

Cognition and Everyday Competence

SHERRY L. WILLIS

Most older adults' primary concern is not poverty, loss of loved ones, or even death itself (Clark & Anderson, 1967). What the aged fear most is the loss of independence—the inability to care for oneself and to live independently in the community. The elderly's inability to function independently is, of course, a concern not only of the aged but of society as a whole. As the age structure of the population becomes increasingly skewed toward the latter portion of the life span, efforts to maintain and enhance the functional independence of the elderly become a major consideration of the young and middle-aged as well as the old.

In this chapter we will discuss factors associated with the elderly's competence to carry out those activities considered essential to independent living in our society. We will discuss the ability to function independently in terms of seven domains of competence. These domains of competence involve the ability to (1) manage one's finances, (2) take one's medications, (3) use the telephone, (4) shop for necessities, (5) prepare meals, (6) carry out basic housekeeping chores, and (7) transport oneself to locations outside walking distance. It should be noted that within the study of functional health (Fillenbaum, 1985; 1987a; Lawton & Brody, 1969), these domains of competence have been represented by the instrumental activities of daily living (IADL). We will use the term *everyday competences* in discussing these seven domains. A major focus of the chapter is on the role of *cognitive* factors in adequate functioning within these competence domains.

We begin by presenting a model for studying everyday competence. The model considers (1) antecedents of competence, (2) components of competence, (3) mechanisms mediating the demonstration of competence, and (4) outcomes of everyday competence. Second, the literature on age differences and age-related changes in everyday competence is reviewed. Finally, some

This chapter was written while the author was a visiting scholar at Stanford University with the support of research grants AG08082 and AG08055 from the National Institute on Aging.

methodological issues related to the study and assessment of everyday competence are discussed.

MODEL OF EVERYDAY COMPETENCE

Definition

Everyday competence represents the adult's ability or potential to perform adequately those activities considered essential for living on one's own. Three issues need to be considered with regard to how competence is conceptualized in this chapter.

To begin with, everyday competence represents the *potential* or *capability* of the individual to perform certain tasks, not the actual daily behaviors of the individual. It is important to differentiate between competence and the behaviors the adult regularly performs in daily life. Competence represents the ability to carry out, when necessary, a broad array of activities considered essential for independent living, even though in daily life the adult may perform only a subset of these activities. This distinction is evident in the major batteries that have been used to assess functional competence (Fillenbaum, 1987b, 1987c; Lawton & Brody, 1969). Functional assessment has traditionally addressed the question "Can the individual perform an activity?" rather than "Does the individual perform the activity on a regular basis?"

A second issue concerns the conceptualization of competence as involving *multiple domains* and *multiple components*. The ability to live independently involves adequate functioning in at least seven domains (medications, finances, shopping, meal preparation, transportation, phone, housekeeping). These seven domains have consistently been identified across diverse disciplines and literatures involved in the study of functional assessment.

Likewise, competence involves multiple components, including both *individual* and *contextual* components. Everyday competences are reflected in complex, higher-order cognitive activities, carried out in a given context or setting. Thus, not only the physical, mental, and emotional capabilities of the individual but also the supportive or limiting nature of the social and physical context must be considered.

Finally, while everyday competences may be judged to be universal when considered at the genotypic or latent construct level, at the phenotypic level they are culturally and contextually bound. For example, although meal preparation is considered to be an everyday competence in all cultures, the specific activities and tasks associated with meal preparation vary by culture. The British version of the IADL includes ability to make a cup of tea

and to carry a tray. Alternatively, the competence to maintain a household includes an item on gardening in New Zealand.

Overview of the Model

Figure 4.1 presents a model for studying everyday competence. Competence is conceptualized as a multidimensional construct, involving the seven domains described above. The model can be applied individually to each of the seven domains, or competence can be considered at the meta-level, across domains.

The model proposes two broad categories of *antecedents* of competence. At the micro-level, *individual* factors (physical health, cognition) are considered; at the macro-level are *sociocultural* factors, including issues such as social policies for health care and cultural stereotypes of aging.

The antecedents of competence often cut across the seven domains and are largely transcontextual. In contrast, the *components* of competence are concerned with particular domains of competence and with specific tasks or activities represented by these domains of competence. The components are domain-specific and context-specific. Both individual and contextual components of competence are considered.

Although the adult may have the competence to perform the activities considered essential for independent living, this does not mean that he or she will actually carry out the necessary behaviors. The *mechanisms* of competence involve factors that moderate the actual manifestation of competence in the daily life of the individual. First, the individual's attributions

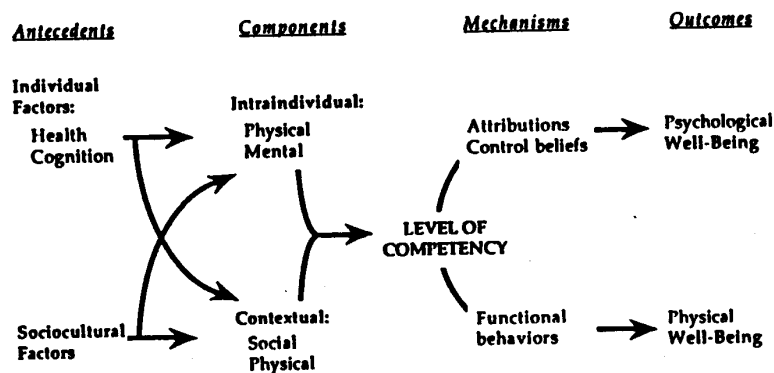


Figure 4.1 Model of everyday competence.

and beliefs regarding control and efficacy have been shown to influence behavior in such areas as medication compliance (Rodin, Timko, & Harris, 1985). Second, regular performance of the functional behaviors associated with competence is required. For example, the older adult must not only be capable of loading a pill reminder case but must also perform the activity on a regular basis.

Finally, the model proposes that the major outcomes of everyday competence are physical and psychological well-being. In the following section, we consider each aspect of the model in more detail and review relevant literature.

ANTECEDENTS OF EVERYDAY COMPETENCE

Physical Health

In both the epidemiological and functional assessment literatures, everyday competence has frequently been characterized as a dimension of health. Indeed, IADL measures involving the elderly's self-report of their level of everyday competence have typically been summed with ratings of mobility and physical self-maintenance into a category called "functional health" (Lawton, 1987) or "physical functioning" (Calanos, Fillenbaum, Cohen, & Burchett, 1991). Inclusion of the terms "health" or "physical" to describe everyday competence suggests that physical health should be a major antecedent. In this section, the literature on the relationship between everyday competence and various measures of physical health is briefly reviewed.

Physical Health and Perceived Level of Everyday Competence

The relationship between interviewer ratings of physical health and ratings of perceived everyday competence (based on subjects' self-reports of competence) has been examined both for large representative samples of elderly and for smaller, selective samples. Based on three large representative samples, Fillenbaum (1985) reported the relationship between ratings of physical health and ratings of everyday competence to be on the order of .54. However, findings from the more recent Duke epidemiological studies indicated a relationship of .16 for blacks and .22 for whites between ratings based on self-reports of health conditions and ratings based on self-reports of everyday competence (Galanos et al., 1991). In summarizing findings from a number of studies conducted with subjects at the Philadelphia Geriatric Center, Lawton (1987) reported an association of .30-.40 between self-reports of everyday competence and physical health (assessed via self-reports of health conditions); a similar level of relationship was reported in earlier research (Lawton & Brody, 1969).

Findings from the above studies, in addition to being based on self-reports of physical health, provide little insight into the specific health conditions or age-related changes in physical functioning that may be related to everyday competence. Branch, Horowitz, and Carr (1989) studied the relationship between everyday competence and vision. Vision impairment, defined as blindness in one or both eyes or reported trouble seeing, is the second most prevalent impairment among those over age 65. It was found to affect 13% of the noninstitutionalized elderly; the proportion increases with age, with 16% of those 75 to 84 years and 27% of those aged 85 and older reporting vision impairment (Havlik, 1986). Branch et al. (1989) compared changes in self-reports of everyday competence over a 5-year period for a group of elderly who reported good vision at both interviews versus a group of elderly reporting a decline in vision over the 5-year period. Those reporting a decline in vision were significantly more likely to report needing greater assistance with activities associated with everyday competence. For example, elderly with vision problems were twice as likely to report needing assistance with shopping and paying bills as were those reporting good vision. Those suffering visual impairment were 1.5 times less likely to leave their residence and were only half as likely to travel by car.

