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URSULA M. STAUDINGER, MICHAEL MARSISKE, and PAUL B. BALTES

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Resilience and Reserve Capacity in Later Adulthood: Potentials and Limits of Development across the Life Span

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In this chapter we explore the potential and limits of development across the life span. Our exploration is conducted with explicit concern for identifying similarities and differences between life-span theory and developmental psychopathology (see also Staudinger, Marsiske, & Baltes, 1993). To facilitate the comparison, we focus on two concepts that are embedded in the life-span and the developmental psychopathology research traditions, respectively—reserve capacity and resilience.

Resilience is a major concept in research on developmental psychopathology; it conveys the idea that individuals can avoid negative outcomes despite the presence of significant risk factors in their environments. It also includes the idea that individuals can regain normal levels of functioning after developmental setbacks, both with and without the help of external interventions (e.g., Garmezy, 1991; Rutter, 1987). In contrast, stereotypic conceptions of late life and the process of aging have historically tended to see late life as a time of uniformly negative changes and losses; in other words, a period of the life span not characterized by much resilience.

Reserve capacity is a construct from the realm of life-span theory (e.g., Baltes, 1987; Kliegl & Baltes, 1987); it refers to an individual's potential for change and especially his or her potential for growth. In this chapter, we shall elaborate on one of the fundamental propositions of the life-span developmental perspective, which is that, across the entire age range, development is simultaneously comprised of "gains and losses;" that is, of increases, decreases, and stability of functioning. Individuals have "reserve capacity" and are capable of functional "plasticity" throughout the entire life course. Implicit in this life-span perspective is the idea that resilient functioning—the ability to

maintain and regain adequate levels of functioning in the face of risks and losses—is a potential that, in varying degrees and expressions, continues to be possible throughout adulthood and old age (Baltes & Baltes, 1990a).

The central goal of this paper is to show, drawing on life-span psychological research, that resilience is a major feature of psychological aging. Moreover, we will suggest that resilience is not only a "naturally occurring" phenomenon (i.e., older adults spontaneously show resilient functioning despite the presence of risks), but that resilience can be supported and enhanced by interventions and "age-friendly" environments. In the process, we highlight similarities and differences between two domains of developmental research—developmental psychopathology and life-span development. There has been a paucity of formal connections between these subdisciplines, despite the fact that the two areas may be able to nurture one another (e.g., Cicchetti, 1993; Datan & Ginsberg, 1975).

We begin by introducing some of the major concepts from the psychology of life-span development. Focusing on old age, we identify resilience within this theoretical framework and highlight two facets of research on reserve capacity and resilience. We then provide a selective review of the literature in three areas of psychological aging (cognition, self and personality, social relations) in order to illustrate resilience and reserve capacity in later life. The third major component of this paper presents an evolving model in which resilience is integrated into the framework of life-span development.

A LIFE-SPAN PERSPECTIVE ON THE RANGE AND LIMITS OF DEVELOPMENT IN LATER ADULTHOOD

What is life-span developmental theory? Since our joint discussion of resilience and reserve capacity in later life is nested within a life-span perspective on development, we begin by presenting an overview of the central concepts and assumptions of this orientation. Many concepts in life-span theory, such as plasticity and multidirectionality, can be found in other developmental schools as well. What is unique about life-span theory

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Table 22.1 Summary of Family of Theoretical Propositions Characteristic of Life-Span Developmental Psychology

Concepts	Propositions
Life-span development	Ontogenetic development is a lifelong process. No age period holds supremacy in regulating the nature of development.
Multidirectionality	Considerable diversity or pluralism is found in the directionality of changes that constitute ontogenesis, even within the same domain.
Development as gain/loss	The process of development is not a simple movement toward higher efficacy, such as incremental growth. Rather, through life, development always consists of the joint occurrence of gain (growth) and loss (decline).
Plasticity	Much intraindividual plasticity (within-person modifiability) is found in psychological development. The key developmental agenda is the search for the range of plasticity and its constraints.
Historical embeddedness	How ontogenetic (age-related) development proceeds is markedly influenced by the kind of sociocultural conditions existing in a given historical period, and by how these evolve over time.
Contextualism as paradigm	Any particular course of individual development can be understood as the outcome of the interactions (dialectics) among three systems of developmental influences: age-graded, history-graded, and non-normative.

Note: After Baltes (1987).

is its attempt at synthesis, viewing such concepts as a family of perspectives characterizing psychosocial and behavioral development (see also Table 22.1; Baltes, 1987; Baltes, Reese, & Lipsitt, 1980; Lerner, 1984). The life-span approach may be more metatheoretical than theoretical, to the extent that it identifies an orientation to the study of stability and change across the life span that encompasses multiple domains of functioning.

Extending the research focus of "mainstream" developmental psychology beyond infancy, childhood, and adolescence, life-span developmental psychology defines its territory as encompassing the entire life course, from infancy into old age. Many life-span researchers, however, work in the field of adult development and aging. More recently, as childhood longitudinal research has come of age, a new cohort of researchers is joining the effort to construct a life-span view of human development (Eichorn, Clausen, Haan, Honzik, & Mussen, 1981; Hetherington, Lerner, & Perlmutter, 1988; Reese, 1993; Sørensen, Weinert, & Sherrod, 1986).

For many, the second half of life is connected with negative stereotypic expectations, such as the belief that old age is largely a period of decline and despair. The life-span view presented here argues against such simplistic and unidirectional views of development. Conceptualizing development across the life span as being multidirectional and modifiable, and applying these notions to aging research, this theoretical orientation signals a view that challenges models of aging that are oriented *exclusively* toward decrements (Baltes, 1993; Riley & Riley, 1989; Rowe & Kahn, 1987).

As will be discussed in more detail, at all ages, development implies concurrent and successive gains and losses, which can be either dependent upon or independent of each other (see also Uttal & Perlmutter, 1989). Contrary to widely held beliefs

about childhood as a period of universal progression, losses occur even early in life. Piaget (1965), for example, described some visual illusions that increase with age and others that decrease with age. He ascribed this loss in visual accuracy to advancement in cognitive stage, in this case the development of conceptual schemata. Similarly, in contrast to equally widely held beliefs about the pervasiveness of decline with aging, there continue to be gains in later life. In language development, for example, individuals may continue to modify and expand their verbal knowledge even into very old age (e.g., Horn & Hofer, 1992). Similarly, there is evidence that at least some older adults demonstrate advances in areas such as wisdom and work-related expertise (e.g., Baltes, Smith, & Staudinger, 1992). Even in the field of memory research, which is "notorious" for its findings of age-related declines, there is a facet called implicit memory (i.e., unintentional memory), which evinces stability and some increase across the life span (e.g., Graf, 1990; Howard, 1991). The notion of what constitutes a loss and what constitutes a gain is highly complex and dependent, for example, on age-graded, history-graded, and idiosyncratic influences.

Development as Life-Long Transactional Adaptation

The core assumption of life-span developmental psychology is that development occurs from birth until death. The central feature of the developmental process is "transactional adaptation" (e.g., Lerner, 1984, 1986) or "person-environment interaction" (e.g., Magnusson, 1990). That is, development is not simply the passive unfolding of "pre-wired" maturational programs, or the mechanistic reaction of organisms to environmental stimuli.

Development is the outcome of a constant and active process of the individual's transactions with changing contextual influences, including age-graded changes of the genome and historical transformations of society. Transactional adaptation comprises the view that the individual is actively selecting developmental contexts; the individual can simultaneously change contexts and be changed by contexts at the same time.

Development occurs at multiple levels. Not only psychological functioning changes with age, but also the contexts (and their associated risks and resources) and the functional consequences (evaluative criteria) of development change with age. Returning to the examples of language and cognitive development, it is not only proficiency that changes or develops with age, but also the contexts of their acquisition and application in everyday life. Furthermore, the criteria according to which language and cognitive proficiency are evaluated undergo age-related changes. Whenever development is considered from a life-span perspective, it is these three interlocking constants of development (i.e., level of functioning, sources or contexts, functional consequences) which are at the focus of analysis.

If one assumes that development occurs through transactional adaptation, then the stability or change of these internal and external developmental contexts becomes analytically important. Development can be brought about by continuous (cumulative/atrophic) or discontinuous (innovative/disruptive) processes. In the intellectual domain, for example, both continuous and discontinuous developmental processes are constantly at work. With regard to continuity, for instance, at both the mean level, and in terms of *interindividual* retest stability (i.e., of rank order of performance), adults show substantial stability of intelligence test performance over multiple retest occasions (e.g., Hertzog & Schaie, 1988; Schaie, 1994). The same seems to be true for personality development as measured by standard personality tests (e.g., Costa & McCrae, 1988; Siegler, George, & Okun, 1979). At the same time, however, as persuasively argued by Nesselrode (1991) and discussed in more detail below, both on theoretical and empirical grounds there is also sizable *intraindividual* (within-person) variability. Thus, there are two sides to consider when it comes to the continuity of development: interindividual continuity or stability on a group-level of analysis can be concurrent with intraindividual change (see also Brim & Kagan, 1980).

Development is also characterized by discontinuity; that is, innovation or disruption. New influences on development can emerge over the life span. As we develop or age, we are continuously confronted with new internal and external developmental contexts that may give rise to discontinuity. This phenomenon is captured by the theoretical concept of "developmental tasks" (both in the practical and intrapsychic sense) which change over the life course (e.g., Erikson, Erikson, & Kivnick, 1986; Havighurst, 1973; Labouvie-Vief, 1982; Levinson, 1978; Oerter, 1986). The cognitive and social effects of participation in the work force, for example, represent new contexts for development that were not present when the same individuals were still in school (e.g., Smith & Marsiske, in press). Retirement (e.g., Atchley, 1982) and widowhood (e.g., Wortman & Silver, 1990) are other life-span contexts where issues of discontinuity take center stage. Furthermore, health and

functional changes that arise as a consequence of biological aging, such as decreases in sensory functioning, can serve as sources for developmental innovation and/or disruption late in life (Lindenberger & Baltes, 1994).

Multidirectionality and Multidimensionality of Life-Span Development

We have argued that according to the life-span perspective, development throughout life is characterized by the *simultaneous* and *successive* occurrence of increases (gains), decreases (losses), and maintenance (stability) in transactional-adaptive capacity. This conception of development involving gains and losses is highlighted by the notion of *multidirectionality*. Multidirectionality of life-span development encompasses the increase, maintenance, and decrease of functioning within one behavioral domain across time. Furthermore, multidirectionality becomes paramount if development is considered not to be uni- but *multidimensional* (e.g., intellectual functioning involves distinct categories such as fluid versus crystallized intelligence). Thus, when development is approached from a life-span perspective, it is important to distinguish between the overall balance of developmental gains and losses across domains and the domain-specific trajectories for particular functions. Such a point of view is consistent with a *multilevel* or systemic approach to development (Ford, 1987).

Development is a process that unfolds in many different domains of functioning. There is no unitary developmental process that affects all dimensions of an individual in the same way. Although changes in some domains of functioning in an individual will tend to be correlated, it is quite possible for individuals to experience changes in some areas that are quite independent of changes in others. For example, in the psychological sphere, personality functioning in adulthood can develop rather independently of physical functioning (e.g., Baltes, 1993; Smith & Baltes, 1993). When studying development, then, it may often be more meaningful to speak of domain-specific trajectories for particular functions (e.g., Karmiloff-Smith, 1992; Weinert & Helmke, in press). The "overall development" of a person would represent some complex admixture of development along specific dimensions.

Within the same individual, at the same moment in time, some functions may be increasing while others are decreasing or remaining stable. Normal development in adolescence, for example, may include increases in physical competence that are concurrent with decreases in the ability to acquire additional languages. Normal aging includes normative biological losses (e.g., Finch, 1990), and losses in some areas of intellectual functioning, while other domains of intellectual functioning and personality functioning may show stability or even increase (e.g., Baltes, 1993; Baltes & Graf, in press). Taken together, the multidimensionality and multidirectionality perspectives argue against overly simplistic conceptions of development across the life span; even in individuals of advanced old age with a pattern of predominant decline, increments in some domains may be present. Consider, for instance, possible advances in the psychological intimacy of a father-son relationship emanating from contacts initiated by the father's impending death. From a life-span perspective, therefore, aging is

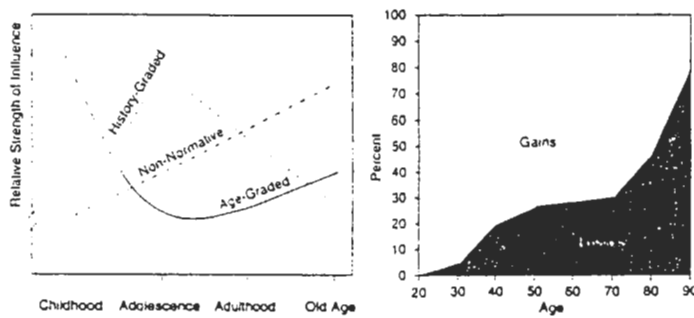


Figure 22.1 Shifting weight and valence of developmental influences. On average aging is characterized by an increasing proportion of losses relative to gains (right; after Heckhausen, Dixon, & Baltes, 1989). From a life-span developmental perspective, increases in non-normative influences (e.g., illness, unexpected death of social network members) and age-graded influences (e.g., biological decline, social role loss after retirement) with primarily negative valence may constitute the most important sources for this shifting ratio (left; Baltes, Reese, & Lipsitt, 1980).

not synonymous with decline. With increasing age, however, the balance of gains to losses in level of functioning and available reserves across different domains of development does become less positive (Baltes, 1987; see right panel of Figure 22.1).

Heterogeneity of Life-Span Development

Not only may particular individuals be demonstrating different developmental trajectories for different abilities at the same time, but individuals differ from one another with regard to their developmental profile. Even when a particular developmental change is considered "normative" in the statistical sense, this does not imply universality. Rather, there may be substantial *interindividual differences* in the magnitude, timing, sequencing, and even directionality of the change. Not all children begin to walk by their first birthday. Some will have begun to walk before, while others may begin to walk later than their age peers. Some may start to walk before they talk and vice versa. In some cases (i.e., individuals with pathological conditions), the ability to walk may be delayed for years, or even permanently. In late life, negative changes in some cognitive domains (e.g., memory, speed of information processing) seem to become normative in the seventh or eighth decade (e.g., Salthouse, 1991a). Despite this, many individuals may not have experienced declines, or may have experienced declines of smaller magnitude, while other individuals may have experienced intellectual losses earlier in adulthood (e.g., Nelson & Dannefer, 1992; Schaie, 1989). With age, some individuals may first experience health-related declines and only much later declines in cognitive functioning and others may first show cognitive deficits and stay healthy much longer.

Heterogeneity of development does not concern only the comparison between individuals but also the comparison within one individual at different points in time, or in different domains of functioning. Thus, there is *intraindividual variability*

within and between domains (Buss, 1973; Nesselroade, 1989). The notions of domain- and time-related intraindividual variability of development are conceptually important, because they guard against global conceptions or what may be called a halo effect of developmental achievement or decline. It is not necessarily true that an individual low in performance in one domain is also low in all other domains of development. An older person, for example, who has become physically feeble may still be quite alert intellectually (e.g., Smith & Baltes, 1993). Similarly, at the early end of the life span, a child with reading disabilities may be quite proficient when it comes to mathematics (Karmiloff-Smith, 1992; Stanovich, 1991).

One specific aspect of intraindividual variability is *plasticity* (Baltes, 1987; Gollin, 1981; Lerner, 1984). Plasticity denotes the range of latent reserves of functioning. It encompasses both the reserves currently available and the reserves that may become available in the future. This is a concept we shall consider in much greater detail later in this chapter. It is important to note that not only will an individual differ in his or her developmental status across different domains, but the same individual may also differ within one domain at different points in time (Nesselroade, 1991). A one-time assessment of intellectual functioning, for example, ignores the fact that individuals may score differently on intelligence tests depending on factors like anxiety, fatigue, perceived relevance of the test, and level of baseline performance (Cornelius, 1986; Labouvie-Vief, Hoyer, Baltes, & Baltes, 1974). Individuals can also improve their performance substantially as a simple function of practice (i.e., "warming up" to the task); in other words, as a function of the degree to which currently available reserve capacity is activated.

Taken together, concepts like multidimensionality, multidirectionality, inter- and intraindividual differences highlight the need to carefully consider *individuals* and their contexts when studying development, and to consider the *domain-specificity* and *latent reserves* of development. Not all children will acquire language, walking, and toileting skills at the same ages, or in the same sequences. Particular children may also vary from day to day in their expressions of these competencies; the child who has been toilet trained may still have an occasional "accident." A child early in acquiring toileting may be a late walker. Across the life span, this highly differentiated view of development becomes even more significant because of a decrease in biological functions and an increase in individuation (Baltes, 1993; Nelson & Dannefer, 1992).

Development as a Gain/Loss Dynamic

Throughout this consideration of life-span developmental perspectives, we have argued that it is useful to define development—despite its longstanding association with progression (Harris, 1957; Nisbett, 1980)—as a concept without a priori direction. Stated differently, development includes the full range of directional possibilities—from gain, to stability, to loss. The process of development should not solely be described as a continued progression to higher levels of functioning, or positive growth.

The life-span perspective conceives of development as a system of changes that encompasses positive and negative directions

and consequences (Baltes, 1987; Weinert, 1994). When considering the overall balance between gains and losses across domains, a generally positive or negative picture may emerge. As we shall suggest below, however, aging may be a portion of the life-span where the balance of gains and losses shifts, and becomes increasingly negative. Viewing overall development as a system of positive and negative changes implies the possibility of dysfunctional ("unsuccessful") developmental outcomes. We will see in more detail later that this conception of development is one of the natural links between the life-span developmental perspective and developmental psychopathology. Research on risk and protective factors in the field of developmental psychopathology is aimed, for example, at identifying the developmental constellations (considering internal and external developmental contexts) that lead to adaptive or maladaptive developmental outcomes, respectively (e.g., Cicchetti, 1993; Cicchetti & Garmezy, 1993; Jessor, 1993; Rutter, 1987).

The gain/loss argument goes beyond the simple observation of multidirectionality in one or more developmental domains. It also includes the idea of considering the developing human organism as a complex system (see Ford, 1987). Thus, developmental domains are not independent of each other and a dynamic interplay between gains and losses ensues. In one model of developmental adaptation, the model of *selective optimization with compensation* (to be discussed below), Baltes and Baltes (1990) highlight the idea that organisms have limited amounts of adaptive resources and that these resources change in their range and fixedness across the life span (see also Marsiske, Lang, Baltes, & Baltes, in press).

A first limitation on resources results from investment into a specific path of development. No individual can do all things; there must be a selection of courses of action from the broader universe of possible action plans. This idea has a long history in developmental science and has similarity to Waddington's idea of canalization (Edelman, 1987; Waddington, 1975). Under the assumption of limited adaptive resources, every selection of a developmental path necessarily implies that other action possibilities have not been selected; the selection of one developmental alternative (even if such selection has been "preselected," e.g., by the genome) necessarily implies the loss of potential to engage in many other developmental courses. In this sense, all development, including developments we would traditionally classify as exemplifying progressive growth, are complemented by an element of loss. One example is the often confirmed negative side effects of professional specialization. As one becomes increasingly proficient in a particular career, one loses some potential to invest in proficiency in other careers. Similarly, as one learns to walk, one loses some efficacy in other earlier motor behaviors (e.g., creeping, crawling). This idea of development as increasing canalization of resources sets the stage for life scenarios that are likely to exhaust an individual's transactional-adaptive resources. Midlife is one example. It is a life stage which presents the individual with many competing developmental task domains including career, children, parents, and so on. Although an individual in midlife usually also has a large amount of internal and external resources available, the sheer amount of demands can still present a risk situation by exceeding resources at hand (e.g., Brim, 1992).

A second limitation on resources and their development ensues from age-related changes in the overall range (level) and scope (variability) of resources. Across the life span, the totality of resources available for development changes. This is particularly true for early and late life. In the case of old age, as we will see in more detail below, it is not so much the demands of the external contexts which exhaust resources, but rather the decay of physical resources in combination with the loss of external resources that characterize potential risk situations. This suggests that the gain-loss dynamic shows configurations specific to age and life period that should be considered when life-span scenarios for developmental optimization, protection against losses (maintenance of functioning), and recovery from dysfunction are evaluated.

Life-Span Development and Contextualism

When development is described as the outcome of ongoing processes of transactional adaptation, analytic attention must shift to the question: What are the intra- and extra-personal conditions that are transacting in producing a developmental outcome? Developmental contextualism (Lerner & Kauffman, 1985; Reese & Overton, 1970; Riegel, 1976), and its allied idea of probabilistic epigenesis (Lerner, 1984), reflect the classic interactionist position (e.g., Anastasi, 1970) that development is always the simultaneous and complex outcome of forces of nature and nurture, of genes and environment, of intra- and extra-personal influences.

In life-span work on this topic, Baltes and his colleagues (Baltes, Cornelius, & Nesselroade, 1979; Baltes et al., 1980) have proposed a tri-factor model of internal and external contextual influences (age-graded, history-graded, and non-normative), which delineates the macrosystem of developmental sources (explicated further below). The point to be made here, however, is that these systems of biological and contextual influence may serve important analytic and explanatory functions in understanding both interpersonal and intercultural regularities of developmental trajectories, as well as in understanding the sources of inter-individual differences (e.g., Baltes & Nesselroade, 1984; Dannefer, 1984). In other words, due to biological and sociogenic differentiation, individuals will find themselves with similarities and differences in developmental challenges and opportunities.

