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## Development of Instruments and Evaluative Procedures on Contributors to Illness and Health

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### Abstract

Instruments available for a person-centered assessment of the causes of well-being and ill-being are described. Monitoring at the level of symptoms of illness and past lifestyle behavior has failed to promote change in well-being in a strong and consistent way. Therefore, we illustrate a way of assessing the interactions among multiple aspects of the causes of well-being. For example, at least three distinct aspects of human well-being are known to interact synergistically to promote health – neurobiological plasticity, self-regulatory functioning and virtue. The neglect of any one of the ternary aspects of well-being impedes understanding and treatment of the whole person. Each aspect can be reliably measured using quantitative and qualitative techniques to facilitate treatment planning and analysis of their interactions as a complex adaptive system, although further work is needed to clarify the content and structure of each aspect.

### Keywords

Diagnosis; health promotion; personality; person-centered care; plasticity; resilience; self-regulation; virtues; well-being

### Introduction

Methods for assessing contributors to health and illness have been available and well-documented in national surveillance projects since the mid-1970s. Public health initiatives have recognized the importance of voluntary lifestyle choice in determining both well-being and ill-being since the Canadian LaLonde report in 1974 [1]. The LaLonde report concluded that major improvements in health depended on lifestyle, environment and human biology in addition to the way healthcare services were organized. Likewise, the US Surgeon General in 1979 estimated that most deaths in the USA each year were the result of unhealthy lifestyles and the importance of lifestyle has been repeatedly confirmed since that time [2,3].

## Public health initiatives

In response to these findings, national health agendas were developed to try to modify lifestyles as a major strategy for enhancing health and preventing illness. These public health agendas have been reviewed and modified with objective targets for 1990, 2000, 2010 and 2020 in the USA. In 1991, *Healthy People 2000* moved beyond measurement of causes of mortality to measuring quality of life [4]. In the more recent US public health initiative, *Healthy People 2010*, there were 467 objectives in 28 focus areas including nutrition and weight, physical activity and fitness, mental health and tobacco use [5]. Information about the objectives of *Healthy People 2010* is compiled and monitored by the Office of Disease Prevention and Health Promotion of the US Department of Health and Human Services (US DHHS) [6]. Proposed objectives for *Healthy People 2020* are also available on the *Healthy People* website. The challenge of the new national initiative is to reduce unnecessary suffering, illness and to improve quality of life by health promotion, health protection and prevention of disease and infirmity. The two overarching goals for *Healthy People 2020* are to attain and promote a high quality of life for all people across all life states. The US DHHS intends to develop objectives to health track and monitor progress in improving the quality of life with regard to health and well-being across the US population.

In order to modify lifestyle practices, health risk assessment methods have been developed to inform and motivate progress, including measurement of predictors of morbidity and mortality, as well as measures of variables that promote and protect health or prevent illness. Health promotion is defined by the *American Journal of Health Promotion* as the “science and art of helping people to change their lifestyle to move toward a state of optimal health”. Lifestyle refers to all those behaviors over which we have voluntary control, including those choices and actions that modify our health risks. The variables that have been identified and studied scientifically in relation to predictors of health and illness include self-responsibility for health, physical activity and exercise, nutrition, interpersonal relationships and supports, safe use of drugs and alcohol, stress management, rest, and sleep, accident or injury prevention, smoking avoidance or cessation, sexual behaviors, and spiritual growth or fulfillment of potential [7].

## Measuring healthy and unhealthy behaviors

Instruments for assessing health risk and lifestyle were employed in Alameda County, California for assessing health risk since 1972 [8]. These early studies employed short instruments with six items to assess diet, exercise, alcohol and smoking. Later studies conducted by the Center for Disease Control (CDC) assessed a much larger range of predictors of health and illness risks. In 1980, the CDC developed a *Health Risk Assessment* (HRA) based on 43 questions to predict the risk of dying within one decade based on national census data. The questions used included demographics, blood pressure, cholesterol levels, driving habits, smoking, alcohol and gender-specific health issues [9]. Different versions of the questionnaire are available for middle-aged individuals and those 55 years of age and older.

The CDC is also conducting surveillance projects for high school and college students using other instruments for cross-state comparisons. The *Youth Risk Behavior Survey* (YRBS) was

developed to study health risk behaviors of high school students (grades 9-12). The surveys are conducted in 45 minute class sessions and assess behaviors that predict risk in six areas: (1) behaviors that predict violence or accidental injuries, (2) alcohol and drug use, (3) tobacco use, (4) risky sex, (5) healthy diet, (6) physical inactivity. A version is available for college students also [10].