Physical Health and Performance

In our research on the elderly's performance on tasks associated with everyday competence, we have examined the relationship between performance and several indicators of physical health, including the number and types of prescription medications taken for acute and chronic disease (Willis & Marsiske, 1991). There was a significant but modest negative relationship between number of cardiac drugs and total number of drugs taken and performance on tasks associated with everyday competence ($r = -.20$ for cardiac drugs, $r = -.15$ for total drugs).

The elderly's compliance with drug therapies is one domain of everyday competence in which the relationship with physical health has been examined. Elderly with multiple disease pathologies who are taking multiple drugs with complicated regimens were found to be less compliant (Fedder, 1982, 1984; Fincham, 1988).

Cognition

The relationship between cognition and everyday competence has been examined in a variety of literatures and disciplines, including functional

assessment, geriatrics, clinical psychology, and adult cognition. These diverse studies have involved elderly populations with different personal characteristics, various measures of cognition, and different approaches to the assessment of everyday competence. In this section, we provide a brief review of three types of studies that have examined the relationship between cognition and everyday competence. The first group includes research on functional assessment with noninstitutionalized, community-dwelling samples. The second group focuses on clinical research with cognitively impaired samples of elderly. The third group of studies has been conducted by developmental and experimental psychologists studying adult cognition with noninstitutionalized, community-dwelling populations.

Functional Assessment Studies

The four studies in this group involve data obtained through interviews with subjects. Very brief, global measures of cognition were employed (Lawton, 1987). Everyday competence was assessed in terms of IADL. Each IADL domain (e.g., medication, food preparation) was assessed by a single item; the subject or an informant indicated on a 2- or 3-point scale whether the subject could perform activities in this domain independently or needed assistance. Items have been summed to form a composite measure of everyday competence; in some studies, an overall rating was assigned by the interviewer (Duke, 1978).

Two articles by Fillenbaum report findings from large, representative samples of elderly. In the 1970s, three surveys of functional assessment were conducted in North Carolina, Virginia, and Cleveland, Ohio (Fillenbaum, 1985); the Cleveland survey also included a short measure of cognition. Concurrent correlations between the everyday competence score and the cognition score were on the order of .50-.60. Subjects' mental status was reassessed 1 year later, and the everyday competence measure predicted subsequent mental status ($r = .48-.51$). Recently, Fillenbaum and associates (Galanos et al., 1991) have reported on findings from the Duke epidemiological studies that include both black and white elderly. Notably, the correlation between cognition and the everyday competence summary score was one of the few relationships to reach clinical significance (blacks, $r = .43$; whites, $r = .36$). Galanos, et al. (1991) write:

On average, those with cognitive impairment tended to have the most difficulty with the activities. . . . They had particular difficulty with instrumental activities of daily living; proportionally three to six times as many people with impaired cognitive functioning reported problems with instrumental activities as did those whose level of cognitive functioning was unimpaired. This was approximately

double the rate for those whose physical health was poor or who were depressed. . . . In this community-based sample, mental condition appears to be more important than physical condition in determining performance on complex tasks. (p. 11)

Lawton and associates have conducted a number of studies examining the relationship between cognition and IADL. In one of the earliest reports on a measure of IADL, Lawton and Brody (1969) reported a correlation of .40 between a short mental status measure and interview ratings of IADL. Lawton (1987) summarizes the findings from five studies conducted at the Philadelphia Geriatric Center. Multivariate analyses were employed to examine the relationship between brief mental status measures and IADL ratings. Significant relationships between mental status and perceived IADL competence were reported in four of the five studies.

Studies with Cognitively Impaired Elderly

The study of everyday competence in cognitively impaired elderly is of interest from both basic and applied perspectives. In the early stages of dementia, the elderly usually are community-dwelling, sometimes living alone and attempting to carry out many of the activities representative of everyday competence. Indeed, it is the person's failure to perform some of the activities associated with everyday competence (e.g., driving, managing financial matters) that motivates spouses and adult children to seek assessment and diagnosis. Given that mental problems typically appear earlier than physical debilitation in dementia patients, declines in performance are often noted for IADL prior to decline in self-maintenance tasks (e.g., bathing).

Early clinical diagnosis is largely based on performance on neuropsychological tests. The relationship between performance on such tests and the patient's everyday competence is of interest both in understanding the etiology and pattern of decline in brain functioning and in counseling family with regard to the types of services and support systems needed at various stages of the disease. Limitations in the range of competence assessed by traditional neuropsychological batteries has been noted (Ashford, Kolm, Colliver, Bekian, & Hsu, 1989; Vitaliano, Breen, Albert, Russo, & Prinz, 1984). Test items may not have sufficient range to discriminate reliably the cognitive limitations in early dementia patients, who may be functioning quite adequately in many areas, whereas a floor effect on items may be observed late in the disease progression. Alternatively, some patients suffering from problems other than dementia may exhibit low scores on traditional measures yet function quite adequately on everyday competences. Functional assessment of everyday competences is increasingly being recognized as a useful supplement to traditional neuropsychological batteries.

Ashford and colleagues (1989) examined the relationship between performance on the Mini-Mental State Exam (MMSE) and families' reports of patients' everyday competence as represented by IADL ($r = .76$). Patients had been diagnosed with possible or probable Alzheimer's disease. Decline in IADL functioning was shown earlier in the disease progression than were limitations in self-maintenance activities. In addition, in severely demented patients whose MMSE scores had dropped to almost zero, IADL functioning continued to provide a sensitive and reliable assessment of progressive cognitive deterioration.

Vitaliano et al. (1984) examined whether items from traditional neuropsychological measures could predict performance on everyday activities varying in complexity. Items from the MMSE and the Dementia Rating Scale served as predictors. Three levels of complexity in everyday activities were assessed, with self-maintenance activities representing the lowest level of complexity, communication (talking, listening) as an intermediary level, and reading and writing as the most complex activities. The data supported the hypothesis that performance on more cognitively complex everyday activities requires a broader array of cognitive processes than do less complex activities. The most complex activities of reading and writing were found to be significantly related to four types of cognitive processes (attention, calculation, recognition, and orientation). In contrast, the least complex, perhaps more physically oriented activities associated with self-maintenance were predicted only by the two less cognitively demanding processes of attention and recognition.

As in the study of normal cognitive aging, those studying dementia-related cognitive impairment have also bemoaned the lack of reliable measures to assess actual performance on activities associated with everyday competences. Loewenstein et al. (1989) recently reported on the development of a new instrument to assess seven domains of everyday competence in cognitively impaired populations. The domains were time orientation, communication (telephone usage, posting a letter), transportation (road signs), finances (counting currency, making change), shopping (remembering a shopping list), eating skills, and self-maintenance (dressing, grooming). Patients classified as suffering from mild or moderate stages of dementia were found to perform more poorly than either depressed or normal aged on all activities except those that required telling time, identifying change, eating, and dressing/grooming. These findings again support the notion that the more cognitive, complex everyday competences associated with the IADL decline earlier than do self-maintenance competences.

Finally, Heaton and Pendleton (1981) extensively examined the literature, including young and older adult subjects, on the relationships between neuropsychological test scores and aspects of self-care, independent living, academic achievement, and vocational functioning. Overall, significant rela-

tionships were found between test scores and indices of independent functioning, including clinician ratings and hospital discharges.

Studies of Everyday Problem Solving

A recent trend in the study of adult cognition has been a focus on everyday problem solving or practical intelligence (Poon, Rubin, & Wilson, 1989; Sinnott, 1989; Sternberg & Wagner, 1986). This trend has been evident in mainstream cognitive psychology as well as in geropsychology. Everyday problem solving, in contrast to academic or information processing approaches traditionally studied in the laboratory, is said to focus on "real world" problems that occur in naturalistic settings, are of intrinsic concern to the subject, and may involve multiple or ambiguous solutions (Wagner, 1986).