We take an example from the development of eating behavior. All organisms must eat, for example, but the conditions of food availability and nutritional needs will vary. Ontogeny (or age-graded influences) shapes some of these issues: infants need particular nutrients in the service of their rapid cellular growth and differentiation; older adults have typically been reported as having fewer caloric requirements relative to their younger age peers (Masoro & McCarter, 1990). Not all of this is biological; when older adults are in societies that retire them from active work, for example, lowered physical activity may also reduce caloric requirements. History-graded influences are also relevant to eating behavior: food availability (both in amount and in kind) varies dramatically over time (Elder & O'Rand, in press), as do social norms about eating and desired weight (Garner, Garfinkel, Schwartz, & Thompson, 1980). The recent historical growth of reported eating disorders like

anorexia nervosa and bulimia in some Western countries highlights the potential power of changing norms about food to influence individual behavior (e.g., Klingenspor, 1994). There are also non-normative, more idiosyncratic influences (Cooper & Fairburn, 1992). Individuals may be born with differential sensitivity to feelings of satiety, and individual family and cultural constellations can also shape attitudes toward desirable foods and caloric intake (Johnson, McPhee, & Birch, 1991; Petersen, 1988).

Contextualism, then, is a world view (Pepper, 1942) or meta-theoretical paradigm which is central to the life-span perspective. It highlights the commitment of life-span scholars to understanding the transactional and probabilistic role of biological, social, cultural, and historical changes in development. It signals an analytic posture that looks to internal and external influences on various levels of analysis and how they mutually influence each other in understanding human development. Context is not merely viewed as monolithic and determined, but rather as a complex and probabilistic system of interdependent areas or territories of influence ranging from inner biological to outer physical and socio-cultural ones (e.g., Bronfenbrenner, 1979; Lawton & Nhemow, 1973). Contextualism also highlights an orientation toward understanding both the reasons for commonalities across individuals and cultures, the sources of their differences, as well as the degree to which there are as yet untapped reserves for further growth or alternative pathways.

Development Is Embedded within History

Cultural and historical influences represent, in effect, one area or one level of the broader set of contextual influences that affect development (e.g., Lerner & von Eye, 1992). In the development of life-span theory and research, they have always obtained special attention. Historical periods and cultural changes condition and shape the opportunity structures to which individuals have access. Social structures are constantly evolving, and vary across cultures and socioeconomic groups. Major historical events (e.g., war, economic depression, migrations) and historical changes in technology (e.g., introduction of antibiotics, increasing availability of food, the growing role of the computer in society) have had an effect on the level and direction of psychological development (e.g., Baltes, 1968; Caspi, 1987; Elder & O'Rand, in press; Riegel, 1972; Riley, 1986; Schaie, 1965). Elder (1979), for example, showed that the Great Depression had long-term effects on the psychosocial adjustment of American men. The nature of that effect, however, was moderated by age during the Depression, and prior family socialization practices.

One major demonstration of the important role of history has been suggested by life-span developmental research on *cohort differences* (e.g., Baltes et al., 1979; Labouvie & Nesselroade, 1985; Schaie, 1965, 1994). In longitudinal and cross-sectional sequential research methodology, multiple birth cohorts of individuals (i.e., individuals born at about the same period in historical time) can be followed over time. Such designs permit the examination of whether individuals born in different sociocultural conditions evince differences in developmental trajectories. That is, when comparing the developmental trajectories from different birth

cohorts (here, taken as an *index* of the broad body of contextual differences in such variables as education, medicine, economic conditions), are there differences in level, direction, and dispersion of functioning?

In adolescent personality development, for instance, Nesselroade and Baltes (1974) have shown that even over short periods of historical time (1970–1972) age trajectories of personality dimensions such as achievement motivation, social anxiety, and independence can vary substantially between cohorts of adolescents (see also Petersen, 1988). In the intellectual domain and for adulthood and old age, Schaie (1983, 1994) demonstrated that cohort differences in intellectual functioning can be sizeable: over historical time, comparing adults in the range from early adulthood to old age born from 1889 until 1966, some intellectual abilities studied have shown increase (e.g., verbal, spatial, and reasoning ability), while others have shown stability (numerical ability) or even decrease (word fluency) over generational birth cohorts. Moreover, as was true for adolescent personality development, the identification of historical effects may not require such a broad sampling of birth cohorts. Even when birth cohorts separated by an average of 15 years are studied over only a three-year longitudinal interval, a substantial influence of birth cohort on cognitive functioning has been detected (Hultsch, Hertzog, Small, McDonald-Miszczak, & Dixon, 1992). In a similar way, a recent study of psychosocial development in adulthood, also employing a cohort-sequential design, identified cohort effects (Whitbourne, Zuschlag, Elliot, & Waterman, 1992). Using an inventory based on Erik Erikson's model of psychosocial development, Whitbourne and her colleagues found that the late-life developmental task of reaching integrity versus falling into despair was less favorably resolved by the later-born cohorts. The authors suggested that this may have been due to a historical erosion in philosophical values in the society (Whitbourne et al., 1992).

The implications of historical and cultural embeddedness are related to notions of interindividual and intraindividual differences. That is, in considering development, it is also important to consider intercohort or interhistorical period differences. It would not be correct to assume that the developmental trajectories obtained for today's cohort of older adults in some domain will necessarily continue to hold for future cohorts. For example, Fries' (1983) work suggests that future cohorts of older adults may show less medical comorbidity and disability prior to death, due to changes in nutrition and general life style as well as medical treatment. Life-span psychologists proffer that one must be continuously aware of the historical and cultural relativity of any putatively "normative" developmental trends.

The Study of Development Asks for Multidisciplinary

Life-span developmental psychologists naturally tend to focus on antecedents and outcomes of a psychological nature. Following from the contextualistic paradigm, however, is the notion that development is constituted by both psychological and nonpsychological domains, and their constant interplay. Aging, for example, is associated with a large number of normal biological changes (e.g., Birren & Schaie, 1990; Finch, 1990; Maddox,

1987). Psychological development occurs concurrently with these biological changes, and it is reasonable to think of the dynamic interplay between them. Age-related changes in musculoskeletal, neuronal, or sensory systems, for example, may influence such psychological domains as social participation or information processing. Moreover, the motivational system may influence biological health: individuals who select physical fitness as a goal may engage in different health-maintaining behaviors than individuals who select other goals. The study of development, with all its facets, is a fundamentally multidisciplinary enterprise, and no single-discipline account of it is likely to be adequate (Mayer & Baltes, in press).

As psychologists interested in development across the life span, we must acknowledge the fundamental incompleteness of psychological inquiry into development. Even accounts of psychological phenomena may need to include non-psychological variables be it from the realms of sociology, history, anthropology, economics, social work, or biology and medicine. It may be particularly fruitful to consider interdisciplinary collaboration when working on certain developmental topics. Some recent examples of this approach include work by M. Baltes, Mayr, Borchelt, Maas, and Wilms (1993), who investigated the influence of biomedical, sociological, and psychological variables on everyday activity patterns of 70- to 100-year-old persons. They found, for instance, that biological-medical variables were particularly important in determining "basic" levels of everyday activity such as self-care behaviors. In predicting "expanded" domains of competence, such as leisure and social activities, psychological factors like intellectual functioning gained in prominence. Similarly, Featherman, Smith, and Peterson (1990) investigated the joint and distinct role of both social and psychological variables in understanding the career development and specialization (e.g., planners versus practitioners) of engineers.

Before we move on to the final major theoretical orientation from life-span psychology, the plasticity of functioning, the main focus of this chapter, we will briefly summarize our key points thus far. We have described a number of crucial characteristics of the development of psychological functioning as life-span theory views them (see also Table 22.1). Such characteristics included an emphasis on the active role of the individual in development, which is reflected in the conceptualization of development as the outcome of a process of transactional adaptation to changing internal and external developmental contexts. Furthermore, development has been characterized as encompassing concurrent (and successive) gains and losses. The notion of gains and losses presupposes the multidimensionality and multidirectionality of development. Development is not "governed" by one uniform process, but rather by multiple and variable processes. Variability of development is observed between individuals within the same domain and between different domains of functioning. Variability across time and across domains is also observed within one individual. This latter aspect of variability leads to the central concept of this paper, the plasticity of psychological functioning.

Plasticity can be viewed as a special case of intraindividual variability in level of functioning. The phenotype of behavior observed at a given point in time is not fixed. There are reserves in performance capacity which can become apparent under certain

conditions. We will also see that reserves in performance capacity are not fixed in time but follow a developmental course of their own.

Levels of Reserve Capacity and Variations in Plasticity of Development

The concept of *plasticity*, which includes both the consideration of the range and limits of behavioral change, is the final central concept in life-span theory and research which we want to consider (Baltes, 1987; Lerner, 1984). If human development is the product of dynamic and probabilistic transactions among diverse sources of developmental influences and selection processes, then development must also be characterized by plasticity.

As we have already suggested, the course of psychological development is not completely predetermined, neither within nor across domains. It includes both fixed, variable, and latent components. These variable components, we have argued, are reflected in interindividual differences, intraindividual differences and modifiability, and cross-cultural differences as well as historical relativity. Latent components denote level and domains of functioning which, while possible in principle, have not been activated or become manifest. In this sense, plasticity is conceptualized, not unlike the "norm of reaction" in behavior genetics which asserts that genetic inheritance sets the upper and lower boundaries of behavioral development (Dunn, 1965; Lerner, 1984), as the potential for change in transactional-adaptive capacity. Although plasticity is often used to denote an increase in level of adaptation, definitionally it is a concept that does not imply the direction of change but, rather, aims at characterizing the range and limits of development.

Plasticity of development can also be considered at different levels of analysis and across time: Is there one overall degree of plasticity or is the plasticity of development—like development itself—also a multidimensional and multidirectional concept? Does the degree of plasticity change with age? The first type of question is still difficult to answer. There is an indication from training transfer studies that training gains in one domain of functioning, such as a specific cognitive task which has demonstrated plasticity, do not always transfer to other cognitive tasks (Detterman & Sternberg, 1993; Guberman & Greenfield, 1991; Karmiloff-Smith, 1992; Royer, Cisero, & Carlo, 1993). This suggests that plasticity of development, like development itself, may require a distinction between general-purpose and task- or domain-specific resources.

The concept of plasticity provides an index of an individual's manifest and latent change potential and how flexible and robust he or she might be in dealing with developmental challenges and demands. In life-span work, the degree of plasticity has been denoted as an individual's *reserve capacity* (or reserves), which is constituted by internal (e.g., cognitive capacity, physical health) and external (e.g., social network, financial status) resources available to the individual at any given time. Furthermore, taking a systemic approach, plasticity in one domain of functioning may serve as a resource for another domain. To illustrate this point, consider an older person who demonstrates plasticity in the domain of social relations by establishing new social ties.

These new social relationships could later serve as important sources of support if bodily deterioration increases the need for assistance. It is important to note that an individual's resources need not be fixed, but may themselves change over time. The gains and losses discussed above not only concern the development of phenotypically manifested behavior, but also the latent plasticity of development. This implies that sometimes losses may not become immediately obvious on the behavioral level. Phenotypic behavior may show stability even as the related reserves or the behavioral potential undergoes a gradual age-related decrease. It is also possible that losses in plasticity will only become visible under especially demanding performance settings which require these reserves (e.g., Baltes, 1987; Kliegl & Baltes, 1987).

The concept of reserve capacity has been further differentiated. To denote both concurrent and future change potential, life-span researchers have offered a two-tier classification of reserve capacity: (a) baseline reserve capacity, and (b) developmental reserve capacity. *Baseline reserve capacity* denotes an individual's current maximum performance potential, that is, the most an individual can do with current internal and external resources. Resources, however, can be activated or increased, for instance, through optimizing interventions or new age-related changes of the positive or negative kind. This temporal (ontogenetic) trajectory of plasticity is subsumed under the label of *developmental reserve capacity*. As reserve capacity increases or decreases, so does the potential for (positive) plasticity. The investigation of the *range and limits of plasticity*, in both senses, is a major focus of life-span developmental research (Baltes, 1987; Kliegl & Baltes, 1987).

Building on the distinction between performance and competence (Flavell & Wohlwill, 1969), the differentiation between tiers of reserve capacity (baseline vs. developmental) helps in the interpretation of possible sources of loss and decline in functioning. This is particularly important for understanding aging. A decline or loss in performance level can be, but does not have to be, related to a decline in reserve capacity. Declines in performance can be due to contextual ("phenotypic") rather than "genotypic" conditions involving levels of reserve capacity. As we argue later, it is necessary to conduct research oriented toward testing the range and limits of reserve capacity, such as training research in the areas of physical and cognitive functioning, in order to ascertain whether or not the source of age-related performance differences is due to age differences in developmental reserve capacity (Coper, Jänicke, & Schulze, 1986; Kliegl, Smith, & Baltes, 1990; Salthouse, 1991a).

RESILIENCE AS A TYPE OF RESERVE CAPACITY

How can the resilience concept be understood in the context of life-span developmental psychology? To date there has been little integration of these two research streams. We suspect there are at least two reasons for this: First, resilience is a construct that, in psychology, originated in research on the development of psychopathology rather than on normal development (e.g., Cicchetti, 1989; Garmezy, 1991; Masten, Best, & Garmezy, 1991; Rutter,

1987). Most adult developmental research, aside from relatively recent efforts concerned with old age in the area of mental health (e.g., Birren & Sloane, 1980) and senile dementia (e.g., Cohen, 1989; Smyer, Zarit, & Qualls, 1990), has focused on "normal" aging (e.g., Birren & Schaie, 1990). Second, resilience is a term which has been used and applied primarily in research on childhood and adolescence, rather than adulthood and old age. One exception has been the work of the MacArthur Foundation Network on Successful Aging (Rowe & Kahn, 1987).

In our view, there is substantial overlap between definitions of resilience and life-span views of developmental reserve capacity. Garmezy (1991, p. 459), for example, has defined resilience as "the capacity for recovery and maintained adaptive behavior that may follow initial retreat or incapacity upon initiating a stressful event." For Rutter, resilience describes "the positive pole of individual differences in people's response to stress and adversity" (Rutter, 1987, p. 316).

Thus, definitions of resilience in the literature seem to contain reference to two kinds of adaptive response: (a) the maintenance of normal development despite the presence of threats or risks (internal and external), and (b) recovery from trauma. Unlike the notion of invulnerability, resilience is not considered to be trait-like. Rather, it is assumed that an individual's resilience changes in transaction with specific circumstances and challenges (Magnusson & Öhman, 1987; Rutter, 1987). Consequently, resilience demonstrated in one situation is not automatically sustained over time or transferred to other circumstances and challenges. An individual's degree of resilience is considered a function of protective factors (internal and external) that modify the person's response to some environmental hazards that "normally" result in maladaptive outcomes (Garmezy, 1991; Rutter, 1987).

Mapping definitions of resilience onto the concepts of reserve capacity and plasticity suggests that resilience can be conceptualized as one *type* of plasticity. While plasticity, in principle, can be seen as encompassing the potential for any change in adaptive capacity (including increase, maintenance, decrease), resilience refers to the potential for the maintenance and regaining of levels of normal adaptation; that is, resilience is a subtype of the broader range of changes in adaptive capacity encompassed by plasticity. Like reserve capacity, resilience implies the presence of latent resources which can be activated. However, unlike resilience, reserve capacity is not only relevant to maintaining or regaining *normal* levels of adaptation. Reserve capacity also refers to factors and resources that promote *growth beyond* the current and normal level of functioning (Staudinger, Marsiske, & Baltes, 1993; see also Figure 22.3).

Although notions of plasticity and resilience serve a heuristic purpose, conceptual problems remain with both lines of research. For example, the distinction between the protective factors and mechanisms underlying resilience, and resilience as an outcome can be quite arbitrary. In a similar way, this is true for the distinction between resources on the one hand and plasticity on the other; that is, plasticity itself can serve as a kind of resource. Moreover, in both lines of research the criteria for what constitutes a protective factor or a resource are not easy to define. What may be a protective factor in one context can be a risk factor in another, and vice versa.

These and similar issues have been subsumed in the life-span literature under the concept of *multifunctionality* of development and associated variations in developmental outcomes (e.g., Baltes & Silverberg, 1994; Chapman, 1988). Is there only one adequate criterion for a loss with respect to intellectual functioning in old age, for example? Is school or college performance in young adulthood an adequate reference point for assessing intellectual efficacy in older adults, or should we also consider changes in intellectual task demands and in later adulthood and criteria of "normal" intellectual functioning in late life? Another example comes from the study of autonomy versus dependency in old age. Is the advent of dependent behavior in old age only to be considered a loss, or can dependency under certain conditions also imply gains (e.g., provision of social contact of freeing up resources for other desirable activities; Baltes, in press)? In other words, what is *labeled* as decline or loss may actually be quite adaptive within the everyday ecology of older adults.

If one takes the person-in-context definition of resilience seriously, then one should specify both the developmental domain or unit "at stake," as well as the selected marker(s) for assessing and evaluating resilience. More concretely, one should be aware that speaking about *the* resilience of a person in general, and about life-span development in general, rather than about resilience within a specific domain of functioning, may be overly ambitious. Optimization of adaptation at any given point in the life course needs to take into consideration *positive and negative transfer effects across domains of functioning and across time*. For instance, high-level physical functioning at one point in time, as in the case of top college athletes, can have long-term negative effects on health. Or as another example, career-oriented achievement motivation in early adulthood, for instance, is generally considered a protective and optimizing factor. In later adulthood, and especially during retirement, such a personality characteristic can become quite dysfunctional.

Resilience and Reserve Capacity in Later Adulthood as a Function of Risk and Protective Factors

Having introduced the central life-span propositions that are relevant to the investigation of the whole life course and how resilience fits into this framework, we will now shift to the central focus of this chapter, which is later adulthood. What are the potential risks, challenges, and gains of old age? We have argued before that according to life-span theory, limiters and facilitators of development can be categorized into three broad systems of developmental influences: (a) age-graded, (b) history-graded, and (c) non-normative (Baltes, 1987; Baltes et al., 1980). Individuals act and react within the setting of these influences.

Age-graded influences are defined as biological and environmental determinants that have a fairly strong relationship to chronological age and are therefore quite predictable in their temporal course. Their direction of influence is assumed to be rather similar across individuals. *History-graded* influences also involve environmental and biological determinants, but they are associated with historical time. Individuals develop within the framework of evolution and culture; the influences of pharmacology

on health, or the nature of educational opportunities, for example, vary across cultures and historical time. Finally, another set of biological and environmental determinants is *non-normative*, in the statistical sense. Non-normative influences do not follow a general and predictable course; rather, they differ in onset, duration, and prevalence from individual to individual and are not clearly tied to ontogenetic or historical time. Non-normative influences represent the idiosyncratic facet of development, and are contained in factors such as unique life experiences (e.g., migration, winning in a lottery) or biomedical conditions of health or endowment (e.g., physical injury due to an accident, special musical talent) and varying constellations of these influences.

These three systems of developmental influences manifest themselves as both facilitators (supportive of gains) and limiters (supportive of losses) of life-span changes in functioning and the mastery of life tasks. Translating life-span ideas into the language of resilience, we could define facilitators and their related gains as protective factors, and the limiters and their related losses as risk factors. There have been speculations about the relative influence of these three systems of developmental influences across the life span (Baltes et al., 1980), which are schematically illustrated on the left side of Figure 22.1. In addition to the relative weight, the functional valence (e.g., value expectation) of the three streams of influences also changes with age. In old age, idiosyncratic and normative influences become increasingly negative, threatening current levels of adaptation. This shifting balance in the functional valence of developmental influences is also captured in subjective beliefs about the life-span trajectories of gains and losses as shown in the right panel of Figure 22.1.

Indeed, old age has been described as the period of life which is generally characterized by a depletion of reserves (and thus resources) through multiple losses, often occurring simultaneously or within a short period of time (e.g., Baltes, 1991; Finch, 1990; Fries, 1990; Schaie, 1989). Negative non-normative and age-graded events (see left panel Figure 22.1), such as death of spouse, death of friends, running out of one's own life time, decline of physical health and physical functioning, loss of social status, prestige, and sometimes financial insecurity, on average, all become increasingly prevalent in late life. In fact, one could argue that some events (e.g., illness), judged to be rare or non-normative in earlier periods of life, may become relatively normative in old age. Together these perspectives on the risks, challenges, and gains of old age suggest a high likelihood for an increasing call upon reserves and resilience in old age, if adaptive functioning is to be maintained (see also Figure 22.3 below).

Dealing with this relative age-related increase in losses will test the limits, and may exhaust the internal and external resources that individuals have available. Furthermore, if aging individuals are engaged in managing many losses, they will have fewer developmental reserves available to invest in their development and growth. This is not to conclude that protective factors do not operate in old age, or that resources are entirely depleted. The critical issue in old age, however, is the overall ratio of gains to losses (e.g., Baltes & Baltes, 1990b; Brandtstädter, Wentura, & Greve, 1993; Hobfoll, 1989). Any one of the losses mentioned above, such as loss of spouse or loss of employment, also may occur at earlier times in the life span. At younger ages, however, it is

unlikely that an individual would also have to deal simultaneously with many concurrent losses. Thus, it may well be that older persons have access to some protective factors, but nevertheless the overall need for resources more and more often surpasses those available.

In summary, old age is characterized by a general restriction in the range of plasticity or reserve capacity and an increase in challenges with negative valence. Nevertheless, within specific domains of functioning, declines might still be modulated, and there may still be potential to repair and enhance functioning to or beyond earlier levels. Indeed, there is evidence that in some domains of psychological functioning even continued growth can be promoted by means of enhancement programs. In the following sections, we review some research selected from three domains of psychological functioning in which we and our colleagues at the Max Planck Institute for Human Development and Education in Berlin have conducted research (cognitive functioning, self and personality, and social transactions), in order to provide some illustrative evidence for protective mechanisms and resilience in old age. Along the line, we also point to the consistency of this evidence with concepts of life-span developmental psychology. In addition, we discuss a model of "successful aging" that describes how aging individuals might focus and optimize their reserves in effective ways including the generation and enlisting of compensatory efforts.