Several other lifestyle and health risk appraisal instruments are available, including the *Lifestyle Assessment Questionnaire* of the National Wellness Institute [11], the *Wellness Index* and its short version the *Wellness Inventory* [12,13], the *Personal Lifestyle Questionnaire for Adolescents* [14] and the *Health Promoting Lifestyle Profile* [15]. The *Lifestyle Assessment Questionnaire* of the National Wellness Institute has 50 and 100 item versions and is available online [11]. Its health assessment measures six dimensions including physical, occupational, emotional, social, intellectual and spiritual aspects of lifestyle. There are questions in ten sections that elicit self-reports about physical activity, nutrition, self-care, safety, social and emotional wellness, emotional wellness and sexuality, emotional management, intellectual wellness, occupational wellness and spirituality and values.

The *Wellness Index* and *Inventory* were developed by the Wellness Institute, a 380 item self-scoring questionnaire with 12 dimensions including self-responsibility and love, breathing, sensing, eating, moving, feeling, thinking, communicating, sex, finding meaning and transcending [12,13]. It is scored to assess the balance of energy investment in these 12 life areas.

### Identifying the causes of well-being

The most thorough instruments for the assessment and prediction of well-being have included measures of the symptoms and behaviors that reflect a person's sexual, physical and material, emotional and social, intellectual and cultural and spiritual functioning. Surveys that measure symptoms and behavioral indicators of physical and mental functioning have been extensively used by national surveillance projects with the objective of improving well-being and reducing ill-being. Measures of mind-body functioning have also been used in clinical and research programs to modify lifestyle behaviors. Unfortunately, monitoring of the symptoms and behaviors that reflect mind-body functioning has done little to change them, little to understand the underlying processes that lead to change and little to inspire the development of healthy ways of living, as shown by the absence of change in the levels of well-being in the general population despite the introduction of monitoring and intervention efforts [16]. Monitoring has been ineffective whether the surveys considered only risky behaviors and symptoms of illness, healthy behaviors, or both.

Therefore, the evaluation of contributors to illness and health requires attention to their causes, not just their symptoms. In order to evaluate the causes of health and illness, we need to consider how to measure a person's motivation for change, his or her available resources for doing so, as well as his or her capacity for present and future change and not just his or her past symptoms and behavior.

According to research based on the work of Carl Rogers, effective person-centered therapy depends on three key elements in the therapeutic encounter: (1) respect or unconditional positive regard; (2) empathy, and (3) genuineness [17,18]. These three common factors in psychotherapy are related to three general practices that promote well-being, as measured by character development, health and happiness: (1) working in the service of others, which fosters mutual respect and hopeful self-directedness; (2) letting go, which fosters empathy and cooperativeness and (3) awareness, which fosters genuineness and self-transcendence [19-22].

We are participating in research under the auspices of the Anthropedia Foundation to develop a program for the assessment and promotion of the causes of well-being, rather than focusing exclusively on past behaviors and symptoms of illness [23]. In this research, we have been able to distinguish three distinct and dynamically self-organizing aspects of human well-being, each of which needs to be activated for health. In other words, there are three aspects to the causes of well-being that can be distinguished in evaluating contributors to health and illness. Some exemplars of these three aspects of well-being are neurobiological plasticity, meta-cognitive functions for self-regulation of personal and social goals and virtues (such as hope and courage). These aspects of a person promote well-being synergistically, so each needs to be evaluated to understand their joint contribution to health and illness. The full content and structure of these domains of plasticity, functioning and virtue requires further research and would require much more exposition to be fully understood and used in a clinical context, but here we will describe exemplars from each aspect in order to illustrate why a person-centered perspective to health promotion is essential.

### **Evaluation of motivation and self-regulatory functioning**

Most people with unhealthy behaviors are simply not motivated to change. The motivation for self-regulatory change can be measured using a stages of change model that distinguishes pre-contemplation, contemplation, preparation and commitment to change [24]. Among people at risk due to unhealthy behaviors, such as smoking tobacco, heavy drinking, and unhealthy diets, 40% are in a pre-contemplative stage of change (i.e. they are not interested or even considering changing their behavior) and another 40% are in a contemplative stage (i.e. considering changing at some later date). Only 20% are in preparation for change [25]. The most promising outcomes have been found with interventions that are individualized and interactive, especially when combined with person-centered counseling to enhance awareness and provide hope and encouragement. When people are recruited for lifestyle modification that focuses on enhancing awareness, outcomes of interventions are similar whether the subjects involved are self-initiated volunteers or pre-contemplative recruits [24,26]. This suggests that lifestyle change can be substantial if people receive person-centered care that increases their self-awareness and provides structured guidance on how to change. Accordingly, it is useful for health promotion to evaluate and promote a person's level of awareness and motivation to change.

Self-regulatory functioning concerns the whole person. Not surprisingly, psychological research has focused mostly on the functioning of thought in human life. This section will

consider the research already accomplished in that domain with an eye towards psychological therapy. That said, it is important to remember that to be in a state of well-being, we need the whole person to be functioning well.