The topic of everyday problem solving is of particular concern in cognitive aging because the external validity of traditional cognitive constructs and measures for studying intellectual functioning in old age has been seriously questioned (Schaie, 1978, 1987; Willis & Baltes, 1980). Traditional approaches to the study of intelligence (e.g., psychometric intelligence, information processing, Piagetian) have been derived largely from earlier stages in the life span and have been validated in terms of developmental tasks (e.g., education, vocational aptitude) of concern at early stages in the life span. The question arises whether such approaches and the corresponding measures still tap important cognitive processes for older adults facing qualitatively different developmental tasks and everyday problems.

Some have contended that everyday problem solving and traditional approaches to the study of intelligence represent distinct, unrelated forms of intelligence (Ceci & Liker, 1986; Frederiksen, 1982; Wagner, 1986). However, we have suggested that a hierarchical relationship exists between the two forms of intelligence in our previous writing (Willis, 1987; Willis & Marsiske, 1991; Willis & Schaie, 1986). Similar to Berry and Irvine (1986), we propose that the cognitive processes and abilities represented in the traditional approaches to intelligence are considered universal across cultures. When nurtured and directed by a particular society or at a particular stage of life, these processes and abilities develop into cognitive competences that are manifested in daily life as cognitive performance. In other words, the basic abilities and processes represent *genotypic* forms of intelligence that are relatively context- or culture-free. Everyday competences, are represented in activities of daily living, are *phenotypic* expressions of intelligence that are context- and/or age-specific (Schaie, 1987; Willis & Schaie, 1986). The particular activities and behaviors that serve as phenotypic expressions of intelligence will vary with the age of the individual, that person's social roles, and the environmental context. The seven domains of everyday competence described earlier in this chapter may be integral to independent functioning in our society across the adult years. However, the

relative salience of the various domains and the activities representative of the domains may vary from young adulthood to old age.

In the following section we briefly review studies that have examined the relationship between traditional cognitive abilities and processes and performance on activities representative of everyday competence. We have restricted our view of the practical intelligence literature to focus on studies in which the problems studied fall within the seven domains of everyday competence described previously.

We have conducted a program of research examining older adults' ability to solve everyday problems involving printed material (Willis, 1987; Willis & Marsiske, 1991). Tasks in each of the seven IADL domains have been examined: meal preparation (e.g., dietary chart), transportation (e.g., bus schedule), financial management (e.g., Medicare form), medications (e.g., medicine bottle label), shopping (e.g., mail order catalog form), and telephone (e.g., emergency phone listing). Both concurrent and lagged relationships between basic psychometric mental abilities and subjects' performance on everyday tasks involving printed material have been examined (Willis, 1987; Willis & Marsiske, 1991; Willis & Schaie, 1986).

Because different psychometric abilities exhibit different patterns of age-related change in later adulthood (Schaie, 1990), we are particularly interested in the specific mental abilities that were related to everyday task performance. Cattell (1971) has differentiated between two broad domains of mental abilities. Crystallized abilities (e.g., verbal, social reasoning) are said to reflect acculturated influences, such as level of schooling: in healthy older adults, crystallized abilities remain stable, on average, showing little or no decline until old-old age. In contrast, fluid abilities involve abstract reasoning and speeded responding; fluid abilities are said to be impacted by neurological assaults and to exhibit earlier patterns of decline, beginning, on average in the mid-60s or earlier. Thus, older adults performance on everyday tasks would be expected to show different patterns of developmental change, depending on whether such tasks are more closely related to fluid or crystallized abilities.

In our research on concurrent relationships between mental abilities and everyday tasks, we have found that over half of the variance in older adults performance on everyday tasks can be accounted for by mental ability performance (Willis & Marsiske, 1991; Willis & Schaie, 1986). Both fluid and crystallized abilities have been found to account for everyday task performance, although a somewhat greater portion of the variance was accounted for by fluid abilities. However, causal relationships among variables cannot be determined by examination of concurrent relationships. In our hierarchical model of ability-everyday competence relationships, basic mental abilities have been hypothesized to be the salient antecedents of performance on complex tasks of daily living. To test this hypothesis, we examined whether performance on fluid and crystallized abilities at the first

assessment occasion were significant predictors of everyday task performance 7 years later. Both fluid and crystallized abilities were indeed found to be significant predictors.

To further examine the reciprocal relationship between abilities and everyday task performance, a series of structural equation analyses were conducted (Willis et al., 1991). That is, the directionality of the relationship between abilities and everyday tasks was examined by contrasting models of abilities as predictors of everyday task performance *versus* models of everyday task performance as predictors of abilities. Findings from the structural equation analyses indicated that fluid ability at the first assessment occasion predicted everyday task performance at the second assessment occasion 7 years later. Everyday task performance predicted abilities at the second occasion less well. Therefore, these findings provide support for our hypothesis that functioning on basic mental abilities is a significant antecedent of everyday tasks involving printed materials.

The findings of other studies also support the role of mental abilities as salient antecedents of everyday competence. Camp, Doherty, Moody-Thomas, and Denney (1989) presented a series of everyday problem situations to older adults and asked them to generate as many efficacious solutions as possible. Problem situations included the domains of shopping, financial management, and housekeeping. Judges rated the efficacy of problem solutions, and subjects' scores were the summed efficacy ratings across solutions. Subjects' scores were found to correlate significantly with the WAIS Information ($r = .34$) and Similarities ($r = .29$) subtests and with a measure of abstract reasoning ($r = .40$).

Cornelius and Caspi (1987) presented elderly subjects with a series of practical problem situations, focusing on transportation, financial management, shopping, and housekeeping. Four solutions to each problem were presented, and subjects were asked to rate the likelihood that they would apply each of the four solutions. Judges provided independent estimates of the efficacy of each solution alternative; the outcome measure was the degree of congruence between subject's likelihood ratings and judges' ratings of solution efficacy. Outcome scores were significantly related to verbal ability ($r = .27$) and abstract reasoning ability ($r = .29$).

COMPONENTS OF EVERYDAY COMPETENCE

Intraindividual Components

Task-specific Physical Skills and Abilities

This component is concerned with the specific physical skills and abilities required to perform a particular everyday activity and whether or not the

elderly suffer from physical conditions that limit their performance of such skills. For example, in taking medications, the elderly may need tactile dexterity and strength to open childproof containers or visual proficiency to read the small, fine print on medicine bottle labels. In a study of community-dwelling elderly, 52% were observed to have difficulty with or could not open containers with a childproof cap. Twenty-two percent reported that they needed to use a vision aid (e.g., magnifying glass) other than glasses in order to read the labels on their medicine bottles (Willis & Diehl, 1989).

In an excellent chapter by Charness and Bosman (1990) on human factors and aging, data are provided on the physical demands of certain tasks, compared with the average level of physical functioning for the elderly on the task. For example, pedestrian accidents among the elderly are most likely to occur as a result of older people's being struck by vehicles at intersections. It appears that green light time values often have not been calibrated to the normative "fast walking speed" of the older adult. Data from Sweden indicate that the average "fast walking speed" for elderly aged 79 years was 1.21 m/s, whereas the assumed walking speed for intersections in Sweden was 1.4 m/s (Svanborg, 1984).

Task-specific Cognitive Skills and Abilities

There have been relatively few instances in which the specific cognitive skills and abilities required to perform a task have been studied in later adulthood. One noteworthy exception is Park's (1991) recent work on a cognitive model for the study of medication adherence in the elderly. The model involves four cognitive components related to steps in medication adherence: (1) understanding medication instruction (comprehension), (2) integration of information across multiple drugs (working memory), (3) long-term recall of medication information (long-term memory), and (4) remembering to take the medication at the appropriate times (prospective memory). Recent research on memory processes involved in the various phases of medication adherence indicated that the elderly made more comprehension errors than did the young and made more errors in long-term recall of medication information (Morrell, Park, & Poon, 1989). However, several studies suggest that the prospective memory of the elderly may be as good as or better than that of younger adults (Leirer, Morrow, Paniante, & Shiekh, 1988; Poon & Schaffer, 1982).