Two Facets of Research on Reserve Capacity and Resilience in Later Adulthood

Following the dual conception of resilience as (a) the maintenance of normal development despite the presence of risks, and (b) recovery from trauma, two research themes of plasticity and resilience can be distinguished with regard to aging. The first approach is research on the "real-life" or "natural" (in vivo) occurrence of resilience or plasticity. This refers to studies that demonstrate reserve capacity in old age by investigating how old adults "naturally" adapt to and master circumstances that could potentially threaten the normal developmental trajectory in everyday life. Here, it is important to underscore that we mean "natural" in the sense of a high degree of everyday prevalence, and not in the sense of a biologically determined phenomenon. Research on coping, and also on cognitive enrichment through work-related specialization, and selective and compensatory processes of the self fits this aspect of plasticity.

The second stream of plasticity research in old age has moved beyond the natural context of everyday functioning, and has focused on different forms of *intervention*. In this approach, the focus is on what is possible in principle and if "natural" conditions were different. Two kinds of intervention research can be identified. One set of studies focuses on remediation and treatment of existing declines and pathologies (e.g., Baltes & Danish, 1979; Riley & Riley, 1989), challenging the view based on negative stereotypes of old age that age-associated losses cannot be minimized or reversed. There is accumulating evidence that remediation is often possible (e.g., Baltes, 1988; Baltes & Lindenberger, 1988; Carstensen, 1988; Danish, Smyer, & Nowak, 1980; Fries, 1989). A second kind of intervention research focuses

explicitly on prevention and optimization; that is, on interventions that, through both domain-general and domain-specific strategies, enhance developmental reserve capacity, promote growth, and move individuals beyond the normal developmental trajectory toward optimal levels of functioning. As do younger people, older people have considerable developmental reserve capacity that might be activated under specific cultural conditions related to the social and physical environment, and that might facilitate their attainment of such positive late-life goals as maintenance of social productivity, independent functioning, or advanced states of well-being (Baltes & Baltes, 1990b; Riley & Riley, 1989; Ryff, 1984, 1991). In the following sections, we will illustrate psychological research on those two facets of plasticity and resilience by reviewing studies from the areas of cognitive functioning, self and personality, and social transactions. We begin by considering cognitive and intellectual resilience.

COGNITIVE RESILIENCE IN ADULTHOOD AND OLD AGE

In the following sections on the aging mind, we examine three broad streams of research as more in-depth illustrations of the themes we have mentioned above. We first consider descriptive evidence regarding the nature of developmental changes in adult intellectual performance. Second, we focus on those aspects of the aging mind, such as professional expertise, which may be less likely to demonstrate normative losses in old age; that is, where cognitive resilience in real-life (natural) contexts is a frequent outcome. Finally, given that some features of adult intelligence are expected to evince losses in advanced old age, we consider the potentials for and limits to modifiability (improvement) in these domains.

A Dual-Process Conception of the Aging Mind: Is There Need for Cognitive Resilience?

Historically, the level of intellectual functioning in late life, if studied from a resilience perspective, would more likely have been categorized as a "risk factor" than as a "protective factor with regard to the overall balance of development." There is widespread empirical support from both cross-sectional and longitudinal studies using omnibus and ability-specific measures of intelligence that older adults do not perform as well as younger adults on a variety of measures of intellectual functioning (Salthouse, 1991a).

There is evidence, however, to moderate a *general* view of cognitive aging as decline. With the onset of longitudinal and cohort-sequential investigations (see Maddox, 1987) and increasing reliance on multifactorial conceptions of intelligence (e.g., Horn & Hofer, 1992), a more complex picture of adult intellectual functioning has emerged (Lindenberger & Baltes, in press). Current empirical perspectives suggest that there is substantial inter-individual variability in the onset and rate of negative changes, that the magnitude of negative change differs by domain of intellectual functioning, and that for a sizable number of persons the outcome is one of stability of intellectual

functioning through much of adulthood (Schaie, 1989). Normative decline (i.e., ability-general losses for most individuals) is not visible until later adulthood, often in the seventh decade and beyond (Hertzog & Schaie, 1988; Lindenberger, Mayr, & Kliegl, 1993). After age 70 to 75 (Schaie, 1989), in part because of an increase in age-associated illnesses, ability-general decline becomes increasingly likely.

In this context of multifactorial models of intelligence, the distinction between fluid and crystallized intelligence (Cattell, 1971; Horn & Hofer, 1992) has been one of the most fruitful taxonomies of intellectual abilities in the life-span developmental literature. In our own work, we have combined the Horn-Cattell framework with perspectives from cognitive and evolutionary psychology. As a result, we have proposed the distinction between two higher order "idealized" constructs of intellectual functioning: the fluid-like *mechanics*, and the crystallized *pragmatics* of the mind (Baltes, 1987, 1993; Baltes, Dittmann-Kohli, & Dixon, 1984). In this scheme, the cognitive mechanics reflect the neurophysiological architecture of the brain as it developed during ontogeny and has been largely prepared by processes of evolution. The cognitive pragmatics can be understood as the kind of knowledge and information that cultures offer about the world and human affairs, and that developing individuals acquire as they participate in culture-based socialization.

Based on this theoretical position regarding the different primary sources for the development of the cognitive mechanics and pragmatics, it is assumed that the two facets to the aging mind evince different life-span trajectories. The evidence concurs. The cognitive mechanics or fluid intelligence, as captured, for instance, in the speed and accuracy of basic information processing, demonstrate age-related declines beginning as early as middle adulthood (e.g., Salthouse, 1991a). Conversely, there is growing evidence that, given positive cultural and personal circumstances, stability and even positive age change during adulthood are possible in the knowledge-based pragmatic facets of the mind, such as in tests of vocabulary or professional expertise (Baltes, 1993; Staudinger, Cornelius, & Baltes, 1989).

The Cognitive Pragmatics: "Natural" Resilience through Knowledge

The cognitive pragmatics refer to the *enrichment* of the cognitive system by bodies of knowledge, and the associated potential *compensatory* power of culture-based knowledge in the face of biologically determined losses in the mechanics of the mind. This possibility for the cognitive pragmatics to serve as a reservoir for enrichment and as a compensatory resource we have termed "natural" resilience. This is not meant to imply that only losses in the cognitive mechanics cause gains in the mental pragmatics (Uttal & Perlmutter, 1989); pragmatics do not only serve a compensatory function. Rather, we argue that the development of knowledge systems in old age is a potential gain in its own right that may also serve as a source of protection. In other words, people may have reserve capacity in the crystallized pragmatics, even when there is age-related loss in the mechanics of intelligence, and they may use pragmatic reserves to offset these losses in the mechanics.

The developmental research tradition contains several interrelated efforts to highlight the important role of knowledge for cognitive advances (e.g., Brown, 1982; Chi, Glaser, & Rees, 1982; Glaser, 1984; Weinert & Waldmann, 1988). One important model of cognitive development in knowledge domains is the "expertise" model. Here, we are guided by the general view of expert knowledge systems recently summarized in Ericsson and Smith (1991). We draw from this literature general perspectives on how living longer may result in a movement *toward* high levels of functioning in select areas of cognition and intelligence. In principle, research on expertise suggests that a coalition of factors must be present, and that their presence must extend over time, so that performance moves in the direction of higher and higher levels until expertise is reached. In the following sections, we illustrate two resilience-related phenomena. First, it is shown that living longer (i.e., being older), under particular conditions, may result in the acquisition of certain bodies of knowledge, which are conducive to higher levels of psychological functioning. Second, we demonstrate that pragmatic knowledge can be used to compensate for age-associated losses in the cognitive mechanics.

The Performance of Older Experts

The question of whether expertise, or the availability of a rich procedural and factual knowledge base, is a protective factor against age-related losses in intellectual functioning has only recently begun to be addressed. In one study of expert typists, described in Salthouse (1991a), younger typists showed superiority on several measures of perceptual-motor speed (reaction time, tapping speed, rate of digit symbol substitution). Such evidence is suggestive of a performance advantage on the part of the younger typists in sheer response speed while typing. However, the older *expert* typists selected for the study could achieve *equally good* performance levels on a typing task when they were provided with larger typing preview spans. In other words, acquired procedural knowledge involving reading ahead in the to-be-typed text (reserves in pragmatics) was used to offset developmental losses in the cognitive mechanics; that is, age-related slowing of reaction time and of tapping speed. Similar findings were reported by Krampe (1994; see also Ericsson, Krampe, & Tesch-Römer, 1993) who compared young and old expert pianists. Specifically, despite the presence of age-related "mechanical" decline in reaction and tapping times, older expert pianists were able to play well and fast, most likely by preparing and coordinating multiple finger movements in advance through "deliberate practice." Charness (1985) also reported that older chess players seemed to differ from younger players in their evaluative chess strategies. In each case, "pragmatic" procedural strategies appeared to compensate for the loss in the cognitive mechanics (see also Erikson & Charness, 1994).

In summary, research is supportive of the contention that knowledge-based expertise yields a pattern of age-maintenance or age-increase in expertise-related functioning. Moreover, process-oriented research designed to understand the components of age-invariant expertise suggests that high levels of pragmatic knowledge may be used to produce more effective and efficient response strategies, despite age-associated losses in relevant cognitive mechanics (Clancy & Hoyer, 1994). Similar interpretations

can be derived from research on the late-life accomplishments of some artists and scientists (e.g., Perlmutter, 1990; Simonton, 1991).

Wisdom: Expertise in the Fundamental Pragmatics of Life

Besides investigating expertise in professional and in leisure domains, "knowledge about life and the human condition" has been identified as another example of the cognitive pragmatics. Research on wisdom is a sample case. In our own work, we have defined wisdom as an "expert knowledge system in the fundamental pragmatics of life permitting excellent judgment and advice involving important and uncertain matters of life" (e.g., Baltes, Smith, & Staudinger, 1992; Baltes & Staudinger, 1993). This body of knowledge entails insights into the quintessential aspects of the human condition, including its biological finitude, cultural conditioning, and individual variations. At the center of this body of knowledge are questions concerning the conduct, interpretation, and management of life.

The central idea of this line of research is to explore whether individuals, during adulthood and old age and under favorable personal and experiential conditions, can acquire and refine knowledge and skills dealing with life review, life planning, and life management and thereby attain higher levels of wisdom-related knowledge. In several studies with adults of differing ages and professional background, individuals were presented with life dilemmas and asked to think aloud as they went about solving them. The tasks varied in difficulty and age-relevance. Thinking-aloud responses were transcribed and scored according to five wisdom-related criteria that were defined as essential to wisdom (Baltes & Smith, 1990; Baltes & Staudinger, 1993). Two of these criteria (rich factual and rich procedural knowledge about life) represent basic criteria and are taken from general theories of expert systems (e.g., Ericsson & Smith, 1991). The three remaining meta-criteria (life-span contextualism, relativism of values and life goals, recognition and management of uncertainty) are informed by life-span research on adult cognitive and personality development (e.g., Alexander & Langer, 1990; Erikson et al., 1986; Maciel, Heckhausen, & Baltes, 1994; Sinnott & Cavanaugh, 1991; Sternberg & Berg, 1992).

The definition of wisdom as an expert knowledge system (expertise) implies the presence of high standards which relatively few individuals will reach. Therefore, as expected, relatively few truly "wise" responses were identified. Despite this relative lack of high-level responses, performances in the middle-level range demonstrated a pattern dramatically different from those derived from research on the cognitive mechanics in aging. On average, older persons performed as well as younger adults on the wisdom-related tasks (Smith & Baltes, 1990; Staudinger, 1989). Also, older adults, that is, 60- to 80-year-olds, produced as many of the top 20% of performances as younger adults. Besides, the performance of older adults was best when they responded to a life dilemma that was typical for their own period in life. Moreover, there was evidence that being older, when *combined* with certain experiential contexts conducive to the accumulation and refinement of wisdom-related knowledge, was associated with the relatively highest levels of performance. In addition, it was found that certain personality traits (such as Openness to Experience) were correlated with higher levels of wisdom-related performance.

One experiential context studied was that of certain professional specializations, such as clinical psychology or family law. The results indicated the presence of an age by experience interaction: Older clinical psychologists not only performed better than age-matched professional controls, but in some tasks they actually outperformed their younger professional colleagues (Smith, Staudinger, & Baltes, in press; Staudinger, Smith, & Baltes, 1992). Subsequent research included a sample of distinguished citizens nominated as wise and characterized by wisdom-facilitative biographical constellations. Two examples may highlight the special character of this group: 57% have published their autobiographies, and 41% were members of the German anti-Nazi resistance movement during the Third Reich. This sample had an average age of 67 years (ranging from 41 to 88 years). Findings from this study further verified the enhancing effect of certain experiential settings, and again documented the absence of negative age effects in wisdom-related performance. Older wisdom nominees performed at least as well as the next group, the old clinical psychologists, and both groups performed better than the two professional control groups. When considering the top range of performances, the wisdom nominees produced more than their share and more than any other group of the best performances (Baltes, Staudinger, Macreker, & Smith, in press).

In research on wisdom-related performance, we witness an example of the "natural" resilience of the mind as well as its potential for enrichment (Staudinger & Baltes, in press). This research also reminds us that chronological age in itself is not the most important resource which contributes to these mental reserves. Rather, it is the combination of features such as facilitative experiential contexts, personality characteristics, motivational constellations, and age-related accumulation of experiences which seem to be generative of higher levels of wisdom-related performance.

Everyday Competence: "Natural" Resilience in Tasks of Daily Living

Another domain of complex, high-level functioning is that of everyday problem solving or everyday competence. Everyday competence is a complex concept, and has been studied from a variety of multidisciplinary perspectives, including medical/biological (Katz, Ford, & Moskowitz, 1963; Mahoney & Barthel, 1965), sociological/epidemiological (Manton, Stallard, & Liu, 1993; Wolinsky, Callahan, Fitzgerald, & Johnson, 1992), and psychological (Baltes, Mayr, Borchelt, Maas, & Wilms, 1993; Lawton, 1991; Lawton & Brody, 1969; Willis, 1991).

In the context of the present chapter, we want to focus on cognitive components of everyday competence, which we shall discuss here as *everyday problem solving*. The emphasis has been on objective, performance-based measurement (i.e., studying what individuals can do, or performance potential, rather than what individuals say they can do). Everyday problem solving and its allied concept of practical intelligence (e.g., Sternberg & Wagner, 1986) encompass the total spectrum of situations in which mental abilities are used in the conduct of daily life (e.g., Lave, 1988). As a result, individual research attempts have tended to be selective, and relatively unrelated to one another (Hartley, 1989; Marsiske & Willis, in press a).

Most life-span theory about everyday cognition has tended to emphasize the ideas of contextualism and adaptive fit discussed at the beginning of this chapter. With regard to the study of older adults, for example, a number of theorists have proposed that the everyday tasks confronted by older adults should have features of self-selection, personal relevance, and high familiarity (e.g., Baltes & Baltes, 1990b; Berg & Sternberg, 1985). They represent often-encountered tasks for which individuals may have well-developed action plans, knowledge structures, and scripts. Theories which emphasize this pragmatic, knowledge-based aspect of everyday competence would predict that, in those task domains which are personally salient and familiar, late life may be a time of differential preservation of competence and selectively maintained high levels of performance (e.g., Salthouse, 1991b). Some research on everyday cognition has tended to support these assertions, with older adults typically performing as well as, or better than, younger adults on tasks of everyday information use and social strategy use (e.g., Cornelius & Caspi, 1987; Demming & Pressey, 1957; Denney, 1984; Gardner & Monge, 1977; Heidrich & Denney, 1994).

A second stream of life-span theory and research on everyday cognition has more specifically emphasized normatively defined tasks of "basic competence" (e.g., food preparation, medication use, housekeeping; see Morrell, Park, & Poon, 1990; Willis, 1991). In addition, consistent with lay (implicit) conceptions of everyday competence (e.g., Berg & Sternberg, 1992; Cornelius & Caspi, 1987; Sternberg, Conway, Ketrone, & Bernstein, 1981) these studies emphasize adults' abilities to adapt to unexpected but potentially relevant life situations (e.g., dealing with widowhood, poor weather; see Denney & Pearce, 1989) and thereby tap more into the cognitive mechanics than the pragmatics of the mind (Marsiske & Willis, in press b). Consequently in this research, there has been less evidence for preservation of functioning in late life.

Willis, Jay, Diehl, and Marsiske (1992) showed that older adults, followed longitudinally over a seven-year interval, as they moved from 70 to 77 years of age, on average experienced significant mean decline in performance on a measure of reasoning and document literacy involving everyday texts (e.g., prescription labels, bus schedules, recipes), which was predicted by associated losses in psychometric intelligence functioning. Despite this decline at the group level, when intraindividual change trajectories were examined, the majority of the sample (62%) was judged to have performed at levels close to what they had shown seven years earlier. The findings of mean decline from 70 to 77 years of age are consistent with cross-sectional research reported by Denney and her colleagues on adult problem solving. Over several cross-sectional studies, Denney (see Denney, 1989, for a review) has demonstrated that peak performances in adults' ability to generate solutions to everyday problems, even when those problems are drawn from the experiences of older adults, is typically highest in middle-aged subjects (subjects aged 40 to 50).

The research on everyday problem solving in later life is still too sparse to permit broad generalizations about age-related resilience. Despite this, given findings regarding the different trajectories for the mechanics and pragmatics of intelligence across adulthood, it is possible to conclude that "natural"

resilience will be observed primarily in those everyday tasks which emphasize the crystallized pragmatics and which draw on individuals' reservoirs of procedural and declarative knowledge in the domains in which they have specialized. The major exception from this pattern, as we shall argue for the cognitive mechanics (Baltes, Kuhl, & Sowarka, 1992), are persons who are afflicted by severe brain-related diseases such as Senile Dementia of the Alzheimer's Type.

In sum: A major aspect of successful aging concerns knowledge about the nature of life-span development itself, and the human condition, and how such knowledge about the course and conditions of life might be useful for managing the peaks and valleys of everyday behavior (Baltes & Baltes, 1990a; Baltes, Smith, & Staudinger, 1992; Brim, 1992; Fries, 1989). As for the dynamics between the crystallized pragmatics and the fluid mechanics, research suggests that level of performance can be maintained in select domains despite losses in the cognitive mechanics. Drawing on rich levels of procedural and factual knowledge, older adults seem able to compensate for age-related reductions in the cognitive mechanics by the use of knowledge-based pragmatic resources. Capacity reserves in the cognitive pragmatics, then, seem to provide a rich and "natural" source for cognitive resilience. In many ways, such findings and perspectives are consistent with a view held in sociology and also the educational sciences (e.g., Featherman, 1983; Mayer, 1994; Maddox, 1987). It is the view that—at the macrolevel—education and stimulating work careers serve as major facilitators of aging well.

Potential for Resilience and Growth in the Cognitive Mechanics: Training Results

It would be incorrect to assume that, even if normal age-related losses in performance on measures of the fluid mechanics exist, they *necessarily* imply underlying losses in cognitive competence (baseline reserves), and the absence of potential for resilience in the mechanical components of intellectual functioning. Indeed, as suggested by cohort studies, some of the negative age differences observed in cross-sectional studies not only reflect "genotypic" decline associated with the biology of aging, but also cohort- or generational disadvantages associated with education and societal status (Schaie, in press), and occupational complexity (e.g., Schooler, 1990). Such findings do suggest that there is "room" for cultural factors to influence the level and rate of normative aging of the cognitive mechanics. Indeed, from a civilization point of view, the period of "old age" is still "young" (Baltes & Baltes, 1990b), and we are only beginning to understand what it takes to optimize individual aging, and what role cultural factors might play.

Exploring the range of modifiability and optimization has been at the center of cognitive training research (Baltes, 1993; Baltes & Willis, 1982; Denney, 1984; Labouvie-Vief, 1977; Willis, 1987). A growing body of cognitive intervention research has suggested that, as is true for younger age groups, older persons also possess substantial baseline reserves concurrently with the "normative" losses in baseline performance. These reserves can be activated and enriched under appropriate conditions. The most direct evidence comes from cognitive training research.

Activation of Current Maximum Performance (Baseline Reserves) in the Cognitive Mechanics: Cognitive Resilience After Intervention

For almost two decades, research findings have documented robust individual plasticity (modifiability) in the performance of older adults on tests of fluid intelligence and the cognitive mechanics (e.g., working memory). The general paradigm has involved tutored or self-guided instruction of older adults, ranging from about 60 to 90 years of age, in the strategies needed to successfully solve fluid intelligence problems. With slight variations across studies, the broad pattern of findings suggests: (a) older subjects demonstrate significant performance gains on the tests selected for training and practice, and (b) training group superiority, relative to untrained controls, is often maintained for periods up to one year or more. Training gains on selected tests are in the range of one-half to one standard deviation. Generally, however, training effects do not generalize beyond the abilities selected for training (e.g., Bäckman, Mäntylä, & Herlitz, 1990; Baltes & Lindenberger, 1988; Baltes, Sowarka, & Kliegl, 1989; Denney, 1984; Verhaeghen, Marcoen, & Goossens, 1992; Willis, 1987).

Taken together, the literature on training the cognitive mechanics of the mind (e.g., fluid intelligence and working memory) seems to support the presence of substantial levels of baseline reserve capacity in the cognitive mechanics, that exist concurrently with normal age-related losses. The only major exception seems to be research with older persons with, or at risk for, Senile Dementia of the Alzheimer's Type (Baltes, Kühl, & Sowarka, 1992). Such persons do not seem to profit from cognitive training. Despite this caveat, for most older persons, changes in practice and in contextual support allow for significant improvement in performance levels. One implication is that the presence of enriching cognitive environments, either by providing for formal practice, or by providing in vivo practice associated with social tasks and roles for older adults, may constitute one protective factor for the management of decline in the cognitive mechanics.

