
From Social Structure to Biology

Integrative Science in Pursuit of Human Health and Well-Being

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What does it mean to be psychologically well, and what are the factors that promote such well-being? These are the initial questions we will explore in this chapter. A multidimensional formulation of psychological well-being derived from numerous conceptual frameworks will be described, and we will use this framework to summarize findings on individual differences in positive psychological functioning. Variation associated with sociodemographic factors (i.e., age, gender, socioeconomic status) is of particular interest. Data from community and national samples (both cross-sectional and longitudinal) will be reviewed to illustrate how well-being is *contoured* by broad life course and social structural influences.

We then shift to different questions—namely, what are the physiological substrates of psychological well-being, and how do they influence physical health? We will describe a conception of positive human health that is fundamentally anchored in psychological and social well-being. Our approach contrasts with the prevailing formulations of health, which are de-

finied primarily in negative terms (e.g., illness, disease, functional limitations, disability). Although the science of positive human health is in its infancy, we highlight beginning lines of inquiry that illustrate links between psychological and social well-being and health. The neurobiological mechanisms that might account for these outcomes also are considered.

The overarching objective of this chapter is to advance a perspective of human health and well-being that is deeply *integrative*. On the one hand, our research reaches *outward* to connect psychological well-being to macro-level, social structural forces; on the other hand, our agenda reaches *inward* to probe the biology of well-being and its role in extending both length and quality of life. In terms of integrative science, the approach we advocate is consistent with E. O. Wilson's (1998) challenge to scholars of the 21st century to embark on the task of *consilience*—that is, the linking of facts and theories across the scientific disciplines. We believe that understanding the nature of human well-being—what it is and how it comes about, as

well as its implications for biology and health—illustrates a rich forum within which to pursue consilience. It also affords promising new directions for promoting positive health via interventions targeted at enhancing individuals' psychosocial well-being.

Psychological Well-Being: What Is It and Who Has It?

Portrayals of the Positive

The discipline of psychology has long been interested in what constitutes positive psychological functioning (for reviews see Ryff, 1985, 1989a; Ryff & Singer, 1998a, in press-a). William James (1902/1958), for example, articulated a vision of "healthy-mindedness"; Carl Jung (1933) wrote about processes of individuation, self-realization, and coming into selfhood; Abraham Maslow (1968) offered detailed descriptions of what it means to be self-actualized; Erik Erikson (1959) depicted the continuing challenges from infancy to old age for the developing ego; Gordon Allport (1961) put forth a conception of maturity; Carl Rogers (1961) characterized the fully functioning person; Karl and Charlotte Bühler (Bühler, 1935) wrote about basic life tendencies that work toward the fulfillment of life; and Marie Jahoda (1958) drew on many of these formulations to enumerate positive components of mental health, in contrast to the prevailing construals of mental health as the absence of the negative (e.g., depression, anxiety).

As a cursory review of contemporary texts in personality psychology would reveal, more players could be added to the list of "positive psychologists." The field of psychology thus has shown a persistent interest in healthy, adaptive sides of human functioning. Outside the discipline are yet other efforts to delineate optimal features of the human experience. Coan (1977) summarized visions of what constitutes the best in us via a sweeping historical portrayal that contrasted ideals of the early Greeks with views from the Middle Ages, the Renaissance and Romantic eras, and more recent philosophies (e.g., existentialism). In each period, unique qualities were upheld as the pinnacle of human potentiality (e.g., reason, close contact with the divine, creative self-expression). Coan also juxtaposed these Western varieties of ultimate capacities with Eastern perspectives that elevate other qualities (e.g., transcending the illusion of

separateness, overcoming desire—the source of suffering, living mindfully). From the field of philosophy, Becker (1992) offers yet another view via different formulations of specific criteria that define the "good life."

Taken together, these accounts illustrate the abiding interest, in psychology and beyond, in depicting the highest levels of human functioning and the ideals toward which we, as mere mortals, strive in our life journeys. Viewed in this light, recent interest in positive psychology represents a return to core issues that have captivated the imagination of scholars and philosophers throughout time. To grapple with what constitutes optimal functioning is, at the most basic level, to broach ultimate questions of why we are here and how we should live. Contemporary social science has much to contribute, via its empirical findings, and to gain, via the science of human betterment, engagement with these questions.

Nonetheless, it is the case that empirically oriented realms of psychology have been slow to embark on scientific studies of the positive. Why is this so? A key factor undoubtedly reflects funding priorities—that is, it always has been easier to obtain grant support to study maladies of the human condition rather than human strengths. The latter often have been dismissed as low-priority luxuries vis-à-vis real social problems that must be given preference in allocating scarce resources. Fortunately, growing interest in health promotion and increasing evidence that prevention works are signaling shifts in funding climates toward support for research on the positive (Albee & Gullotta, 1997; Raczynski & DiClemente, 1999).

A further impediment to the science of well-being has been the paucity of reliable and valid assessment tools. Without instruments that operationalize the preceding characterizations of optimal functioning, it is impossible to probe their varieties, causes, or consequences. One response to the need for measurement tools has been a multidimensional model of positive psychological functioning that represents points of convergence in many of the previously described formulations (see Ryff, 1989a). Six key dimensions (see definitions in Table 39.1) provided conceptual starting points for developing assessment instruments (see Ryff, 1989b; Ryff & Keyes, 1995). Together, these dimensions encompass diverse features of what it means to be well, including having positive regard for one's self and one's past life, good-quality relationships with others, a sense that life is purposeful

Table 39.1 Definitions of Theory-Guided Dimensions of Well-Being

Self-Acceptance

High scorer: possesses a positive attitude toward the self; acknowledges and accepts multiple aspects of self, including good and bad qualities; feels positive about past life.

Low scorer: feels dissatisfied with self; is disappointed with what has occurred in past life; is troubled about certain personal qualities; wishes to be different than what he or she is.

Positive Relations with Others

High scorer: has warm, satisfying, trusting relationships with others; is concerned about the welfare of others; capable of strong empathy, affection, and intimacy; understands give-and-take of human relationships.

Low scorer: has few close, trusting relationships with others; finds it difficult to be warm, open, and concerned about others; is isolated and frustrated in interpersonal relationships; is not willing to make compromises to sustain important ties with others.