Contextual Components

Physical Context

It is instructive to consider the amount of time older adults report spending on activities representing everyday competences and where these activities

take place. Differences in time utilization have been found for samples varying in level of competence. Studies in both the United States and Germany indicate that community-dwelling older adults spend more time on obligatory activities (e.g., meal preparation, shopping, housekeeping) than on any other type of activity. Older adults in Germany reported spending more than half of a typical day on obligatory activities; these activities are usually performed at home and in the morning (Baltes, Wahl, & Schmid-Furstoss, 1990). In a U.S. study, community-dwelling elderly reported spending a total of 5 to 6 hours per day on obligatory activities (Lawton, Moss, & Fulcomer, 1986-87; Moss & Lawton, 1982). However, the amount of time spent in particular domains was found to vary with the physical competency level of the older adult. Physically able older adults spent more total time in obligatory activities than physically frail elderly. In particular, they spent more time in shopping, housework, meal preparation and travel. They also spent less time at home. In contrast, less physically able community-dwelling older adults reported spending more time in health care activities (Moss & Lawton, 1982).

Social Context

Both the German and U.S. studies of the elderly's daily activities indicated that most obligatory activities are performed alone. Although solitary activity was particularly likely for the widowed and those living alone, most married elderly also reported doing the majority of obligatory activities alone. However, the physical health of the individual did moderate whether or not activities were performed alone. For less physically able elderly, the performance of obligatory activities was more likely to occur in the presence of another person, often providing assistance (Moss & Lawton, 1982).

We turn now from defining the antecedents and components of everyday competence to considering the outcomes of competence. We must begin, however, by considering the mechanisms moderating the manifestation of everyday competence in the activities of daily living.

MECHANISMS

High levels of competence are not necessarily associated with desirable or efficacious behavior. Although the elderly may be competent to perform the tasks and activities required to function independently in our society, they may choose not to do so for various reasons. In this section, we consider one mechanism that has been shown to moderate whether individuals carry out desired behaviors, namely, the individual's beliefs regarding self-efficiency and control. Second, we briefly consider the literature examining whether

or not health-seeking and other efficacious behaviors have actually been found to be related to physical and psychological well-being, the outcome variables in our model.

Self-Efficacy and Control Beliefs

Individuals develop beliefs regarding the relationship between their behavior and the resulting outcomes (Baltes & Baltes, 1986; Rodin et al., 1985). When individuals perceive events as contingent on their own behavior or their own personal characteristics, they have an internal locus of control orientation. When, however, events are believed to result from chance or dependence on powerful others, such perceptions represent a belief in external control (Rotter, 1966; Rodin et al., 1985; Wallston & Wallston, 1982). Whether or not individuals think the outcome of events is under their control is determined, in part, by their self-efficacy beliefs. Perceived self-efficacy refers to people's judgments of their own capabilities to execute different levels of performance in different domains (Bandura, 1977). How are control beliefs and self-efficacy related to effective functioning? Individuals with an internal locus of control and high self-efficacy have been shown in experimental studies to be more likely to initiate the desired behavior and to show longer persistence in carrying out the activity. Self-efficacy and control beliefs are of particular interest in old age because the elderly are increasingly likely to experience physical limitations, role loss, and cultural stereotypes that impact negatively on efficacy and control beliefs.

Significant relationships between control and efficacy beliefs and everyday competence have been reported, whether competence is assessed through self-report or performance measures. In her diary study of older adults' everyday activities, Baltes et al. (1990) found a significant positive relationship between self-efficacy beliefs and perceived level of everyday competence. Likewise, Duffy and MacDonald (1990) found the elderly's beliefs regarding health locus of control were associated with self-reports of everyday competence. The elderly who believed control of their health was determined by chance or by powerful others reported needing more assistance with everyday activities.

In two studies in our laboratory, we have examined the relationship between efficacy and locus of control beliefs and community-dwelling elderly's performance on tasks involving everyday competence with printed materials. In a study of concurrent relationships, the elderly who reported higher external control beliefs (chance and powerful others) performed more poorly on everyday tasks (Willis & Marsiske, 1991). A more powerful demonstration of the relationship was found in a longitudinal study in which the elderly's performance on everyday tasks was found to predict their

self-efficacy beliefs 7 years later (Willis, Jay, Marsiske, & Diehl, 1991). Older adults who performed more competently on daily tasks had higher self-efficacy beliefs 7 years later. These data suggest that older adults are aware of changes in their level of everyday competence and adjust their self-efficacy beliefs accordingly. The literature also indicates that high internal control beliefs are related to several indicators of psychological well-being, including life satisfaction, morale, and effective coping strategies (Rodin et al., 1985).

Efficacious Behaviors

Our model assumes that (1) everyday competence is a prerequisite to the performance of health promotion behaviors and other types of efficacious activities and (2) performance of such activities will increase the likelihood of physical and psychological well-being. Previous research indicates that certain personal characteristics are related to the practice of more and better health habits. These characteristics include being older, being female, and having higher income (Wilson & Elinsor, 1981). In a recent survey of health practices involving a representative sample of adults 18 years and older, the elderly reported higher compliance rates with most health practices than did younger age groups (Bausell, 1986). For 17 of the 20 health behaviors examined, the compliance rate was over 50% for older adults. The greatest differences between older and younger adults were found in the areas of dietary behaviors, blood pressure monitoring, and practice of safety precautions in the home. Older adults held stronger beliefs regarding the efficacy of such health practices for promoting longevity. Moreover, the older adult's belief in the efficacy of the health behaviors was the strongest predictor of compliance rate.

Findings on the relationship between health practices and health status (physical well-being) in the elderly have been mixed. Some studies have found health practices related only to perceived health status, not to actual health status (Brown & McCreedy, 1986; Palmore, 1970). However, some recent research has found health promotion activities are associated with improved overall health in older people (Hawkins, Duncan, & McDermott, 1988; Ostrow & Dziewaltowski, 1986; Paffenbarger, Hyde, Hsieh, & Wing, 1987).

OUTCOMES: PHYSICAL AND PSYCHOLOGICAL WELL-BEING

Older adults' competence to carry out activities associated with independent living impacts on both their physical and psychological well-being.

Physical Well-Being

Limitations in competence to perform activities associated with independent living has been related to a number of negative indices of physical well-being. Epidemiological surveys have focused primarily on mortality as the key outcome variable associated with loss of ability to function independently. Although a strong association might be expected between mortality and inability to perform self-maintenance activities (e.g., bathing, eating), the strength of a relationship might be questioned between mortality and the less physically demanding, more cognitively complex IADL. However, studies in the United States and in Japan report significantly higher death rates among the elderly suffering from limitations in instrumental activities associated with everyday competence. One-year follow-up data from the Cleveland survey (subjects 65+ years) indicated that the overall death rate was 5%; however, of those unable to perform unaided any of the five IADL studied, 27% had died (Fillenbaum, 1985). At the other extreme, only 2% of those who could perform all five activities independently had died.

A Japanese study examined in more detail the mortality rate of able versus disabled elderly with respect to each of the seven instrumental activity domains (Koyano et al., 1989). Even for the physically less demanding but cognitively more demanding domain of financial management, significant differences in mortality rates were found for able males and females (2.2% and 1.1%, respectively) versus disabled males and females (13.8% and 8.9%, respectively). After controlling for the effects of age, the odds of mortality in the disabled were 4.3 times that of the nondisabled for males and 4.2 times for females.

Limitations in ability to function independently are associated not only with higher mortality rates but also with increased likelihood of requiring future health and social services. Having one or more IADL limitations has been found to be associated with subsequent nursing home placement (Branch & Jette, 1982; Shapiro & Tate, 1985), hospital utilization (Donaldson & Jagger, 1983), and use of home health care (Evashwick, Rowe, Diehl, & Branch, 1984; Wolinsky et al., 1983).

Psychological Well-Being

More attention has often been placed on physical than on psychological outcomes because greater emphasis has often been given to physical and disease-related antecedents of everyday competence. However, for many older adults, it might be argued that the stress and discomfort associated with loss of independence is largely psychological rather than physical in nature. Dependency has been found to affect the elderly's self-concept and

life satisfaction even more so than physical pain or social isolation (Kuri-ansky, Gurland, Fleiss, & Cowan, 1976).

Lawton (1987) examined findings from five separate studies conducted at the Philadelphia Geriatric Center regarding the multivariate relationships between the elderly's ability to function independently and their psychological well-being. The construct of psychological well-being was defined in terms of variables such as morale and life satisfaction. In four of the five studies, level of everyday competence was found to have a significant and direct effect on psychological well-being. In addition, in three of the five studies, everyday competence was found to have indirect effects on psychological well-being via the mediating variable of time use. Limitations in everyday competence impacted on time spent in discretionary activities, which in turn related to psychological well-being.

