Health and Well-Being in the Young Old and Oldest Old

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Most individuals experience a decline in health status during old age. Paradoxically, there are proposals that older adults nevertheless maintain a positive sense of well-being, an indicator of successful aging. Data from the Berlin Aging Study (BASE: Baltes & Mayer, 1999), a locally representative sample of men and women aged 70 to 100+ (N = 516, M = 85 years), suggest that cumulative health-related chronic life strains set a constraint on the potential of oldest old individuals to experience the positive side of life. The young old in BASE reported significantly higher positive SWB than did the oldest old. Chronic illness and functional
Impairments (e.g., vision, hearing, mobility, strength) limit well-being especially in very old age.

Health and Well-Being in Old Age: Findings from the Berlin Aging Study

In old age, the challenges of dealing with chronic illness and impairments in physical, sensory, and cognitive functioning have a pervasive impact on the nature and routine of everyday life. In this context, an important question in the gerontological literature concerns the extent to which individual differences in health status and functional capacity in very old age are linked to subjective well-being (SWB). SWB is viewed as a general indicator of psychological adaptation and successful aging (e.g., Baltes & Baltes, 1990; Lawton, 1991; Rowe & Kahn, 1987). As such, measures of SWB provide an estimate of the effectiveness of social policies, welfare programs, and the success of medical and psychiatric treatments designed for the elderly population.

Given the recent growth of the elderly population in developed countries, it has also become important to consider health and SWB in different phases of old age and to examine changes during old age. Some researchers suggest that the young old (or Third Age) be distinguished from the old and the oldest old (Fourth Age; e.g., Baltes, 1997; Suzman, Willis, & Manton, 1992). Suzman, Willis, and Manton (1992) identified 85 years of age as the criterion of membership in the oldest old category. The population over age 85, unlike any other age strata, is typically characterized by a higher percentage of women over men, higher levels of comorbidity and institutionalization, and greater consumption of medical and care services. Individuals born between 1890–1915 who comprise the oldest old observed in 2000 also exemplify a set of characteristics that are cohort-specific: for example, they have a lower level of education compared with subsequent cohorts and a higher likelihood of long-term widowhood. Whereas the majority of the young old begin to deal with health challenges in collaboration with their spouse, the majority of the oldest old (and in this case, typically older women) deal with declining health during widowhood. The different life circumstances associated with these proposed two phases of old age likely play a critical role with regard to the potential of the individual to maintain positive well-being (Smith & Baltes, 1997).

Increasingly, epidemiological and national surveys of the elderly focus on the trajectory and economics of service use associated with disability and frailty (e.g., Liu, Manton, & Aragon, 2000). Poor mental health outcomes are usually evaluated (e.g., dementia, depression). However, few studies include a wide range of health indicators (e.g., specific physical illnesses, functional health, subjective health) or measures of positive well-being (e.g., life satisfaction, satisfaction with aging, experience of positive emotions) that might enable researchers to tease apart differential relationships between components of well-being and different aspects of health.
It is also important to investigate changes in well-being over time. The psychological literature abounds in studies of the so-called “well-being paradox” showing the efficacy of self-protective processes to minimize the effects of negative events in the short-term (e.g., Diener, Suh, Lucas, & Smith, 1999). There are, however, surprisingly few longitudinal studies of well-being. Furthermore, it is still an open question whether the irreversible changes in health and life conditions that characterize old age eventually set constraints on the operation of these processes.

In this article, we review findings from the Berlin Aging Study (BASE; Baltes & Mayer, 1999) on relationships between health and well-being in old age. BASE is a multidisciplinary intensive study of a locally representative sample of men and women aged 70 to 100+ years \( (N = 516) \) living in the western districts of Berlin. Using an age-by-sex stratified design, the study initially included equal numbers of men and women together with equal numbers of young old and oldest old, thus allowing age and gender comparisons. Before describing the study and our findings, we first outline some general concepts of health and well-being that have guided our analyses.

### Concepts of Health in Old Age

The definition of “health” with regard to old age is a subject of debate. There is consensus that health in old age cannot meaningfully be defined as the absence of disease because the prevalence of diagnosable disorders in elderly populations is high. Instead, health is considered to be multifaceted: The diagnosis of disease should be complemented by assessment of discomfort associated with symptoms (e.g., pain), life threat, treatment consequences (e.g., side-effects of medication), functional capacity, and subjective health evaluations (Borchelt, Gilberg, Horgas, & Geiselmann, 1999; for a review see Lawton & Lawrence, 1994). Furthermore, Rowe and Kahn (1987) suggested that the health of subgroups of older adults be defined in terms of their status relative to age and cohort norms (e.g., successful, usual, versus pathological).