Autonomy

High scorer: is self-determining and independent; is able to resist social pressures to think and act in certain ways; regulates behavior from within; evaluates self by personal standards.

Low scorer: is concerned about the expectations and evaluations of others; relies on judgments of others to make important decisions; conforms to social pressures to think and act in certain ways.

Environmental Mastery

High scorer: has a sense of mastery and competence in managing the environment; controls complex array of external activities; makes effective use of surrounding opportunities; is able to choose or create contexts suitable to personal needs and values.

Low scorer: has difficulty managing everyday affairs; feels unable to change or improve surrounding context; is unaware of surrounding opportunities; lacks sense of control over external world.

Purpose in Life

High scorer: has goals in life and a sense of directedness; feels there is meaning to present and past life; hold beliefs that give life purpose; has aims and objectives for living.

Low scorer: lacks a sense of meaning in life; has few goals or aims; lacks sense of direction; does not see purpose in past life; has no outlooks or beliefs that give life meaning.

Personal Growth

High scorer: has a feeling of continued development; sees self as growing and expanding; is open to new experiences; has sense of realizing his or her potential; sees improvement in self and behavior over time; is changing in ways that reflect more self-knowledge and effectiveness.

Low scorer: has a sense of personal stagnation; lacks sense of improvement or expansion over time; feels bored and uninterested with life; feels unable to develop new attitudes or behaviors.

and meaningful, the capacity to effectively manage one's surrounding world, the ability to follow inner convictions, and a sense of continuing growth and self-realization. Other components undoubtedly could be added to this provisional model, which, whatever its limitations, has provided tools for empirical assessment of well-being.

Empirical Coordinates of Psychological Well-Being: Variations by Age, Gender, and Socioeconomic Status

In this section, we briefly summarize findings from multiple studies regarding variation in well-being by age, gender, and socioeconomic

status (indexed primarily by level of education). We target these variations because all three speak to how well-being is *contoured* by larger forces, be they biological (aging/maturational processes), or social structural influences (position in social hierarchies, access to resources and life opportunities). Our investigations also have linked well-being to other psychological variables (e.g., social comparison processes, attributions, coping strategies, personality traits), but for the present purposes we restrict our focus to sociodemographic variation.

With both local community samples and nationally representative samples, we have documented replicable patterns of *age differences* in well-being (Ryff, 1989b, 1991; Ryff & Keyes,

1995; Ryff & Singer, 1998c). Recent data from MIDUS, a national survey conducted by the MacArthur Midlife Research Network, illustrate these patterns (see Figure 39.1). What is apparent is the diversity of patterns by age—that is, some aspects of well-being show incremental profiles, others decremental, and still others, little variation with age. Environmental mastery and autonomy, for example, have repeatedly shown incremental patterns from

young adulthood through midlife to old age. Purpose in life and personal growth, in contrast, repeatedly show downward trajectories across these age periods. Self-acceptance, in turn, tends to show little age variation, as do positive relations with others (only for women). Such replicable patterns have been obtained with scales of different depth of measurement (e.g., 20-item, 14-item, 3-item; Ryff, 1989b, 1991; Ryff & Keyes, 1995).