Everyday competence is not a static phenomenon but a dynamic construct that undergoes quantitative and qualitative change as the individual progresses from young-old to very old age. In the next section, we review the literature on age-related change in everyday competence.

DEVELOPMENTAL CHANGE IN EVERYDAY COMPETENCE IN OLD AGE

Cross-Sectional Survey Findings

Much of the prior research on everyday competence has involved large-scale surveys of noninstitutionalized elderly. Although the survey research has benefited from representative sampling, it has suffered from two problems. It has been cross-sectional, so age-related changes in competence could not be examined, and second, level of competence has been assessed by self-report. Typically, the older adult has been asked to rate his or her level of competence in each of the seven domains on a 3-point scale: can perform without help, can perform with help, or unable to perform even with assistance. In studies using comprehensive assessment batteries, such as the OARS (Duke, 1978), a summary rating across the seven domains was then made by the interviewer.

Survey research suggests that 20% to 30% of the community-dwelling elderly report having difficulty with one or more of the seven domains associated with independent living (Fillenbaum, 1985; Galanos et al., 1991). There has been limited survey research on ethnic differences in level of competency. In the recent Duke epidemiological study, approximately one-third of blacks and one-quarter of whites were found to need assistance in one or more of the seven domains (Galanos et al., 1991).

Although competence in all seven domains is considered essential for independent living, there is variability in the frequency or regularity with

which activities in each domain are performed. Stone and Murtaugh (1990) distinguish between three domains in which activities are typically performed on a daily basis (meal preparation, medications, telephoning) versus the remaining four domains (shopping, financial management, housekeeping, transportation), involving activities less frequently performed. It might be argued that competence in activities performed daily is more critical and that a greater proportion of elderly would report needing assistance in those domains. This hypothesis, however, is not supported by the findings of several national surveys in which representative samples of community-dwelling elderly were interviewed regarding the domains in which they perceived a need for assistance. Older adults from three large surveys reported being more likely to need assistance with housekeeping, transportation, and shopping, none of which is considered a daily activity (Fillenbaum, 1985); comparable findings were recently reported by a study in the Netherlands (Kempen & Suurmeijer, 1990).

Figure 4.2 shows the proportion of young-old (60-74 yrs) and old-old (75+ yrs) and the proportion of men and women in a large survey (Fillenbaum, 1985) who reported themselves to be able to perform competently in each domain without assistance. Comparisons of young-old and old-old indicate a smaller proportion of old-old capable of functioning indepen-

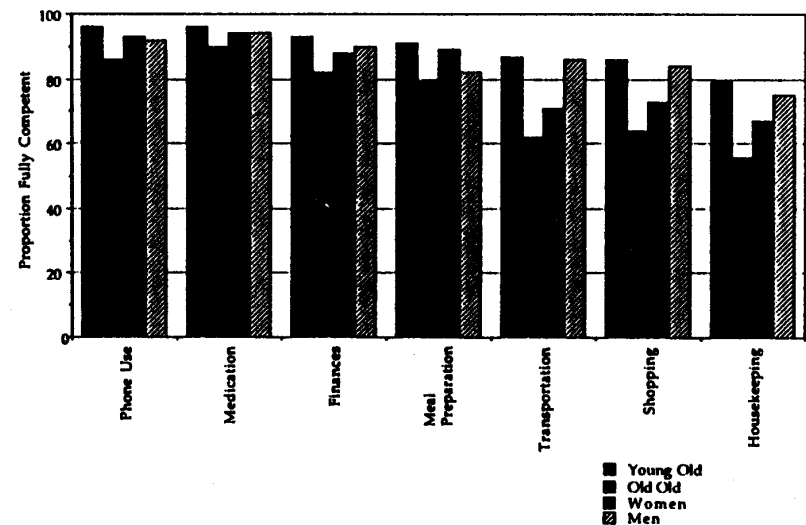


Figure 4.2 Proportion of persons reporting themselves as "fully competent."

dently in each of the seven domains. Age differences are most evident for the three domains of shopping, transportation, and housekeeping; over 40% of the old-old report needing some assistance. Both blacks and whites reported the greatest limitations with regard to the domains of transportation, shopping, and housekeeping, although a higher proportion of blacks reported needing assistance in each domain (Galanos et al., 1991).

Comparisons of men and women indicate no gender difference with respect to telephone usage, taking medications, or financial management (Fillenbaum, 1985). Men report themselves to be somewhat more competent with respect to shopping, housekeeping, and traveling to locations outside walking distance. Fillenbaum (1985) has argued that data on physical competence and mobility do not support the rationale that these gender differences can be attributed to differences between men and women in physical mobility. It has been suggested that men and women may have different standards for housekeeping, thus resulting in more men than women reporting continuing competence in this domain. Lack of adequate explanations for these age and gender differences highlights a limitation of the current self-report procedure for assessing competence in that there is little examination of the reasons (i.e., physical, mental, motivational) for which individuals perceive themselves no longer to be competent to perform in these domains.

Based on Guttman scaling of these cross-sectional survey data, perceived competence in the seven domains has been ranked in order of difficulty. The order from most to least difficult was reported to be housework, travel, shopping, meal preparation, and management of finances (Fillenbaum, 1985). However, in a sample selected so that all subjects reported limitations in one or more personal care (ADL) or IADL domains, the ordering of difficulty was somewhat different (Stone & Murtaugh, 1990). The domain in which most subjects reported needing assistance was grocery shopping (11%), followed by financial management (9%) and laundry (8%).

Age-Related Change in Everyday Competence

Change in Perceived Competence

One epidemiological study has examined the rate of change in older adults' perception of competence, comparing samples differing in level of physical and mental functioning. Blazer (1978) compared the proportion of community-dwelling versus institutionalized elderly who reported themselves to have remained stable, to have declined, or to have improved in level of competency over 1 year. Of the community dwelling, 44% perceived themselves to be at the same level of competency after 1 year, 38% reported

themselves to have declined, and 18% perceived an improvement in competency level. In contrast, 52% of the institutionalized elderly reported having declined, 31% had remained stable, and 17% reported having improved. The greater rate of decline in the institutionalized sample would be expected. However, what is noteworthy is that 17% of even the institutionalized elderly reported improvement over the year, indicating plasticity in perceived level of functioning.

Change in Level of Performance

In prior research, we examined 7-year change in performance on tasks associated with everyday competence in a relatively healthy community-dwelling sample of older adults (Willis & Marsiske, 1991). The tasks required older adults to read and comprehend printed material associated with each domain (e.g., comprehending medicine bottle labels, mail order catalog forms, etc.). Figure 4.3 presents average longitudinal change data for three age groups: 63-year-olds retested at age 70, 70-year-olds retested at age 77, and 77-year-olds retested at age 84. Note that the pattern of age-related change is fairly linear but that the magnitude of change varies across

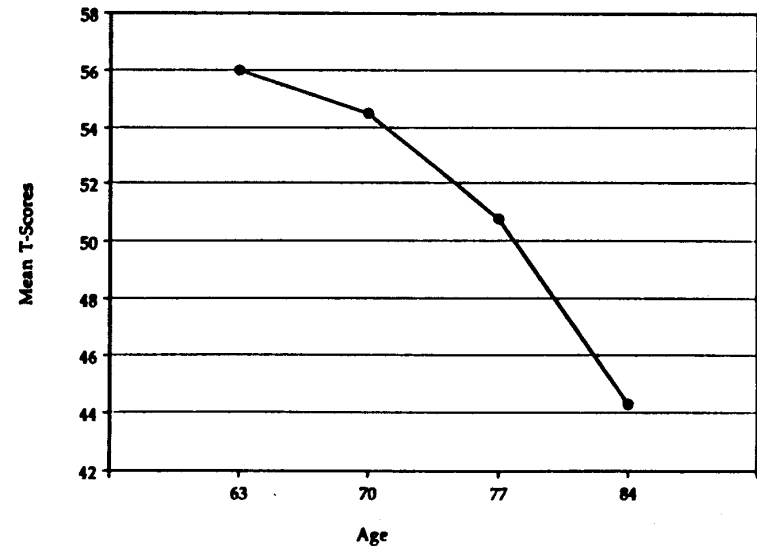


Figure 4.3 Change in performance on everyday tasks.

the age groups. The 63-year-olds declined less than .2 of a standard deviation over the 7-year interval. In contrast, the magnitude of decline was .4 and .6 standard deviation units for the 70- and 77-year-olds, respectively.