The different facets of health (e.g., diagnoses, mortality risks, functional capacity, subjective health) are intercorrelated but need not necessarily be strongly related (Idler, 1993; Johnson & Wolinsky, 1993; Lawton & Lawrence, 1994). Clearly, some illnesses or functional impairments have few symptoms that limit daily activities whereas others impose great constraints. Some illnesses result in much pain and discomfort, whereas others are relatively pain-free. This heterogeneity of symptoms experienced by older adults may have important consequences for their interpretations of illness and perceived well-being, both in the short term and over longer periods of time (Prohaska, Keller, Leventhal, & Leventhal, 1987). Judgments of subjective health and satisfaction with one’s health also reflect the operation of different value and motivational systems (Idler, 1993). Whereas two older adults with osteoarthrosis may have the same limitations as assessed by an
objective health status scale, they might assign very different levels of importance to their incapacity as a function of their life background and personal preferences. There are large individual differences in the amount of time, discomfort, money, and risk that older adults are prepared to invest in undertaking treatment and also in how individuals rate the limitations of one illness compared to another health state (Tsevat et al., 1994).

**Approaches to Studying Well-Being in Old Age**

What constitutes well-being in very old age? Researchers have taken two main routes toward answering this question. These routes roughly correspond to commonsense theories that attribute the sources of well-being either to an individual’s material resources or to his/her life philosophy and disposition. As might be expected, approaches that focus on defining well-being in terms of material resources and life conditions are primarily represented in the fields of sociology and economics (Schuessler & Fisher, 1985). Here researchers are interested in determining a so-called *objective* set of social-normative criteria that specify the prerequisite physical, material, and personal life conditions which can contribute to successful aging and a “good life” in old age (e.g., acceptable housing, access to a wide-range of health-care and community services, sufficient financial means and mental health).

The approach to identifying well-being which emphasizes the importance of the individual’s *subjective* experience of life is taken primarily by psychologists (e.g., Campbell, Converse, & Rodgers, 1976; Diener et al., 1999). This approach defines well-being in terms of individuals’ cognitive evaluations of their lives and their feelings of enjoyment and upset associated with their life circumstances. Defining well-being in terms of the individual’s subjective experience of life avoids the difficult task of establishing consensus about criteria of quality that satisfy both individuals and social institutions. The standards and/or needs of one target individual or group may not always match the standards and criteria of an observer (e.g., professional caregiver, government department, institution).

With regard to measurement of SWB, researchers are distinguished with respect to whether they use as outcome variables (a) single versus multi-item responses, (b) scales tailored for the healthy, the frail, or the demented elderly versus general populations, and (c) measures that address either the *affective* or *cognitive* components of well-being, or some combination of these components (Campbell et al., 1976; Diener et al., 1999). Measures biased toward the affective components of SWB ask about the experience of enjoyment and happiness, the preponderance of happiness and pleasant feelings over unpleasant feelings, or the absence of emotional upset. More cognitively-oriented measures focus on judgments of life quality, meaningfulness, and satisfaction. Various researchers have also introduced other dimensions (e.g., adjustment, mastery, morale, satisfaction with one’s aging,
valuation of life, or mental health: see Lawton, 1991; Ryff & Singer, 1998). Unfortunately, a large number of studies in the gerontological literature focus only on assessing the presence of negative aspects (e.g., depressivity) and neglect the positive side of well-being.

Proposals About Well-Being in Old Age

Is old age associated with lower subjective well-being and is this associated with health? Comparisons between young and older adults reveal different age trends for measures directed to affective versus cognitive components of well-being (Diener et al., 1999). Feelings of happiness show negative correlations in late adulthood (e.g., Charles, Reynolds, & Gatz, 2001) whereas reports of satisfaction either reveal no age trends or a small increase with age (e.g., Diener et al., 1999). Findings vary depending whether analyses of age effect control for life circumstances such as poor health which may disadvantage older individuals (e.g., Kunzmann, Little, & Smith, 2000; Mroczek, 2001).

Theoretically, SWB is expected to be generally stable, with short-term fluctuations contingent on negative events (Diener et al., 1999). In part, stability is a function of enduring personality characteristics and self-protective processes: Some people are dispositionally happy and others chronically unhappy (Costa & McCrae, 1980). Stability may also be due to consistencies in life circumstances over time. After the period of early adulthood, for example, housing family, work, leisure, and finances take on a degree of predictability for most people.