Conscious thought, such as self-affirmation, cognitive reframing, reasoning or anticipation of consequences, does not change behavior alone. However, thought can be helpful indirectly in synergy with other processes [27]. Conscious thought interacts with unconscious and automatic processes by enabling behaviors to be shaped by non-present factors, social and cultural information, attitudes and values and thereby allowing reflection and self-regulation of multiple competing impulses, goals and values [28]. Behavioral change requires actual exercises, which in turn facilitate development of the person to support the changes in behavior by the modification of unconscious and automatic processes. Mental strength in self-regulation can be developed by self-directed exercises, just as a muscle can be strengthened by repeated use [29]. Stress, fatigue, or prior efforts to regulate one's self consistently impair efforts at self-regulation on a later task, consistent with a strength model of will-power, but not with models of self-regulation as knowledge or skill [30,31]. Strength of self-regulation (i.e. capacity to delay gratification) develops coincident with the emergence of meta-cognition in self-aware consciousness after 4 years of age [32]. Purposeful practice of new behaviors in one's life situation tends to promote greater self-directedness in other life situations as well. For example, monitoring and improving posture, regulating mood, or monitoring and recording eating may seem unnatural at first, but with practice becomes spontaneous and then enhances a person's self-control in other areas as well, such as quitting faster in a hand-grip task following a conscious effort to suppress forbidden thoughts [30].

In addition to laboratory tests of self-regulation, personality tests can be used to quantify the mental dispositions that predict health and illness [33]. Among modern inventories, the *Temperament and Character Inventory* (TCI) has proven particularly useful in prediction of individual differences in health, happiness and maturity, recovery of health and risk of physical and mental illness [21,22,33,34]. TCI Self-directedness is the most powerful predictor of all aspects of well-being (i.e. physical, emotional, social and spiritual). Cooperativeness is predictive of social and emotional well-being. Self-transcendence is predictive of happiness (i.e. presence of positive emotions and absence of negative emotions) [21]. The effects of these character traits are also influenced by TCI temperament traits, which quantify a person's emotional style [35].

Carol Ryff has also developed a model of psychological well-being that is predictive of individual differences in health and illness [36]. Her model of eudaimonic well-being measures six distinct dimensions of wellness, including autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance. Eudaimonic well-being is distinguished from hedonic well-being, which involves the presence of positive emotions and the absence of negative emotions. Like the TCI character traits, psychological well-being is predictive of measures of physical, emotional and social well-being [36-39]. Hedonic well-being, on the other hand, has a less consistent relationship with health than do measures of character and eudaimonic well-being [39].

Psychological well-being has a complex relationship to many personality traits as measured by the five-factor NEO inventory or the TCI [37,40]. The paths to well-being vary in the personality traits present in different individuals and in different situations. In fact, the same person often shows greater variation in behavior in different situations than do different people in the same situation [41, 42]. Accordingly, a person-centered approach to well-being involves individualized consideration of all the strengths and weaknesses in the functioning of thought that a person manifests in his or her own unique psychosocial context.

### Evaluating plasticity

Plasticity most commonly refers to the ability of many organisms to adapt their biology or behavior to changes in their external and internal environment. Plasticity, however, exists in all aspects of the human being: body, thought and psyche. Human beings are probably the most plastic of all species and hence the most variable, thereby allowing people to live under an extremely wide range of conditions all over the world [43]. Most research on plasticity has focused on neurobiological impacts. Therefore, this discussion will be mostly confined to the discussion of plasticity at a neurobiological level (even though it exists within all aspects of a person).

Changes in self-regulatory functions induce plasticity in the whole person and vice versa. A notable example is meditation's effect on white matter in the anterior cingulate [44]. Consequently, measures of personality and psychological well-being are moderately correlated with individual differences in neurobiological indices of health, including neuroendocrine, immune, cardiovascular and sleep measures [39,45]. Ill-being and well-being have distinct profiles of biomarkers, confirming the importance of interactive feedback relationships between thought and biology [38].

Human biological plasticity is substantial but limited, so that plasticity may result in either preservation of health when adequate or of illness when inadequate. In a large longitudinal study, the temperament dimensions of the TCI were at least as predictive of preclinical atherosclerosis as traditional risk factors, such as smoking [45]. On the other hand, high TCI self-transcendence is associated with greater temporal cortical gray matter volume in older people, suggesting that mental activities, such as meditation, may protect against the frequent decrease in gray matter with increasing age [46]. The development of meta-cognitive self-regulation, value judgments and the awareness of expression of virtues, like compassion and courage, all depend on individual differences in the development of neural networks that permit self-awareness [47-49].

The relationships between personality traits and the causes of morbidity and mortality are complex, confirming that a person-centered approach to analysis of the interactions between plasticity, self-regulatory functioning and virtues is essential [50]. For example, personality and resilience were studied in a large sample of maltreated and non-maltreated low-income children in relation to the regulation of two stress-responsive adrenal steroid hormones, cortisol and dehydroepiandrosterone (DHEA). Resilience is the human ability to adapt in the face of tragedy, trauma, adversity, hardship and ongoing significant life stressors. Being maltreated was not related to differences in group average levels of either hormone in either the morning or the afternoon [51]. Higher resilience was observed in non-maltreated

children with low morning cortisol and DHEA, whereas in maltreated children, higher resilience was related to high morning cortisol and a rise in DHEA from morning to afternoon. Both personality and stress hormones made independent contributions to predicting resilience in low-income children at high risk for maltreatment [51].