Although Figure 4.3 indicates a decline, *on average*, for older adults, there are wide individual differences in the rate and patterns of decline. Each individual's performance was examined in terms of magnitude of change, and each individual's performance was categorized as having reliably changed, having remained stable, or having improved over the 7-year interval. The proportion of individuals showing no reliable decline over each age interval was 63-70 years, 70%; 71-77 years, 50%; 77-84 years, 36%.

METHODOLOGICAL ISSUES IN THE STUDY OF FUNCTIONAL COMPETENCE

Limitations of Self-Report Data

Findings from both survey research and clinical studies have relied heavily on the older adult's self-report of level of functioning in each of the competency domains. In the case of comprehensive functional assessment instruments, such as the OARS (Duke, 1978), a summary rating (6-point scale) was derived across the seven domains. However, a number of investigators have noted at least two limitations in self-report data on everyday competence. Older adults often overestimate their level of competence when compared to ratings by professionals or to actual performance. Second, the self-report data provide little information on what factors (physical, mental, environmental) account for the reported limitation in functioning.

In validity studies associated with development of the OARS, significant differences between ratings based on clinical interviews and self-report data were found in only one area: functioning on activities of daily living (Fillenbaum, 1978). In noting this discrepancy, Fillenbaum writes: "On ADL, however, the questionnaire tends to give too rosy a picture, for clinicians, in personal contact with clients notice difficulties which are not so evident from questionnaire data alone" (p. 28). Disparities between self-reported level of functioning and ratings of health professionals in contact with the older adult have also been noted by Ford et al. (1988).

Although overestimation of functional competence is more common in healthy, community-dwelling elderly samples, the etiology of the disorder in impaired populations affects whether competence is overestimated or underestimated. In a study of geriatric psychiatric patients, Kuriansky et al. (1976) found that only 41% of patients evaluated their level of physical ability at the same level as exhibited on a performance test. Patients diagnosed as having an organic disorder were more likely to overestimate

competence, whereas those with a functional disorder were more likely to underestimate performance. Moreover, the patient's self-report of competence was not a good predictor of outcome measures, such as deinstitutionalization. However, informants' (e.g., spouses, close friends) evaluation of the patient's level of competence was significantly related to actual test performance.

Stability and Reliability Issues

Stability

Stability is concerned with the consistency of the respondent's answers over time. Over brief periods of 1 week to 1 month, older adults' self-reports of competence are highly stable; test-retest correlations in several studies are reported to be in the range of the .70s to .80s (Fillenbaum, 1978, 1985; Fillenbaum & Smyer, 1981; Lawton, Moss, Fulcomer, & Kleban, 1982).

Reliability

Two forms of reliability are concerned: (1) the internal consistency within the test (among items and or subscales) and (2) observer consistency, including both interobserver consistency and intraobserver consistency over time. There has been relatively little examination of the internal consistency of the older adult's responses across competency domains (e.g., meal preparation, transportation, etc.), partially because comprehensive functional assessment batteries require the interviewer to derive a single summary rating of competence across competency domains. On the one hand, it might be hypothesized that a relatively low level of internal consistency in responses would be expected across such disparate activity domains as meal preparation, financial management, and telephone usage. On the other hand, it might be argued that a high level of internal consistency should be found in self-report data because a halo effect would lead older adults to perceive themselves, in general, as competent or incompetent.

The limited data available suggest considerable internal consistency across IADL domains for both self-report data (Fillenbaum, 1985; Lawton et al., 1982) and performance data (Willis et al., 1991; Willis & Schaie, 1986). Lawton et al. (1982) report an alpha of .91 for the instrumental activities scale of the Multilevel Assessment Instrument (MAI). Factor analyses of the OARS Multidimensional Functional Assessment Questionnaire (OMFAQ) indicated that instrumental activities load on a separate factor from physical activities of daily living (Fillenbaum, 1985). Furthermore, a high degree of internal consistency has been observed in our recent

studies of older adults' performance on tasks related to each of the seven competency domains. In two separate studies, using different measures of competency, we examined the relationship between older adults' performance on tasks involving printed materials associated with each competency domain (Willis, 1991; Willis & Schaie, 1986). In both studies, significant relationships were found between older adults' performance on tasks associated with, for example, financial management (e.g., filling out an IRS form) and transportation (e.g., reading a road map).

Acceptable levels of both interrater reliability and intrarater reliability have been reported for self-report questionnaire data. Interrater reliability estimates have been reported in the range of .80s to .90s (Fillenbaum, 1978; Fillenbaum & Smyer, 1981). Likewise, the rater's self-consistency in rating an older adult's self-report questionnaire data over a 12- to 18-month interval for activities of daily living was found to be in the .80s and .90s (Fillenbaum, 1978).

Validity Issues

At least three types of validity are of concern in the study of everyday competence. *Construct* validity is concerned with whether a procedure or instrument is measuring the phenomenon it purports to measure. *Discriminant* validity is concerned with whether a procedure or instrument differentiates between subgroups expected to differ in level on the construct of interest. *Predictive* validity deals with how well an instrument predicts the individual's future level of functioning on the construct of interest or on a related outcome variable. Predictive validity has been considered in a previous section on psychological and physical well-being as outcomes of competence.

With regard to discriminant validity, the self-report data from comprehensive functional assessment batteries have been shown to discriminate between elderly living independently and those in assisted-living or institutional settings. That is, community-dwelling older adults report themselves to be functioning more competently than do those in assisted or institutional settings (Fillenbaum, 1978; Lawton et al., 1982).

However, findings from studies of the construct validity of self-report data have been problematic (Fillenbaum, 1978; Fillenbaum & Smyer, 1981; Lawton et al., 1982). Professionals' evaluations, based on clinical interviews or physical examinations, have been the "gold standard" against which ratings derived from self-report data have been compared. Generally, the correlations between professional evaluations of competence and older adults' self-reports of their ability to function independently have been modest (Fillenbaum, 1978; Lawton et al., 1982). As noted previously, com-

munity-dwelling older adults tend to overestimate their level of competence, compared to the ratings of professionals.

SUMMARY AND CONCLUSIONS

In this chapter we have presented a model for the study of everyday competence in later adulthood and have reviewed literature related to each aspect of the model. The literature review has identified gaps and limitations in prior research. These limitations result, at least in part, from inappropriate terminology used to define everyday competence and from the methods used to assess the phenomenon.

The terminology used to study everyday competence links the construct too closely with the domains of health and physical functioning. Indeed, some authors have gone so far as to use the terms "functional health" or "physical functioning" to describe activities associated with everyday competence. If the term "health" was widely interpreted to emphasize well-being and effective functioning, in the manner used by the World Health Organization, then there would be no problem. However, when used in the study of aging, health is most commonly associated with a medical model that focuses on disease, disability, and irreversible decline. This focus has broad implications, not only for research on everyday competence but also for the provision of services to elderly persons with limitations in everyday competence.

Physical health antecedents, particularly chronic diseases, are overemphasized as the major antecedents and correlates of everyday competence. The research literature, however, suggests that cognitive factors are at least as salient if not more salient predictors of competence. Indeed, in the study of dementia, cognitive limitations are seen as the major impediment to everyday competence. Emphasis on physical illness as the primary cause of limited competence has also markedly influenced the types of services provided to the elderly. The most common types of services (homemaker services, visiting nurses, Meals on Wheels) focus on compensating for physical limitations. Far less attention is given to the design of services that attempt to modify or remediate loss of everyday competence.