Proposals that subjective well-being may decline in old age (especially among the oldest old) are derived from research documenting the accumulation of debilitating health conditions, functional impairments, and personal losses during old age (Birren, Lubben, Rowe, & Deutchman, 1991). It is suggested that the increased risk of frailty, loss of functional capacity, and poor health during the period of very old age (85 years and older) may place constraints on life satisfaction and overwhelm individuals to such a degree that they moderate their expression of well-being (Smith, Fleson, Geiselman, Settersten, & Kunzmann, 1999). These authors also suggest that some dimensions of subjective well-being may be more susceptible to change.

To date, few analyses of subjective well-being in heterogeneous samples of old and very old individuals have been published to provide answers to these general questions. Short-term changes in well-being have been examined in subgroups of adults over the age of 70: for example, with regard to the experience of specific late-life events (e.g., Kling, Seltzer, & Ryff, 1997) or adaptation to health conditions (Verbrugge, Reoma, & Gruber-Baldini, 1994). The majority of studies focus on the well-being of individuals between the ages of 60 to 80 years. There is little information about differences between the young old and oldest old and changes in well-being during very old age. One goal of our research in the Berlin Aging
Study is to address these open questions. In this article, we focus specifically on the links between health and SWB in the young old and oldest old. We speculated that different facets of health (e.g., specific physical illnesses, functional health, subjective health, and mortality) would be related to individual and age-related differences in specific components of SWB (e.g., life satisfaction, satisfaction with aging, experience of positive and negative affect). It has been suggested, for example, that illness may only compromise perceived quality of life when it is accompanied by functional impairment (Lawton, 1991).

**Associations Between Health and Subjective Well-Being: Findings from BASE**

The Berlin Aging Study (BASE: Baltes & Mayer, 1999) was established in 1989 to investigate questions about very old age from the collaborative perspectives of four disciplines: psychiatry, psychology, sociology, and internal medicine. Distinguishing features of the BASE design are: (a) a special focus on the very old (probability sample stratified by age and sex), (b) sample heterogeneity achieved by local representativeness of the western districts of Berlin, and (c) intensive multidisciplinary data collection (involving 14 sessions and data from each individual collected over 3–5 months). The study focuses on the former West Berlin because it commenced before the city was officially unified. Descriptions of the study design, procedure, sample representativeness (compared to city census data), and sample selectivity have been published elsewhere and so are described here only briefly (Baltes & Mayer, 1999; see also Baltes & Smith, 1997).

The initial parent sample ($N = 1,908$) was obtained from the city registry (in Germany, all residents must be registered). 516 participants (27% of the parent sample ($N = 516$; age range 70 to 103 years) completed all 14 sessions of assessment at the first measurement occasion (1990–1993). Problems of sample selectivity were expected because of the intensity and duration of the assessment procedure over a period of 3–5 months, the advanced age of the sample, and the location in a large metropolitan city. Indeed, the 516 persons who completed the 14-session intensive protocol had a lower mortality in the 12 months following initial contact (5.6% compared to 13.5% in the parent sample) suggesting that, on average, they were possibly healthier than members of the parent sample.

The 14-session protocol began with an initial two-hour multidisciplinary Intake Assessment followed by 13 sessions in which data specific to research topics of each of the four disciplines were collected (psychiatry, psychology, sociology, and internal medicine). Assessment sessions, which typically were carried out in the participants’ place of residence (private home or institution), each required on average 1.5 hours. Data were collected by trained full-time research assistants, as well as medical personnel including physicians, dentists, and psychiatrists. Throughout
the study, each individual participant was assigned to one of the research assistants who served as a continuing liaison agent. Individuals in the 14-session sample received DM 500 (approximately US$220) for their participation.

Four longitudinal follow-ups of the survivors from the cross-sectional sample have since been completed at two yearly intervals. These follow-ups have involved different amounts of assessment. A single-session multidisciplinary assessment was collected in 1993–1994 ($N = 361$), reduced versions of the first occasion Intensive Protocol (six sessions) were collected in the periods 1995–1996 ($N = 206$) and 1997–1998 ($N = 132$), and a repeat of the single-session multidisciplinary assessment together with parts of the Psychology Battery was completed in 2000 ($N = 89$). In addition, we also regularly receive updated information regarding the mortality of BASE 516 sample from the City Register (at the end of 1999, 70% were deceased).

