have supported the two-continua model. For example, the latent factors of mental illness and mental health correlated ($r = -.53$), but only 28.1% of their variance is shared in the MIDUS data (Keyes, 2005a). Recently, this model has also been replicated in a random sample of U.S. adolescents (aged 12 to 18 years) with data from the Panel Study of Income Dynamics's Child Development Supplement (Keyes, 2006), in Dutch adults (Westerhof and Keyes, 2008, 2010), Setswana-speaking South African adults (Keyes et al., 2008), Polish youth and adults (Karas, Cieciuch, and Keyes, 2014), South Korean adolescents (Lim, 2014), Italian adults (Pettillo et al., 2014), and several other cultures such as China, Iran, Norway, and Australia (Keyes, 2013).

There are several important implications of the two-continua model. First, even if all mental illness were cured tomorrow, this would not mean that everyone is mentally healthy or flourishing. This implication flows from the fact that the absence of mental illness does not imply the presence of mental health. In the American adult population between age 25 and 74 years, just over 75% were free of three common mental disorders during the past year (i.e., major depressive episode (MDE), any other episode (AOE), and just one episode (AOE)).
episode—MDE, panic attacks—PA, and generalized anxiety disorder—GAD). However, while just over three-quarters were free of mental illness during the past year, only about 20% were flourishing.

A second implication of the two-continua model is that the presence of mental illness does not imply the absence of mental health. Of the 23% of adults with any mental illness, 14.5% had moderate and 1.5% had flourishing mental health, while only 7% were languishing and had a mental illness. Thus, about 70% of adults with mental illness (i.e., MDE, GAD, or PA) had moderate or flourishing mental health (Keyes, 2002, 2005a, 2007). The absence of mental illness does not mean the presence of mental health, but the presence of mental illness does not imply the absence of some level of good mental health.

A third implication of the two-continua model is that level of mental health should differentiate level of functioning among individuals free of, and those with, a mental illness. Put differently, anything less than flourishing mental health is associated with impairment for persons with a mental illness and persons free of a mental illness. Findings consistently show that adults and adolescents who are diagnosed as not flourishing are doing worse in terms of physical health outcomes, healthcare utilization, missed days of work, conduct problems, and psychosocial functioning (Keyes, 2002, 2005a, 2006, 2007). Over all outcomes to date, individuals who are flourishing function better (e.g., fewer missed days of work) than those with moderate mental health, who in turn function better than languishing individuals—and this is true for individuals with a recent mental illness and for individuals free of a recent mental illness. Regardless of whether they have a high level of burnout, medical students who are not flourishing are more likely to seriously consider dropping out of school and to engage in suicide than students who are flourishing (Dyrbye et al., 2012). Dyrbye et al. (2012) also found higher rates of unethical conduct (e.g., said a medical test was pending when it had not been ordered) and fewer humanitarian values (e.g., personally want to provide care to the underserved) among students who were not flourishing.

A fourth implication is that changes in positive health may precede and increase risk of illness. Studies have shown that changes in the direction of flourishing lower the future risk of mental illness (Grant, Guille, and Sen, 2013; Keyes, Dhingra, and Simoes, 2010); compared to those flourishing, individuals not flourishing are at elevated risk at all ages between 25 and 74 of ten-year all-cause mortality (Keyes and Simoes, 2012) and suicidal ideation, plans, and attempts (Keyes et al., 2012). Moreover, and compared to individuals who are depressed, those not flourishing do not experience any more positive emotion as a result of doing more positive daily activities; however, individuals who are flourishing experience much more positive emotions when they do more of the same positive daily activities (Catalino and Fredrickson, 2011).

The problem is that, in the U.S., over half of adolescents, college students, and adults are not flourishing, but at the moment do not have a mental illness. Such individuals who are not flourishing are at increased risk of problems that cannot be fixed and for which treatments, in the case of mental illness, are costly and palliative (Insel and Scolnick, 2006). Worldwide, there is too much mental illness and not enough people are flourishing. Mental illness is a burden to society and so is the absence of flourishing. If we promote flourishing, we have found that you get more of what we want (i.e., good mental health) and less of what we do not want and cannot fix (i.e., mental illness). Yet, most nations continue to argue for providing more treatment as a way to achieve better mental health in their populations (see, e.g., London School of Economics and Political Science Centre for Economic Performance Mental Health Policy Group, 2006).

