1-1-1998

Predictability of everyday task performance by perceived health, self-efficacy and cognitive ability

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PREDICTABILITY OF EVERYDAY TASK PERFORMANCE BY PERCEIVED HEALTH, SELF-EFFICACY AND COGNITIVE ABILITY

by

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A Thesis submitted in partial fulfilment of the requirements for the award of

Master of Psychology

At the Faculty of Community Services, Education and Social Sciences,
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Date of submission: November 19, 1998

ABSTRACT

This exploratory research investigated the relationship between a brief neuropsychological measure and everyday functional ability in older community-dwelling adults. The association between these two areas is complex, as a specific functional domain often involves several of the cognitive skills typically assessed by a neuropsychological instrument. Whilst there is an extensive literature linking neuropyschological tests to everyday functioning in cognitively impaired older adults, little research has been directed at investigating the relationship between cognitive test performance and everyday competence in non-dementing older people who reside independently in the community. A brief cognitive instrument able to predict coping deficits in instrumental activities of daily living would facilitate identification of health care and service needs, contributing to the functional independence of this population.

A sample of 134 independently-living males and females aged 60-93 years completed the Neurobehavioural Cognitive Status Examination (Cognistat) and the Direct Assessment of Functional Status (DAFS). As beliefs about performance have been shown to correlate with actual ability, study participants also completed a 72-question self-efficacy inventory, the Personality in Intellectual-Aging Contexts (PIC). Finally, in order to investigate the relationship of health and functional performance, participants responded to a four-item subjective health measure.

Simple correlations revealed modestly significant relationships between subjective health and two of the functional domains. Although there were exceptions, the general pattern was for significant correlations between self-efficacy sub-scales and

measures of everyday competence. This pattern was also evident in the correlations between the cognitive variables and the functional domains.

Hierarchical regression analyses examined the relative ability of self-reported health, self-efficacy scales from the PIC and the cognitive variables from Cognistat to predict the functional domains of DAFS, in that order. Self-reported health accounted for comparatively little variance in all domains of DAFS. The PIC inventory contributed significantly to the variance of four of the five functional domains, exceeding the contribution of the cognitive variables in two areas. Cognistat scales explained a significant amount of the variance in all DAFS domains, retaining the highest predicted amount in three instances. In summary, when self-reported health and self-efficacy were statistically controlled, cognitive variables remained strong predictors of everyday competence.

Memory was identified as the most consistent predictor of everyday task performance. It was argued that components of memory functioning may also be strongly associated with deficits in other cognitive variables.

A brief cognitive measure predicting the functional ability of an older independently-living adult may be more practical and cost-effective than a functional assessment. It was therefore concluded that interventions aimed at improving cognitive functioning, in particular memory, may have positive implications for performance in several functional domains.

DECLARATION

I certify that this thesis does not, to the best of my knowledge and belief:

i. Incorporate without acknowledgement any material previously submitted for a degree or diploma in any institution of higher education;

ii. Contain any material previously published or written by another person except where due reference is made in the text; or

iii. Contain any defamatory material.

ACKNOWLEDGEMENTS

The preparation of a document of this kind can never be achieved without input, support and encouragement from many sides. I would like to express my appreciation of the assistance I have received in undertaking this research by explicitly acknowledging some people, who have been actively instrumental in providing support of varying kinds. Many others will remain anonymous, but without them this thesis would not have come into being.

Those whose anonymity must be retained are the 134 participants in the study. Their interest in my research and forbearance in completing the time-consuming test measures bears testimony to their community spirit and the judiciousness of the older members of our population. I was privileged to meet some wonderful seniors.

Throughout the period of my research I benefited from the considerable clinical and academic expertise of Associate Professor Ed Helmes, of Edith Cowan University. His unwavering support, his generous time availability, and his capacity to remain calm in the presence of problems great and small, enabled me to undertake useful and professional research – and to enjoy it!

The love, loyalty and encouragement so unstintingly given to me by my son and my daughter have been a constant source of nourishment. I have drawn on their energy, attempted to emulate their zest for life, and been inspired by their individual successes.

And last, but most rather than least, I acknowledge my father. He has been, and is, my role model, who has always believed the challenge can be met. His staunch moral support and his belief in my ability to achieve my goals have sustained me in recent times, as throughout my life. Most of all, I thank him for his unconditional love.