Analogous to the neural plasticity that takes place in response to brain injury, Cicchetti hypothesizes that resilience is the ability of individuals to recover functioning after exposure to significant threats, severe adversity or trauma [52]. Given the differences between individuals in their strengths and weaknesses, the paths to recovery of well-being may vary greatly depending on both the person and the treatments employed. For example, recovery from major depression that is unresponsive to antidepressant drugs can result from neuroplasticity produced by deep brain stimulation of either the subgenual anterior cingulate cortex (Brodmann area 25) or the anterior limb of the internal capsule, which have common cortico-limbic connections to other brain areas (e.g. the frontal pole, medial temporal lobe, nucleus accumbens and hypothalamus) via different pathways [53-56].

Other work shows that cognitive-behavioral techniques and biofeedback allow a person to learn to self-regulate the functional activity of specific brain circuits, promoting recovery of health in a variety of neuropsychiatric and medical disorders [57-59]. Awareness can also be facilitated without instruments or invasive procedures by brief training in integrative mind-body meditation. Meditation is more effective than the same amount of time in relaxation training [60]. Even brief training in mind-body meditation increases activity in the anterior cingulate cortex (a cross-road between the rational and emotional brain regions), rapidly induces changes in white matter connectivity and enhances self-regulation of neurophysiological functions that are usually considered to be unconscious or autonomic, such as heart rate, respiration, skin conductance [44, 60, 61].

### Measuring virtue

Virtues are often defined as character traits that are morally praiseworthy [62]. In our experience, it is useful to distinguish virtues, which are universal and transcendent, from values, which are culture-bound and individually variable, a subject we will return to later. What is important here is to point out that this distinction has not been made consistently in much recent work [63-65]. We will begin this section on virtues by reviewing some of the research on values and psychological health.

A values-based perspective on contributors to health and illness is also important and complementary to the psychological and biological aspects of a person [66-68]. Values are a person's principles or standards of behavior and are based on what he or she regards as important or desirable in life. The assessment of values has recently been enhanced by the development of practical inventories with good psychometric properties [63,64]. For example, the *Schwartz Value Survey* has been validated in studies of more than 60,000 people in 64 countries. It measures 10 types of values grouped into two pairs of opposed motivations: Openness to Change (self-direction, stimulation) versus Conservation (conformity, tradition, security), Self-transcendence (universalism, benevolence) versus Self-enhancement (power, achievement). The tenth value, hedonism, is considered to contribute to both Openness to Change and Self-enhancement [63].

The *Values in Action Inventory of Strengths* has been administered to over 150,000 adults [64]. It measures 24 strengths grouped around 6 virtues that the authors suggest emerge consistently across history and cultures: wisdom (creativity, curiosity, open-mindedness, love of learning, perspective), courage (bravery, persistence, integrity, vitality), humanity (love, kindness, social intelligence), justice (citizenship, fairness, leadership), temperance (forgiveness and mercy, humility and modesty, prudence, self-regulation) and transcendence (appreciation of beauty and excellence, gratitude, hope, humor, spirituality). Independent work suggests that personal experience, cultural background and current situational context influence the meaning and expression of values and virtues in particular individuals [69].

Mixtures of qualitative and quantitative approaches to the assessment of virtues can be useful to deal with cultural diversity in meaning and motivation [69]. Virtues have been described as those qualities or powers that help a person to perfect their character, live well and flourish by self-actualization of their potential [70]. From this perspective, virtues are something distinct from the cognitive-behavioral aspect of personality and values because they are self-transcendent [71]. Virtues help to regulate passions and guide conduct so that a person can enjoy living a “good life”, that is, a life that not only realizes their potential, but also serves others well. Virtue is a means to living a good life; it is not an end in and of itself. Some positive psychologists reduce virtues to character strengths or values that are distinct from moral reasoning and that can be acquired by deliberate cognitive-behavioral practices without invoking any search for what is beyond human existence [64,65,72]. Personal values can be an indicator of the expression of virtue in a person's life, but should not be conflated with virtue itself, which is not culturally bound; virtue is universal across all cultures because all people seek to understand the good. In fact, many philosophers like Plato and Spinoza have pointed out that virtue's very purpose is to propel us in the pursuit of what is good.