The catch and last implication of the two-continua model is that the things we know can lower the bad (e.g., lowering stress to lower depressive symptoms) do not necessarily increase the good (i.e., levels of positive mental health). Put another way, the genetic and environmental causes
of mental illness may not be shared with the genetic and environmental causes of flourishing. Indeed, we have found this to be the case (Kendler et al., 2011) and will therefore turn next to the evidence that supports the need for a salutogenetic approach in behavioral genetics.

**The need for salutogenetics**

With the exception of two studies I could locate (Archontaki, Lewis, and Bates, 2013; Gigantesco et al., 2011), both of which considered the six dimensions of Ryff's PWB, the literature on the genetic and environmental etiology of well-being has focused on some aspects of emotional well-being—satisfaction with life, happiness, or positive affect. The evidence suggests that a common set of genes underlies both life satisfaction and positive affect (Bartels and Boomsma, 2009; Lykken and Tellegen, 1996; Nes et al., 2006; Roysamb et al., 2002; Sturbe et al., 2005; Tellegen et al., 1988). Broad heritability estimates in these studies have ranged from 36% to 56%. No study found evidence for strong effects of the family environment, and one found support for sex-specific effects, with females reporting a slightly higher (8%) heritability estimate than males (Roysamb et al., 2003).

Based on the long form of the MHC measure and on the 670 pairs of same-sex twins from the MIDUS sample of U.S. adult twins, we have found strong support for the heritability of positive mental health and for the two-continua model at the genetic level (Kendler et al., 2011; Keyes, Myers, and Kendler, 2010).

First, the common pathway model was the best fitting model to the three phenotypic measures of positive mental health—emotional, psychological, and social well-being. In other words, the three measures of well-being all share a single common source of genetic variance that may be referred to as the latent propensity for good mental health. The latent factor of positive mental health was quite heritable at 72% among the population. We also found no evidence that the magnitude of genetic and unique environmental effects on any kind of well-being differed for males and females (Keyes, Myers, and Kendler, 2010).

Next, we investigated whether and how much of the highly heritable construct of positive mental health was shared in common with the genetic variance of the mental disorders measured in the MIDUS. The MIDUS twins received the same measures of well-being and past-year mental illness (i.e., MDE, GAD, PA) as the nationally representative sample of MIDUS adults. A common pathway model was the best fitting model to the three MIDUS measures of mental illness, as these measures of mental illness represent internalizing mental disorders. The latent factor for mental illness was also highly heritable, with 61% attributable to additive genetic effects among the population. We found that exactly 50% of the genetic influences of the common factor of mental health were shared with the genetic influence for the common factor of mental illness. In other words, half of the genetic influences on mental health and on mental illness are independent of each other. Moreover, less than 10% of the environmental influences on the common factor of mental health were shared with the common factor of mental illness, which means that the majority of the environmental causes of mental illness and of mental health are independent of each other. This evidence for the two-continua model has been replicated in recent studies that have focused on depression and the emotional facets of well-being (Franz et al., 2012; Nes et al., 2013).

As such, the two-continua model appears to be encoded in our DNA. Because there is some genetic overlap of mental illness and health, our findings suggest that it may be somewhat more difficult to reach high levels of well-being if one inherits strong genetic risk factors for depression or an anxiety disorder. However, high genetic liability to mental illness does not preordain
individuals to low levels of SWB. Conversely, inheriting a low level of genetic risk for mental illness by no means guarantees that an individual will flourish in life.

In short, the two-continua model appears to arise from the fact that as much as half of the genetic propensity for, and nearly all of the environmental causes of, positive mental health are independent of the genetic liability for, and environmental causes of, common internalizing mental disorders. At the phenotypic level, the absence of mental illness does not mean the presence of mental health, because the absence of genetic risk for internalizing mental illness does not mean the presence of high genetic potential for flourishing.

Conclusion

There is now substantial empirical evidence that PWB in the broad sense includes dimensions of positive functioning in addition to positive affect (or feeling good about life). Flourishing is the combination of feeling good about a life in which one is also functioning well. This distinction and the merger of feeling good and functioning well is important not merely for conceptual reasons that go back to ancient Greek philosophical distinctions about the good life or factor analytic evidence supporting the distinction. Rather, and until very recently, the fields of positive psychology and behavioral genetics have focused almost exclusively on hedonic forms of well-being.