It will be interesting to explore to what degree such practice- and training-related activities reduce the onset and rate of decline, and thus, could function as protective factors in the sense of prevention. Training and practice results from longitudinal research in the age range from 64 to 95 years have suggested that, in the majority of older subjects who had experienced reliable intellectual decline, intervention could remediate performance on the trained tests to levels approximating that displayed by the same subjects fourteen years earlier (Willis & Schaie, 1986). For subjects who had not declined, training and practice could enhance performance above younger baseline levels. Further, there is growing evidence that subjects evince significantly less decline in the seven years following training and practice, relative to untrained controls (Willis & Nesselroade, 1990; Willis & Schaie, 1994). In general, longitudinal research with subjects who have experienced memory training has been less positive. Two studies reported no maintenance of training gains over a three-year period (Anschutz, Camp, Markley, & Kramer, 1987; Scogin & Bienias, 1988). More recently, however, Nealy and Bäckman (1993) have reported that very intensive memory training did

show maintenance over a three-year span, suggesting that lack of durability may be a partial function of intervention intensity. One problematic feature of longitudinal analysis with older adults is selective survivorship; that is, longitudinal results are based on a positively selected subset of subjects. Moreover, we need to be careful not to generalize from improvement in select trained tasks and functions to a wider spectrum of cognitive functioning. So far, if anything, the lack of such transfer to a wide spectrum has been demonstrated.

Another unaddressed question in the cognitive training research reviewed here is that of age differences in the magnitude of training gain; that is, whether young adults would have profited more, the same, or less than older adults (Salthouse, 1991a). There are good reasons for the dearth of substantial age-comparative training studies. In the usual age comparisons, a myriad of factors make it almost impossible to differentiate between differences in competence (genotype) or reserve capacity and differences in performance (phenotype) (e.g., Salthouse, 1991a; Willis & Baltes, 1981). To make this distinction possible, it is necessary to move beyond the given and explore the range and limits of developmental reserve. This is done within a testing-the-limits paradigm which, by means of intensive and extensive intervention, aims at (a) enhancing existing reserves and (b) estimating asymptotic levels of "best" performance potential (Baltes, 1987; Kliegl & Baltes, 1987).

Enhancing Developmental Reserves in the Cognitive Mechanics: Potentials and Limits

Testing the limits, as a paradigm in life-span research, was designed for two main purposes. The first was to identify limits to performance by means of variation in difficulty and difficulty-related performance conditions. The basic metaphor is the "stress test" used in biology and medicine, designed to assess the upper range of adaptive fitness and early indications of emerging dysfunctions (Baltes & Kindermann, 1985; Coper et al., 1986). The second goal of testing-the-limits research was to explore an "optimal" range of functioning, not unlike practice and training research in athletics. The building theme for this kind of research was the search for "developmental" reserve capacity.

In this vein, testing-the-limits work was aimed at engineering and testing of high levels of performance (Baltes & Lindenberger, 1988; Kliegl & Baltes, 1987). One way in which this was illustrated was through the use of a mnemonic technique, the so-called Method of Loci. The key feature of this method is to first acquire a mental map of fixed locations, and then to create mental images for each word that link it to one of the locations. The goal of this research was not to train memory experts, but to use the Method of Loci as a research model and as a means of manipulating and studying more general processes associated with the cognitive mechanics (Baltes, 1993; Kliegl et al., 1990).

In an illustrative example of this line of research, a sample of young and old (65 to 83 years) highly intelligent subjects was recruited. Training and practice in the Method of Loci continued for more than thirty sessions, until subjects approximated a level of asymptotic performance. As was true for earlier cognitive training research, substantial performance plasticity was demonstrated in all subjects: mean performance increased from recall

of 5 to 7 words to recall of a mean of about 15 words in correct order (Baltes & Kliegl, 1992; Kliegl et al., 1990). However, under conditions of high levels of difficulty and "stress," as the speed of the task was increased, as well as under conditions of extensive practice, negative age differences in plasticity (developmental reserve capacity) became more and more apparent and were magnified over those age differences present at baseline. Indeed, under conditions of high difficulty and near individual limits or best performance levels, there was virtually no overlap in the performance distributions of young and old subjects, with significant performance superiority in the younger subjects. The negative age differences obtained in this research were sizable and robust (Baltes & Kliegl, 1992): After few sessions of training and practice, the mean performance of young adults exceeded the mean performance that older adults would achieve after about 35 sessions of training and practice.

In summary: There are two facets to the aging of the cognitive mechanics: (a) Substantial training improvements in performance can be observed in older persons unless they are afflicted by a brain-related illness such as senile dementia; and (b) at least with regard to fluid intelligence, gains appear to be task-specific and long-lasting. On the other hand, however, when the highest possible levels of functioning of older adults are studied in comparison with younger adults (i.e., following intensive training), seemingly irremediable losses in developmental reserve capacity become manifest. Older adults have slower cognitive mechanics and they are more likely to make errors than younger adults.

Such results can be interpreted as suggesting that cognitive reserves of the mechanics kind are reduced with increasing age. For several reasons, these reductions may not become manifest in actual cognitive functioning. First, despite losses, for many tasks there may still be a surplus of reserves beyond current levels of functioning. Second, knowledge-based compensation seems to be possible in tasks related to domains of expertise. Third, reductions in reserves are less likely to become noticeable under average everyday conditions of cognitive functioning. One can expect, however, that aging losses in reserves of the mechanics may become evident if an older person has to operate under high challenge or complex conditions, especially under conditions where cognitive speed, parallel processing, and new learning are required. A simple everyday example of such a high-challenge situation might be that of having to decide quickly whether to cross an intersection in the face of oncoming traffic.

Intervention-Supported Resilience in the Face of Cognitive Pathology: The Sample Case of Dementia

Aside from case studies, there is relatively little systematic research on the regaining of resilience after older adults have suffered from pathology in cognitive functioning. One of the most widely known cognitive pathologies of advanced old age is senile dementia. Although this is frequently discussed as a mental health problem (see Smyer et al., 1990), it comprises a complex set of disorders that seem to have primarily biological origins (Cohen, 1989). Senile Dementia of the Alzheimer's Type (SDAT) and multi-infarct dementia are among the most

prevalent types (Fratiglioni et al., 1991). At present, exact diagnosis of dementia type is possible only at autopsy. To provide adequate treatment, it is important to distinguish senile dementia from other potentially treatable dementing conditions, like depression (Blazer, 1989) and adverse drug reactions (Callahan, 1992; Morrison & Katz, 1989).

One of the major defining features of dementing conditions is their influence on cognitive functioning. Memory impairment, in particular, is one of the first noticeable symptoms of the disease. Although, as we suggested in our review of cognitive mechanics, there are normal age-related deficits in memory functioning (e.g., Craik & Jennings, 1992; Hultsch & Dixon, 1990), one major difference between normal and pathological (i.e., demented) cognitive aging seems to center on the relative magnitude of cognitive reserve capacity. While there is strong evidence that, with a variety of supportive conditions including training and modification of task instructions or material to-be-remembered, healthy older adults can demonstrate substantial improvement in memory performance (Craik, Byrd, & Swanson, 1987; Herlitz, Lipinska, & Bäckman, 1992; Kliegl et al., 1990), the literature on the effect of supportive memory conditions (e.g., Craik, 1977) in demented elders is less positive. Supportive memory conditions that do not seem to work particularly well for individuals with cognitive impairment—as compared to non-impaired elders—include the use of pictorial and highly concrete verbal stimuli at encoding (e.g., Butters et al., 1983; Wilson, Bacon, Kramer, Fox, & Kaszniak, 1983), increasing the semantic organization of the to-be-remembered words (e.g., Cushman, Como, Booth, & Caine, 1988), using interventions which increase the strength of memory traces (e.g., Corkin, 1982), or using subject-generated word lists as the to-be-remembered words (Dick, Kean, & Sands, 1989).

In a similar way, research attempting to use fluid intelligence training paradigms with demented elders or even persons at risk for dementia has documented a lack of improvement in performance. One generalization about dementia seems to be that it is characterized by the relative absence of cognitive reserve capacity, as instantiated, for instance, by the relative inability to profit from cognitive training (Baltes, Kühl, & Sowarka, 1992).

As the life-span perspective on inter-individual variability suggests, global generalizations about the effects of cognitive interventions on persons with dementia must be tempered by the acknowledgment of heterogeneity. In one detailed review of cognitive intervention research in dementia, Herlitz and her colleagues (1992) noted that the effectiveness of supportive memory conditions shows some inconsistencies over studies. One reason for this is weak validity of the diagnosis. The severity of dementia is often not systematically examined. Using intervention techniques primarily informed by a cognitive processing approach, some memory improvement is possible in mildly demented subjects, but virtually no improvement has been documented in the memory performance of moderately or severely demented individuals.

Within the cognitive processing approach, in line with our earlier discussion of normal cognitive aging, the most effective interventions seem to fall into two categories: those which minimize the demands of the task drawing on the cognitive mechanics, and

those which increase the "pragmatic," knowledge-related component of the task.

Reduction of Demands on Speed of Information Processing

A number of studies have reported that decreasing presentation rates (i.e., increasing the study time individuals have with to-be-remembered items) can be beneficial. When demented elders were given up to eight times more study time per item to be remembered relative to normal older adults (i.e., 16 seconds instead of only 2 seconds), memory performance in demented and non-demented elders was about the same (e.g., Corkin et al., 1984; Huppert & Piercy, 1979; Kopelman, 1985). Thus, there is some support for the notion that when mechanical demands (e.g., on speed of information processing) are relaxed, demented elders may be able to show improved memory performance.

Focus on Prior Knowledge

Bäckman and his colleagues have shown that memory interventions that rely on the preserved knowledge of demented elders can be effective. In general, persons with dementia display some similarity to normal older adults in their better memory for information from the remote past than from the recent past. In one study, Bäckman and Herlitz (1990) presented both mildly demented and normal older adults with pictures of famous faces. Half the faces were of persons whose fame was at its highest in the 1940s, while the other half of the faces were of the recently famous. Not surprisingly, normal elders generally outperformed demented subjects. An interesting differential pattern of results was found, however, by using two different test conditions. In the first test condition, both groups were asked whether they knew the famous faces from their past. In this condition, both groups showed superior face and name recognition of the more dated famous individuals. In a subsequent second test condition, subjects were asked whether they recognized the famous faces from having just seen them in the research situation. In this condition, normal elders also showed superiority for dated faces, but demented subjects showed no difference between dated and recent famous faces.

In a second study, Lipinska, Bäckman, and Herlitz (1992) attempted to increase the activation of knowledge from past life by having subjects generate statements about each picture, and by keeping names and faces associated at all times, both at study and at test. Under these circumstances, when past knowledge was more active, demented subjects also showed a superior memory for dated faces in the condition which asked whether they had seen the person in a previous research situation. These results are suggestive of the view that increased reliance on intact knowledge could compensate, in part, for some dementia-related deficits in the cognitive mechanics.

The evidence for the effectiveness of cognitive training and support interventions with demented persons is weak. Despite this pessimistic pattern of results arising from intervention research within the cognitive processing tradition, however, it would be incorrect to conclude that there is *no* cognitive reserve capacity in demented elders at all. Even within the cognitive processing tradition of intervention research, it seems that external resources can contribute to the reserves of demented persons

when external investment of time and effort in intervention is high, and the intervention is task-specific. Furthermore, there are other forms of intervention which have not yet been sufficiently explored. As an example, intervention research within the tradition of behavior modification has suggested the potential for regaining at least some resilience even in cases of severe dementia. As we will discuss next, this latter strategy emphasizes the systematic use of reinforcement principles and engineering of age-friendly environmental conditions (e.g., Baltes & Barton, 1977; Lawton, 1988; Skinner, 1983).

Strategies of Behavior Modification and Operant Psychology

Principles of behavior modification and operant psychology have been successfully applied in maintaining functioning and reversing dysfunctioning in various cognitive and behavioral domains, and in a variety of groups with pathological conditions, including older adults (e.g., Baltes, 1988; Baltes & Barton, 1977; Carstensen, 1988; Horgas, Wahl, & Baltes, in press; Skinner, 1983). Operant procedures, in general, require fewer cognitive resources on the part of the target person. They are characterized by rather creative treatment combinations involving, for example, stimulus control, reinforcement schedules, and shaping. Thus, they appear to be promising as potentially effective interventions to use with demented elders.

Unfortunately, relatively few developmental and cognitive studies, so far, explicitly engaged in experimental or functional analyses of behaviors, their specific micro-ecological antecedents and consequences (i.e., their eliciting, prompting, reinforcing, and punishing conditions; Baltes & Barton, 1979). Developmental operant research carefully considers the acquisition, maintenance, and extinction schedule of behaviors. It also offers the opportunity to "engineer" quite complex behaviors out of simpler behavioral units (e.g., Baltes, in press; Carstensen, 1988; Mosher-Ashley, 1986-87; Wisocki, 1991). In the field of mental retardation, for instance, the use of operant procedures has offered a rich world of possibilities to enhance development and everyday functioning. Therefore, it seems plausible to expect similar outcomes for the field of dementia.

Early behavior-modification research with demented old persons has demonstrated its effectiveness in treating such specific dysfunctions as inability to eat independently and disturbing vocal behavior (Baltes & Barton, 1979). Recently, Camp and his colleagues (Camp et al., 1993; Camp & Schaeffer, 1989; Foss, Camp, & O'Hanlon, 1993; McKittrick, Camp, & Black, 1992) have documented the success of the joint application of memory and behavior modification principles in the case of spaced-retrieval memory training in persons with dementia. Spaced retrieval involves repeatedly retesting the recall of specific information, and doing so at increasingly longer intervals. In its simplest form, a subject is presented with a stimulus and asked to recall it after some interval. If the stimulus is not recalled, there is corrective feedback. After each correct recall, the interstimulus interval is systematically lengthened; after incorrect recall, the interstimulus interval is reduced to a prior level. Using this procedure in several small studies with demented individuals, one subject could remember the name of a nurse for periods of up to six months (but could recall no other staff members). Other subjects

learned to extract a colored coupon from an array of distractors for a period of up to a week (subjects were reinforced with money for correct selections). On one level of interpretation, and when restricting one's attention to a carefully defined behavior, this research quite impressively documents the effectiveness of operant conditioning. In addition, Camp and his colleagues have argued that the success of this intervention program may in part be due to the fact that it circumvents deficits in explicit, effortful memory by relying on less effortful, and more preserved, implicit (unintentional) memory capabilities (e.g., Graf & Schacter, 1987).

Taken together, the results of memory training and operant interventions with demented older adults can be summarized in two points. First, regarding the results of intervention studies in the cognitive processing tradition, it seems that after the onset of pathological cognitive loss, an increased weakening of reserve capacity is observed (Baltes, Kühl, & Sowarka, 1992). The potential modifiability of memory functioning seems to be very closely related to the severity of dementia. As long as there are at least some intact cognitive processes (e.g., encoding, activation of prior knowledge), however, some reserves can be activated and some resilience can be regained. Second, in terms of intervention studies applying classical behavior modification principles and linking these approaches to cognitive psychology, it seems that the implementation of operant principles may represent a relatively untapped resource for achieving limited improvements in persons with dementia (Camp et al., 1993), and may also have positive secondary gains with regard to social relations and self esteem (e.g., if subjects recognize and can name their families, colleagues and caregivers, they may be able to increase their amount of social participation). Thus, intervention-supported cognitive resilience, albeit within limits, may be possible through creative and combinatorial use of a variety of behavioral engineering techniques even in older adults with substantial brain-based cognitive dysfunctions.

The complexity and degree of investment increase as the severity of the dysfunction increases. However, even in cases when resilience seems irretrievably lost at the individual level because of severe losses of biological and cognitive resources, a whole structure of external and interpersonal resources (e.g., behavior modification principles, formal and informal caregiving) can be called upon to recover to a certain degree the resilient functioning of older adults. Of particular importance in this intervention effort is the physical environment. With regard to physical environmental resources such as housing, Lawton (e.g., 1982, 1988) has provided an extensive review and suggestions for architectural design that are all based on behavioral modification principles, behavioral ecology, and person-environment transactions. As to the role of interpersonal and social factors, we shall consider these in greater detail in our section on social transactions.

RESILIENCE AND RESERVE CAPACITY IN ADULTHOOD AND OLD AGE: SELF AND PERSONALITY

What about personality and self-related functioning in old age? Not unlike the pragmatics of the mind and contrary to the

mechanics, self-regulated functioning shows much stability and even age-related growth. There is little correlation between age and various indicators of self-related functioning (e.g., Baltes, 1993; Brandtstädter et al., 1993), including self-esteem (e.g., Bengtson, Reedy, & Gordon, 1985), sense of personal control (e.g., Lachman, 1986), or happiness and subjective well-being (e.g., Costa et al., 1987; Ryff, 1989). This also includes 80- to 100-year-olds (Smith & Baltes, 1993). Thus, on the group level, age does not seem to be a "risk" factor for the self and its sense of control and well-being.

The absence of strong relationships between age and self-related functioning, despite what we have characterized as an increase in risks and potential losses with advancing age, is theoretically important. Indeed, the discrepancy between an increasing number of risks on one hand, and maintenance of adaptive functioning in the self on the other, has been labeled a "paradox" (Baltes & Baltes, 1990b; Brandtstädter & Greve, 1994). Implicit in the paradox formulation is the assumption that the self exhibits resilience, or reserve capacity, in the face of age-related risks and primarily health-related losses.

In contrast to the domain of cognitive functioning, research in areas of the aging self has only started to link the mechanisms hypothesized to underlie resilience to self-related criteria of resilience. Rather, in many cases, chronological age is simply used as a proxy variable for all risks allegedly linked to old age, without precise specification of what particular risk factors might be. Relatively few studies have made a point of (a) identifying a group of old adults actually at risk for self-related dysfunction and comparing it with same-aged controls, and (b) examining some of the mechanisms hypothesized to underlie maintained well-being in the high-risk group (e.g., Staudinger, Freund, Linden, & Maas, in press).

Furthermore, evidence is emerging that maintenance or optimization of self-related functioning not only illustrates domain-specific resilience in areas of the self, but that certain processes and mechanisms of the self may also serve as resources for resilience and growth in *other* domains of psychological functioning. One hypothesis is, not unlike findings on the role of self-efficacy and agency (Bandura, 1986), that effective functioning in some self-related domains increases the likelihood that individuals will maintain and optimize their functioning in other domains, such as intelligence, memory, or health. In this sense, adaptive processes of the self can take on the character of "general purpose" mechanisms (cf. Karmiloff-Smith, 1992).

Self-Regulatory Processes and "Natural" Resilience in the Aging Self

In our selection of theoretical and empirical work (see also Baltes 1991, 1993; Brandtstädter et al., 1993; Carstensen & Freund, 1994; Hobfoll, 1989; Magai & Hunziker, 1993; Markus & Herzog, 1991; Rosenberg, 1979; Ryff, 1991; Whitbourne, 1987), we first consider research which provides evidence for the "natural" resilience of the aging self. It comprises studies from three areas: (a) recent social-cognitive research on the transactional-adaptive capacities of the self, (b) research on life-span development of personality, and (c) research on emotional management,

and coping. Finally, we return to the questions of whether, and to what degree, self-related functioning can be seen as a general resource for resilience and developmental reserve capacity, and whether there is resilience in the face of pathology.

Multiple and Possible Selves

Most current conceptions describe the self as a multifaceted dynamic structure comprised of a relatively stable array of self-conceptions (e.g., Greenwald & Pratkanis, 1984; Markus & Wurf, 1987). Different situations or contexts, however, activate different subsets of this composite structure. Markus and Wurf (1987) have called this the working self-concept. This view of the self as both stable and dynamic fits life-span conceptions that emphasize the potential for continuity as well as change as a characteristic feature of transactional adaptation during development. Furthermore, evidence is accruing that a multifocal and diversified structure of priorities and self-conceptions, or identity projects, makes transactive adaptation to developmental changes easier (e.g., Linville, 1987; Thoits, 1983). Older adults who define their "selves" through multiple identities which are richly construed, positively evaluated and anchored in the present, are more successful (as measured by subjective well-being) in their mastery of negative developmental changes associated with their health condition (Freund, 1993). Similarly, a variety of sociologically oriented studies suggest that a greater number of identities (e.g., family and work) is related to better mental health (Coleman & Antonucci, 1982; Kessler & McRae, 1982).

Along these lines, research by Markus and others (e.g., Cross & Markus, 1991; Markus & Nurius, 1986) for example, has demonstrated that in negotiating the changes and transitions of adulthood, "possible selves" (i.e., those identities which are either feared or hoped for presently, in the past, or in the future) are used as resources to motivate and defend the individual. For instance, an individual currently dissatisfied in the workplace might use the hoped-for possibility of a future promotion as a facilitator for subjective well-being or self-esteem and as a motivator for continued engagement. Such findings point to the possibility that having access to a larger set of well-developed possible selves may be a protective factor as we confront and manage growing old. In one study on possible selves and perceived health, the majority of older adults had possible selves in the domain of health and also the most important possible self was in the realm of health. In addition, self-regulatory processes (e.g., perceived efficacy, outcome expectancy) explained over half of the variance in self-perceived health when it was also listed as most important hoped-for self component (Hooker, 1992). In other words, older adults felt subjectively healthier if at the same time they reported hopes for their health and believed that they had some control over their health. When it came to dreaded possible selves in the health domain, such as increasing morbidity and physical suffering, self-regulatory processes had almost no predictive power with regard to perceived health. That is, "health pessimism" seems to be unimportant when it comes to subjective health in the present.