**BASE Participants**

The cross-sectional BASE sample ($N = 516$) consisted of six age/cohort groups (age 70–74 years, born 1922–1915; age 75–79 years, born 1917–1910; age 80–84 years, born 1913–1905; age 85–89 years, born 1908–1900; age 90–94 years, born 1902–1896, and age 95–105 years, born 1897–1883). Because of the three-year time interval required to acquire and assess the sample, there is some overlap in birth cohort membership across adjacent groups. Participant recruitment and field work were structured so as to obtain a final sample with equal numbers of men and women in each age/cohort group ($n = 43$ respectively). The average age of participants at the first cross-sectional measurement was 85 years.

Fourteen percent of the 516 BASE participants were institutionalized (e.g., in housing complexes for seniors, nursing homes, hospitals) and 5% were non-German nationals. These figures are consistent with city statistics for the Berlin population over the age of 70 years. In 1990–1993, 30% of the BASE sample were married, 55% widowed, 7% divorced, and 8% had never married. Representative for these age cohorts in Berlin, 65% of the sample had primary level education, 28% high school and college level, and 8% university level (see Baltes & Mayer, 1999).

Demographically speaking, the elderly population of the western districts of Berlin is more similar to that in other large cities of former West Germany than one might expect from West Berlin’s post–World War II history of enclosure (Kohli & Künemund, 2000; Mayer, 1988). There are, however, some demographic differences. Based on 1989 microcensus and 1991 population registry information, 12% of West Berlin inhabitants were aged 70 years and above, compared to 10.5% in the former Federal Republic of West Germany (Statistisches Bundesamt, 1993). Moreover, economically and educationally, the older adults of the
western districts of Berlin were somewhat better off than their West German counterparts (Senatsverwaltung für Soziales, Berlin, 1995). On a continuum of social stratification, participants in BASE were distributed as follows: lower class (7%), lower middle class (20%), middle class (31%), upper middle class (30%) to higher class (11%; Baltes & Mayer, 1999).

How about historical and culture-specific cohort effects? BASE participants have lived in the midst of many historical events. The oldest participants were born in 1886 and the youngest in 1920. The oldest birth cohorts were aged in their 20s and 30s at the time of World War I and the youngest were born during or shortly after that war. All participants experienced World War II, although at different points in their lives. These cohort-specific experiences, of course, had an impact on the educational and occupational opportunities, health experiences, and family lives of the individuals (for details see Maas, Borchelt, & Mayer, 1999). The age peers of BASE participants born in other parts of Europe (e.g., France, England, Russia, Italy, Poland) had slightly different experiences of these historical events but also much in common on a day-to-day basis. There was also a large wave of migration from Germany (and Europe) to the USA, Australia, and Canada after World War I and up to the 1950s (Hatton, 2001). Many of the people who left Germany to begin new lives in the USA have been sampled most likely in studies of old age carried out by researchers there. In order to tease out the specific effects of cohort and cultural (national) experience, it is important that studies undertaken in different countries include some common measures and exchange findings. BASE researchers, for example, have had regular exchanges with researchers from the MacArthur Successful Aging Network (Rowe & Kahn, 1987) as well as large studies in England, Sweden, USA, and Canada. Cultural differences are most likely to be observed in lifestyle, self-report and psychological measures, but it is also possible that different life histories and environmental interactions contribute to differences in disease prevalence and longevity (e.g., Mayer, 1988; Smith, 2001; Vaupel et al., 1998). Inequalities in societal and political systems (e.g., education, health, and pension systems), of course, also contribute to differences in quality of life in old age (e.g., O’Rand, 2001). For the most part, we expect that patterns of age differences and changes in well-being similar to those that we find in BASE would be found in studies carried out in large cities of other developed societies.

*Measures*

The indices of health and well-being addressed in this article are listed in Table 1 (for details on well-being see Smith et al., 1999; for health see Steinhagen-Thiessen & Borchelt, 1999). BASE included a standard measure of the affective components of SWB, *positive and negative affect* (Positive and Negative Affect Schedule, PANAS: Watson, Clark & Tellegen, 1988), together with a 15-item
Table 1. Measures of Subjective Well-Being (SWB) and Health Used in the Berlin Aging Study (BASE)