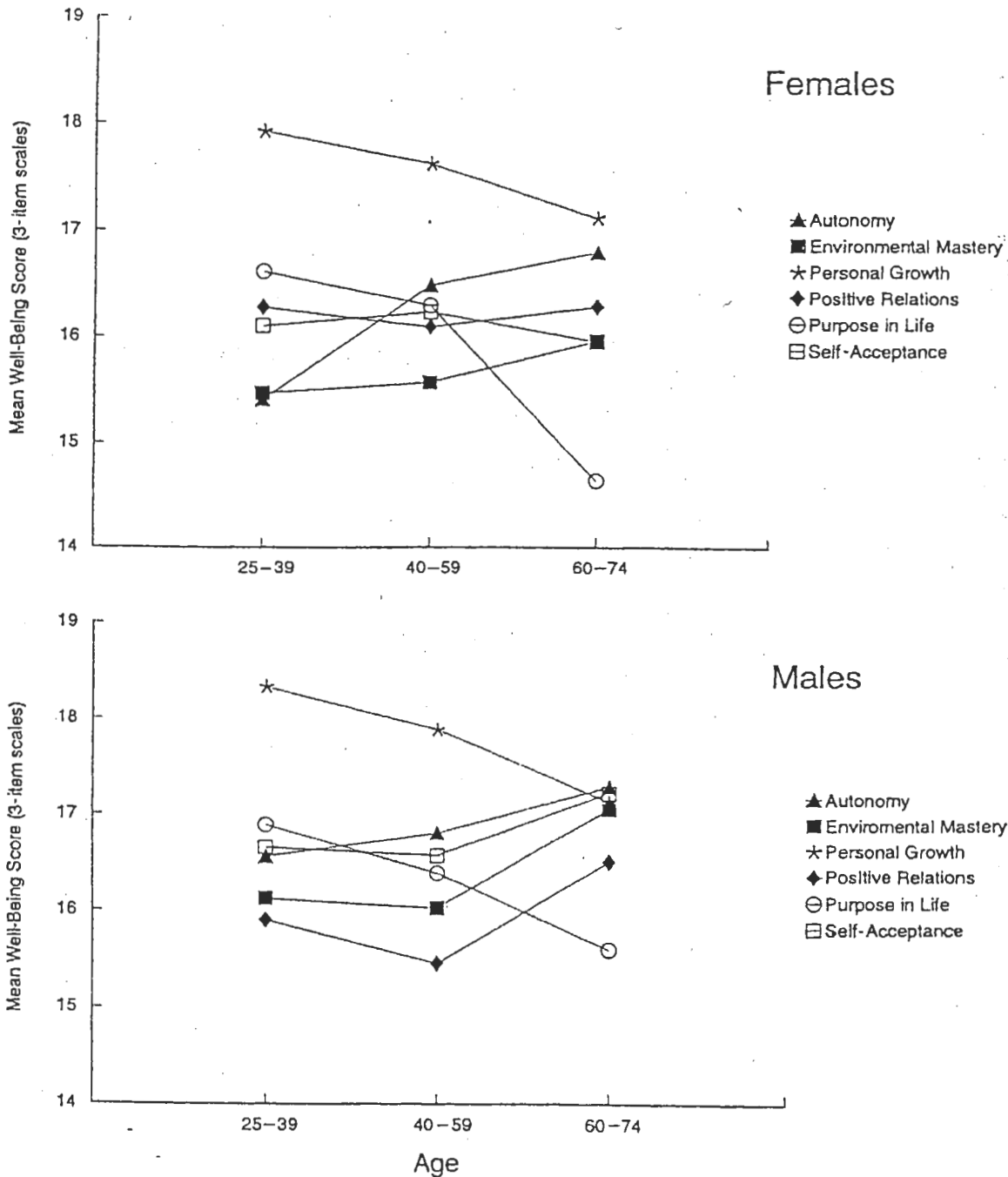


Figure 39.1 Age Differences in Psychological Well-Being. Source: MIDUS (MacArthur National Survey)

Though cross-sectional data cannot clarify whether these patterns represent aging/maturational changes or cohort differences, other longitudinal findings have shown that change in well-being does occur with aging, particularly in the context of life transitions (Kling, Ryff, & Essex, 1997; Kling, Seltzer, & Ryff, 1997). The strong consistency (in both national and community samples) of the sharply lower scores on purpose in life and personal growth among older adults compared with young and midlife adults speaks, we believe, to important societal challenges regarding the growing aged population. More people are living ever longer, but relative to younger groups, they report diminished opportunities to keep their lives purposeful and engaged as well as limited venues for continued growth and development. These findings perhaps are related to what sociologists refer to as the *structural lag* problem—namely, that contemporary social institutions “lag behind” the added years of life that many now experience (Riley, Kahn, & Foner, 1994). As such, the research points to important societal challenges regarding the rapidly expanding aged population.

With regard to *gender differences* in well-being, our studies also have uncovered important new findings. Specifically, women have shown comparable or more positive profiles on well-being compared with men. For the interpersonal dimension of well-being—positive relations with others—women always score significantly higher than men. In fact, as shown in Figure 39.1, interpersonal well-being is the lowest rated dimension for men, although open-ended interviews have documented that men, like women, espouse relatedness as a key component of ideal functioning (see Ryff, 1989c). In several studies (including a Korean sample), women also have shown higher profiles on personal growth relative to men (Ryff & Singer, 1998c). These findings offer an important counterpoint to evidence that women are at greater risk for depression than men (Culbertson, 1997). Women’s psychological strengths in the well-being realm do not challenge these gender differences in depression; rather, they enrich the picture by pointing out that psychological vulnerabilities may exist, side by side, with notable psychological strengths. Alternatively, for men, the data have underscored that their interpersonal well-being may be compromised (relative to women and relative to their own

ideals). Multidimensional assessment of well-being thus has provided a more comprehensive understanding of gender differences in mental health.

Do psychological strengths accrue disproportionately to those possessing greater access to resources and opportunities in life? This is the question of *socioeconomic differences* in psychological well-being, which relates to the growing interest in social inequalities in health, both mental and physical (Adler, Marmot, McEwen, & Stewart, 1999). Prior studies have documented that the poor and disadvantaged are more likely to experience mental and physical illness, as well as greater life stress, than those with socioeconomic advantages (Adler et al., 1994; McLeod & Kessler, 1990). Are they also less likely to experience positive well-being? Figure 39.2 summarizes educational differences in psychological well-being among members of the Wisconsin Longitudinal Study (WLS), begun in 1957 with a random sample of high school seniors. The data, based on assessments of well-being at age 53 ($N = 6,306$), show higher profiles of well-being for those persons with more education, with the results being particularly strong for women. Even after controlling for other life history variables (e.g., high school IQ, parental education, income, occupational status), education remains a strong predictor of psychological well-being (see Ryff, Magee, Kling, & Wing, 1999).

Similar patterns are evident in the MIDUS national survey, where well-being and other indicators of health have been shown to be compromised among persons with less education (Marmot et al., 1998; Marmot, Ryff, Bumpass Shipley, & Marks, 1997). Another representative sample—the National Survey of Families and Households (based on 13,017 Americans)—revealed both age and educational differences on purpose in life (Bumpass & Aquilino, 1995). That is, the findings converged with prior results, showing that with age one is less likely to report high levels of purpose in life, but in addition clarified that one is less likely to have high purpose if one has less education. Figure 39.3 summarizes the results of age and education and the likelihood of being in the upper quartile on life purpose. Because positive psychological functioning may well constitute a protective resource in the face of challenge and life adversity (Ryff & Singer, 2000a; Ryff, Singer, Love, & Essex, 1998),