A second major limitation to progress is the traditional method for assessing everyday competence. Research findings have generally been based on self-reports of the elderly and depend on a single item per competence domain. This approach surely is time-efficient, but the quality of the resulting data must be questioned. First, there is the problem of accuracy. The elderly overestimate their level of competence when compared to either clinical ratings by professionals or to actual performance data. Second, the 3-point scale typically used (performs independently, performs with assis-

tance, not able to perform) seriously restricts the possible range of variability, thus obscuring potentially significant relations with other variables. Third, items have typically been summed across domains, resulting in a single global score. Such global scores mask the wide individual differences in competence among different domains and precludes the systematic examination of domain-specific antecedents. These limitations in method of assessment should be of concern not only to the researcher but also to the clinician. The current deficient assessment methods are widely used to determine individual limitations and form the bases for service recommendations at the individual level. It is well recognized that far more stringent reliability and validity standards are required when research instruments are to be used for decisions at the individual level.

Measurement development is therefore a major concern for future research on everyday competence. Three issues must be addressed. First, a performance-based approach is essential. Everyday competence must be assessed through performance or direct observation rather than via self-report. Fortunately, new behavioral measures are being developed. The work of Loewenstein et al. (1989) with dementia patients and our own research on a measure assessing everyday competence via printed materials are useful first steps. Second, global measures of competence must be supplemented with reliable domain-specific subscales. Complex domains of behavior, such as shopping or transportation, cannot be assessed reliably with a single item. Multiple-item subscales that tap different aspects of each domain are needed. Third, measures must not only assess the competence of the individual but must also identify the causes of limitations in competence. As illustrated in our model, everyday competence is a multidimensional construct involving individual (physical, cognitive) and contextual (physical and social environment) components. Comprehensive measures are therefore needed to assess each of these components.

Finally, longitudinal studies need to examine the pattern and rate of change in activities associated with everyday competence. Currently, only a few 1-year follow-up studies of everyday competence exist. More far-reaching longitudinal studies that examine changes in competence from young-old to old-old to very old age are necessary to understand the rate and pattern of change in competence occurring across later adulthood. Change in competence is not likely to be uniformly linear and incremental; therefore, data from 1-year follow-up studies could be used to estimate the pattern and rate of change occurring over longer periods from young-old to old-old age. Work in other areas of adult development, such as cognition, suggests that change is more likely to follow a stair-step pattern, with plateaus followed by a drop or increment in performance. Such nonlinear patterns and the antecedent conditions associated with change can be ascertained only with longitudinal data.

In summary, the study of everyday competence in later adulthood poses many challenges and rewards for the serious researcher. But it is also an area of great personal concern to the elderly, and it is of major economic and social significance for our society. It deserves our best research effort.

REFERENCES

- Ashford, J. W., Kolm, P., Colliver, J. A., Bekian, C., & Hsu, L. (1989). Alzheimer patient evaluation and the mini-mental state: Item characteristic curve analysis. *Journal of Gerontology, 44*, P139-P146.
- Baltes, M. M., & Baltes, P. B. (1986). *The psychology of control and aging*. Hillsdale, NJ: Erlbaum.
- Baltes, M. M., Wahl, H. W., & Schmid-Furstoss, U. (1990). The daily life of elderly humans: Activity patterns, personal control, and functional health. *Journal of Gerontology: Psychological Science, 45*, P173-P179.
- Bandura, A. (1977). Self efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.
- Bausell, R. B. (1986). Health-seeking behavior among the elderly. *Gerontologist, 26*, 556-559.
- Berry, J., & Irvine, S. (1986). Bricolage: Savages do it daily. In R. Sternberg & R. Wagner (Eds.), *Practical intelligence* (pp. 271-306). New York: Cambridge University Press.
- Blazer, D. (1978). The OARS Durham survey: Description and application. In Duke University Center for the Study of Aging (Eds.), *Multidimensional functional assessment: The OARS methodology* (2nd ed.). Durham, NC: Duke University.
- Branch, L. G., Horowitz, A., & Carr, C. (1989). The implications for everyday life of incident self-reported visual decline among people over age 65 living in the community. *Gerontologist, 29*, 359-365.
- Branch, L. G., & Jette, A. M. (1982). A prospective study of long-term care institutionalization among the aged. *American Journal of Public Health, 72*, 1373-1379.
- Brown, J. S., & McCreedy, M. (1986). The hale elderly: Health behavior and its correlates. *Research in Nursing and Health, 9*, 317-329.
- Camp, C., Doherty, K., Moody-Thomas, S., & Denney, N. (1989). Practical problem solving in adults: A comparison of problem types and scoring methods. In J. Sinnott (Ed.), *Everyday problem solving: Theory and applications* (pp. 211-228). New York: Praeger.
- Cattell, R. B. (1971). *Abilities: Their structure, growth, and action*. Boston: Houghton-Mifflin.
- Ceci, S., & Liker, J. (1986). Academic and nonacademic intelligence: An experimental separation. In R. Sternberg & R. Wagner (Eds.), *Practical intelligence*. New York: Cambridge University Press.
- Clark, M., & Anderson, B. (1967). *Culture and aging*. Springfield, IL: Charles C. Thomas.
- Charness, N., & Bosman, E. A. (1990). Human factors and design for older adults.

- In J. E. Birren & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (3rd ed., pp. 446-464). New York: Academic.
- Cornelius, S., & Caspi, A. (1987). Everyday problem solving in adulthood and old age. *Psychology and Aging, 2*, 144-153.
- Donaldson, L. J., & Jagger, C. (1983). Survival and functional capacity: Three year follow-up of an elderly population in hospitals and homes. *Journal of Epidemiological Community Health, 37*, 176-179.
- Duffy, M. E., & MacDonald, E. (1990). Determinants of functional health of older persons. *Gerontologist, 30*, 503-509.
- Duke University Center for the Study of Aging (Eds.). (1978). *Multidimensional functional assessment: The OARS methodology* (2nd ed.). Durham, NC: Duke University.
- Evashwick, C., Rowe, G., Dieh, D., & Branch, L. (1984). Factors explaining the use of health care services by the elderly. *Health Services Research, 19*, 357-382.
- Fedder, D. O. (1982). Managing medication and compliance. *Journal of American Geriatrics Society, 30S*, 113-117.
- Fedder, D. O. (1984). Drug use in the elderly: Issues of noncompliance. *Drug Intelligence and Clinical Pharmacy, 18*, 158-162.
- Fillenbaum, G. G. (1978). Reliability and validity of the OARS multidimensional functional assessment questionnaire. In Duke University Center for the Study of Aging (Eds.), *Multidimensional functional assessment: The OARS methodology* (2nd ed.) (pp. 20-28). Durham, NC: Duke University.
- Fillenbaum, G. G. (1983). Screening the elderly: A brief instrumental activities of daily living measure. *Journal of the American Geriatrics Society, 33*, 698-706.
- Fillenbaum, G. G. (1987a). Activities of daily living. In G. L. Maddox (Ed.), *The encyclopedia of aging* (pp. 3-4). New York: Springer Publishing Co.
- Fillenbaum, G. G. (1987b). Multidimensional functional assessment. In G. L. Maddox (Ed.), *The encyclopedia of aging* (pp. 460-462). New York: Springer Publishing Co.
- Fillenbaum, G. G. (1987c). OARS Multidimensional Functional Assessment Questionnaire. In G. L. Maddox (Ed.), *The encyclopedia of aging* (pp. 496-497). New York: Springer Publishing Co.
- Fillenbaum, G. G., & Smyer, M. A. (1981). The development, validity, and reliability of the OARS Multidimensional Functional Assessment Questionnaire. *Journal of Gerontology, 36*, 428-434.
- Fincham, J. E. (1988). Patient compliance in the ambulatory elderly: A review of the literature. *Journal of the Geriatric Drug Therapy, 2*, 31-52.
- Ford, A. B., Bolmar, S. J., Salmon, R. B., Medalie, J. H., Roy, A. W., & Galazka, S. S. (1988). Health and function in the old and very old. *Journal of the American Geriatrics Society, 36*, 187-197.
- Frederiksen, J. (1982). A componential theory of reading skills and their interactions. In R. J. Sternberg (Ed.), *Advances in the psychology of human intelligence* (Vol. 1) pp. 125-180. Hillsdale, NJ: Lawrence Erlbaum.
- Galanos, A., Fillenbaum, G. G., Cohen, H. J., & Burchett, B. (1991). *Limitations of functional health status in the comprehensive assessment of community-dwelling elderly*. Unpublished manuscript, Duke University, Durham, NC.
- Havlik, R. (1986). *Aging in the eighties: Impaired senses for sound and light in persons age 65 years and over*. NCHS, Advance Data Vital and Health Statistics, No. 125. Washington, DC: U.S. Government Printing Office.
- Hawkins, W. E., Duncan, D. F., & McDermott, R. J. (1988). A health assessment of older Americans: Some multi-dimensional measures. *Preventive Health, 17*, 344-356.
- Heaton, R. K., & Pendleton, M. G. (1981). Use of neuropsychological tests to predict adult patients' everyday functioning. *Journal of Counseling and Clinical Psychology, 49*, 807-821.
- Kempen, G. I. J. M., & Suurmeijer, T. P. B. M. (1990). The development of a hierarchical polytomous ADL-IADL scale for noninstitutionalized elders. *Gerontologist, 30*, 497-501.
- Koyano, W., Shibata, H., Nakazato, K., Haga, H., Suyama, K., & Matsuzaki, T. (1989). Mortality in relation to instrumental activities of daily living: One-year follow-up in a Japanese urban community. *Journal of Gerontology, 44*, S107-109.
- Kuriansky, J. B., Gurland, B. J., Fleiss, J. L., & Cowan, D. (1976). The assessment of self-care capacity in geriatric psychiatric patients by objective and subjective methods. *Journal of Clinical Psychology, 32*, 95-102.
- Lawton, M. P. (1987). Contextual perspectives: Psychosocial influences. In L. W. Poon (Ed.), *Handbook for clinical memory assessment of older adults*. Washington, DC: American Psychological Association.
- Lawton, M. P., & Brody, E. M. (1969). Assessment of older people: Self-maintaining and instrumental activities of daily living. *Gerontologist, 9*, 179-185.
- Lawton, M. P., Moss, M., & Fulcomer, M. (1986-87). Objective and subjective uses of time by older people. *International Journal of Aging and Human Development, 24*, 171-188.
- Lawton, M. P., Moss, M., Fulcomer, M., & Kleban, M. (1982). A research and service oriented multilevel assessment instrument. *Journal of Gerontology, 37*, 91-99.
- Leirer, V. O., Morrow, D. G., Pariante, G. M., & Sheikh, D. (1988). Elders' nonadherence, its assessment, & computer assisted instruction for medication recall training. *Journal of the American Geriatrics Society, 36*, 877-884.
- Loewenstein, D. A., Amigo, E., Duara, R., Guterman, A., Hurwitz, D., Berkowitz, N., Wilkie, F., Weinberg, G., Black, B. M., Gittelman, B., & Eisdorfer, C. (1989). A new scale for the assessment of functional status in Alzheimer's disease and related disorders. *Journal of Gerontology, 44*, P114-P121.
- Morrell, R. W., Park, D. C., & Poon, L. W. (1989). Effects of the quality of instructions on memory and comprehension of prescription information in young and old adults. *Gerontologist, 29*, 345-353.
- Moss, M., & Lawton, M. P. (1982). Time budgets of older people: A window on four lifestyles. *Journal of Gerontology, 37*, 115-123.
- North, A. J., & Ulatowska, H. K. (1981). Competence in independently living older adults: Assessment and correlates. *Journal of Gerontology, 36*, 576-582.
- Ostrow, A. C., & Dziewaltowski, D. A. (1986). Older adults' perceptions of physical activity participation based on age-role and sex-role appropriateness. *Research Quarterly for Exercise and Sport, 57*, 167-169.