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Source</th>
<th>Measure/Example items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective well-being</td>
<td>Lawton (1975)</td>
<td>Philadelphia Geriatric Center Morale Scale (PGCMS)</td>
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<td></td>
<td>Liang &amp; Bollen (1983)</td>
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<tr>
<td></td>
<td>-Aging satisfaction</td>
<td>“Things keep getting worse as I get older” (R)</td>
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<tr>
<td></td>
<td>-Life satisfaction</td>
<td>“I sometimes feel that life isn’t worth living” (R)</td>
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<tr>
<td></td>
<td>-Positive affect</td>
<td>10 PANAS items: e.g., interested, excited, inspired</td>
</tr>
<tr>
<td></td>
<td>-Negative affect</td>
<td>10 PANAS items: e.g., distressed, afraid, irritated</td>
</tr>
<tr>
<td></td>
<td>-Depressivity</td>
<td>Hamilton Rating Scale for Depression (HRSD)</td>
</tr>
<tr>
<td>Health</td>
<td>Steinhagen-Thiessen &amp; Borchelt (1999); WHO (1980)</td>
<td>Clinical anamnesis: Diagnosis using ICD-9 codes weighted by severity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Nr. cardiovascular-related illnesses</td>
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<tr>
<td></td>
<td></td>
<td>-Nr. muscular-skeletal disorders</td>
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<tr>
<td></td>
<td></td>
<td>-Nr. other illnesses (e.g., cancer)</td>
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<tr>
<td>Physical health</td>
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<tr>
<td>(Multimorbidity)</td>
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<tr>
<td>Functional capacity</td>
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<tr>
<td></td>
<td>-Vision</td>
<td>Near and distance acuity (Snellen charts)</td>
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<tr>
<td></td>
<td>-Hearing</td>
<td>Right and left ear/8 frequencies</td>
</tr>
<tr>
<td></td>
<td>-Balance and gait</td>
<td>Composite of 4 tests</td>
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<tr>
<td></td>
<td>-IADL and ADL</td>
<td>Self-reported (10 items)</td>
</tr>
<tr>
<td></td>
<td>-Grip strength</td>
<td>Dynamometer: Left and right hand</td>
</tr>
<tr>
<td>Subjective Health</td>
<td>Survey Single Item</td>
<td>“How would you rate your health at present?” (5-point response scale)</td>
</tr>
<tr>
<td>Mortality</td>
<td>City Registry</td>
<td>Date of death</td>
</tr>
</tbody>
</table>

Note. (R) = reverse coded.

measure specifically designed for use with older adults, which assessed two cognitive components, life satisfaction and satisfaction with aging (Philadelphia Geriatric Center Morale Scale, PGCMS: Lawton, 1975). Items in all measures were read aloud by an interviewer and simultaneously presented visually in large font. The individual’s response to each item on a 5-point scale was recorded by the interviewer. Cronbach’s alphas were high for all scales (PGCMS .85, Positive Affect .78, Negative Affect .81). In addition, we also include information about an observer rating of depressivity (HRSD: Hamilton, 1967) completed in BASE by a gerontopsychiatrist.

Diagnoses of physical illnesses according to the ICD-9 codes were based on clinical examinations (carried out in the field by a physician), medical history information, medication information, pathology findings (e.g., from blood, urine, and saliva probes), and functional assessments (e.g., spirometry, ECG). Compiled information for each participant was discussed in conference between the BASE physicians and psychiatrists in order to reach consensus about the final diagnoses. Each diagnosis was subsequently rated for certainty, stage of illness (mild to severe), life threat, and severity of symptoms in this consensus conference. Additional measures of subjective health and functional capacity were collected by trained interviewers in a multidisciplinary assessment session (see Table 1).
Health Status

The prevalence of physical illness is high amongst individuals aged 70 to 100+ years. At least one mild to severe internal, neurological, or orthopedic disease was diagnosed for 96% of the BASE sample (Steinhagen-Thiessen & Borchelt, 1999). BASE physicians estimated that this illness would be accompanied by moderate to severe symptoms in 71% of cases. Life-threatening illnesses, such as congestive heart failure, were observed in 33% of the sample. Multimorbidity is also a fact of life for many older persons: 30% of BASE participants were diagnosed as having at least five severe physical illnesses. As is often reported in the literature, older women were more likely to belong to the subgroup with multiple chronic illnesses than older men. The most frequent diagnoses were for hyperlipidemia, cerebral atherosclerosis, heart failure, osteoarthritis, degenerative diseases of the spine, and hypertension. Musculoskeletal disorders (e.g., osteoarthritis, osteoporosis) were at the top of the list of disorders considered to cause the individual most symptomatic discomfort. Of interest, too, was the finding that the BASE dentists judged that about 75% of participants who had dentures most likely experienced trouble chewing and speaking because their dentures were in need of renewal or repair.