Other philosophical and scientific traditions have grappled with the nature of virtue. Psychoanalytic traditions view virtues as the elevation or enlightenment of human behavior by higher cognitive processes like sublimation and altruism, which are automatic but consciously accepted as desirable in self-awareness even if they involve personal sacrifice and suffering [73,74]. Anthropology and phylogenetic research can be used to examine the biological and material expressions of virtue in human life. For example, phylogenetic research shows it is necessary to distinguish unconscious impulses that preserve physical life or defend against perceived threats to life, which depend on the rapid operation of the limbic system, from self-regulation of thought by the semantic learning and executive control systems [49,75]. Likewise, unconscious limbic processes must be distinguished from automatic behaviors that involve coordinated activation of the anterior prefrontal cortex with other tertiary association cortical areas during the expression of virtues, which allow a person to preserve the well-being of both one's self and others [49]. For example, altruism in humans is based on feeling engagement and compassion for others, which involve automatic shifts between self and other viewpoints with an outlook of participatory unity [76]. Such automatic view-point shifting depends on neural circuits involving self-awareness, as well as cortical interactions with mesolimbic brain reward centers that allow personal sacrifice to be experienced as satisfying [76,77].



As it concerns the evaluation of well-being in clinical contexts, virtues certainly impact the development of our life narrative. Hence one possibility for the assessment of virtues can be based on qualitative analysis of a person's life narrative as a component of person-centered integrative diagnosis [68]. By such enlargement of consciousness, a person can begin to answer the usually implicit question “Who am I meant to be?”

The subject of virtue is vast and cannot be fully explored in this paper due to space considerations. Future papers will consider the assessment of virtue in much greater depth and detail. Suffice it to say that it is essential to consider virtue's role in the development of well-being, because it propels us in our self-transformation and our understanding of the good. Virtues allow us to preserve our whole being and to get in touch with that which transcends human thought. Virtues cannot be reduced either to plasticity or to effortful functioning of analytical thought. Plasticity allows human beings to survive while sacrificing for others or sublimating personal desires. A person's virtues shape his or her cognitive goals, which in turn induce biological plasticity.

## Conclusions

The evaluation of contributors to health and illness has traditionally been limited to the measurement of the symptoms of past behavior. Unfortunately, monitoring at the level of symptoms and past behavior has failed to promote change in well-being in the general population [16]. As illustrated by the examples we have given, the causes of well-being and ill-being involve the synergy among three distinct aspects of human well-being – plasticity, functioning and virtue.

Each of these distinct aspects of well-being can be reliably measured using quantitative and qualitative techniques. Brain imaging and biomarkers of neuroendocrine, immune, cardiovascular and sleep measures provide objective measures of biological plasticity in prospective studies [39,45]. Assessment of personality and psychological well-being provide reliable and strong predictors of the self-regulatory functions of human thought in the development of health and happiness [21,22]. Assessment of virtues provide reliable and strong predictors of automatic dispositions that allow a person to enjoy the realization of his or her potential while serving others well [63,64]. Each of these examples of a contributor to well-being operates in synergy with the others.

The development of well-being must be evaluated as a complex adaptive system of biological, emotional, social, cultural and spiritual variables organized in multiple levels [20,78,79]. Complex systems require a person-centered, multi-level and integrative approach to diagnosis and assessment in order to promote well-being and reduce ill-being [19,51,68]. Measurement of the causes of well-being and ill-being, rather than its symptoms, can be plausibly expected to improve the success of health promotion in both individual and population-based interventions. Future papers will explore these interactions and provide more concrete frameworks for the application of these ideas in a clinical context.