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CHAPTER ONE

1. Introduction

1.1 Background Information

Most Western societies are recognised as stressing individualist lifestyles. In other words, from childhood onwards we are encouraged to accept responsibility for our own lives, emphasising individual values over social ones. Independence evolves as the desired functional state, with dependence increasingly regarded as the negative alternative on the dependence-independence continuum (White & Groves, 1997).

One consequence of this traditional mode of thinking is that the inability to live independently is feared by many older adults far more than illness, loss of financial resources, or even death (Willis, 1996b; Willis & Schaie, 1994). Independence embodies the control which older people perceive to exercise over their lives, their ability to solve problems and their autonomy in decision-making (Bandura, 1997; White & Groves, 1997).

However, in order to maintain an independent lifestyle, some older adults may require selective assistance with commonly recurring tasks or situations which arise in the course of everyday life. As the primary concern of this population group is to live independently into advanced old age, assessment of the older individual's relative level of competency in everyday functioning, and the services and interventions needed to maintain competence, is of specific and particular relevance to public policy issues (Willis, 1996b; Willis, Jay, Diehl & Marsiske, 1992). As pointed out by Ikegami

(1995), functional assessment plays a key role in evaluating the quality of life of older adults.

Everyday competence, or "practical intelligence" (Willis, 1996a, p. 595), has been defined as the ability of an older person to successfully adapt to environmental demands and to adequately perform activities considered essential for living independently (Willis & Schaie, 1994). With other words, the performance of everyday tasks is an aspect of practical intelligence. Baltes, Mayr, Borchelts, Maas and Wilms (1993) defined everyday competence lucidly as "the effective management of daily life" (p. 658).

The tasks involved in effectively managing everyday situations frequently necessitate a complex interaction of several intellectual or cognitive processes. Intellectual skills involved include memory, attention, problem solving and visuospatial ability (Backman & Hill, 1996). However, as Backman and Hill pointed out, the relationship between everyday competence and cognitive processes has been debated in the literature. Criticisms have been directed mainly at the use of laboratory-based assessments as indicators of how individuals function in natural settings. It has been argued that standard tasks are unable to accurately reflect the complexities and variations inherent in real-life settings.

Park, Morrell, Frieske and Kincaid (1992) provided a useful example of the multiphase cognitive processes of memory involved in a practical intelligence task as it occurs in the real world context of older people's lives. Many older adults take medication for chronic diseases, so that medication adherence behaviours are of

particular importance to the health and wellbeing of this age group. Park et al. argued that instructions on why medication should be taken, which amount and the most suitable time to take them involves comprehension; storage of this information in long-term memory; integration of information in working memory if several medications are taken; and the use of prospective memory to adhere to the appropriate schedule. Medication-taking for chronic health problems may consequently involve problem solving over a period of many years.

Chronic health problems and resultant medication-taking are common amongst the older population, with this age group consuming approximately 50% of prescription drugs (Park et al., 1992). Many prescribed medications interact with one another and may influence both cognitive and practical functioning (Smith & Darlington, 1996). Further, the efficacy of some prescription drugs may be impacted upon by 'over-the-counter' drugs, such as antacids (Schneider, 1996), confounding expected improvements in health.

In addition to the effects which drugs may elicit, the health problem for which medication is being taken may impact on the physical ability of an older adult, as well as negatively affecting intellectual functioning (Perlmutter & Nyquist, 1990). When measuring the intellectual performance of older adults it is therefore of particular importance to consider health status. In Perlmutter and Nyquist's study, for example, self-reported health correlated with performance on standard intelligence tasks.

Intellectual functioning, functional competence, and health status of older adults is also associated with self-efficacy. Efficacy beliefs have been found to influence

thought processes (Bandura, 1997). Strong self-efficacy beliefs in older adults can positively affect performance, as well as lower health risks and improve health status. When assessing functional ability, a measure of self-efficacy may provide valuable information on the association between perceived and actual everyday competence. However, Davis-Berman (1995) argued that in order to accurately assess the association between efficacy and cognition, older individuals should not only be questioned on their self-efficacy beliefs, but also asked to perform a behaviour relating to the functional domains being evaluated.

1.2 Significance of the Current Study

Neuropsychological assessments have been widely used to provide information regarding performance on cognitive, perceptual and motor domains (McCue, 1997). Additionally, these assessments have been found to be useful in the diagnosis of psychiatric disorders or organic conditions. As McCue commented, a neuropsychological assessment evaluates higher cortical functioning, in particular cognitive processing.