Age and gender differences were apparent in the majority of functional health indicators (Smith & Baltes, 1998; Steinhagen-Thiessen & Borchelt, 1999). For example, amongst the oldest old (over age 85; N = 258), 60% of women but only 32% of men reported that they needed assistance in bathing or showering. Among the very old women (over 85 years), 81% had difficulties shopping and 84% could not use public transport. Whereas the handgrip strength of 70-year-old men was on average $21 \pm 6$ kg, for 70-year-old women it was $8 \pm 5$ kg. At age 90, this was reduced to 12 kg for men and 2 kg for women. Similar gender- and age-related differences were found in measures of physical mobility (e.g., standing and walking with eyes closed, bending).

Visual acuity (even when tested with prescribed glasses) for reading and distance declined from 70 to 100 and was significantly worse for women than for men. At age 70–79, 21.5% of the BASE sample were classified (World Health Organization standards) as being moderately or severely visually impaired, compared to 80% at the ages 90–100 years (Baltes & Mayer, 1999). Hearing acuity showed similar age differences: 47% were classified as having moderate or severe hearing impairment in the speech frequency range at age 70–79, compared to 93% for ages over 90 years. Whereas many 70-year-olds could discriminate tones at 10 to 30 dB, no individuals over 90 could hear tones presented at less than 30 dB.

Considered separately, the prevalence of chronic illness, frailty, and incapacity increases with age from 70 to 100 (Borchelt et al., 1999). In addition, many individuals are impaired in several capacities (physical and cognitive) and so have multiple chronic life strains. To examine this in BASE, we calculated the percentage of individuals who endured multiple impairment across six domains: physical
illness, vision, hearing, functional capacity (Instrumental Activities of Daily Life–Activities of Daily Life [IADL-ADL]), hand strength, and cognitive functioning. On average, BASE participants endured accumulated chronic strain in three areas ($M = 2.86, SD = 1.93$). The number of multiple strains increased with age ($r = .67$): Whereas only six persons under age 80 (3.5%) had five or more chronic strains, this was the case for 54% of those aged 90 and older. Forty percent of people aged 70 to 74 had no impairments but no person older than 90 years had this status and only 2% (4 from 172 people) older than 90 had one impairment. These findings dramatically illustrate the differences in life conditions experienced by the young old and the oldest old. There were also significant differences between the men and women in BASE: 17% of men but only 8% of women had no impairment and 35% of women but only 16% of men endured strains in five or six domains. Alongside this picture of the prevalence of illness and functional impairment, we found that 29% of BASE participants themselves rated their health as good or very good, and only 33% reported their health to be poor or very poor. Furthermore, self-ratings of subjective health were not correlated with age ($r = -.01$).

**Age/Cohort and Subgroup Differences in SWB**

Overall, 63% of BASE participants reported that they were satisfied or very satisfied with their life at present and that they experienced positive affect more often than negative affect (Smith et al., 1999). A reported 83% say that they were satisfied or very satisfied when they looked back over their life. The correlation between positive affect and negative affect was essentially zero ($r = .04$), as is typically found in younger samples (Watson et al., 1988), supporting the notion that the experience of these two affect dimensions is independent and that they contribute differentially to overall well-being. The prevalence of diagnosed major depression in BASE was 5%, somewhat higher than that reported in other studies (Baltes & Mayer, 1999).

Significant differences between the young old (70–84 years) and oldest old (85–103 years) were found for the positive side of well-being (life satisfaction, satisfaction with aging and the experience of positive affect) but were not evident on the negative side (experience of negative affect, depressivity). The young old reported higher positive well-being than the oldest old. These cross-sectional findings were confirmed in longitudinal analyses (Kunzmann et al., 2000). Gender differences were also found: The men in BASE reported higher life satisfaction and satisfaction with their own aging, the women reported more frequent experience of negative affect (Smith & Baltes, 1998). Married persons generally reported higher subjective well-being than people in all other categories of marital status. In the BASE sample (as in most samples of older adults), many more men than women were currently married (or living with a partner). Regression analyses indicated that age, gender, marital status, and institutionalization together accounted for 6%
of the variance in subjective well-being (reported in Smith et al., 1999), a level which is similar to studies with younger samples (e.g., Diener et al., 1999).

Several authors (e.g., Birren et al., 1991; Lawton, 1991) have pointed out that the institutionalized are an identifiable subgroup of older adults who appear to be at risk for lowered well-being. This was also found in BASE. Participants living in institutions (14\% of the sample) reported less frequent experience of positive affect compared to participants living in private homes (the difference was 0.5 \textit{SD}). Participants diagnosed with possible early to mild dementia were significantly less satisfied with their life and reported less frequent experience of positive affect compared with BASE participants without signs of dementia. These effects remained even after controlling for institutionalization (Smith et al., 1999).