- Paffenbarger, R. S., Hyde, R., Hsieh, C., & Wing, A. (1987). Physical activity, other life-style patterns, cardiovascular disease and longevity. *Acta Medica Scandinavica*, 711(Suppl.), 85-91.
- Palmore, E. (1970). Health practices and illness among the aged. *Gerontologist*, 10, 313-316.
- Park, D. C. (1991). Applied cognitive aging research. In F. I. M. Craik & T. A. Salthouse (Eds.), *Handbook of aging and cognition*. New York: Erlbaum.
- Poon, L. W., Rubin, D. C., & Wilson, B. A. (Eds.). (1989). *Everyday cognition in adulthood and late life*. New York: Cambridge University Press.
- Rodin, J., Timko, C., & Harris, S. (1985). The construct of control: Biological and psychosocial correlates. In M. P. Lawton (Ed.), *Annual review of gerontology and geriatrics* (Vol. 6, pp. 3-55). New York: Springer Publishing Co.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, 80, 1-28.
- Schaie, K. W. (1978). External validity in the assessment of intellectual performance in adulthood. *Journal of Gerontology*, 33, 695-701.
- Schaie, K. W. (1987). Applications of psychometric intelligence to the prediction of everyday competence in the elderly. In C. Schooler & K. W. Schaie (Eds.), *Cognitive functioning and social structure over the life course* (pp. 50-58). New York: Ablex.
- Schaie, K. W. (1990). Intellectual development in adulthood. In J. E. Birren & K. W. Schaie (Eds.), *Handbook of the psychology of aging* (3rd ed.) (pp. 291-310). New York: Academic Press.
- Shapiro, E., & Tate, R. B. (1985). Predictors of long term care facility use among the elderly. *Canadian Journal on Aging*, 4, 11-19.
- Sinnott, J. (1989). *Everyday problem solving: Theory and applications*. New York: Praeger.
- Sternberg, R., & Wagner, R. (Eds.). (1986). *Practical intelligence*. New York: Cambridge University Press.
- Stone, R. I., & Murtaugh, C. M. (1990). The elderly population with chronic functional disability: Implications for home care eligibility. *Gerontologist*, 30, 491-496.
- Svanborg, A. (1984). Technology, aging & health in a medical perspective. In P. K. Robinson & J. E. Birren (Eds.), *Aging and technological advances* (pp. 159-168). New York: Plenum.
- Vitaliano, P. P., Breen, A. R., Albert, M. S., Russo, J., & Prinz, P. N. (1984). Memory, attention, and functional status in community-residing Alzheimer type dementia patients and optimally healthy aged individuals. *Journal of Gerontology*, 39, 58-64.
- Wagner, R. (1986). The search for intraterrestrial intelligence. In R. Sternberg & R. Wagner (Eds.), *Practical intelligence* (pp. 361-378). New York: Cambridge University Press.
- Wallston, K. A., & Wallston, B. S. (1982). Who is responsible for your health? The construct of health locus of control. In G. S. Sanders & J. Suls (Eds.), *Social psychology of health and illness* (pp. 65-95). Hillsdale, NJ: Erlbaum.
- Willis, S. L. (1987). Cognitive interventions in the elderly. In K. W. Schaie (Ed.),

- Annual review of gerontology and geriatrics* (Vol. 7) (pp. 159-188). New York: Springer Publishing Co.
- Willis, S. L., & Baltes, P. B. (1980). Intelligence: Contemporary issues. In L. W. Poon (Ed.), *Aging in the 1980's: Psychological issues* (pp. 260-272). Washington, DC: American Psychological Association.
- Willis, S. L., & Diehl, M. (1989, August). *The elderly's comprehension of information regarding commonly prescribed drugs*. Paper presented at the annual meeting of the American Psychological Association, New Orleans, LA.
- Willis, S. L., Jay, G., Marsiske, M., & Diehl, M. (1991). *Longitudinal change & prediction of everyday task performance in the elderly*. Unpublished manuscript. University Park, PA: Penn State University.
- Willis, S. L., & Marsiske, M. (1991). Life span perspective on practical intelligence. In D. E. Tupper & K. D. Cicerone (Eds.), *The neuropsychology of everyday life: Issues in development and rehabilitation* (pp. 183-198). Boston: Kluwer.
- Willis, S. L., & Schaie, K. W. (1986). Practical intelligence in later adulthood. In R. Sternberg & R. Wagner (Eds.), *Practical intelligence* (pp. 236-270). New York: Cambridge University Press.
- Wilson, R. W., & Elinson, J. (1981). National survey of personal health practices and consequences: Background, conceptual issues, and selected findings. *Public Health Reports*, 96, 218-225.
- Wolinsky, F. D., Coe, R. M., Miller, D. K., Pendergast, J. M., Creel, M. J., & Chavez, M. N. (1983). Health services utilization among the noninstitutionalized elderly. *Journal of Health and Social Behavior*, 24, 325-337.