Functional assessment, on the other hand, addresses skills required in everyday living situations. As already illustrated, multiple cognitive processes may be involved in a practical task, so that the relationship between cognitive and functional domains is complex.

There is an extensive literature linking neuropsychological tests which investigate cognitive processes to everyday functioning in cognitively impaired older adults, particularly in those older people who are believed to have dementia of the

Alzheimer's type or Alzheimer's Disease (AD) (e.g. Loewenstein, Rubert, Arguelles & Duara, 1995; Mahurin, DeBettignies & Pirozzolo, 1991; Nadler, Richardson, Malloy, Marran & Brinson, 1993; Tuokko & Crocket, 1991). Whilst Nadler et al. reported significant correlations between cognitive domains and functional ability, other researchers have been less assertive in their findings. Mahurin et al., for example, found that only some neuropsychological test scores were highly associated with an impaired person's everyday functioning. Loewenstein et al. argued that in addition to the predictions from cognitive measures, collateral information from caregivers and medical records was required to make a decision on a dementing individual's functional capacity.

However, only a minority of older adults experience difficulty in functioning competently in the community due to cognitive impairment (Carney, 1995; Fillenbaum, 1985; Fine & Thomson, 1995; Kendig et al., 1996). Notwithstanding this positive imbalance, little research has been directed at investigating the relationship between cognitive measures and everyday competence in the majority, non-dementing older population who reside independently in the community (Backman & Hill, 1996; La Rue & Markee, 1995). Backman and Hill commented that "research in which cognitive performance measures are used to predict everyday activities in normal aging is essentially lacking" (Backman & Hill, 1996, p. 83).

Gibson, Mathur and Racic (1997) reported that in Australia the proportion of older people is projected to rise from 12% of the total population in 1996 to 16% in 2016. In the research literature the population group commonly referred to as 'older adults' are those aged 65 years and older. Within this expanding age group it is useful

to conceptually divide older adults into three groups: those aged between 65 and 74 years are referred to as 'young-old'; those between 75 and 84 as 'old-old'; with the 'oldest-old' including those over 85 years (Jackson, Antonucci & Gibson, 1990). National statistics show that the number of Australians aged 80 years and over is anticipated to rise from one in five in 1996 to one in four in 2016. The proportion of women, however, is expected to decrease from 56% of the aged population in 1996 to 54% in 2016. Currently, 40% of Australian women aged 65 and over live alone compared to 18% of their male peers.

According to Ikegami (1995), the rapid and continuing growth of the ageing population necessitates a refocusing of the approach to treatment for older adults from the present diagnostic, disease-specific intervention mode, to broader-ranging and ongoing care. Many factors, including physical, medical, psychological, social, developmental and environmental, interact in complex ways in the older population (Kaszniak, 1996). An older individual may have several interrelated problems, all of which require accurate evaluation, and medical diagnoses may have only limited value in indicating services required (Ford et al., 1988; Mulrow, Gerety, Cornell, Lawrence & Kanten, 1994). Functional measures, assessing the relationship between everyday competence and environmental demands, better serve this purpose (McCue, 1997).

In Australia, programmes providing appropriate home-based support have demonstrated that both highly dependent older people, as well as those with complex care needs can be effectively cared for in their own homes (Gibson et al., 1997). The majority of older people can thus remain in their own homes into advanced old age rather than transfer to an aged hostel or nursing home. In addition to home-dwelling

being the preferred option of these individuals (Fine & Thomson, 1995; Willis & Schaie, 1994), the mortality rates are far greater for older adults who are institutionalised than for those who are cared for at home (Aneshensel, Pearlin, Mullan, Zarit, & Whitlatch, 1995). However, the cost of wide-ranging and extensive functional assessment of community-dwelling, non-dementing older adults to determine the support and care required or sought after would be prohibitive.

1.3 Purpose of the Current Study

The main objective of the present exploratory study was to investigate whether variables from a brief cognitive measure could predict the ability of older adults to function competently in the community. Cognitive competence is a vital component of functional well-being and plays an important role in the effective delivery of health care services. The use of a short instrument to assess health and practical care delivery could facilitate service provision, enable the specific support and care requirement of an older adult to be delivered, and potentially result in substantial cost savings. In addition, individuals requiring more comprehensive evaluation would receive timely referrals to the appropriate service. As beliefs about performance and self-reports about health have been shown to correlate with actual performance ability, health and self-efficacy variables were also included in the study.