Our longitudinal analyses of BASE data are still in progress, but already it is clear that the cross-sectional age differences reported above reflect age-related change (Kunzmann et al., 2000). Some aspects of SWB decline from 70 to 100+ years whereas others are stable. Decline is especially evident in the positive side of well-being: in aging satisfaction, life satisfaction, and positive affect. For aging satisfaction, the total estimated decline from 70 to 100+ years is equivalent to 1.1 \textit{SD}, for life satisfaction, 0.8 \textit{SD}, and positive affect 0.7 \textit{SD}. In contrast, negative affect is characterized by average stability. There are large individual differences in average level on each component of SWB, but no significant interindividual differences in intraindividual change (i.e., regardless of level, individuals change at approximately the same rate and direction). So far, we find that models testing whether stability is the best estimate for individuals aged 70 to 79 followed by decline after age 80 fit well for the dimensions aging satisfaction and positive affect. These initial findings suggest that the period of transition from the Third (young old) to the Fourth Age (oldest old) may be critical for these two aspects of positive well-being.

\textit{Associations Between Health and SWB}

Several analyses of the BASE data have indicated that functional health constructs and subjective health were significant sources of SWB (Kunzmann et al., 2000; Smith et al., 1999). Smith et al. (1999), for example, compared the predictive power of objective status and subjective satisfaction with functioning in the health domain. Subjective evaluations of health status and functional vision were stronger predictors of SWB (PGCMS: Lawton, 1975) than were the objective measures of health status (e.g., number of diagnosed illnesses, visual acuity). Overall, subjective health proved to be the strongest predictor of SWB, followed by satisfaction with current finances and satisfaction with social activities.

Furthermore, physical health as indicated by number of diagnosed illnesses (after controlling for sociodemographic variables) predicted the subjective evaluation of physical impairment, satisfaction with social participation, and satisfaction
with social relationships. This latter finding provides a hint about one mechanism underlying the relationship between health and SWB: Over time, physical illnesses, especially those accompanied by severe symptoms, likely influence functional health together with the routines of daily life and so place constraints on social participation and social contact. Social participation and social contact are thought to be important sources of affect (e.g., Carstensen, 1993; Ryff & Singer, 1998).

Hierarchical regression analyses were conducted to examine the relative unique predictive role of three categories of health indicators (chronic illnesses, functional health, and subjective health) in accounting for individual difference variance in different components of SWB. Considered together, the facets of health accounted for 32% of the variance in aging satisfaction, 20% in life satisfaction, 18% in depressivity, 14% in negative affect, and 13% in positive affect. When entered into the analyses alone, the presence of physical illness accounted for relatively little unique variance, in comparison to functional health (e.g., vision, hearing, physical mobility) and subjective health. Subjective evaluations of health played a greater role in individual differences in life satisfaction, aging satisfaction, and depressivity, whereas functional health had a greater weight for positive affect. The contributions of age and gender to the prediction of the various SWB components were not significant over and above the three health indicators. This finding suggests that, for the most part, age- and gender-related variance in SWB can be attributed to health factors. Of interest, our measure of accumulated strain across six domains (described above) correlated significantly (\( p < .001 \)) and negatively with overall SWB (\( r = -.27 \)), aging satisfaction (\( r = -.37 \)) and positive affect (\( r = -.34 \)) but was not related to negative affect (\( r = .05 \)).

We have found also that SWB is associated with mortality in old age. The predictive power of subjective health over and above objective health indicators in terms of mortality is well-known (Idler, 1993). Maier and Smith (1999) used proportional hazards regression analyses to examine the associations between functioning on 17 indices of psychological functioning and subsequent risk of death. Intellectual functioning and SWB were found to be associated with an increased mortality risk after statistical controls for age, sociodemographic characteristics, and health measures. Lower positive affect, dissatisfaction with aging, dissatisfaction with life, lower extraversion, lower openness, and emotional loneliness were associated with an increased hazard of dying. Of these latter six characteristics, only dissatisfaction with aging remained as a significant risk factor after controls for age, sociodemographic characteristics, and health.

Few other studies have investigated perceived well-being in relation to mortality. It could be that evaluations of how one is aging reflect quite accurate summary perceptions about individuals’ present status with respect to functioning in a variety of domains. In subsequent analyses of BASE data (e.g., Jopp, Lißmann, & Smith, 2000), we examined perceived functional decline (a composite of subjective
change in seven domains including vision, hearing memory, mobility, and ADL) as a predictor of mortality. The relative risk of death was 46% greater for participants who perceived much functional decline over two years compared with those who reported little. Individuals who perceived no decline lived at least two years longer on average.