## References

1. Hancock T. LaLonde and beyond: Looking back at “A New Perspective on the Health of Canadians. Health Promotion International. 1986; 1(1):93–100.
2. Balluz LS, Okoro CA, Mokdad A. Association between selected unhealthy lifestyle factors, body mass index, and chronic health conditions among individuals 50 years of age or older, by race/ethnicity. *Ethnicity & Disease*. 2008; 18(4):450–457. [PubMed: 19157249]
3. Mokdad AH, Marks JS, Stroup DF, Gerberding L. Actual causes of death in the United States, 2000. *Journal of the American Medical Association*. 2004; 291(10):1238–1245. [PubMed: 15010446]
4. Services, U.S.D.o.H.a.H. Healthy People 2000: National Health Promotion and Disease Prevention Objectives for the nation. Public Health Service; Washington, D.C.: 1991.
5. DHHS, Healthy People. Tracking Healthy People. US Department of Health and Human Services; Washington, DC: 2010. 2000.
6. USA.gov. Healthy People. [2009 24 October] 2010. 2009; Available from: [www.healthypeople.gov/](http://www.healthypeople.gov/)
7. Malone, AM.; Walker, SN. Measuring healthy lifestyles. In: Frank-Sromborg, M.; Olsen, SJ., editors. *Instruments for Clinical Healthcare Research*. Jones & Bartlett Publishers; Boston: 2004. p. 409-421.
8. Belloc NB, Breslow L. Relationship of physical health status and health practices. *Preventive Medicine*. 1972; 1(3):409–421. [PubMed: 5085007]
9. HRA, HPN. [2009 23 October] The Healthier People Network HRA. 2009. Available from: [www.thehealthierpeoplenetwork.org/](http://www.thehealthierpeoplenetwork.org/)
10. CDC. Youth Risk Behavior Surveillance: National College Health Risk Behavior Survey - United States. *Morbidity and Mortality Weekly Report* 1997. 1995; 46(SS-6):1–54.
11. Institute, NW. [2009 23 Aug] Your on-line wellness inventory:. Aug 28. 2001 [Testwell.org](http://Testwell.org). 2001 Available from: [www.testwell.org](http://www.testwell.org)
12. Travis, JW. *Wellness Index*. Second Edition ed.. Ten Speed Press; Berkeley, CA: 1988.
13. Travis, JW.; Ryan, RS. *Wellness workbook for health professionals*. Second edition revised ed.. Ten Speed Press; Berkeley, CA: 1988.
14. Mahon NE, Yarcheski A, Yarcheski TJ. Psychometric evaluation of the Personal Lifestyle Questionnaire for Adolescents. *Research in Nursing & Health*. 2002; 25:68–75. [PubMed: 11807921]
15. Walker SN, Kerr MJ, Pender NJ, Sechrist KR. A Spanish language version of the health Promoting Lifestyle Profile. *Nursing Research*. 1990; 39(5):268–273. [PubMed: 2399130]
16. Myers DG, Diener E. The pursuit of happiness. *Scientific American*. 1996; 274(5):70–72. [PubMed: 8934647]
17. Lambert, MJ. *Bergin and Garfield's Handbook of Psychotherapy and Behavior Change*. Fifth edition.. Wiley; New York: 2003.
18. Rogers, CR. *On Becoming a Person: A therapist's view of psychotherapy*. Houghton Mifflin; Boston: 1995.
19. Cloninger CR. The science of well-being: an integrated approach to mental health and its disorders. *World Psychiatry*. 2006; 5(2):71–76. [PubMed: 16946938]
20. Cloninger, CR. *Feeling Good: The Science of Well-Being*. Oxford University Press; New York: 2004. p. 374
21. Cloninger CR, Zohar AH. Personality and the perception of health and happiness. *Journal of Affective Disorders*. 2011; 128(1-2):24–32. [PubMed: 20580435]
22. Cloninger CR, Zohar AH, Cloninger KM. Promotion of well-being in person-centered mental health care. *Focus*. 2010; 8(2):165–179.
23. Anthropedia, F. [2011] Know Yourself. 2009. Available from: <http://anthropedia.org>
24. Nigg CR, Burbank PM, Padula C, Dufresne R, Rossi JS, Velicer WF, Laforge RG, Prochaska JO. Stages of change across ten health risk behaviors for older adults. *Gerontologist*. 1999; 39(4):473–482. [PubMed: 10495586]
25. Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *American Journal of Health Promotion*. 1997; 12(1):38–48. [PubMed: 10170434]