CHAPTER TWO

2. Review of the Literature

2.1 General Literature

Some researchers have queried the relationship between psychometrically measured intelligence and practical intelligence in older adults (see Backman & Hill, 1996; Sbordone, 1996; Willis & Marsiske, 1991). As Bieliauskas (1996) pointed out, neuropsychological tests provide reliable and comparative measures of older adults' cognitive abilities. However, although these results are of interest and importance for research and diagnoses, the ecological validity or practical implications of testing have received less attention. Ecological validity has been defined by Sbordone (1996) as the "functional and predictive relationship between the patient's performance on a set of neuropsychological tests and the patient's behavior in a variety of real-world settings" (p. 16). Bieliauskas examined the utility of some common measures of cognition, for example, memory, language, and judgement and reasoning, commenting on the practical application of these intellectual processes in everyday life.

Memory is commonly measured by the Wechsler Memory Scale-Revised (WMS-R; Wechsler, 1987), but also through screening instruments such as the Mini Mental State Exam (MMSE; Folstein, Folstein & McHugh, 1975) and the Neurobehavioral Cognitive Status Examination (NCSE or Cognistat; Kiernan, Mueller, Langston & Van Dyke, 1987). Practical implications of memory deficits range from forgetting recent experiences to causing serious difficulty in adapting to everyday tasks and activities (Bieliauskas, 1996; Tuokko & Crocket, 1991).

Measurements of language are generally assessed in two components: expressive language, that is, the ability to say what one wants to, and receptive language, that is, being able to comprehend what has been said (Bieliauskas, 1996; Tuokko & Crocket, 1991). Expressive language is often measured by the 'FAS', or Controlled Oral Word Association Test (Spreen & Strauss, 1991), whereas the Peabody Picture Vocabulary Test-Revised (Dunn & Dunn, 1981) is a recognised measure of receptive language. Both the MMSE and Cognistat provide screening measures in each of these language areas. As Bieliauskas commented, difficulties in expressing or comprehending language impact on practical communication, as well as being a possible source of frustration for the affected older person and those with whom they wish to communicate.

An assessment of judgement and reasoning is often made using the comprehension and similarities subtests of the Wechsler Adult Intelligence Scale-Revised (WAIS-R; Wechsler, 1981), but can also be made through the Cognistat screening subtests (Bieliauskas, 1996). These measure are of particular practical importance because of their relevance in managing one's affairs and in making informed decisions about practical and health issues.

A further consideration within the realm of ecological validity is whether the cognitive abilities being tested because of their purported relationship to an everyday task are of functional importance and relevance to a particular examinee (Franzen & Wilhelm, 1996). For example, a memory scale within a psychometric battery may be presented as a good predictor of memory for shopping lists. However, for an older

person residing in a nursing home who no longer shops for groceries or household items, there appears little relevance in this assessment.

McCue (1997) provided a thought-provoking discussion on the relationship between neuropsychological testing and functional assessment of older individuals. As illustrated by Park et al. (1992), McCue argued that the association between test performance on cognitive measures and performance on a functional task is complex and may involve several of the skills being evaluated by neuropsychological tests. For example, the use of a telephone may require short-term memory, motor and language skills. McCue presented a comprehensive table of studies which had sought to relate neuropsychological predictors to functional outcomes. All studies tabled involved either older adults with dementia, residents of nursing homes, or geriatric patients in hospitals. Whilst results of most studies reported strong relationships between cognitive performance and functional ability, as both variables tended to reflect nonspecific general domains, ecological validity was not satisfied. The studies "say nothing about how measures of *specific* neuropsychological functions relate to the ability to meet *specific* environmental demands" (McCue, 1997, p. 379, italics added). McCue argued, however, that increasing evidence reveals a reliable correlation between neuropsychological measures and performance in everyday functioning.

Notwithstanding reliable test scores and their claimed relationship with various functional domains, the practical applicability of assessment in the older individual's daily life remains of paramount importance (Bieliauskas, 1996; Willis & Schaie, 1994). The primary reason for assessments of this nature is to determine the capability of older adults to live independently. If deficits in skills are identified, appropriate support and

services can be provided to enable individuals to maintain their independent life style. Measures of cognition which are most likely to be associated with everyday functioning include memory, receptive and expressive language skills, and judgement and reasoning (Bieliauskas, 1996).