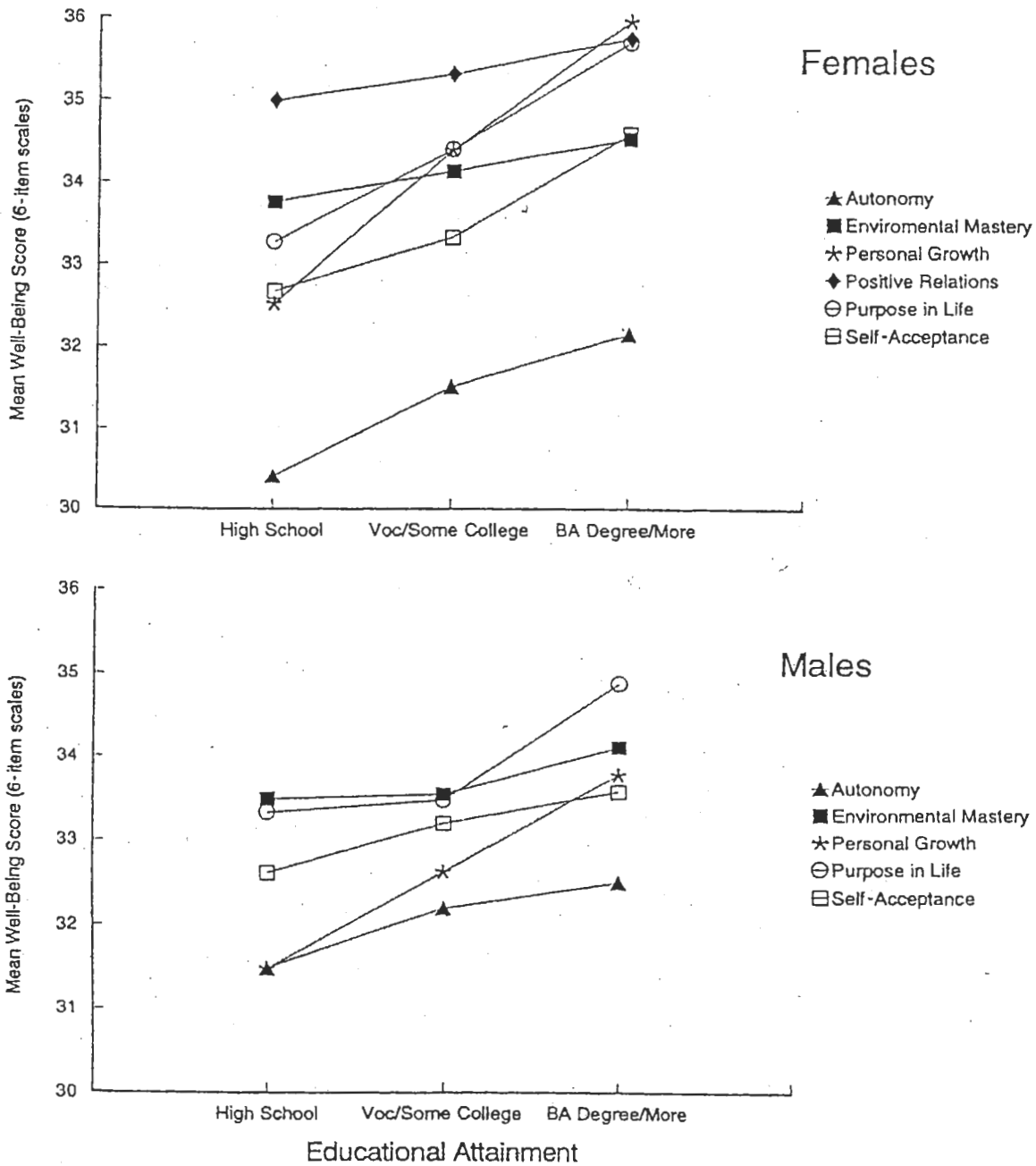


Figure 39.2 Educational Differences in Psychological Well-Being. Source: MIDUS (MacArthur National Survey)

these findings draw attention to the diminished profile of such strengths among persons with less education.

Another finding that has emerged from the assessment of psychological well-being in nationally representative samples is illustrated in Figure 39.4. Arrayed in the figure are maximum and minimum values and 25th, 50th, and 75th percentiles of well-being (in this case, for purpose in life, although similar pat-

terns are evident for other dimensions). What can be seen is that variability in well-being *increases* as one moves down the educational hierarchy. That is, there is greater spread, particularly at the low end, among individuals with less education. These findings are important for two reasons. First, they underscore the importance of assessing psychological well-being in sociodemographically diverse samples. Such effects would be missed entirely with the

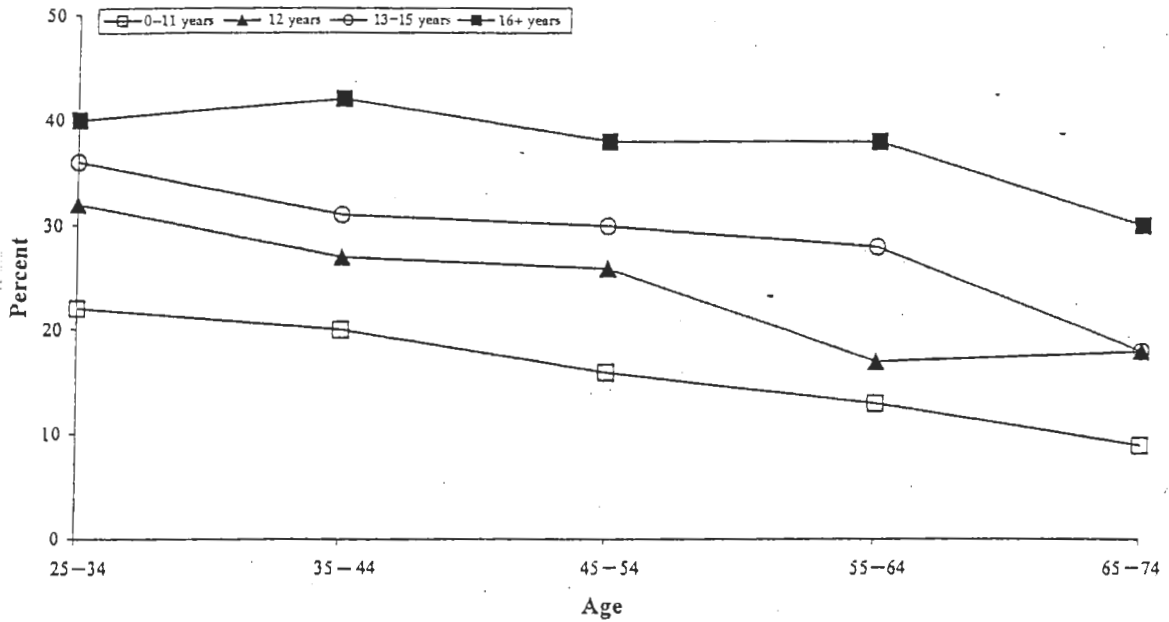


Figure 39.3 High Purpose in Life: Age and educational variation (percent in upper quartile of scale). Source: NSFH (National Survey of Families & Households)

college-sophomore subject pools, whose restricted range, in turn, will fundamentally limit efforts to connect well-being to other factors. Second, distributions such as the one illustrated in Figure 39.4 point to new directions in the study of psychological resilience, defined as having high well-being *despite educational disadvantage*. Inquiry along these lines can be instrumental in identifying the

sustaining strengths that enable some to experience well-being, despite life's inequities (see Markus, Ryff, & Barnett, in press; see also other chapters in this volume on topics of resilience, optimism, and hope).