26. Prochaska JO, Velicer WF, Rossi JS, Redding CA, Greene GW, Rossi SR, Sun X, Fava JL, Laforge R, Plummer BA. Multiple risk expert systems interventions: impact of simultaneous stage-matched expert system interventions for smoking, high-fat diet, and sun exposure in a population of patients. *Health Psychology*. 2004; 23(5):503–516. [PubMed: 15367070]
27. Baumeister RF, Masicampo EJ. Conscious thought is for facilitating social and cultural interactions: how mental simulations serve the animal-culture interface. *Psychological Review*. 2011; 117(3):945–971. [PubMed: 20658859]
28. Baumeister RF, Masicampo EJ, Vohs KD. Do conscious thoughts cause behavior? *Annual Review of Psychology*. 2011; 62:331–361.
29. Baumeister RF, Gailliot M, DeWall CN, Oaten M. Self-regulation and personality: how interventions increase regulatory success, and how depletion moderates the effects of traits on behavior. *Journal of Personality*. 2006; 74(6):1773–1801. [PubMed: 17083666]
30. Muraven M, Baumeister RF, Tice DM. Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *Journal of Social Psychology*. 1999; 139(4):446–457. [PubMed: 10457761]
31. Metcalfe J, Mischel W. A hot/cool-system analysis of delay of gratification: dynamics of willpower. *Psychological Review*. 1999; 106(1):3–19. [PubMed: 10197361]
32. Mischel, W. From good intentions to willpower.. In: Gollwitzer, PM., editor. *The Psychology of Action: Linking Cognition and Motivation to Behavior*. Guilford Press; New York: 1996. p. 197-218.
33. Gruzca RA, Goldberg LR. The comparative validity of 11 modern personality inventories: predictions of behavioral acts, informant reports, and clinical indicators. *Journal of Personality Assessment*. 2007; 89(2):167–187. [PubMed: 17764394]
34. Cloninger CR, Svrakic DM, Przybeck TR. A psychobiological model of temperament and character. *Archives of General Psychiatry*. 1993; 50(12):975–990. [PubMed: 8250684]
35. Cloninger, CR., et al. *The Temperament and Character Inventory (TCI): A Guide to its Development and Use*. Washington University Center for Psychobiology of Personality; St. Louis: 1994.
36. Ryff CD, Keyes CL. The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*. 1995; 69(4):719–727. [PubMed: 7473027]
37. Ruini C, Ottolini F, Rafanelli C, Tossani E, Ryff CD, Fava GA. The relationship of psychological well-being to distress and personality. *Psychotherapy and Psychosomatics*. 2003; 72(5):268–275. [PubMed: 12920331]
38. Ryff CD, Dienberg LG, Urry HL, Muller D, Rosenkranz MA, Friedman EM, Davidson RJ, Singer B. Psychological well-being and ill-being: do they have distinct or mirrored biological correlates? *Psychotherapy and Psychosomatics*. 2006; 75(2):85–95. [PubMed: 16508343]
39. Ryff CD, Singer BH, Dienberg G. Dienberg Love, Positive health: connecting well-being with biology. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*. 2004; 359(1449):1383–1394.
40. Schmutte PS, Ryff CD. Personality and well-being: reexamining methods and meanings. *Journal of Personality and Social Psychology*. 1997; 73(3):549–559. [PubMed: 9294901]
41. Fleeson W. Toward a structure- and process-integrated view of personality: traits as density distribution of states. *Journal of Personality and Social Psychology*. 2001; 80(6):1011–1027. [PubMed: 11414368]
42. Fleeson W. Moving personality beyond the person-situation debate. *Current Directions in Psychological Science*. 2004; 13(2):83–87.
43. Mascie-Taylor, CGN.; Bogin, B., editors. *Human Variability and Plasticity*. Cambridge University Press; New York: 1995.
44. Tang YY, Lu Q, Geng X, Stein EA, Yang Y, Posner MI. Short-term meditation induces white matter changes in the anterior cingulate. *Proceedings of the National Academy of Sciences of the United States of America*. 2010; 107(35):15649–15652. [PubMed: 20713717]
45. Hintsanen M, Pulkki-Raback L, Juonala M, Viikari JS, Raitakari OT, Keltikangas-Jarvinen L. Cloninger's temperament traits and preclinical atherosclerosis: the Cardiovascular Risk in Young Finns Study. *Journal of Psychosomatic Research*. 2009; 67(1):77–84. [PubMed: 19539821]

46. Kaasinen V, Maguire RB, Kurki T, Bruck A, Rinne JO. Mapping brain structure and personality in late adulthood. *Neuroimage*. 2005; 24(2):315–322. [PubMed: 15627574]
47. Takahashi H, Kato M, Matsuura M, Koeda M, Yahata N, Suhara T, Okubo Y. Neural correlates of human virtue judgment. *Cerebral Cortex*. 2008; 18(8):1886–1891. [PubMed: 18203696]
48. Cloninger, CR. The Phylogenesis of Human Personality: Identifying the Precursors of Cooperation, Altruism, and Well-Being.. In: Sussman, RW.; Cloninger, CR., editors. *The Origins of Cooperation and Altruism*. Springer; New York: 2011. In press
49. Cloninger CR. The evolution of human brain functions: the functional structure of human consciousness. *Australian and New Zealand Journal of Psychiatry*. 2009; 43(11):994–1006. [PubMed: 20001395]
50. Cloninger CR. How does personality influence mortality in the elderly? *Psychosomatic Medicine*. 2005; 67(6):839–840. [PubMed: 16314586]
51. Cicchetti D, Rogosch FA. Personality, adrenal steroid hormones, and resilience in maltreated children: a multilevel perspective. *Development and Psychopathology*. 2007; 19(3):787–809. [PubMed: 17705903]
52. Cicchetti D. Resilience under conditions of extreme stress: a multilevel perspective. *World Psychiatry*. 2010; 9(3):145–154. [PubMed: 20975856]
53. Gutman DA, Holtzheimer PE, Behrens TE, Johansen-Berg H, Mayberg HS. A tractography analysis of two deep brain stimulation white matter targets for depression. *Biological Psychiatry*. 2009; 65(4):276–282. [PubMed: 19013554]
54. Mayberg HS. Modulating dysfunctional limbic-cortical circuits in depression: towards development of brain-based algorithms for diagnosis and optimised treatment. *British Medical Bulletin*. 2003; 65:193–207. [PubMed: 12697626]
55. Mayberg HS, Lozano AM, Voon V, McNeely HE, Seminowicz D, Hamani C, Schwab JM, Kennedy SH. Deep brain stimulation for treatment-resistant depression. *Neuron*. 2005; 45(5):651–660. [PubMed: 15748841]
56. Giacobbe P, Mayberg HS, Lozano AM. Treatment resistant depression as a failure of brain homeostatic mechanisms: implications for deep brain stimulation. *Experimental Neurology*. 2009; 219(1):44–52. [PubMed: 19426730]
57. Johnston SJ, Boehm SG, Healy D, Goebel R, Linden DE. Neurofeedback: A promising tool for the self-regulation of emotion networks. *Neuroimage*. 2010; 49(1):1066–1072. [PubMed: 19646532]
58. Linden DE. Brain imaging and psychotherapy: methodological considerations and practical implications. *European Archives of Psychiatry and Clinical Neuroscience*. 2008; 258(Supplement 5):71–75. [PubMed: 18985299]
59. van Paasschen J, Clare L, Woods RT, Linden DE. Can we change brain functioning with cognition-focused interventions in Alzheimer's disease? The role of functional neuroimaging. *Restorative Neurology and Neuroscience*. 2009; 27(5):473–491. [PubMed: 19847071]
60. Tang YY, Ma Y, Fan Y, Feng H, Wang J, Feng S, Lu Q, Hu B, Lin Y, Zhang Y, Wang Y, Zhou L, Fan M. Central and autonomic nervous system interaction is altered by short-term meditation. *Proceedings of the National Academy of Sciences of the United States of America*. 2009; 106(22):8865–8870. [PubMed: 19451642]
61. Tang YY, Ma Y, Wang J, Fan Y, Feng S, Lu Q, Yu Q, Sui D, Rothbart MK, Fan M, Posner MI. Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences of the United States of America*. 2007; 104(43):17152–17156. [PubMed: 17940025]
62. Stevenson, A.; Lindberg, CA., editors. *The New Oxford American Dictionary Third ed.* Oxford University Press; New York: 2010. 2010. 2096
63. Schwartz, S. Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries.. In: Zanna, M., editor. *Advances in Experimental Social Psychology*. Academic Press; Orlando FL: 1992. p. 1-65.
64. Pederson, C.; Seligman, MEP. *Character Strengths and Virtues: A handbook and classification*. Oxford University Press; New York: 2004.
65. Cawley MJI, Martin JE, Johnson JA. A virtues approach to personality. *Personality and Individual Differences*. 2000; 28:997–1013.