Behavioral genetic evidence suggests that eudaimonic and hedonic measures share a single common source of genetic variance for men and women in the U.S. (Keyes, Myers, and Kendler, 2010). Yet, most studies using flourishing as the standard reveal that over half of youth and adults have not found a way to function well in a life where they feel quite good about life. When asked if they feel “very” or “quite” happy about life, most people in the U.S. and the U.K. (over 90%; Layard, 2011) feel good about life. However, many individuals feel good about life but are not functioning well, and they have worse outcomes in terms of mental illness (Keyes and Annas, 2009) and mortality (Keyes and Simoes, 2012) than those who are flourishing. The same is true of individuals who are functioning well but are not feeling very good about life, who have worse outcomes than those who are flourishing.

Americans have always thought of themselves as pragmatists, and I suspect that is true of most people around the globe. That is, we should stick with things that work. That does not ring true when it comes to health care today, especially the mental health of populations around the world. Despite living longer, we are parking more ambulances at the bottom of the cliff because more people are breaking down with mental illness. Two notions get in the way of progress: first, “if it’s not broken, there is no need to fix it”; second, “if it breaks, we can fix it” (or find a fix for it).

Anxiety and mood disorders are called “common” disorders because they are prevalent and start early, roughly between the ages of 15 and 26. Such mental disorders are recurrent because risk of a future episode increases with each new episode. Worse, all treatments for mental illness are palliative—they address the symptoms, not the causes. Whether it is physical or mental health, we say we want to “go to a destination called health,” but our roadmap is flawed, overly skewed toward treating and managing illness. Our stubborn beliefs that we can fix or manage problems are getting us nowhere in terms of reducing the amount of mental illness. We are lost, and either we do not know it or we only ask for direction from the experts trained in the broken system of treating our way out of health problems.

Science supports the two-continua model where the absence of mental illness does not translate to the presence of mental health. Increasing the good, when it comes to positive mental health, appears to protect against an increase in mental illness. That is, movement away from flourishing appears to increase, and movement toward flourishing appears to decrease, the risk of future
mental illness. Unless you are diagnosed as ill, health care policy and programs provide little to
nothing to help people who are not flourishing. This has to change, and this is where positive
psychology and salutogenetics become important, because both seek to understand and promote
positive health.

There are enough challenges that lie ahead for those who care about mental health and those
who care about mental illness. There is too much mental illness and there is too little flourishing.
Mental illness is a burden to society and so is the absence of flourishing. We will always need the
best available treatment, because prevention of illness will never be infallible. But, if we promote
flourishing, we might get more of what we want (i.e., good health) and less of what we do not
want (i.e., illness). We need promotion of positive mental health now more than ever to comple-
ment the treatment of mental illness.

How do we get to this promised land of the presence of good mental health? We now know that
flourishing is as genetic as mental illness. When many people hear this they panic and wonder if
they have the genes for flourishing. My response has been, "Don't panic, genes do not determine
the outcome" (see also Chapters 15 and 16). The scientific evidence now suggests that the quality
of the environment activates "what's inside." Epigenetically, a sick society activates genetic risks;
a healthy society should activate the genetic potential to flourish (see Chapter 13 on epigenetics).
The genetic potential for flourishing operates largely independently of genetic risk for conditions
like depression. This means that the two-continua model is in our DNA; we are wired for two
possibilities, and the one that wins is the one that our environment activates. Which one wins?

There is a Native American Indian story of an elder explaining to a young boy the two sides of
human nature. "Son," the elder says, "we are made up of two wolves and there is a battle going on
inside us all. One is negative and evil, the other is positive and kind." The son asks, "Which one
wins?" The elder replies, "The one you feed." We are feeding the wolf of illness and death, not
health and life.

We need different tools in our hands if we want more people to flourish in life. Everything is a
nail when all we have are hammers in our hands. Everyone is a patient if nations only have hospi-
tals, doctors, and medical procedures for the care of citizens' health. We will need to imagine and
build a system with a new kind of professional trained in the art and science of protecting against
the loss of flourishing and promoting it. To get to that place, we need to support the best minds
from around the world and from multiple disciplines to study the salutogenetic side of human
nature. The contributors to the chapters in this book are those pioneers whose research is building
the case for salutogenetics.

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