This select summary of findings excludes the extensive work that has been conducted on how well-being is influenced by life experiences and life transitions (e.g., parenthood, caregiving, re-

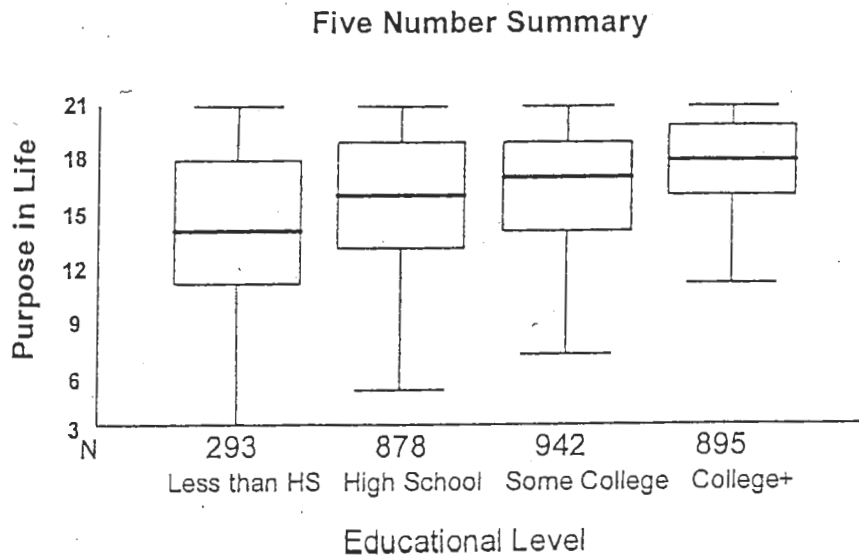


Figure 39.4 Variation in purpose in life by level of education (five-number summary).

location, marital status changes; e.g., Li, Seltzer, & Greenberg, 1999; Marks & Lambert, 1998; Ryff, Schmutte, & Lee, 1996; Smider, Essex, & Ryff, 1996), as well as by goals, social comparison processes, personality traits, and coping strategies (e.g., Heidrich & Ryff, 1993; Kling, Seltzer, & Ryff, 1997; McGregor & Little, 1998; Ryff & Singer, 1998d; Schmutte & Ryff, 1997). We chose to focus on sociodemographic variation to underscore the influence of social structural and life course factors on well-being, and thereby to broaden the disciplinary purview of how to think about individual differences in well-being.

Well-Being, Biology, and Health: Are the Criterial Goods Protective?

Positive Health and the Physiological Substrates of Flourishing

In 1948 the World Health Organization defined health as a "state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948, p. 28). Unfortunately, this visionary conception did not guide subsequent studies of human health. Rather, the past half century shows a persistent focus on health defined in terms of illness, disease, dysfunction, and disability. We recently called for renewed emphasis on "positive health" (Ryff & Singer, 1998a, 1998b), albeit with a somewhat different slant. We argued that psychological and social well-being are, indeed, part of health; but, more important, we underscored the need to understand the neurobiology that underlies psychosocial flourishing. This is a call to embark on a new era of science on positive functioning conceived as a *biopsychosocial nexus*, that is, the salubrious joining of mind and body (Ryff & Singer, 2000a).

To explicate mechanisms that might account for how the "criterial goods" (e.g., quality relationships, purposeful engagement) might influence health, we put forth three promising research directions: examination of allostatic load, cerebral activation asymmetry, and immune competence. The first pertains to a measure of cumulative wear and tear on numerous physiological systems (cardiovascular, metabolic, hypothalamic-pituitary-adrenal [HPA] axis, sympathetic nervous system; Seeman, Singer, Rowe, Horwitz, & McEwen, 1997; Seeman,

McEwen, Rowe, & Singer, 2001). Longitudinal aging research has shown that high allostatic load predicts incident cardiovascular disease, cognitive impairment, declines in physical functioning, and mortality. The key question for positive health, however, is whether psychological and social strengths *decrease* the likelihood of high physiological wear and tear (i.e., decrease high allostatic load)? In other words, does well-being serve a protective function? In a subsequent section, we will offer preliminary evidence providing an affirmative answer.

The second venue, that of cerebral activation asymmetry, emerges from affective neuroscience and its elaboration of the neural circuitry of emotion (Davidson, 1995, 1998; Sutton & Davidson, 1997). This work has demonstrated that individuals showing greater left as compared with right prefrontal activation in response to emotional stimuli are more likely to show positive affect and are less vulnerable to depression. Viewed more broadly, the positive health question is whether psychological strengths (e.g., purposeful engagement, positive self-regard) are neurally instantiated in particular patterns of neural activation. Although affective neuroscience has actively pursued the brain mechanisms that are implicated in depression, it is also important to advance scientific agendas that probe the neural circuitry of human flourishing.

The third direction, immune competence, is derived from the growing literature on psychoneuroimmunology, which links psychosocial factors and immune function (Maier, Watkins, & Fleshner, 1994). Here, three decades of research has probed the psychological modulation of immunity, but the emphasis has been primarily on exposure to stressors (e.g., electric shocks, restraints, or maternal separation in animals; exams, divorce, caregiving, or loneliness in humans). The positive counterpoint that would link, for example, zestful engagement in living, or loving and nurturing social relationships to cellular and humoral immunity has received far less scientific attention. These are questions that go to the core of whether psychosocial strengths are protective.

Other mechanisms could be added as promising routes for elaborating the neurobiology of flourishing, such as via central neuropeptides (oxytocin and vasopressin), neurogenesis, anabolic systems and growth factors, and gene expression (for examples of each, see Ryff & Singer, 2000a, 2000b). Indeed, the scientific op-

portunities for connecting psychological and social flourishing to processes within the brain and the body are vast. In the following sections, we briefly describe select lines of inquiry that have begun to explore connections between different aspects of well-being and health. With regard to physiological substrates, our illustrative focus is on allostatic load.