66. Fulford KW. Bringing together values-based and evidence-based medicine: UK Department of Health Initiatives in the 'Personalization' of Care. *Journal of Evaluation in Clinical Practice*. 2011; 17(2):341–343. [PubMed: 21114716]
67. Williams R, Fulford KW. Evidence-based and values-based policy, management and practice in child and adolescent mental health services. *Clinical Child Psychology and Psychiatry*. 2007; 12(2):223–242. [PubMed: 17533937]
68. Mezzich JE, Salloum IM, Cloninger CR, Salvador-Carulla L, Kirmayer LJ, Banzato CE, Wallcraft J, Botbol M. Person-centred integrative diagnosis: conceptual bases and structural model. *Canadian Journal of Psychiatry*. 2010; 55(11):701–708.
69. Cook KV, Sandage SJ, Hill PC, Strawn BD. Folk conceptions of virtue among Cambodian-American Buddhists and Christians: A hermeneutic analysis. *Psychology of Religion and Spirituality*. 2010; 2(2):83–103.
70. Meara NM, Schmidt LD, Day JD. Principles and Virtues: A foundation for ethical decisions, policies, and character. *Counseling Psychologist*. 1996; 24:4–7.
71. Cloninger CR. Spirituality and the science of feeling good. *Southern Medical Journal*. 2007; 100(7):740–743. [PubMed: 17639764]
72. Cloninger CR. Book review of Peterson and Seligman's *Character and Human Virtues*. *American Journal of Psychiatry*. 2005; 162:820–821.
73. Freud, S. *Standard Edition of The Complete Psychological Works*. Strachey, J.; Freud, A., editors. Hogarth Press; London: 1966.
74. Westen D. The scientific status of unconscious processes: is Freud really dead? *Journal of the American Psychoanalytic Association*. 1999; 47(4):1061–1106. [PubMed: 10650551]
75. Cloninger CR, Abou-Saleh MT, Mrazek DA, Moller H. Biological perspective on psychiatry for the person. *International Journal of Person-centered Medicine*. 2011; 1(1):137–139.
76. Moll J, Krueger F, Zahn R, Pardini M, de Oliveira-Suza R, Grafman J. Human fronto mesolimbic networks guide decisions about charitable donation. *Proceedings of the National Academy of Sciences of the United States of America*. 2006; 103(42):15623–15628. [PubMed: 17030808]
77. Levine B. Autobiographical memory and the self in time: brain lesion effects, functional neuroanatomy, and lifespan development. *Brain and Cognition*. 2004; 55(1):54–68. [PubMed: 15134843]
78. Cicchetti D, Toth SL. The past achievements and future promises of developmental psychopathology: the coming of age of a discipline. *Journal of Child Psychology and Psychiatry*. 2009; 50(1-2):16–25. [PubMed: 19175810]
79. Luthar SS, Cicchetti D, Becker B. The construct of resilience: a critical evaluation and guidelines for future work. *Child Development*. 2000; 71(3):543–562. [PubMed: 10953923]