Selection of Goals and Life Priorities

Possible selves act as motivational sources, and are linked to goals that are either strived for or avoided. Indeed, the content

and priorities of life goals and self-defining components seem to change with age. In one study of 70- to 100-year-olds, for instance, health, well-being of family members, cognitive fitness, and thinking about life had highest priority with regard to goal investment for older adults (Staudinger et al., 1994b). Similar to earlier findings on cognitive pragmatics of the mind (e.g., expertise research), these results also point to selection into individual life contexts and the importance of internal and external contexts in defining salient features of the self in old age (see also Brandtstädter & Rothermund, 1994; Carstensen, 1993). In a study on the effects of community relocation on mental health in old age, Ryff and Essex (1992) found that the psychological centrality of certain life domains (e.g., family, economics) moderated the resilience-increasing effect of certain interpretative mechanisms of the self.

Age-related changes in goal structures were also found on a meta-level of aggregation. Using a sentence completion technique, Dittmann-Kohli (1991) demonstrated that older adults find meaning in life predominantly by searching for "contentment," whereas younger adults more often reported that they searched for happiness. Furthermore, Ryff (1989) found that younger people are more likely to assess their subjective well-being in terms of accomplishments and careers, whereas older people are more likely to associate well-being with good health and the ability to accept change. It seems to be highly protective to renounce or relegate to the periphery of importance those roles and commitments that are no longer serviceable, and to invest in others more "in tune" with current conditions of living (e.g., Brim, 1992; Dittmann-Kohli, 1991; Lazarus & DeLongis, 1983). Again, the general line of argument is that selection and resetting of priorities are facilitated if there is a rich variety of self-defining concepts to select from and to rearrange.

Adjustment of Aspirational Levels through Social Comparisons

In addition to the change in content and ranking of self-concepts and goals, there is evidence for other self-regulatory processes protecting the aging self. Research on the self also suggests that aging individuals modify their aspirational levels within given domains of functioning in order to adapt to decreases in, for instance, their behavioral competence or negative changes in their health condition.

Adjustment of aspirational levels can occur through a variety of mechanisms. Quite often, it is related to processes of social comparison. New reference groups are selected in order to permit a reorganization of personal standards of evaluation. This might be done, for example, by comparing oneself to specific subgroups, such as age, gender, and ethnic-cultural groups, rather than the population at large. Downward comparisons, in which individuals compare themselves to people who are worse off in a relevant domain of functioning, may become more and more important with age (Heckhausen & Krueger, 1993; Taylor & Lobel, 1989; Wood, 1989). Costa and McCrae (1980), for example, found that health expectations decline with age regardless of the individual's own health status. In a study of the effect of community relocation on subjective well-being, it was demonstrated that endorsement of social comparisons predicted various aspects of well-being (e.g., personal growth, self-acceptance; Ryff & Essex,

1992). Downward social comparisons also play an important role in the evaluation of goal investment: It seems that we select reference groups which make the age-related difference in goal investment disappear or at least appear to be much smaller. Indeed, in one study, chronological age was substituted by cognitive and physical status of participants. When old subjects (70 to 105 years) were divided into two groups according to "high" and "low" level of functioning in terms of cognitive-physical status, no group difference in current goal investment ratings was obtained. A significant group difference emerged only when both groups were asked to use their past status as a comparison referent; lower functioning subjects then indicated greater perceived declines in goal investment (Staudinger et al., 1994b).

In general, then, the contention is that selection of appropriate comparison groups is an important protective mechanism that empowers the aging individual to manage the gains and losses of old age. Better functioning groups are selected for comparison if the goal is to maintain and to improve, while more poorly functioning group referents tend to be selected if the goal is to deal with losses. Note that despite the discussion of these comparison strategies as though they were operating at a conscious level, little is known about the level of consciousness at which such mechanisms operate. Later we shall suggest that the most critical question regarding the adaptiveness of such mechanisms concerns the use of the "right" (functional) comparison at the "right" time.

Lifetime (Temporal) Comparisons

Besides social comparisons, comparisons across one's own lifetime constitute an important resource of the self. Suls and Mullen (1982) have suggested that temporal comparisons, especially retrospective temporal comparisons, provide an additional strategy for effective self-management and self-evaluation in old age. Indeed, they have argued that with increasing age, social comparisons become less frequent and lifetime (temporal) comparisons increase in frequency. The evidence to support this hypothesis, however, is still scarce. Again, one must realize that it is not the temporal comparison per se that is protective; rather, depending on the characteristic or the domain selected, lifetime comparisons can result in either the realization of, or loss in, self enhancement.

In earlier age-comparative research on beliefs about development across the life span, it was demonstrated that such beliefs differ when people are asked to generate expectations about themselves versus about a generalized other versus about the personal ideal, and retrospectively versus prospectively (Ahammer & Baltes, 1972; Harris, 1975; Ryff & Baltes, 1976). More recently, this approach of systematic instructional variation (e.g., age referent, social referent) has been explored with regard to the question of age-related change versus stability of subjective well-being. In this vein, it seems that for many older adults shifting the temporal point of reference may be an effective strategy in maintaining high subjective well-being across the life span. Ryff (1991) has found when different age groups are asked to report on their current functioning in different facets of personality (such as autonomy, social relations, personal growth, etc.), they do not differ. Age differences become apparent, however, when instructional variations in temporal referent are introduced. Younger adults have a more positive evaluation of their future and a less positive

evaluation of their past than older adults. Conversely, it seems that older adults, perhaps due to fewer opportunities to achieve in the present and a richer set of positive experiences in the past, increasingly refer to successes of the past. Indeed, reference to earlier achievements may fortify current levels of optimism and energy for dealing with present challenges. Selectively attending to positive aspects of the self at different points in the lifetime can serve to support a positive sense of self at the present. The endorsement of selective lifetime comparisons makes it plausible that in concurrent (present-day) self evaluations only few age differences emerge (see also Fleeson & Baltes, 1994).

Life Review

With respect to self-enhancing and self-maintaining lifetime comparisons, another self-related process often discussed as taking on special meaning in old age is that of life review (e.g., Butler, 1963). Research on the aging self has identified life review as a potentially relevant activity involved in the construction, maintenance, and transformation of the self (Bretytspraak, 1984). In this respect, life review is seen as a highly complex process of self regulation encompassing the reconstruction, explanation, and evaluation of the past. It is not to be confused (as often done in the literature) with reminiscence as remembering past episodes or the wandering of the mind back in time (Staudinger, 1989). In our view, effective use of life review can be considered as another protective mechanism or resource of the self.

Various developmental theorists (e.g., Bühler & Massarik, 1968; Erikson et al., 1986) have conceptualized an individual's life review as a rich resource for the restoration of psychological balance in the face of life transitions and in old age, especially in the face of death. Molinari and Reichlin (1984/85) present a model of life review as "psychological action," proposing that life review is a deliberately initiated action to consolidate and redefine the self-concept in the face of experiences of aging which are incompatible with a person's self-concept. When experiences of aging have a negative impact on a person's current sense of self, reviewing past experiences can redefine one's current sense of self in light of past achievements. Other researchers have also suggested that thinking and/or talking about past events and trying to make sense out of them operate as protective mechanisms to help an older person cope with the losses of aging (e.g., Lewis, 1971; Staudinger, 1989).

Regarding the protective function of life review, Coleman (1974) found that among older adults dissatisfied with their past, "noticeable" life reviewers exhibited higher life satisfaction and less depression than "slight" life reviewers. In a similar vein, a study by Wong and Watt (1991) demonstrated that successful aging was related to integrative reminiscence (life review). Studies on autobiographical memory in depressed and nondepressed elderly (e.g., Yang & Rehm, 1993) are also consistent with the so-called self-enhancement view of life review. Nondepressed subjects recalled more positive events and they also evaluated them as happier now as compared to when the event had happened in the past.

Furthermore, life review has been suggested and employed as a therapeutic means of optimizing and enhancing adaptation in late life (e.g., Birren & Deutchman, 1991; Sherman, 1991). The underlying rationale is, not unlike psychoanalysis, that life review

therapy can be used to facilitate the individual's reconciliation with his or her past life, and thereby support the identification of meaning in life. Although life review groups are an increasingly common phenomenon, empirical evidence in terms of evaluation research on life review groups or guided autobiography groups unfortunately is still scarce or methodologically problematic (Sherman, 1991; Staudinger, 1989).

Personality, Emotional Management and Coping as "Naturally" Protective Factors of the Aging Self

The Aging Personality

Another avenue for exploring self-related resilience and reserves is the study of personality structure and individual differences. What is the adaptive potential of various personality traits in old age?

The current body of research suggests that, in addition to self-management and coping processes, personality traits might also serve a mediating function between age and indicators of self-related resilience such as subjective well-being (Costa et al., 1987; Staudinger, Freund, Linden, & Maas, in press). Individuals with certain patterns of personality characteristics are likely to master challenging events better than others. Neuroticism and extraversion have been shown, for example, to evince significant predictive relations to subjective well-being as measured by the Bradburn Affect Balance Scale. Over a period of 10 years, neuroticism was found to predict the degree of negative affect and extraversion the level of positive affect (Costa, McCrae, & Norris, 1981). Using other measures of personality, it has often been reported that a high standing on dimensions such as ego strength, cognitive investment, and competence (e.g., Block, 1981; Haan, 1981; Helson & Wink, 1987) are positively related to various measures of well-being and adaptation, both cross-sectionally and longitudinally.

Furthermore, there is an indication that individuals with a greater degree of openness to experience (Costa & McCrae, 1985) are better able to adapt to changes. An aging individual who is experientially open, as captured by characteristics such as being emotionally responsive, seeking variety, being intellectually curious, and broad-minded, may be more aware of bodily changes, and may also be able to devise innovative strategies to adapt to them. Empirical evidence with regard to the adaptivity of openness to experience is still scarce (Whitbourne, 1987). From early research on the personality correlates of wisdom, however, there is a suggestion that individuals who are more open to new experiences and who hold a middle position on the introversion-extraversion dimension also evince higher levels of wisdom-related performance (Baltes & Staudinger, 1993). In the same vein, research from the Seattle Longitudinal Study (Schaie, Dutta, & Willis, 1991) has suggested that maintained "behavioral flexibility" may be an important covariate of late-life adaptation: The progression of intellectual ability from middle to old age was substantially related to a flexible personality style over time. Taken together, these findings imply that in addition to a lack of neuroticism, an intermediate degree of extraversion and a high degree of openness to experience seems to be a protective factor when it comes to managing the self-related challenges of old age.

Similarly, and not unlike the work on the role of self-efficacy (e.g. Bandura, 1986) and optimism (e.g., Seligman, 1990) in earlier phases of life, optimism or future time perspective has been demonstrated to possess protective power in old age (e.g., Reker & Wong, 1988). Taylor and Brown (1988; see also Taylor, 1989) suggested that unrealistic optimism ("positive illusions") about the future may be generally adaptive, in that it promotes feelings of self worth, the ability to care for others, persistence and creativity in the pursuit of goals and the ability to deal with stress. In a more recent study, Taylor and others (Taylor et al., 1992) could provide some evidence for the conclusion that optimism is psychologically functional without necessarily compromising health behavior. Most recently the position that inaccurately positive self-knowledge is related to well-being has received increasing theoretical and empirical criticism (Colvin & Block, 1994; Taylor & Brown, 1994). Longitudinal studies, for instance, have suggested that optimism often has a positive impact initially, but that when persistently negative objective circumstances prevail, the cumulative impact of unrealistic optimism turns into being negative. Evidence is also increasing that under certain circumstances realistic pessimism can have highly adaptive outcomes (e.g., Frese, 1993).

Besides the trait model of personality, which describes individual differences in temporally rather stable personality characteristics, one must also consider what have been called the developmental stage models of personality. One of the central historical figures of this school is probably Erikson (1959, 1963; see also Levinson, 1980), with his theory of eight ego-developmental stages. Erikson's theory, for instance, predicts that in the second half of life, individuals in the post-reproductive phase of life either develop generativity or fall into stagnation (Erikson et al., 1986). In dealing with the final developmental task, old adults may achieve ego maturity by integrating their past lives and finding new meaning in them or they may fall into despair.

By and large, the empirical evidence to support these theoretical contentions is still scarce, not only generally but also regarding the analysis of temporally ordered causal sequences. With respect to generativity, there is research suggesting that older adults redirect their ambition toward offspring rather than toward their own achievements (Ochse & Plug, 1986). Considering ego integrity, Ryff (1991) has reported that older adults displayed higher levels of current self-acceptance than they reported in ratings of their own past. Current self-acceptance of older adults was also higher than that reported by younger adults.

Related to this notion that knowledge about one's self becomes better integrated with increasing age is a finding that older adults are more likely than younger adults to behave in accordance with their own feelings and attitudes rather than in response to social expectations (Reifman, Klein, & Murphy, 1989). In addition, relative to younger adults, elders seem more able to integrate self-knowledge, building more realistic self-conceptions. With increasing age, ideal selves are adjusted, so that they approach present selves (Cross & Markus, 1991; Ryff, 1991). Given reduced time left for accomplishments, and the reduced "degrees of freedom" available to make life choices with advancing age, this increased realism seems to be a valuable protective mechanism of the aging self. As mentioned above,

Dittmann-Kohli (1991) characterized this age trend as one from a search for "happiness" to one for "contentment." However, it may be crucial to find the optimal discrepancy between the real and the ideal in order to stay motivated without becoming frustrated by failure (e.g., Thomae, 1970). The "optimal" discrepancy seems to be related to a higher level of life satisfaction (Cross & Markus, 1991).

The idea of ego maturity and its putative benefits for functioning and subsequent development have also been discussed in other approaches to the study of personality development such as Loevinger's model of ego development (Loevinger, 1976), Vaillant's model of adult adjustment (e.g., Vaillant, 1977, 1990), Haan's development of ego structures (Haan, 1977), or concepts of maturity as derived from scales of the California Personality Inventory (CPI; e.g., Helson & Wink, 1987). Ego level as measured according to Loevinger's Sentence Completion Test is reported to display a positive relation with reality-oriented and flexible coping (e.g., Picano, 1989) as well as with tolerance, sensitivity, and responsibility (e.g., White, 1985). With regard to its relation to higher levels of adjustment, the empirical evidence is equivocal (e.g., McCrae & Costa, 1983). In a longitudinal study, comparing two conceptions of maturity, Helson and Wink (1987) found that different measures of maturity predicted different aspects of adjustment (e.g., self-related, other-related).

In his model of adult adjustment, Vaillant (e.g., 1977, 1990) extended psychoanalytical conceptions of defense mechanisms into a developmental framework of more or less mature or adaptive defense mechanisms. Vaillant (e.g., 1983) argued that mature defenses may provide an explanation for some of the so-called invulnerabilities among the disadvantaged, or in the terminology of this chapter, they may carry protective and development-enhancing power. More recently, he provided evidence from long-term longitudinal data for this protective and development-enhancing power of mature defenses in middle and later adulthood (Vaillant, 1990).

Emotional Management: A Protective Facet of the Resilient Self in Old Age

In addition to thinking about ego maturity as a personality characteristic, one can also think about it as adults' ability to manage their emotions. Thus, what Erikson has called ego integrity, and what other developmental theorists have referred to as maturity (e.g., Loevinger, 1976; Vaillant, 1977), can also be conceptualized as a process of gaining perspective and competence in mastering one's own emotional life. In this vein, several studies suggest that older adults seem to be better able to manage their emotions and deal with emotional issues (e.g., Blanchard-Fields, 1986; Cornelius & Caspi, 1987; Staudinger, 1989). Labouvie-Vief and her colleagues (Labouvie-Vief, Hakim-Larson, DeVoe, & Schoeberlein, 1989), for example, have developed a four-level assessment scheme for the understanding and control of emotional states, such as anger, sadness, fear, and happiness during adulthood. They reported that older subjects demonstrated developmentally higher levels of emotional understanding and control than young adults. Being able to manage one's emotions seems to be an especially important protective factor in the context of all the losses (e.g., friends, spouse, social status, physical strength)

an aging individual might have to confront. Weiner and Graham (1989), for example, reported that feelings of pity and helping increased and anger decreased in frequency across the life span. This finding is also congruent with notions of greater generativity at advanced ages. In a similar vein, Levenson, Carstensen, and Gottmann (1993) demonstrated that when comparing old and young married couples who describe themselves as *unhappily* married on measures of life satisfaction, older couples report relatively higher levels of life satisfaction.

The processes underlying such changes in emotional management are not yet identified, neither is it clear how far the effectiveness of emotional management extends into the very late phases of life, that is very old age. Recent evidence from the Berlin Aging Study suggests that even into very old age (70 to 105 yrs.), no significant age differences in the frequency of negative emotions are found. However, negative age differences in the frequency of positive emotions are obtained (Staudinger et al., in press). From research on emotional intensity and expressivity, we do know that the greater ability of older adults to manage their emotions is not just due to an age-related decrease in expressivity and intensity of emotions (Levenson, Carstensen, Friesen, & Ekman, 1991; Malatesta, 1990). The appraisal-model of emotion (e.g., Lazarus, 1993) would suggest that increased capability in emotional management reflects an increase in knowledge about life and oneself (e.g., Baltes & Staudinger, 1993; Edelstein & Noam, 1982; Staudinger, 1989), and/or age-related changes in values, and commitments (Dittmann-Kohli, 1991; Lazarus & DeLongis, 1983). Such development- and resilience-enhancing knowledge and skills involving emotions and emotional regulation can be seen as another instantiation of the knowledge-based mental pragmatics which were identified earlier as having protective and enhancing power with regard to intellectual functioning in old age. In this instance, as well, these seem to serve a protective function for older adults.

Self-Related Resilience through Coping

Another concept which has attracted attention as an integrated and "general purpose" mechanism of adjustment and mastery across the life span is coping. The capacity to cope successfully is another potential protective factor in old age.

In the seventies, Pfeiffer (1977) speculated that with increasing age, *regressive* coping tendencies increase. In the same year, however, Vaillant (1977) reported an age-related increase in *mature* coping mechanisms. In a similar vein, Folkman, Lazarus, Pimley, and Novacek (1987), for example, found that older respondents were less likely to seek social support or use confrontive coping and more likely to use distancing and positive reappraisal. In fact, more and more of the recent evidence supports this "growth" view of coping in adulthood and old age (e.g., Aldwin, 1991; Irion & Blanchard-Fields, 1987; Labouvie-Vief, Hakim-Larson, & Hobart, 1987; McCrae, 1989) or at least speaks for stability in coping behavior.

With respect to the developmental stability of coping behavior during adult life it has been observed, for instance, that individual differences in the endorsement of coping mechanisms are more a function of the type of stressful event than of age

(McCrae, 1989). This finding is extended by evidence from the Berlin Aging Study. In that study, based on data from a representative sample of 70- to 103-year-olds, it is suggested that those old individuals who reported employing a large number of different coping strategies also demonstrated the highest level of well-being (Staudinger et al., 1994a). Similar findings are reported in research on depression in old age. Rather than any particular form of coping, it seems that self-related resilience as indicated by measures of mental health is related to the availability of a large number of different forms of coping (Forster & Gallagher, 1986). We have argued above that the multiplicity of self definitions has protective value and we will see further below that, similarly, social relations with multiple functions are a richer resource than other types of relationships. This evidence suggests that access to a wide repertoire in functioning (e.g., coping, self definitions, multiplexity of a relationship) may be a key resource as it facilitates the person-situation fit.

Furthermore, older adults seem to be more flexible in adapting their coping response to the characteristics of the situation (e.g., controllability) than younger adults (e.g., Aldwin, 1991). Such evidence is congruent with findings that, in comparison to younger adults, older individuals have been found to demonstrate an accommodative coping style in the face of adversity or failure; that is, older adults were more flexible and better able to adjust their strivings to changed circumstances than young adults (Brandstädter & Renner, 1990). Conversely, younger adults were more likely to adhere to their once established goals (i.e., assimilative coping), even if they were no longer realizable. With age, Brandstädter and Renner (1990) have demonstrated that adults favor accommodative (goal flexible) over assimilative (goal persistent) coping. In a similar vein, Heckhausen and Schulz (1993; in press) have more recently proposed an age-related shift from primary to secondary control strategies in order to master the tasks of aging.

In our view, such evidence on age-related stability and positive transformations in coping efficiency is significant for two reasons. First, if late adulthood and old age are characterized by an increasing number of varied stressful events, then the findings on coping efficiency seem to suggest the presence of another component of self-related reserve capacity. Second, in contrast to stereotypical conceptions of the elderly as rigid, the evidence suggests that, based on processes of self-representation, self-regulation, and self-enhancement, older adults possess a substantial capacity for adjustment and flexible mastery of demands.

Regaining Self-Related Resilience after Breakdown: Intervention in Depression

In the following section, we attempt to summarize the evidence available on the regaining of adjustment after "breakdown" in one area of self-related functioning, that is depressivity and depression. While clinical depression is not more but rather less frequent in old age when compared to younger ages, depressive affect and symptoms show an age-related increase after middle adulthood (Anthony & Aboraya, 1992; Gatz & Hurwicz, 1990; Häfner, 1994; Kessler, Foster, Webster, & House, 1992). In addition, our

everyday expectations may suggest that older adults may have increasing difficulty in recovery.

To discuss depression under the heading of the self, however, is to a certain degree arbitrary in the same way as to discuss Senile Dementia of the Alzheimer Type (SDAT) under the heading of cognition. These categorizations are related to a relative priority of self-related and cognitive symptoms, respectively, but both disorders encompass a very complex and variegated system of manifestations involving biomedical, cognitive, and personality-related aspects. The differential diagnosis of depression versus SDAT, for example, is a major technical problem, especially at lower levels of severity or at earlier stages in the progression of the illness. Indeed, it seems to be one of the important characteristics of geriatric pathology that the multidimensional specificity of psychological functioning decreases and eventually is lost altogether (e.g., Helmchen & Linden, 1993).