Quality Relationships With Others and Health

Having good-quality relationships with others is universally endorsed as being central to optimal living (Ryff & Singer, 1998a). The relational world has received extensive attention by social scientists, as in studies of attachment, close personal relationships, marital quality, and family ties, although much of this literature has not been explicitly concerned with health (Ryff & Singer, 2000b). Alternatively, two decades of social epidemiology has provided repeated evidence that social isolation or lack of social support is related to increased risk of disease and reduced length of life (Berkman, 1995; House, Landis, & Umberson, 1988; Seeman, 1996).

In reviewing this prior literature and seeking to advance the positive health agenda, we have enumerated several targets for future research (Ryff & Singer, 2000b, in press-b; Ryff, Singer, Wing, & Love, 2001). One pertains to the need to capture more fully the *emotions of interpersonal flourishing*, particularly the delicate dance between positive and negative emotions that constitute quality ties to significant others. Rewarding relationships (phenomenologically and possibly physiologically) are not those in which negative affect and adverse experience are largely absent, but rather those in which adversity and difficult feelings are successfully negotiated. Thus, negative emotions are fundamental to social relationships, but how they are handled is likely what differentiates healthy from unhealthy ties. A second emphasis addresses the need to track social relationships through time so as to understand *cumulative profiles of relational well-being*. If loving (or tormenting) ties to others have a neurobiological signature, it is the chronic, recurring nature of such beneficial (or detrimental) connection that is likely to be consequential for health. And, as noted previously, understanding these consequences requires explication of underlying mechanisms.

To illustrate our efforts to implement these ideas, we briefly will describe recent findings from a biological subsample of members of the Wisconsin Longitudinal Study (WLS; Ryff et al., 2001; Singer & Ryff, 1999). The WLS was initiated in 1957 with a random sample of one-third of all high school seniors in the state of Wisconsin. A large majority of these individuals was followed over the ensuing decades, with detailed data collected on numerous aspects of their educational and occupational achievements, as well as work and family lives, health, and well-being. To pursue the kinds of research questions described previously, we collected neurobiological data on a subsample (106 individuals, 57 male and 49 female) of the WLS. Respondents were selected to be within geographic proximity to the UW-Madison campus (where biological data were collected). It should be noted, however, that this small subsample matched the full WLS sample on income, in both their families of origin and their own adult household incomes (see Singer & Ryff, 1999).

To pursue the idea of cumulative relationship pathways (positive and negative), we asked the respondents to complete two inventories. One (the Parental Bonding Scale) assessed the extent to which their parents (assessed separately for mothers and fathers) were caring, supportive, and affectionate when they were growing up. The other (PAIR Inventory) was designed to assess multiple dimensions of adult spousal intimacy (emotional, sexual, recreational, intellectual). Individuals were defined as being on the *positive relationship pathway* if they had at least one parent (mother or father) who was caring and affectionate (i.e., above the median on the Parental Bonding Scale) and they also had at least one of two forms of adult spousal intimacy (i.e., above the median emotional/sexual scales or intellectual/recreational scales). Individuals were defined as being on the *negative relationship pathway* if they had negative bonds with both parents and/or had negative interaction with a spouse on both combined aspects of intimacy described previously. The majority on the negative pathway (61% for women, 74% for men) fulfilled both criteria (for details see Ryff et al., 2001).

Our question was whether these cumulative relationship profiles would be related to the respondents' levels of allostatic load—specifically, would those on the positive pathway be less likely to have high allostatic load than those on the negative pathway? Allostatic load was mea-

sured with multiple components of physiological function (systolic and diastolic blood pressure, waist-hip ratio, cholesterol [HDL and ratio of total cholesterol to HDL], glycosylated hemoglobin, urinary cortisol, urinary epinephrine, urinary norepinephrine, DHEA-S). Collectively, these address the cardiovascular system, the HPA axis, the metabolic system, and the sympathetic nervous system (for details see Seeman et al., 1997; Singer & Ryff, 1999). Figure 39.5 shows the percentage of individuals having high allostatic load (defined as being in the top quartile of risk for three or more of the preceding indicators) as a function of whether they were on the positive or negative relationship pathway. As predicted, those on the positive pathway were significantly less likely to have high allostatic load than were those on the negative pathway, although the effects were stronger for men than for women.

These findings suggest possible protective influences associated with having persistently positive, loving, caring, intimate relationships with one's significant others. In further analyses, we juxtaposed these relational histories with the respondents' economic histories (Singer & Ryff, 1999). Following from our preceding emphasis on socioeconomic factors, we expected that individuals who had lived with cumulative economic disadvantage (i.e., being below the median on household income in childhood and adulthood) would be more likely to have high allostatic load than those having persistent economic advantage. We found this to be the case: 50% of those on the negative economic pathway ($n = 22$) had high allostatic load, compared with 36% on the positive economic pathway ($n = 19$). However, putting these economic and relational pathways together, we learned something additionally important—namely, that positive relationship profiles could help *offset* the likelihood of experiencing high allostatic load if one was on the negative economic pathway. Specifically, among those with persistent economic adversity, but positive relational profiles ($n = 13$), only 22% had high allostatic load, compared with 69% of those with the same economic profile but on the negative relational path ($n = 9$).

Given the limited sample size as well as the retrospective nature of the relational assessments, these findings are preliminary. Nonetheless, they provide initial evidence of the possible physiological benefits associated with having good-quality relations, particularly in

the contexts of disadvantage and adversity. The latter illustrate a kind of biopsychosocial pathway of resilience, something we believe warrants further attention in future research (Ryff et al., 1998).

Psychological Well-Being and Allostatic Load

Using data from the same biological subsample of the WLS, we will conclude this section on positive health with a brief summary of how levels of allostatic load are distributed as a function of an individual's standing on each of the six dimensions described in detail in preceding sections. These analyses have the advantage of providing a more differentiated perspective on positive psychology vis-à-vis biology than the prior relational analyses, but they lack the emphasis on *cumulative* well-being described in the preceding relationship profiles. Nonetheless, they are informative next steps in efforts to probe the physiological substrates of numerous dimensions of flourishing.