**Final Comments**

BASE findings on health and subjective well-being have several theoretical and practical implications. Theoretically, our findings provide evidence that health is critical for well-being in very old age. Various facets of health appear to be differentially important. In particular, aspects of functional health (impairment in vision and hearing, reduced physical mobility, and loss of strength) have a negative impact on an older individual’s sense of well-being. Indeed, in BASE, functional impairment explained most of the variance in positive aspects of well-being. Physical illnesses, in contrast, accounted for relatively little unique variance perhaps because symptoms are often treated so that effects are minimized. But physical illness in combination with chronic pain, impairments in vision, hearing, strength, and physical mobility, and subjective evaluations of poor health status, did predict a sizeable proportion of the individual difference variance in subjective well-being.

Health appears to differentially impact the various components of subjective well-being during old age. Rather than setting criteria for what constitutes “a good life,” we accepted the BASE participants’ own reports of their personal sense of emotional well-being and life satisfaction. At the beginning of the study, the majority reported being satisfied and contented. However, the young old were more satisfied and content than were the oldest old. Furthermore, we found strong evidence that, during old age, the positive side of well-being decreases (less life satisfaction, less satisfaction with the way one is aging, less frequent experience of positive affect). Over a period of ten years, we have observed average decreases in these positive components of SWB. It is important to note that, in contrast, we find no evidence that the negative side of well-being increases during old age: Frequency of the experience of negative affect, depressivity (assessed by observer-ratings), and prevalence of diagnosed major depression do not appear to increase on average during very old age.

The experience of the positive side of life was especially compromised after age 80, in the group of the oldest old in BASE. Transition from the Third Age to the Fourth Age (i.e., becoming one of the oldest old) appears to be a great psychological challenge (Baltes, 1997; Smith & Baltes, 1997). The capacity of the individual to adapt to declining health may reach a critical limit. The accumulated chronic strain of dealing with the effects of multiple physical illnesses, frailty, functional impairment, and social losses that characterize the Fourth Age appears
to test the limits of adaptive self-related processes. Poor health in very old age may eventually be an overwhelming factor that either dampens the capacity to experience positive emotions or limits opportunities for such experiences. Social participation and social contacts, for example, are prime sources of positive affect. Clearly, older adults who have great difficulty seeing and hearing, and rarely move beyond the confines of their place of residence are at risk in terms of reduced opportunity for social contacts. The oldest old typically have to rely on the “social world” to come to them.

On a practical level, BASE findings point to the important need for further technological and medical advances as well as social-cultural interventions to improve the quality of life of the oldest old. The multimorbid life contexts of the oldest old highlight the salience of issues of dependency and the personal “cost” of aging. Many of the functional impairments of old age could, in principle, be compensated to some extent by efficient aids or ameliorated by specific intervention. Technological advances in cataract surgery, contact lenses and hip replacement techniques in the 1990s illustrate the potential of medical advances. It is anticipated that future development of efficient hearing aids will improve communication opportunities for many older adults. Advances in rehabilitation methods, treatment, and interventions such as muscular strength training may delay the disablement process and reduce the numbers of older adults who are totally physically dependent on others.

BASE findings also support proposals about the necessary evolution of a “culture of old age” as a compensatory support for older adults, given their reduced biological capacity to adapt (Baltes, 1997). Data from BASE cohorts suggest that social-cultural input should especially be directed to the minimization of the impact of health-related life restrictions and multiple chronic life strains. To some degree, of course, the health constraints observed in BASE and in similar samples from other countries (e.g., the Asset and Health Dynamics Among the Oldest Old [AHEAD] survey in the United States) may be cohort-specific. The oldest old participants in the Berlin Aging Study certainly experienced periods of malnutrition, hardship, and loss in early life and were exposed to epidemics that killed many of their age peers before the general use of antibiotic medications (Maas et al., 1999). This early life exposure may have had a negative long term impact for current oldest old cohorts in terms of chronic health problems, but it may also have contributed to them surviving to an advanced age (Smith, 2001). Other health and lifestyle factors may prove to be critical for survival and personal well-being in future generations of older adults. At present, we indeed know relatively little about the biogenetic, life history, and environmental factors predictive of a healthy longevity (Vaupel et al., 1998). Given this lack of knowledge, in the short term, our findings suggest that all efforts be invested to compensate for health-related constraints so that more individuals have the chance to maintain the positive components of subjective well-being into very old age.
References


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