It is exactly this complexity of symptoms grouped under the heading of depression which results in little consensus in the psychiatric literature regarding issues of prevalence and incidence of depression (e.g., Carstensen & Edelstein, 1987; Cohen, 1989; Häfner, 1994; Helmchen & Linden, 1993). Many symptoms associated with depressive illness in later life (e.g., change in sleep patterns, change in sexual interest, dread of death) are overlooked, and may be dismissed as inevitable manifestations of the aging process. As mentioned before, diagnosis is further complicated by the multimorbidity of many older patients (see Gaylord & Zung, 1987; Kinzie, Lewinsohn, Maricle, & Teri, 1986). In addition, the situation is exacerbated by the fact that epidemiological studies differ dramatically with respect to diagnostic and classification criteria.

Owing to differences in methodology and definition, however, estimates of the prevalence of depression in old age (over 64 years) vary widely, from less than 5%, to almost 44% (Blazer & Williams, 1980). Given the cross-sectional nature of most of this epidemiological research, Lewinsohn, Rohde, Seeley, and Fischer (1991, 1993) have argued that one complication may be a difference in the lifetime occurrence of depression across different birth cohorts. More recent birth cohorts seem to report a higher prevalence of depression, perhaps due to variables including the changing social desirability of acknowledging depressive symptoms. Nonetheless, there seems to be a growing consensus that the prevalence of *major depressive disorder* does not show an age-related increase (Cohen, 1989; Gatz & Hurwicz, 1990; Häfner, 1994). Rather, any age-related increase in depressive symptomatology, if it occurs, may be attributable more to *reactive depressions* (depressivity) arising in association with increasing somatic illnesses, medication effects, or critical life events, rather than specific psychiatric disorders such as depression (e.g., Teri, Baer, & Reifler, 1991).

This lack of an increase in depression in old age highlights the relative age-related robustness and reserve capacity of the self-system from a different perspective. Perhaps most importantly, this fact counteracts the frequently held view that therapeutic interventions are less promising in old age than at earlier age periods. To illustrate, we briefly consider some research concerning the effectiveness of treatment of depression in old age.

Aside from drug therapies, three psychotherapeutic approaches are particularly common for the treatment of depression in later life: psychoanalytic, behavioral, and cognitive-behavioral therapy (Smyer et al., 1990). These therapies seem especially useful in the case of depressivity, or depressive reactions, rather than depression as a nosological category. In each case, treatment results seem to be generally supportive of the notion that there is much self-related resilience in aging individuals, even after the onset of depressive symptomatology. Studies including psychodynamic therapies, usually with adults in their sixties and seventies, have generally reported effectiveness rates which are comparable to those of behavioral and cognitive approaches (e.g., Marmar, Gaston, Gallagher, & Thompson, 1989; Thompson, Gallagher, & Breckenridge, 1987; Thompson, Gallagher, & Czirr, 1988). The gerontological research literature on adult mental health, however, focuses most heavily on behavioral and cognitive approaches to the treatment of depression. We will consider these in greater detail.

Behavioral Approaches

In examining the etiology of depressive symptomatology, behavioral approaches pay particular attention to the negative aspects of the life environments of clients (Carstensen & Edelstein, 1987; Zeiss & Lewinsohn, 1986). In the case of older adults, many normative environmental events have been shown to be potential risk factors for depressive symptomatology, including social role loss and the resultant potential loss of pleasant life events (e.g., Zeiss & Lewinsohn, 1986), coping with chronic illnesses of aging and its resultant pain (e.g., Parmalee, Katz, & Lawton, 1991; Williamson & Schulz, 1992), coping with the illness and caregiving responsibility for a loved one (Pruchno, Kleban, Michaels, & Dempsey, 1990), widowhood and bereavement (e.g., Gilewski, Farberow, Gallagher, & Thompson, 1991) as well as iatrogenic consequences of formal care institutions (e.g., Johnson, 1987; Parmalee, Katz, & Lawton, 1992; Smyer, Cohn, & Brannon, 1988). It is important to note that the age range covered in such studies ranges from the late fifties to the nineties.

Late-life depressivity is also predicted by or correlated with learned helplessness (e.g., Seligman & Elder, 1986). Individuals, aged 65 to 96 years, with higher levels of depression were more likely to attribute failure to a lack of ability, and success to luck; the reverse pattern was found in nondepressed older adults (Maiden, 1987). Not surprisingly, the literature on the provision of more positive life environments (e.g., increasing the number of personally salient pleasant events) to older adults has documented substantial success, even with highly depressed subjects (Goddard & Carstensen, 1986; Teri & Gallagher-Thompson, 1991). Part of the success of this therapeutic strategy may result from the provision of increased control opportunities to older adults (e.g., Baltes & Baltes, 1986; Bandura, 1986; Lachman, 1993; Langer & Rodin, 1976; Rodin, 1986), as they are encouraged to choose events and situations that are pleasing to them (Goddard & Carstensen, 1986). It seems that the transaction between certain external (i.e., environmental features) and internal (i.e., self efficacy) resources contribute to a regaining of resilience.

Cognitive-Behavioral Approaches

Cognitive-behavioral therapy has evolved in varied forms and as the result of joining principles of behavior modification with principles of cognitive psychology and social-learning conceptions of personality. In its traditional form, one major feature of cognitive therapy is to challenge individuals' negative cognitions. The goal is to reduce distortions in thinking about the self and one's relationship to others, and to model more adaptive ways of viewing situations and the world (Beck, 1979). The effectiveness of such therapy presumes, at the least, that individuals have a minimum level of cognitive competency (Krantz & Gallagher-Thompson, 1990). Consequently, pure cognitive therapies are not appropriate for individuals with moderate or severe dementia; in this case, the use of behavioral therapies may be much more effective (Teri & Gallagher-Thompson, 1991). For those older individuals whose level of cognitive functioning is normal, however, numerous studies suggest that cognitive approaches can be highly effective in remediating depression and maintaining treatment gains (e.g., Florsheim, Leavesley, Hanley-Peterson, Gallagher-Thompson, 1991; Gallagher-Thompson, Hanley-Peterson, & Thompson, 1990; Rodman, Gantz, Schneider, Gallagher & Thompson, 1991). However, cognitive status is frequently confounded with age in many intervention studies, since subjects are typically in the young-old (60 to 75 years) range.

Cognitive-behavioral therapy represents a mix of behavioral and cognitive approaches (Meichenbaum, 1974). As outlined for the field of aging by Thompson, Gallagher-Thompson, and their colleagues, it involves producing both changes in clients' environment, and challenging particular cognitions. In the case of chronically ill elderly, for example, the behavioral component involves reinforcing both participation in therapy and in regular self-maintenance activities. Individuals are encouraged to remain as active as possible. Simultaneously, the cognitive component challenges such beliefs as the irreversibility of depression, or the perception of being a "burden." Case reviews suggest that such treatments can be highly effective (e.g., Rybarczyk, Gallagher-Thompson, Rodman, Zeiss, & Thompson, 1992).

In summary, outcome studies regarding the treatment of depressivity have found that structured short-term psychotherapy of almost any kind can evince impressive results with older people (Marmar et al., 1989; Thompson et al., 1987). In those few cases where depression seems to be resistant to treatment, the origins of depressive symptoms are likely located primarily in biological conditions (Goff & Jenicke, 1986). These positive findings stand in contrast both to the historically negative statements in the mental health professions regarding the prognosis of late-life depression, and to the negative aging stereotype which has assumed relatively little mental health-related plasticity in aging individuals (Butler, 1989). In fact, one of the major challenges to the effectiveness of therapeutic interventions with older adults seems to be the latent or manifest unwillingness of mental health professionals to engage in such treatment. Indeed, surveys of mental health professionals frequently reveal high levels of ageism (Gatz & Pearson, 1988), and a general disinterest or resistance in treating older adults (Teri & Logsdon, 1992). Thus, one of the pressing

problems of therapeutic environments for older adults (e.g., nursing homes) is the relative absence of trained mental health practitioners in their settings (e.g., Smyer et al., 1988). More supportive and available therapeutic environments could constitute a critical variable in enhancing the resilient functioning of older adults with depressive symptomatology (e.g., Blazer, 1986; Lewinsohn & Tilson, 1987).

Social Relations (Transactions) and Resilience or Reserve Capacity in Later Adulthood

The final domain of psychological functioning in which we have selected to investigate resilience and reserve capacity in later adulthood is the area of social relationships, or, as we would prefer to call it, "social transactions." We prefer to use the term social transactions to emphasize the exchange or interactive aspect of this domain of psychological functioning (see also Sameroff, 1975). Since James, Mead or Vygotsky we know that any domain of psychological functioning involving cognition and the self is social-interactive in nature (e.g., Baltes & Staudinger, in press; Cole, in press). The domain of social relations is one where this social-interactive nature becomes most obvious. Nevertheless, psychological research in this area has only begun to transcend the classical person-centered research approach. Furthermore, the domain of social transactions provides an instance of how external and interpersonal resources may contribute to the resilience and reserve capacity of an individual. Returning to Figure 22.1, this capacity to profit from and turn to others as resources becomes increasingly important given the age-related increase in physical morbidity and frailty.

In the following section, we attempt to integrate several streams of research relevant to the topic of social transactions: (a) social network approach (e.g., Fischer, 1982); (b) social support and coping (e.g., House, Umberson, & Landis, 1988; Schwarzer & Leppin, 1992); and (c) personal relationships (e.g., Blumstein & Kollock, 1988). As the topic of social transaction lies "between" the individual and the social, various disciplines contribute to this field, including sociology, epidemiology, and psychology. Different disciplines use different emphases and different methodologies in their pursuits. It may be due to this diversity that the field of social relationships is, on the one hand, characterized by a high productivity in terms of empirical studies, and, on the other hand, still awaiting the formulation of unifying theoretical frameworks.

We have selected the family of life-span propositions introduced in the beginning of this chapter as an integrative framework to highlight the nature of developmental changes in social transactions during adulthood and old age (see Table 22.1). Throughout this section, we will illustrate how the propositions of multidimensionality, multidirectionality, the dynamics of gains and losses, potential and limits, and contextualism apply to the field of social transactions. Given the richness of the available empirical material, this review is necessarily selective. Our selection of research was guided by the goal of exploring social transactions as a potentially protective factor or as an instance of resilience in old age but also as a risk factor for normal functioning in later adulthood.

House and Kahn (1985) have introduced the notion of the multidimensionality of social support. We extend this argument, and assert that multiple dimensions of social transactions can be identified which also follow different life-span trajectories. The dimensions considered are: (a) the *function or content* (borrowing from the world of economics one could also talk about the "currency" of exchange) of the social transactions (e.g., social affiliation, emotional support, instrumental support, social control); (b) the *quantity* of social transactions taking place and of the associated "currency" of exchange; and (c) the *quality and structure* of the system of social transactions (e.g., types, density, durability, homogeneity, or reciprocity).

Usually, handbook chapters and review articles on social relations—especially on social relationships and aging—subsume all these aspects explicitly or implicitly under the umbrella of "social support." Social affiliation, for example, is either discussed as the quantitative aspect of social transactions; that is, the mere frequency of social contact, number of relationships or amount of time spent in social transactions, or it is categorized as one type of support. Recently, an increasing number of authors have come to acknowledge that with this exclusive focus on support, both the potential negative effects of relationships, as well as the other functions of relationships besides support, such as social affiliation and sense of personal control, are neglected in their contribution to the social world and the well-being of individuals, especially old people (e.g., Baltes & Silverberg, 1994; Morgan, 1990; Rook, 1990). Two broad themes have been identified as especially suited to illustrate the resilience-related qualities of social transactions in adulthood and old age: Social affiliation or companionship, and social support. By resilience-related we mean that (a) social relationships themselves contribute to a person's reserves, and (b) support provided by social relationships can be a resource in the face of stress.

Social Affiliation: An Interpersonal Resource in Adulthood and Old Age

According to the still prevailing negative aging stereotypes, social transactions and their quantity might be categorized as another risk factor for the achievement of resilience in old age (e.g., Palmore, 1988). As will be demonstrated, the lonely and socially isolated old person is one of the most well-known negative myths of aging.

Social Contact across the Life Span: More Stability Than Change

Two kinds of empirical evidence have actually demonstrated that the expectation that most older persons are lonely and socially isolated is a myth. First, multiple longitudinal studies have found that neither the number of network members, nor the frequency of contacts, show dramatic changes over the life span (for summary see e.g., Carstensen, 1992; Palmore, 1981; Schulz & Rau, 1985). Covering an age range from 20 to 95 years, adults on average report network sizes of 8 to 15 people (see Schulz & Rau, 1985; Smith & Baltes, 1993). A significant drop in frequency of social contacts already occurs between early and middle age

(Carstensen, 1992). This finding of stability is especially true with regard to kin relationships, and with regard to persons categorized as very close (Carstensen, 1992). Due to losses, for example, in peers and siblings, however, a reduction in the number of less close people is found, particularly after age 85 and 90 (Lang & Carstensen, 1994).

A third indicator of social contact, besides number of close network members, and frequency of social contact, is time spent with others. With regard to this third indicator, time spent with other people, Larson and colleagues (Larson, Cskiszentmihalyi, & Graef, 1982), for instance, reported, using a time-sampling and beeper methodology, that older people over age 65 spend 48% of their waking time alone as compared to 25% in adolescence and 30% below age 65. Time spent with friends stays about the same, that is 7%, across the age range studied. Only adolescents spend much more time with friends (i.e., 29%). In a more recent study of a heterogeneous city sample of German elders (mean age $M = 72$ years), using a diary methodology to assess daily activity patterns, it was found that people in that age group spent 59% of their time alone and 6% with friends (Baltes, Wahl, & Schmid-Fürstoss, 1990). This finding is supported by another study using a slightly modified diary methodology. In this study, participants of the Berlin Aging Study (age range: 70 to 103 years) reported a complete list of activities in which they had engaged on a typical day. A major finding of this study was that older people differed to a large degree as to how much time they spent with others. It ranged from as little as 10 minutes for a group characterized primarily by rest activities to 1.5 hours for the most active group (Baltes, Wilms, & Horgas, 1993). Physical status was one predictor of the amount of time spent with others. This study nicely illustrates the range of interindividual variability of social functioning in old age, and it shows that decreases in functioning and reserves in one domain (i.e., health) cut across to other domains and result in decreases in other domains as well (i.e., social transactions). In sum, it seems that number of close social network members and frequency of contact with close friends and family members stay about the same across the adult life span, whereas the time spent with others declines with age. Although some of the quantitative indicators of social contact evince age-related decline, it still would be incorrect to conclude that old people must feel lonely as a result.

The correlational pattern characterizing the relationship between quantity of social contact and subjective well-being is not consistent across studies. In general, it seems that there is a modest positive relationship between life satisfaction and frequency of social contact across the life span. This relationship seems to be especially strong for non-kin interactions (e.g., Larson, 1978). The modest size of the correlation and the inconsistency across studies suggests that there is no isomorphy between amount of social contact (e.g., frequency, time spent with others) and subjective well-being.

Social Contact, Isolation, and Loneliness

In this vein, a second type of evidence has helped to challenge the myth of pervasive loneliness in old age. A clarification in terminology resolves a large portion of the inconsistencies of findings regarding age, social contact, and subjective well-being.

Living alone is not the same as being socially isolated, and neither term is equivalent to loneliness. An important distinction introduced, therefore, is one between so-called social and emotional (or psychological) isolation (e.g., Townsend, 1957; Weiss, 1982) on the one hand and loneliness on the other. Social isolation speaks to the amount of time individuals are alone, while emotional isolation refers to the perceived lack of confidants or close personal relationships. The latter type of isolation seems to primarily contribute to the feeling of loneliness. Frequency, number and type of social contacts or social and emotional isolation are constructs that correspond to "objective" conditions, whereas loneliness refers to the subjective evaluation of these "objective" conditions (Baltes, Tesch-Römer, & Lang, 1994).

Across the life span, individuals may differ on how much contact they need in order to feel well and not lonely. In other words, independent of whether the age trajectories of contact frequency remain stable, increase or decrease, old people may or may not *feel* lonely. The empirical evidence, which is primarily from cross-sectional studies, shows that older adults do not feel more lonely than their younger counterparts (e.g., Mellor & Edelmann, 1988; Peplau, Bikson, Rook, & Goodchilds, 1982). If anything there seems to be a tendency with increasing age for adults to report more, rather than less, satisfaction with their social transactions (Antonucci, 1985). The empirical evidence changes, however, when we consider the age range above age 80. Fifty-three percent of adults above the age of 80 feel lonely (e.g., Kaufman & Adams, 1987; Smith & Baltes, 1993). Again, there is evidence suggesting that it may be useful to distinguish between loneliness with regard to kin and non-kin relationships. Schmitt and Kurdek (1985) reported, for instance, that older women felt especially lonely with regard to friendship and love relationships whereas younger women felt more lonely with regard to family relationships.

Companionship and Social Affiliation: Evaluative Dimensions of Social Contact

Although the correlations are not very high, there are many studies that report a positive relationship, or main effect, of frequency of social contact on psychological well-being. Thus, amount of social contact in itself seems to constitute an important resource for adaptive psychological functioning. These studies, however, seldom consider the possible mediating processes involved in this correlation. This is probably a consequence of the exclusive analytic focus on the "support function" of social transactions.

Companionship has been introduced as one theoretical construct which may help to understand such processes. Rook (1990), for example, defined the need for companionship as the intrinsic motivation to voluntarily share pleasure with others. Companionship defines an important part of the fabric of daily life. She argues that companionship is one way to temporarily escape daily hassles, or preoccupation with one's own faults and failures. Furthermore, companionship may be interpreted as the behavioral affirmation of the focal person's self esteem, since it comes about by a mutual agreement between people who want to share time with each other. The mutuality of companionship may reduce one of the major risks of social support relationships, which is the asymmetry between helper and helpee. Having to accept support

without being able to give something in return may undermine rather than affirm the helpee's self esteem.

We had reported above that the positive relation between frequency of social contact and subjective well-being is especially strong for social relations outside the family (Larson, 1978). The concept of companionship offers an explanation for this differential effect. When a particular activity is carried out with friends, it is likely to be characterized by greater spontaneity, less habitualization, less obligation, and perhaps also by more novelty as compared to sharing this activity with a family member. In selecting companions, we do have a choice which is not available in the case of kin relationship and in turn, this feature is mutual. We are selected by our companions, but usually not by our family.

Is Satisfaction with the Frequency of Social Contacts Always a Resource for Resilience and Enhancement?

Given this positive effect of social contact on well-being, it is interesting to note that although older people over age 65 spend about 50% of their waking time alone (as compared to 25% in adolescence and 30% below age 65; Larson, Cskiszentmihalyi, & Graef, 1982), they do not fill that time with companionship or social contact, neither do they seem to feel bad about it (e.g., Baltes et al., 1994). Multiple explanations are possible: Is it lack of opportunity to be with friends, or do individuals self-select to not spend more time with friends? Resolving this question poses empirical challenges, which illustrates the importance of a type of measurement in assessing social transactions and their role as risk, protective, and enhancing factors in old age.

One approach might be to ask people how satisfied they are with their social relationships. People who select not to spend more time with friends should be more satisfied than those people who would like to, but do not have the opportunity. Unfortunately, researchers typically find that such differences in the evaluative basis do not become visible in satisfaction ratings. Both potential groups of people (self selection, lack of opportunity) tend to give similar satisfaction ratings. We have seen in our discussion of the resilient self that the transformational processes at work within the self can be quite effective in adjusting to almost any living circumstances (e.g., well-being paradox). People come to accept and sometimes even appreciate what they cannot have.

In an attempt to disentangle the paradox, researchers (Campbell, Converse, & Rodgers, 1976; Rook & Thuras, 1988) have distinguished, for example, between satisfaction of contentment (self selected), satisfaction of resignation (lack of opportunity), and defensive denial (lack of opportunity). Any of those three states can underlie the same satisfaction rating. Refinement in measurement is necessary to empirically distinguish these varied forms of satisfaction. The separation of these different types clearly has also implications with respect to resilience in later adulthood. Satisfaction based on defensive denial or satisfaction based on resignation may be less of a resource than satisfaction based on self selection and contentment. Depending on which operationalization of resilience (e.g., presence of well-being or lack of depression) and which evaluative dimension of social relationships (importance, frequency, satisfaction, etc.) are used,

these differences can remain obscure or become visible (Rook & Thuras, 1988).

Social Affiliation: Life-Span Changes in Motivation

Another important piece in the explanatory puzzle of the social time pattern of older people and its contribution to their well-being (e.g., Baltes et al., 1990; Larson et al., 1982) is provided by socioemotional selectivity theory (e.g., Carstensen, 1993). In socioemotional selectivity theory, Carstensen argues that older people, as an example of persons approaching social endings, become very selective about which contacts to engage in and which ones to avoid or to give up. Carstensen claims that in later adulthood emotional and affective benefits, and not information seeking, are the driving forces for contacts. Fredrickson and Carstensen (1990) found, for instance, that older people, in contrast to younger adults, reported preferring familiar over novel social partners. Older people—in contrast to younger adults—also reported that they preferred social relationships which are related to anticipated affect rather than information seeking or future contact. When asked why, older people quite explicitly said that they had no time to waste and had to be careful about their choices.

Applied to the notion of companionship, Carstensen's approach and findings imply that, in old age, only highly selected companions will fulfill affiliation needs. If old friends have died, the likelihood that they will be replaced by new ones should be rather low. New friends do not share a long history of common experiences and therefore do not provide the degree of emotional closeness that is desired. Therefore, turning to companionship as a resource in old age is characterized by conditions that are based on the age-specific nature of social goals.