Figure 39.6 summarizes the data, presented separately for men ($n = 57$) and women ($n = 49$). Using median-split procedures, each sample is divided between those at or below the median and those above the median on all six dimensions of well-being. On all aspects of well-being except one (autonomy), men with higher well-being were less likely to have high allostatic load. Echoing our preceding analyses, however, the strongest differences were evident on the interpersonal dimension of well-being: 60% of men with low scores on positive relations with others had high allostatic load, compared with about 36% of men with high scores on interpersonal well-being. The next most noticeable differences were evident for the purpose in life assessments, followed by personal growth, self-acceptance, and environmental mastery. Only the differences for positive relations were statistically significant (perhaps linked to the small sample and hence limited statistical power).

What is first evident for women is that, overall, they have a lower likelihood of having high allostatic load compared with men. This finding may be informative considering the near 7-year advantage in life expectancy that women have relative to men. However, the direction of effects between women with high versus low well-being is *opposite* to what we had predicted for all outcomes. That is, women are more likely to have high allostatic load if they have

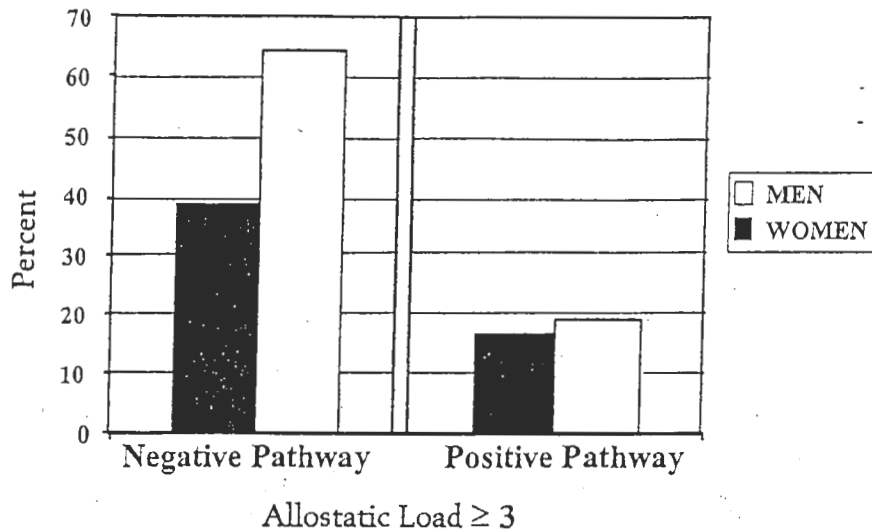


Figure 39.5 Relationship pathways and high allostatic load.

higher well-being, with the differences being most pronounced for women who report high levels of personal growth (statistically significant difference), followed by high environmental mastery (approached statistical significance) and purpose in life. What do these findings mean? We know from examining the underlying components of allostatic load that women are more likely than men to show high profiles on indicators from the HPA axis (cortisol, epinephrine, norepinephrine). Thus, the results suggest that women who are striving to realize their talents through continuing growth and are highly engaged in managing complex environments may have higher activation of stress hormones. Whether these elevated profiles translate to downstream differences in other physiological systems (i.e., is an elevated HPA axis a precursor to an elevated cardiovascular profile?) and/or functional health outcomes remains to be answered. And certainly, the small sample calls for more data collection cases as well as replication efforts.

That the outcomes for positive relations with others for women did not converge with the prior findings on relationship pathways is a conundrum, perhaps explained by the emphasis on significant primary relationships (i.e., parents, spouse) in the prior analyses as well as their cumulative features. Whatever the interpretation, these findings underscore the need for future inquiries linking psychological and social strengths to physiological systems, and point to possible gender differences therein. And, as we have described earlier, there are nu-

merous other bridges to be built between neurobiology and well-being (e.g., cerebral activation asymmetry, neurogenesis, immune function, gene expression). The present work serves as a preliminary illustration of a much larger agenda.

Interventive Significance: Can Well-Being Be Promoted?

A fundamental question in the study of positive psychology is what, if anything, can be done to promote greater levels of well-being for ever larger segments of the population? Can interventions be developed to enhance individuals' experience of the critical goods in life? Although some may argue that propensities for well-being are inscribed in one's genes—that is, that some have more "joy juice" than others (Meehl, 1975)—a new line of intervention work suggests that even those who suffer from major depression can, in fact, benefit from efforts to improve their capacities to experience positive self-regard, quality ties to others, a sense of purpose and direction, continued growth, and so on. This is the work of Giovanni Fava (Fava, 1999; Fava, Rafanelli, Cazzaro, et al., 1998; Fava, Rafanelli, Grandi Conti, & Belluardo, 1998) that has addressed the problem of relapse among those who suffer from depression.

Fava and colleagues argue that in the residual phase of major depression, when debilitating symptoms have subsided but well-being is not fully regained, individuals are at high risk

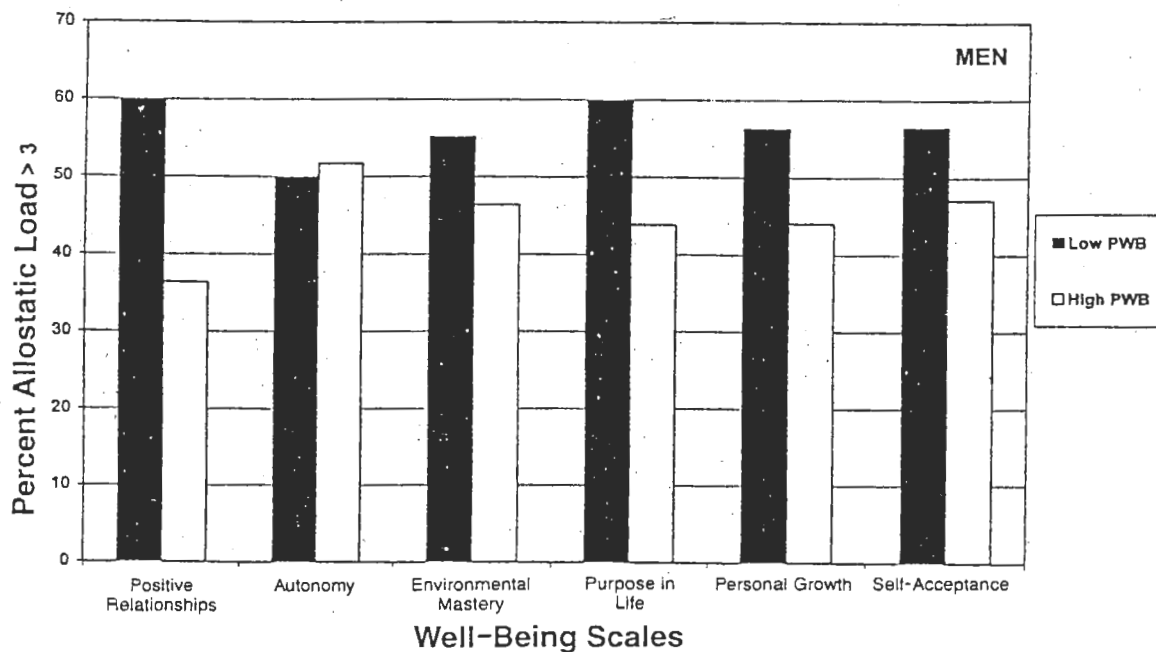
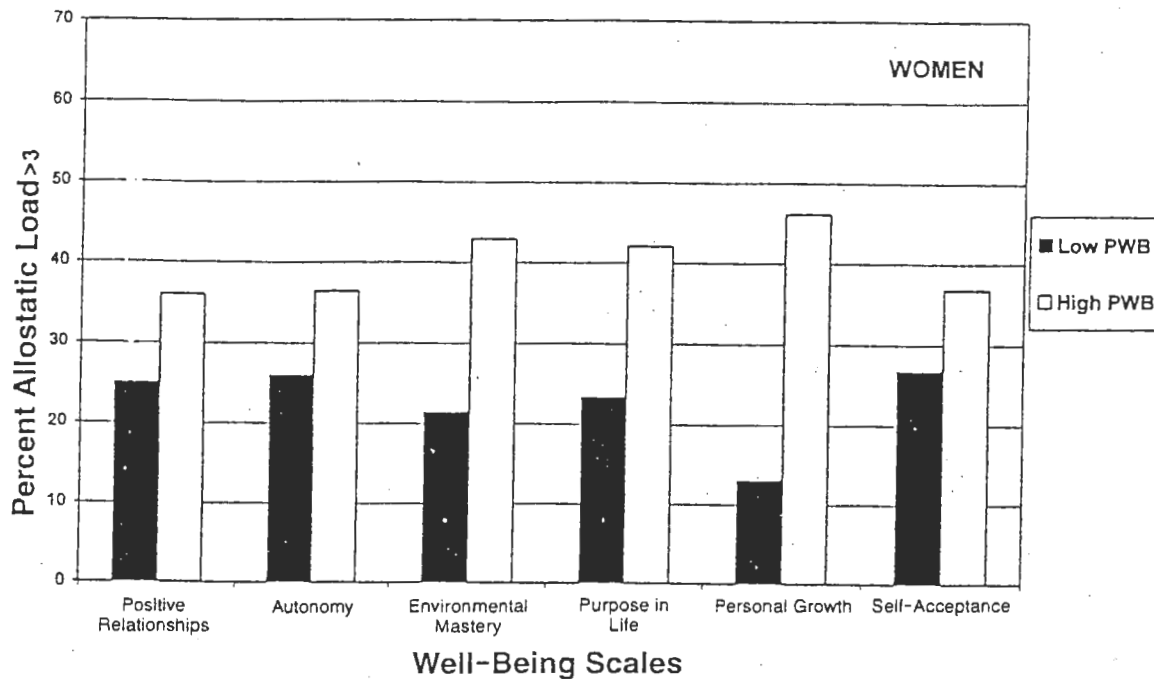


Figure 39.6 High versus low well-being and high allostatic load (for women and men).

for relapse. It is during this period that they particularly need therapy designed to help increase their share of joy juice. To help achieve this end, he implements "well-being therapy," in which clients, via the keeping of daily diaries, are instructed to write about their positive experiences, whatever these might be. When brought to therapy, these experiences

are then used by the clinician to help enlarge the clients' understanding of various aspects of well-being (using the Ryff multidimensional model as a guide) and also to help them understand ways in which they may undermine or prematurely curtail their own experiences of the positive. Those participating in such therapy have shown improved remission profiles

compared with those receiving standard clinical treatment (Fava, Rafanelli, Grandi, et al., 1998). Thus, it appears that even among those for whom well-being is most elusive, there may be hope (see Snyder, Rand, & Sigmon, this volume).

Conclusions

Our purpose in this chapter has been to summarize a program of research dealing with psychological well-being. We have argued that psychology, philosophy, and history have shown long-standing interest in what it means to function optimally. However, empirical research has lagged behind efforts to assess and understand human dysfunction and distress. A multidimensional formulation of well-being was presented as a provisional model for measuring positive functioning. We then showed individual differences on these various dimensions of well-being related to one's age, gender, and socioeconomic standing. Collectively, these studies have drawn attention to particular areas of vulnerability among the aged and to particular strengths among women, and they have underscored the diminished profiles of well-being among individuals with less education.

We followed these analyses with more recent efforts to link positive psychosocial strengths to health. A full understanding of human health encompasses not only physical well-being but also psychological and social flourishing. What is needed, however, are scientific strides that clarify the neurobiology associated with such flourishing and its role in promoting both length and quality of life. To illustrate the work that needs to be done to advance the positive health agenda, we summarized findings showing that individuals with more positive social relationship histories were less likely to show high allostatic load than those with more negative relational histories. We also described preliminary links between allostatic load to the six dimensions of well-being, with the findings highlighting gender differences in need of further clarification in future research.

Overall, our aim has been to take psychological well-being, a prototype of positive psychology, and link it outward to social structure and inward to biology. Traversing this wide territory demonstrates the multidisciplinary scope of research on positive functioning, both how it is contoured by macro-level societal forces and

what its consequences are for understanding health as the presence of wellness. As noted at the beginning of this chapter, this is a scientific agenda in the true spirit of consilience. Finally, that well-being can be promoted, even among those least likely to experience it (Fava's well-being therapy), underscores the interventive promise of this new area of inquiry.

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