The Dynamic between Affiliation and Solitude as a Potential Resource

Self-selection of reduced social participation in late life may be motivated not only by the goal of optimizing emotional closeness, but also by the need to balance contrasting goals. Considering the developmental tasks of old age (Havighurst, 1948), it would be defensible to argue that the need for affiliation or companionship is paralleled by an age-related increase in the need for solitude or privacy (e.g., Rook, 1990). In discussing social transactions as potential resource for resilience, and possibly growth, one should not forget the potential resources related to the *dialectic* between social contact and solitude (Lowenthal & Robinson, 1976). In this respect, one should distinguish between two dimensions; that is, affiliation and solitude, rather than considering only the amount of social contact. There is, for example, an indication that in very old age (above age 85), the investment (in terms of mental time and effort) in relations with friends and with family decreases and investment in dealing with one's death and dying and one's past life increases (Staudinger, Freund, & Smith, 1993b). Congruent with theories of personality development and developmental tasks (e.g., Erikson et al., 1986; Jung, 1971), solitude and interiority seem to gain importance in very old age. Thus, it becomes plausible from still another vantage point that being alone in old age is not synonymous with feeling lonely (see also Baltes et al., 1994).

Whether solitude can be considered a protective or a risk factor emphasizes, again, the importance of considering a person's developmental context. Across the life span, we find telling examples. Take, for instance, the breastfeeding mother of a newborn who wishes to have at least half an hour to herself. In contrast, a single young person may invest a lot of effort into escaping her solitude. Another example might be the overburdened adult at midlife, whose time is completely taken up by professional, family, and sometimes societal obligations so that no time is left for privacy. When it comes to old age, it seems that for older married adults, solitude can be energizing, while for unmarried elders living alone, it can be depleting (Larson, Zuzanek, & Mannell, 1985). This is not meant to imply that it is marriage which "does the trick" but rather that marriage, in this case, stands for the potential availability of social contact. On the one hand, solitude has the potential to be a resource if it is self-selected, and if the individual perceives an opportunity to counterbalance it with intimacy and companionship. On the other hand, it seems that affiliation also needs to be counterbalanced with solitude in order for the protective function of social affiliation to develop to its fullest.

Social Support in Later Adulthood: The Interplay between Risk and Protective Factors

So far, our discussion of the function of social relations in old age has considered social transactions as a resource for strengthening current well-being, without considering the presence of immediate stressors. We now turn to the social support function of social relations, which considers social transactions as a resource in the face of age-related threats or challenges.

Across the life span, and especially in old age (see left panel of Figure 22.1), social support is considered to be a resource when psychological functioning needs to be maintained or restored after the occurrence of a stressor (e.g., Antonucci, 1985). In other words, research on social support primarily focuses on the maintenance or recovery of normal functioning. This matches closely with our definition of resilience. In contrast, research on social contact and social affiliation also emphasizes the potential for enhancement of well-being, which is more consistent with our definition of reserve capacity and its function of supporting growth. This analogy demonstrates once more how important it is, from a perspective encompassing both resilience and reserve capacity, to separate and include both fields of study in the investigation of social transactions as conditions of risk, protection, and enhancement in adulthood and old age.

Social Support: Conceptual and Methodological Issues

During recent decades, this area of research has grown not only in terms of number of studies, but also in terms of differentiation of theoretical concepts. Reviewing the recent literature with regard to the life-span implications of social support for questions of resilience and reserve capacity suggests that it is useful to consider the following differentiations when characterizing interpersonal systems and determining whether or not a given support relationship has the potential to contribute to the focal person's resilience and reserve capacity: (a) perceived availability of

support (prospective) versus perceived received (retrospective) support versus observed support; (b) quantity (frequency, amount) versus quality (satisfaction) of support; (c) presence versus absence of needed support; (d) type of support provided (emotional, instrumental); (e) single relationships versus the support network as a whole; (f) characteristics of the support network (e.g., density, homogeneity, reciprocity); (g) long-term versus short-term support relationships (convoy versus network); (h) support provided by family members versus non-family members; (i) informal versus formal helpers; (j) type of event necessitating support (normative, non-normative, etc.) versus generalized stress aggregated across different events; (k) acute versus chronic stress.

This list of variables speaks, on the one hand, to the complexity of the topic of social support. On the other hand, it also illustrates the relative lack of coherent theory, which is perhaps typical of work at the interface of social psychology and sociology. Keeping in mind the recency of aging research and the complexity of this list, it is obvious that the state of knowledge in this field and its relevance for aging is far from well explicated. Despite these limitations, we subsequently attempt to illustrate issues and questions relevant for aging and aging well.

Social Support as a Resource in the Face of Generalized Stress and Specific Stressful Life Events in Adulthood and Old Age

When the relationship between received social support and psychological well-being has been studied without considering the moderating effect of stress, results have been very inconsistent across different studies. Some studies have documented a positive relationship between social support and well-being in old age, and others have not (cf., Schulz & Rau, 1985). Investigations of the effectiveness of support in response to specific critical life events during adulthood and old age, however, have consistently shown a positive relationship with mental health or subjective well-being (e.g., Cohen & Wills, 1985; Schulz & Rau, 1985). Using data from a prospective longitudinal study (Social Security Administration's Longitudinal Retirement History Study), Wan (1982) concluded that social support has a positive effect on gerontological health during certain stressful events, but that this relationship is considerably more complicated than has previously been suggested. This evidence seems to support the notion of domain-specific reserves. It seems that the protective function of social support is more domain-specific, or in this case, event-specific in nature, than of a "general-purpose" type.

The buffering effect of social support in the case of chronic stress, such as chronic illnesses, seems to be even stronger. This result should still be interpreted with caution, as it is yet based on relatively few studies. For instance, the analysis of coping with chronic strain—a topic of high relevance for old age—has been sorely neglected in the epidemiological literature (Kessler & McLeod, 1985). Singer and Lord (1984), for example, pointed out that in the case of chronic stress the sudden loss of support might become a stressor itself which counteracts the protective effects of provided support.

Consistent with the contextualism proposition of life-span theory, it has been demonstrated that life events can present different types and amount of stress, depending on the point in the life

span at which they occur (e.g., Baltes, 1987; Brim & Ryff, 1980). Schulz and Rau (1985), for example, reported that with increasing age, the stress-inducing effect of widowhood decreases while that of divorce increases. Morgan (1976) suggested that the higher morale of widows over age 70 is related to their experience of fewer negative outcomes. An older widow, for example, may be more likely to have available a reference peer group of supportive, empathic individuals (i.e., other widows). Divorce presents the complementary picture. With increasing age and time spent in a relationship, divorce becomes less and less normative and expected (see also Cooney & Uhlenberg, 1990). As a consequence, no empathic support group is available at older ages, whereas at younger ages one is much more likely to have other divorcees in one's network.

With respect to the buffering effects of support in the case of specific critical life events, some structural features of the network have also been identified as relevant. Depending on the type of life event, the positive effect of network density is linked to a critical threshold. If density is too high, that is if too many network members know each other, this can be—primarily in the case of non-normative life crises—dysfunctional. Certain support functions can no longer be performed by such a network (Hirsch, 1980). The family, as the typical example of a high-density network (which in the case of normative life crises may be highly supportive) may become dysfunctional, for example, in the case of non-normative life events such as divorce, remarriage after widowhood, or marriage in late life (Schulz & Rau, 1985). The dysfunctionality of the family network seems to be related to the presence of homogeneous expectations within the network concerning which behavior is appropriate for the focal person to display. Diversified, less closely knit networks, like friendship networks, increase the probability of finding appropriate models or adequate support needed for coping with non-normative events (e.g., Granovetter, 1973; Wilcox, 1981).

In summary, the findings that the protective function of social support depends on the type of event and the age of the focal person at the time of occurrence provides further evidence for the specificity of reserves. In an earlier section, we offered this notion of domain-specific resources with regard to cognitive training research. The evidence on social support networks seems to suggest that the protective and possibly enhancing function is dependent on the match between a specific constellation of the support network and a particular critical event. In the following section, we try to demonstrate that the protective effect of social support is complicated even further through intervening self-related characteristics.

Personality Characteristics Seem to Mediate the Protective Effect of Social Support

The perceived availability of social support must be distinguished from the retrospectively reported received support in the face of stress (e.g., Schwarzer & Leppin, 1992). In research covering the adult age range, it has been repeatedly demonstrated that the concepts are almost orthogonal. Differentiating between perceived (anticipated) and received support is especially relevant with regard to instrumental support and less so with regard to emotional support (e.g., Dunkel-Schetter & Bennett, 1990; Newcomb, 1990).

As we will see in a later section, the proportion of instrumental support received increases with age (e.g., Depner & Ingersoll-Dayton, 1988). Thus, the differentiation between anticipated and received support may be of special relevance in old age. Usually, perceived social support (i.e., self-reported anticipation or prediction) is more strongly related to adaptive outcomes than reported received support (i.e., self-report on actually received support; Wethington & Kessler, 1986). This seems to suggest that the social-cognitive processes concerning social relations and support can be fairly powerful mediating variables with regard to the stress buffering effect of social support.

It is these and similar findings that have caused some researchers to argue that perceived anticipated social support is, to a certain degree, measuring stable personality characteristics (e.g., Sarason, Pierce, & Sarason, 1990). Social competence, self esteem, and self efficacy have been identified as some of the relevant constructs in predicting, but also in activating and maintaining systems of social support (e.g., Gottlieb, 1983; Krause, 1987; Schwarzer & Leppin, 1992). At the same time, the stronger positive relationship between anticipated support and well-being as compared to received support may also be an illustration of the potential negative effects of provided support. The measure of reported received support is an evaluation of the experience of having received support which includes, for example, having experienced receiving support without being able to reciprocate; that is, having experienced relational asymmetry (e.g., Rook, 1984). The potential negative effects of support (particularly in terms of unequal exchanges) may especially accrue in old age.

Based on the considerations just mentioned and other, similar ones, most current attempts at modeling the causal links between stress, social support and mental health in old age include personality dimensions at various points in the model (e.g., Krause, Liang, & Yatomi, 1989). Personality characteristics such as self efficacy, for example, have been shown experimentally to influence the degree to which others are willing to provide support. Those who show the initiative to help themselves are also more likely to be supported by others (e.g., Schwarzer & Weiner, 1990). Turning this around, it has also been argued, based on life-span research, that the supporter's beliefs concerning the recipient's abilities may become reflected in an increase or decrease of the recipient's own self efficacy beliefs (Antonucci & Jackson, 1987). Considering this from a life-span perspective, it opens a vista on how powerful long-term social relations may be in terms of modifying an individual's resilience and reserves (Antonucci & Akijama, 1987). Returning to the ideas of Mead and others mentioned at the beginning of this section, we can also speculate about the role that social transactions may play in regard to developing and/or maintaining positive or negative illusions about the self and thus contributing to or diminishing self-related reserves (cf. Colvin & Block, 1994; Taylor & Brown, 1988).

A further example concerning the mediating function of personality characteristics makes the close linkage between personal and social-environmental factors in the regulation of resilience through social support equally clear. People with a trait-like tendency for negative affect such as neuroticism, or depressivity, are less likely to be satisfied with anything, and therefore will also tend to be less satisfied with their perceived and received

social support. This in turn, may influence the likelihood of others offering support in the future (Schwarzer & Leppin, 1992). Considering stereotypic expectations and also empirical findings concerning old age which suggest more depressive symptoms in elders (Kessler et al., 1992), this may become a vicious cycle.

Social Support as a Function of Relationship Type (Kin versus Nonkin)

On average, different types of relationships are likely to provide specific types of support. In the language of this paper, we may also say that they represent different kinds of reserves. Some of these patterns have been identified in the literature. The life-span concepts of multidimensionality and multidirectionality are very nicely exemplified in such patterns. In old age, children and the spouse, if living, are the primary source of instrumental support. We will talk about the special role of the daughter with regard to caretaking activities further below. Emotional support is provided by a variety of sources, including spouse, children, friends and sometimes formal organizations such as religious communities or self help groups (e.g., Seeman & Berkman, 1988). In middle age, the spouse is the primary provider of emotional support, and the focus in relationships with friends and colleagues is on informational support (Schulz & Rau, 1985).

A "wildcard" reserve in any support network seems to be so-called multifunctional or multiplex relationships. Such relations carry the potential to fulfill the need for different kinds of support depending on the situation (Hirsch, 1980). The prototype of a multifunctional relationship is the spouse. For instance, it is a well established finding in the aging literature that marriage protects against morbidity (e.g., Depner & Ingersoll-Dayton, 1985; House, Robbins, & Metzner, 1982). This seems to be especially true for men, whereas for women marriage serves a protective function only if they are happily married (e.g., Hess & Soldo, 1985). All their lives, women tend to have a greater number of close relationships than men and therefore seem to adapt more easily to widowhood in old age than men. It has also been reported that being married and having children is among the most important factors keeping older people out of institutions (Hanson & Sauer, 1985). This finding is mediated through the fact that married people do have access to better support networks than unmarried people. At the same time, *childless* married people tend to have smaller support networks than unmarried people (e.g., Hanson & Sauer, 1985; Lang, 1994).

Usually, specific types of support are best provided by certain types of relationships. For example, support that requires residential proximity is often provided by neighbors, support requiring long-term commitment (as for example in the case of a chronic illness) is provided by family members, while support presupposing a similarity in life style is best earned by friends. A spouse (especially a female one), however, is more likely qualified to provide all these different types of support (Dykstra, 1993).

To date, in aging research, different studies have identified different patterns of support functions as characteristic of certain types or relationships (e.g., kin versus nonkin). Some studies identified clear complementary functional profiles for family versus non-family relationships in later adulthood, while other studies failed to do so (e.g., Dykstra, 1993). Dykstra drew the

conclusion that it may not be very helpful to use broad categories such as kin versus nonkin. She proposed differentiation according to (a) characteristics of these relationship types such as degree of consanguinity or degree of friendship, and (b) the kind of network of which these relationships are a part (non-married network, childless network, no acquaintances network, etc.). Concerning these latter context effects, it was demonstrated that relationships with children and friends were nominated as more supportive by those not cohabiting than by those cohabiting. It has been suggested that compensation between types of relationships along a "hierarchy of compensation," may be possible (Cantor, 1979). At the same time, compensatory processes between relationship types clearly seem to have their limits as well. There is evidence, for example, that married and non-married elders differed less than expected in terms of the degree of emotional and instrumental support they received from friends (Dykstra, 1993). There seem to be limits to what a friend (who is defined by voluntary provision of help) can be asked for without threatening the relationship.

Research on personal or close relationships also suggests, however, that such multifunctionality may have high costs (e.g., Morgan, 1990; Rook & Pietromonaco, 1987). A study investigating the process of coping with an acute illness such as a heart attack demonstrated, for example, that spouses not only provided support, but were also active participants in the exchange process. They brought their own vulnerabilities, goals, and demands to the situation which increased rather than decreased the stressfulness of the situation. Despite this, there is evidence suggesting that support from other sources cannot fully compensate for deficiencies in intimate or close relationships (Coyne, Ellard, & Smith, 1990); close relationships generally offer more gains than losses. What distinguishes intimate or close relationships from most other relationships is that they tend to be communal rather than exchange-based. Close relationships tend to be characterized by ongoing mutual commitment and responsiveness and are not constituted by specific exchanges.

The "take home" message with regard to social support, type of social relationship, resilience and reserves in old age may run as follows: It seems to be a great resource in old age to be (happily) married, both in terms of support provided by the spouse, and also in terms of related size of the support network. At the same time, this resource may be diminished by some costs resulting from the closeness of the spouse relationship. Furthermore, non-married or widowed elders are not without resources either. They may be able to compensate for the lack of a multiplex spousal relationship, but only to a certain degree, by activating other types of relationships available in their support network (e.g., Blieszner & Adams, 1992; Lang & Carstensen, 1994).

Reciprocity and Types of Support

Across the life span, the balance sheet of received and provided support changes. Midlife (up to age 65) is characterized by a surplus of provided as compared to received help. Later in life, this gap between support provided and received is increasingly closed. Older people provide about as much support as they receive (Antonucci & Akiyama, 1987; Depner & Ingersoll-Dayton, 1988). To some, this in itself may be a surprising finding.

The life-span trajectory of different types of support can be characterized as follows. Within their families, old people provide a considerable amount of financial support (e.g., Hauser & Wagner, 1994; Johnson, 1988) and assistance with child care (e.g., Bengtson, Rosenthal, & Burton, 1990), while they themselves primarily receive health-related support. Emotional support does not fluctuate in a similar fashion but is a rather stable component of the support system (provision and receipt) throughout the life span.

Reciprocity of support exchange has been demonstrated to be positively related to well-being *over and above* support received (Ingersoll-Dayton & Antonucci, 1988; Israel & Antonucci, 1987; Lang, 1994). This is a finding with specific relevance to the planning of interventions in old age. Not only is it important to think that providing support is a resource for the old person, but so as providing opportunities for the older person to provide support to others. Creating opportunities to provide support can be seen as a protective factor or a resource for the old person. Unmarried or widowed elders, for example, do seem to be able to compensate for a lack of social affiliation due to smaller networks. Data from Berlin Aging Study participants, age 70 to 103 years, demonstrated that unmarried or widowed elders seemed to compensate for this lack of reserve (as indicated by lower levels of well-being) by *providing* (rather than receiving) support to others (e.g., Lang, 1994).

From a life-span perspective, reciprocity is not only a characteristic of a single exchange of support, but can also be traced over a life time or at least over a longer amount of time, and across different domains or "currencies" of support (e.g., Burgess & Hustin, 1979). Different kinds of relationships differ in the degree to which they are based on longer time perspectives or more immediate pay-back loops. Again, the spouse relationship is the prototype of a support relationship with a long-term exchange budget. The parent-child relationship also carries this characteristic. In the latter case, the relationship even has the added advantage that the times of highest need of children and parents respectively are distributed over the life span in sequential order and, therefore, permit anticipated as well as realized effects. Antonucci (1985) coined the term "support bank" to describe that flow of intergenerational exchange. Early in adulthood, parents primarily provide largely unreciprocated support to their children. This way, they make a deposit into their support bank which, later in life, when they themselves may be less able to reciprocate for received support they are able to "cash in" without feelings of overbenefitting. Feelings of overbenefitting have been shown to have resilience-diminishing effects (e.g., Rook, 1984).

From a life-span perspective, a concept like that of the support bank raises the question of possible cohort changes in values which may "devalue" earlier deposits. Although the empirical investigation of the effectiveness of norms of reciprocity has only begun (Rossi & Rossi, 1990), it seems fair to say that those norms are firmly rooted across cohorts. In comparing three cohorts (born in 1920, 1950, 1980), Bengtson and Schütze (1994) came to the conclusion that the effectiveness of the norm of reciprocity has not weakened.

Taking into consideration the *accumulation and anticipation of reserves over time*—as it is done with the concept of a lifelong and intergenerational support bank—opens new perspectives on

prevention as well. The idea of long-term investment, or "lagged reserves," is similar to recently reported findings from research on the prevention of juvenile delinquency (e.g., Yoshikawa, 1994). In his review article, Yoshikawa suggests a cumulative protection model to explain the successful prevention of chronic juvenile delinquency, a good demonstration of the principle of life-span continuity of resources.

Social Support in the Case of Disability and Illness: A Contribution to Resilience in Old Age

So far, we have discussed the social support provided to "normal" relatively healthy middle-aged and older adults. In old age support is increasingly needed in the health domain, however, because the focal person has an increasing likelihood of becoming disabled or ill. In the literature, support of the increasing numbers of frail elders is discussed under the heading of caregiving. Formal and informal sources of help are distinguished. A number of studies report that female spouses and children are the sole informal caregivers to elderly persons, with little extension to siblings and other kin (e.g., Lopata, 1978; Streib & Beck, 1980). In order to interpret these results, one has to take into consideration, however, that studies often have a family bias, so that nonkin age peers are excluded. Nevertheless, it seems safe to conclude that the family is the primary *informal* caregiving source for non-institutionalized elders. Counter to widely spread beliefs about the historical weakening of the family, present-day society is characterized by a continuation of the extended family, substantial intergenerational ties, and continuity of responsible filial behavior (e.g., Bengtson & Schütze, 1994; Brody & Brody, 1989; Field & Minkler, 1988; Rossi & Rossi, 1990).

Most care (80%) provided to older adults comes from informal sources including family members, friends, acquaintances, and neighbors (e.g., Brody & Brody, 1989). The person most likely to take prime responsibility for the care of an elder in the community is the spouse. If there is no spouse, there is a predictable sequence of the next most probable relatives to become primary caregivers, beginning with the adult daughter of the frail individual (Gatz, Bengtson, & Blum, 1990). This suggests that caregiving follows a combination of kinship and gender lines. Costs and benefits on both sides of the caregiving relationship need to be considered. On the side of the caregiver, it is certainly an immense burden with regard to time and investment. At the same time, studies reported that by providing this instrumental support the emotional relationship between frail parent and caregiving adult child can become richer (e.g., Walker, 1990). On the side of the care recipient, family caregiving, for instance, has the advantage that the old person can stay in their familiar environment. However, some studies have also indicated that negative social interactions had a stronger effect on the old person's morale than positive interactions (e.g., Stephens, Kinney, Ritchie, & Norris, 1987).

Formal caregiving structures are—compared to informal structures—underdeveloped, both in terms of long-term care institutions and with regard to community-based ambulatory help systems (e.g., Chappell, 1990). The latter has become a particular focus of social policy. It has been shown that the availability of informal or ambulatory formal support represent external

resources which delay or reduce the need for institutionalization (e.g., Antonucci, 1990). Currently, there is much engagement in articulating the goal that old persons should maintain their "independent" living in their own home as long as possible. The behavioral and social costs of such an approach are not yet fully understood, however. If no ambulatory caregiving system is available, it is still sometimes the case that old people who have no or only limited access to an informal care network (i.e., lack of interpersonal resources) are sent to long-term care institutions, not for medical reasons, but because of the lack of social support (e.g., Cantor, 1983).

As already indicated, it is especially in this context of providing assistance in the basic activities of daily living that the "dilemmas of helping" (Coyne et al., 1990), that is, the potential negative resilience-diminishing effects of support, can become most obvious. In a research program on dependence in old age, M. Baltes and her colleagues have shown that caregivers in institutions, and also, though to a lesser degree, in family settings, tend to display a behavioral pattern which reinforces dependent rather than independent behavior in nursing or family home residents who are in need of physical care (e.g., Baltes, in press; Baltes & Wahl, 1987; Horgas, Wahl, & Baltes, in press). Based on social learning principles, one can conclude that—due to such dependence-support and independence-ignore scripts on the part of the caregivers—care recipients become more dependent than their reserve capacity would permit. Indeed, intervention studies in nursing homes conducted within the same research program, drawing on the operant principles mentioned earlier, have demonstrated that once the caregiver's behavioral pattern was more focused on providing support for independence, it was possible to successfully increase the older person's independent behavior.

Similarly, research on married couples' coping with the acute life-threatening illnesses of one partner found that, under certain conditions, support can become dysfunctional (Coyne et al., 1990). In this study, support became maladaptive whenever the helper primarily had her or his own goals in mind (e.g., getting things done more quickly), rather than also considering the goals of the recipient. In such situations, less support would often constitute more of a resource for the care receiver. Based on these results, Coyne and others (1990) have made a strong pledge for viewing social support from the perspective of interdependence between recipient and provider and not as a "one-way street" concept (see also Baltes & Silverberg, 1994). Social support must be interpreted as the dynamic outcome of negotiations between the parties involved. More support is not always functional. It is possible, therefore, to "overcare."

The concept of functionality or multifunctionality of support has been explored in great detail within the just mentioned research program of M. Baltes and her colleagues on dependency (Baltes, in press). Being dependent and "exercising" dependency is not only indicative of a loss of reserves, but at the same time it can involve gains in reserve capacity; an issue which has been discussed in the clinical literature under the heading of secondary gain of the illness or disorder (e.g., Freud, 1989). First, a certain degree of dependency reduces the aging person's concern with everyday self-care and thereby frees resources for other activities. Second, dependent behavior on the part of the elderly does not only result in one outcome, that is, care. At the

same time, it can, for instance, provide a sense of control over social partners on the part of the old person. As observational research both in family and in institutional settings has demonstrated (Baltes, in press), it is dependent rather than independent behaviors on the part of the elderly which resulted in immediate and positive social responses from the social environment. In particular, dependent behaviors initiated and provided social contact. In other words, losing or "giving up" reserves in one domain (i.e., independent self care) may be a worthwhile "investment" with regard to gaining resources in another domain (i.e., social affiliation). This evidence again suggests that it is useful to consider any reserve-diminishing and augmenting behaviors in a given domain of functioning within the larger system of multiple domains of functioning and reserves.

In the caregiving literature this perspective on multifunctionality and contextual embeddedness is receiving increasing attention. This is, for example, reflected in the recent concern with the caregiving family member or the caregiving family as a family system (e.g., Gatz et al., 1990). Traditionally, in the caregiving literature, the support for the care provider has primarily been reflected in the study of the caregiver burnout syndromes, which threaten the breakdown of the established support system for a given care recipient (e.g., Anthony-Bergstone, Zarit, & Gatz, 1988; MaloneBeach & Zarit, 1991; Pearlin, Turner, & Semple, 1989). Recently, there is growing interest in the system effects and the gains and losses of the various members involved in care giving. These considerations illustrate that the optimization of social support as a resource, which contributes to increased resilience for times of stress and to enhancement of reserves, takes more than finding a provider of support and the optimization of a unidirectional stream of transaction. Social transactions involve reciprocal as well as conflictual goals.

To summarize, research in the domain of social transactions has provided evidence for the maintenance (e.g., social support) but also for the decrease (e.g., social contact) in level of functioning with increasing age. Primarily due to age-graded context effects (e.g., developmental tasks of old age, change in motivation structure), social resilience and reserves, on average, continue to be present at sizeable levels into advanced age. Moreover, domain-specific reserves (e.g., support bank, kin vs. non-kin relations) are often available to compensate for losses and to provide for enhancement (e.g., companionship). With regard to everyday functioning, social support was identified as one of the major resources in the face of physical decline. To optimize this resource, recent research endeavors have started to identify the importance of reciprocity (concurrent or lifetime) and of system effects involving all members of the network. Recent research has also shown how giving up a certain level of independence on the part of the elderly (a loss at first sight) can have also positive consequences (secondary gains).

TOWARD MODELS OF AGING WELL

Our review has shown that all three areas of psychological functioning reviewed here, cognition, self, and social transactions, provide evidence for both "natural" resilience and reserve capacity, as well as the successful regaining and increase of resilience

and reserves through intervention. At the same time, all three areas of functioning are not only resources for development in later adulthood, but also present developmental risks which require resilience. How can this illustrative evidence on cognition, the self, and social transactions help us to understand resilience and reserves in old age in general? We take these findings to represent the influence of two major categories of determinants, biology and culture, and their interactions, which seem to underlie a Janus-like face of aging (e.g., Baltes, 1993; Baltes et al., 1980). It seems that whenever biology and physical health are primary with respect to functioning in a given domain, one predicts age-related decline in performance, especially baseline performance and developmental reserve capacity. In our review, the decline in cognitive mechanics provided an example of this side of the Janus face. Stability and growth of cognitive functioning characterize the other side. Culture-based bodies of knowledge, the unique human capacity for self-reflection and self-agency, and social embeddedness are key resources for the reconstitution, maintenance, and sometimes even enhancement of psychological functioning. Based on such resources, the self seems to serve an executive function with respect to orchestrating gains and losses in various domains of functioning.

Thus far, we have described resilience and reserves in old age more or less separately by domain of functioning (cognition, self, social transactions), and by the processes involved (e.g., practice, learning, coping, social comparison, affiliation, social support). As a next step, we will argue on a different level of aggregation and discuss several *general* strategies of aging well. In the gerontological literature, we find a number of models that attempt to describe how gains and losses, the risk and protective factors of old age, are coordinated in order to achieve successful adaptation (e.g., Atchley, 1993; Baltes, 1991, 1993; Brandstädter et al., 1993; Carstensen, 1993; Hobfoll, 1989). Baltes and Baltes (1990b; see also Baltes & Carstensen, in press; Marsiske, Lang, Baltes, & Baltes, in press), for example, have suggested that throughout life "successful" development can be characterized by a strategy of *selective optimization with compensation*. The processes of selection, optimization, and compensation are coordinated such that the two main overarching goals of human development can be achieved: (a) movement toward higher levels of functioning (growth), and (b) avoidance of negative outcomes (maintenance). It is important to underscore that selection, optimization and compensation may operate on both a conscious and an unconscious level, and, in addition, may be driven by internal and external conditions.

In old age, this general strategy of successful life-span development continues to operate, however with different weights and in different constellations. The shifting balance between gains and losses in old age presents a particularly strong new challenge. For example, due to an overall loss in reserve capacity or resources and increasing constraints on resource replacement (Hobfoll, 1989), it becomes more difficult to maintain high-level or desired levels of functioning in all previously active domains. It then becomes necessary to select domains where one would like or need to preserve high levels of functioning, often at the expense of functioning in other domains. Furthermore, it may become necessary to change the ways by which certain levels of

performance are achieved. Compensation becomes increasingly important (e.g., Bäckman & Dixon, 1992). In those domains where high performance has continued adaptive value, under conditions of declining performance levels, new strategies must be derived, and reserves must be tapped and pooled across different domains of functioning to maintain high-level performance. Figure 22.2 illustrates the operation of selective optimization with compensation summarizing the precursor conditions under which it is evoked in old age and listing its potential consequences.

The research reviewed herein provides illustrations for all three mechanisms, optimization, selection, and compensation. We have seen that, via training and the acquisition of new bodies of knowledge, cognitive functioning can be *optimized*. On a much smaller scale, similar evidence is available from training research in the area of the self. Another important self-related protective factor that supports optimization as a general-purpose mechanism, which we have not reviewed in detail, is self-efficacy and agency beliefs (e.g., Bandura, 1986). Efficacy and agency beliefs can serve as motivators and skill resources in striving for higher levels of performance. Furthermore, self-efficacy has been demonstrated to have positive effects on the availability of social support. In the social domain, we have seen that the reciprocity of social support exchanges contributes to well-being over and above the support received.

With regard to *compensation*, the cognitive area provided evidence for the compensatory power of culture-based bodies of knowledge in the face of declines in the cognitive mechanics. In the area of self and personality functioning, we find, as described above, a rich variety of compensatory processes such as varied use of social comparison at work. Research on personality has

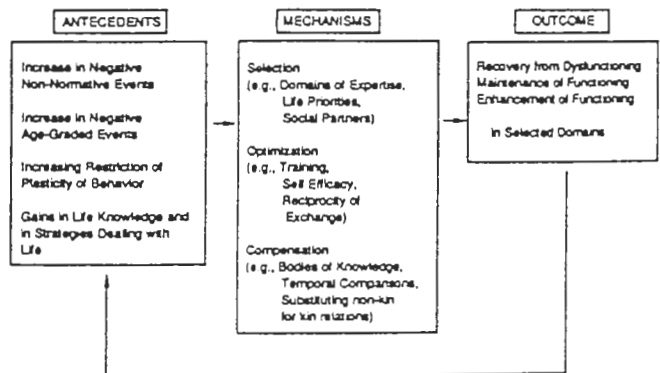


Figure 22.2 A model of successful aging (modified after Baltes & Baltes, 1990b). A coalition of antecedent influences will tend to change the balance of losses and gains in late life. In order to maintain functioning in critical task domains, or even to experience growth in selected areas, three processes are proposed: Selection of domains to maintain or enhance functioning, optimization of functioning in selected domains, and compensation (including substitution) for lowered functioning in those domains which cannot be maintained. Although these processes are assumed to operate throughout life, they take on special salience in late life under conditions of accumulating losses.

been focused more on the identification of mechanisms, rather than documenting their use under conditions of risk and challenge. Utilization of social and temporal comparison processes, availability of many different coping behaviors, coping styles such as flexible goal adjustment, certain personality dimensions (generativity, integrity), and well-balanced emotional management are examples of self-based compensatory factors. Finally, in the area of social transactions it was demonstrated, for example, that some compensation between different types of relationships (kin for nonkin) is possible with regard to the provision of social support.

Another area of compensation refers to compensatory processes that cut across different domains of functioning. For example, in cases when the self has exhausted its resources (e.g., depressivity), it has been demonstrated that compensation by means of external and interpersonal resources, that is relying on members of the social network is possible. The same is true for cognitive functioning, also including in this case the use of "mechanical" assistive devices such as hearing aids, glasses, notebooks, and age-friendly environments (Bäckman & Dixon, 1992).

We find *selection* at work when the self extracts from its broader set of goals and commitments and from the opportunities provided by society those in which maintained functioning is important. In the cognitive area, this strategy of selection is seen in the development of individualized, domain-specific expertises (Ericsson & Smith, 1991). In the social domain, it may involve the selection of emotionally meaningful social relationships (Carstensen, 1993).

This strategy of "aging well" is meant to describe universal adaptive processes. Based on individual life constellations, the specific outcomes of this strategy are bound to exhibit large individual and cultural variations (Baltes & Baltes, 1990b). Using the strategy of selective optimization with compensation, with changed emphases and new weightings, it seems possible that older persons enlist and transform their resources in effective ways. Employment of this strategy not only allows one to recover and maintain adaptation, but also provides the basis for continued growth in select domains.

BEYOND NORMS: INDIVIDUAL CRITERIA OF SUCCESSFUL ADAPTATION

Models of successful development and aging present us with the problem of delineating criteria for what we consider to be optimal aging. They present us with the problem of determining a "best" direction of development. What is the desirable end state of life? Is there one, or are there many potentially incompatible ends depending on the outcome criteria we examine? For example, if we take good physical health in old age as an aspired goal this would necessitate a certain life style, which would in turn demand sacrifices in other domains, such as enjoying certain foods or spending more time in physically inactive ways.

As long as we consider, for example, laboratory training research for cognitive functioning, this criterion problem is perhaps less obvious. In the laboratory training studies, higher levels of performance are often selected as the criterion for reasons of

experimental paradigm. The more words one can remember, the better; the faster we can complete the task, the higher the level of performance. However, as soon as we think about everyday life, the criterion needs to be adapted to ecological demands and characteristics. It then often becomes a question of the right measure: Which kind of behavior is to be endorsed at which time, for how long, and to which degree? What may be a gain in one domain of functioning leads to a loss in another domain, and what may be successful in the short run, may be detrimental when it comes to long-term effects.

Thus, while the focus of cognitive training research has been on demonstrating, in principle, plasticity and limits of plasticity in intellectual functioning, the question of what level of performance is necessary for everyday functioning remains largely unaddressed. In this respect, we also need to ask about the long-term and ecologically valid transfer effects of intellectual training. With regard to the self and the social domain, similar problems have been identified: In coping research, for example, a high domain-specificity of coping behaviors has been identified. Furthermore, coping behaviors which are adaptive as immediate responses need not be adaptive in the long run. Thus, even with regard to coping, implications for everyday functioning are not fully known (Filipp & Klauer, 1991). Similarly, as we have seen in the social domain, it is very important to strike a balance between affiliation and solitude.

The dilemma of defining criteria for adequate as well as optimal functioning in everyday life becomes especially evident when we think about old age. For some, old age is the phase in life characterized by liberation, while for others it becomes the final testing ground of physical health (Baltes & Baltes, 1990b; Fries, 1989). What is the optimal level of self-efficacy beliefs to have? What is the optimal way to grieve? What is the optimal network configuration? What is optimal memory? These examples illustrate that, in old age, general norms may apply even less than in earlier phases of life. Given the wide range of individual differences in levels of functioning and personality make-up (Nelson & Dannefer, 1992), it may be crucial to define reserves on the level of person-in-context units. Given the increasing variability between individuals and the absence of a well-developed culture of old age (Baltes, 1993), this is of particular relevance.

Defining criteria for enhancement seems to be a less difficult task with regard to single individuals and to narrowly defined domains of functioning. For a given person with a particular problem, an intervention could be directed toward increasing the level of functioning within the specific person-in-context condition. Thus, for a newly widowed older man who cannot cook and would like to continue to eat at home, for example, an intervention might be aimed at teaching new skills in the kitchen. However, when conceiving of intervention programs for widowers in general, criteria are less obvious. Some would rather go out to eat, or convince a friend to do the cooking. If the selective optimization with compensation model is an appropriate characterization of how successful adaptation might occur in late life, perhaps individuals could be instructed in the need to select critical life domains, and could be given suggestions about when and how optimization, selection, and compensation strategies could be applied. The domain-specific optimization process would be left

to the particular person-in-context constellation, which is very much congruent with the notion of multidirectional and individualized development (cf., Chapman, 1988).

Earlier, we described the key function of knowledge-based and self-related functioning in orchestrating the optimization of development by processes such as selection and compensation. An important consideration in this respect is the appraisal of resources (Hobfoll, 1989), in this case when to accept a loss and reorient one's life, and when to still strive harder because current behavior is not yet employed to its fullest capability (Staudinger, Cornelius, & Baltes, 1989). With respect to optimizing development, Brim has argued, for example, that one criterion for making this decision could be to consider something like a "performance/capacity ratio" (Brim, 1992). According to this ratio, acceptance of a certain loss becomes necessary when the display of the behavior requires a "dysfunctionally" high amount of reserve capacity. For example, when climbing stairs becomes so exhausting that it threatens an older adult's ability to perform other central everyday tasks, acceptance of this functional loss is desirable. If the inability to continue climbing stairs threatens continued viability, then compensatory strategies (e.g., installation of stair-climbing machinery, change of residence, employment of caregivers, engagement in physical therapy) become necessary. A certain degree of acceptance of the loss is required, however, before one can initiate compensation. These examples illustrate how important it is to realize that what constitutes resilience in old age requires a dynamic, person-in-context view. Multiple levels of meaning and consequences, as well as individual and cultural variations, need consideration.

The Study of Resilience in Later Adulthood and Its Relationship to Normal Development

In conclusion, we would like to reconsider the topic of similarity and differences between concepts from life-span developmental work such as plasticity and reserve capacity on the one hand, and resilience on the other. Life-span research on reserve capacity has an emphasis on the conditions under which development is "optimized." It extends beyond the recovery from maladaptation or the maintenance of normal functioning. In other words, rather than emphasizing the identification of conditions leading to problems and their avoidance (risk and protective factors of mainstream resilience research), the enhancement and optimization model espoused by life-span developmentalists also focuses on the identification of conditions that can lead to growth, even before any threat or challenge has come on stage (cf., Brandtstädter & Schneewind, 1977). We suspect that these differences in emphasis are related to several issues, including the historical distinction between health and disease, as well as between normality and growth. Resilience research in psychology emerged out of epidemiological risk research and the prevention of pathology (cf., Rutter, 1987). Conversely, enhancement research is focused on the optimization in the sense of progress and movement toward some individualized ideal end state (Nisbett, 1980).

We have developed a schematic model that suggests one possible way of integrating the notions of resilience and levels of reserve capacity. With this working model (see Figure 22.3) we do

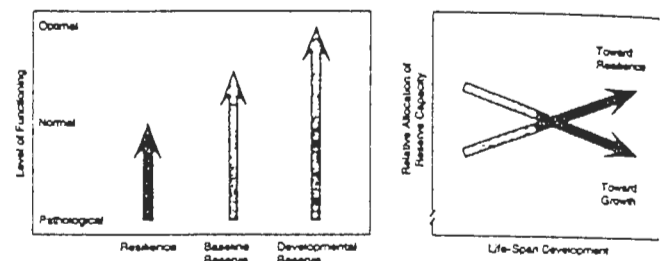


Figure 22.3 Resilience and levels of reserve capacity. Resilience focuses primarily on the maintenance and recovery of "normal" developmental functioning. Reserve capacity serves in addition the attainment of further growth and "optimal" levels of functioning (left). In old age, less overall reserve capacity is available. Therefore, an increasing share needs to be allocated to the avoidance of negative or "pathological" outcomes (right).

not aim so much at reflecting the use of such concepts in the literature, but rather to suggest a theoretical framework which may foster an increased exchange between the two lines of scholarship.

The model distinguishes between three levels of developmental functioning, pathological, normal, and optimal. We prefer to use the term "optimal" rather than "successful" to make the distinction from normal aging more pronounced. Rowe and Kahn (1987) have pointed out, especially with respect to aging, that the term normal has at least two connotations. One is normal in the sense of usual (i.e., the statistical average, which may include losses), and the other is normal in the sense of successful (i.e., free of pathology). We have argued, however, that normal aging in the sense of statistical average increasingly resembles pathological functioning in that it includes a growing feature of loss. That is, the distinction between statistically normal and pathological becomes increasingly blurred with age. We would like to disentangle the notion of "optimal" development conceptually from this blending. While successful aging, in the sense of normal, may be defined by the relative absence of pathology, we want to underscore that a growth-oriented concept of successful aging, in the sense of "optimal," is also possible in principle.

The overlap between the three arrows connotes that resilience can be supported not only by reserves currently available (baseline reserve capacity, "natural" resilience) but also by reserves activated through intervention or development (developmental reserve capacity, resilience through intervention). Furthermore, we would also like to briefly mention that this model is complicated when we consider the issue of domain-specific development and development in general, a topic which deserves more discussion in its own right. For instance, the activation of developmental reserve capacity in one domain of functioning can support resilience in another domain but can also be a risk factor. Becoming too dedicated at work can also maximize financial resources, but may come at the cost of losses in the health or family domain.

What happens when we put this general model in an ontogenetic framework with a focus on old age? Given the changing

gains-losses ratio which, on average, is characteristic of old age, an increasing amount of reserve capacity has to be invested in coping with losses, and in the prevention of dysfunction. Thus, reserves are increasingly unavailable to support growth. We have depicted this age-related change in the relative allocation of reserve capacity on the right-hand side of Figure 22.3. This implies that research on resilience in old age, with its focus on how to prevent dysfunction, and research on reserve capacity, with its focus on how to optimize development, become more closely linked than they are when earlier phases of life are the period under study.

This "life-span convergence" between research on resilience and research on reserve capacity should not lead us to blur the theoretical distinction between the two concepts (see left panel Figure 22.3). While the "resilient move" between "pathological" and "normal" levels of functioning may, in certain cases, involve the activation of reserve capacity, plasticity is a concept that underlies *more* than the avoidance of pathology. Reserve capacity supports the full *range* of adaptive change, or plasticity. In our view, resilience is that type of plasticity concerned with the avoidance of pathology and the maintenance of "normal" functioning. We suggest keeping the resilience concept separate from the movement toward optimal development *per se*. To restate the definition of resilience from the beginning of the paper, resilience has been defined as that kind of plasticity that ensures "normal" (and not "optimal") development despite the presence of threats, risks, and insults.

OUTLOOK

By reviewing the evidence on potential and reserve capacity in old age, we have perhaps generated the impression that the state of optimization and prevention research in human aging is a healthy one. This is not so. Systematic research and theory-building with respect to prevention, intervention, rehabilitation in old age, not to mention growth-oriented enhancement, did not get the attention it deserved for a long time (e.g., Baltes & Danish, 1979). Even now, such attempts are still fighting ageism (Riley & Riley, 1989). Any attempt at intervention may profit from taking into account the characteristics of development as they are described in the propositions of life-span theory. To highlight just a few: Development as transactional adaptation suggests that not only the individual but also the developmental context should be the target of intervention. The gain/loss dynamic alerts to potential negative effects of intervention either with regard to other domains of functioning or with regard to the future. Finally, the model of successful aging through selective optimization with compensation suggests that rather than targeting specific symptoms with certain intervention programs, it may be worthwhile spending time exploring what the most fruitful domains of intervention might be. To advance research on resilient and optimal aging in a more coordinated manner, life-span researchers interested in the range and limits of reserve capacity, and clinical researchers interested in resilience, need to become partners. It is time to move beyond courtship and into active collaboration.

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