2.2 Literature on Relevant Study Variables

The primary variables being investigated in the current study are measures of cognition and functional ability. However, as self-reported health has been found to predict morbidity and mortality in older adults (Heidrich & Ryff, 1993) a subjective rating of health has also been included. A further variable considered to be of importance when assessing cognitive and functional ability is self-efficacy. Although little work has investigated the relevance of Bandura's (1977) self-efficacy theory in the older adult population, Bandura (1997) argued that the principles of this theory are also likely to apply to this age group.

2.2.1 Instrumental Activities of Daily Living

Skills and behaviours required to live independently in the community are generally referred to as instrumental activities of daily living (IADLs). IADLs are viewed as being more complex everyday competencies than the generic basic skills commonly known as activities of daily living (ADLs), which focus on direct self-care (Katz & Stroud, 1989; Kempen & Suurmeijer, 1990). IADLs are additionally concerned with self-reliant functioning of more complex behaviours that enable independent living in the community (Furner, Rudberg & Cassel, 1995; Kazniak, 1996). The standard description of IADLs includes seven areas: shopping skills, money management, communication abilities, transportation, time orientation, eating skills,

and dressing/grooming skills (Loewenstein et al., 1989). The inability to perform IADLs suggests the need for home assistance or a change in accommodation arrangements (Turner et al., 1995).

The majority of instruments reported in the literature for measuring IADLs rely on self-report, for example the Multilevel Assessment Instrument (MAI; Lawton, Moss, Fulcomer Kleban, 1982) and the IADL scale of the Older Americans Resources and Services programme (OARS; Fillenbaum, 1985). In an endeavour to rapidly and cost-effectively identify deficient functional ability in community-dwelling older adults, Fillenbaum developed a five-question screen test from the OARS IADL scale. Although the test is intended to be brief, and each of the five questions can be answered on a three-point scale of 'without help - with some help - not answered', supplementary information is included with each of the first two answer options, and with two of the five questions. For example, question 2:

> "Can you go shoppping for groceries or clothes [assuming she or he has transportation] ...
>
> 1 Without help (taking care of all shopping needs yourself, assuming you had transportation)
>
> 0 With some help (need someone to go with you on all shopping trips), or are you completely unable to do any shopping?
>
> - Not answered." (Fillenbaum, 1985, p. 706).

Predictive validity measures correlated about .50 with future status of mental and physical health of older adults aged 65 and over, and 75 and over. However, I suggest that the questions could be easily misinterpreted, and lack adequate standardisation.

On the other hand, the MAI (Lawton et al., 1982) is more extensive, including 216 items covering areas of physical health, cognition, IADLs, ADLs, time use, social interaction, personal adjustment, perceived environment and objective environment. Whilst middle length, short and best-item versions were also developed, the recommendation was made for the full length MAI to be administered wherever possible. As Bieliauskas (1996) pointed out, however, many older adults "do not have the patience or perseverance to complete ... lengthy tests" (p. 276).

Although self-report measures of functional ability are recognised as being valuable, supplementary information is frequently required to determine accurate results. Kiyak, Teri and Borson (1994) conducted a two-year longitudinal study comparing self-reports and family reports of physical and functional health amongst 93 community-residing older adults (mean age = 71 years). Forty of the participants had a presumptive diagnosis of early AD, 53 participants were non-dementing. All were free of major medical illnesses. Kiyak et al. found that reports by participants with AD on their levels of functional abilities were consistently higher than those of family members. Estimations of functional status by non-demented participants were more concordant with reports by family members. The conclusions drawn from the study were that whilst normally healthy older people are generally able to accurately assess their functional ability, those with presumed AD are less able. As mild levels of impairment are not always clinically obvious, Kiyak et al. recommended interviewing both the person being assessed and a family member or caregiver, in order to obtain reliable information when using self-report measures.

In addition, Kiyak et al. (1994) suggested that the "development of practical performance-based functional assessment instruments will be required to evaluate the degree to which perceived impairment is reflected in actual deficits in functional capacity" (p. 330). In two studies involving high-functioning older adults' self-appraisal of their abilities and activities, Pushkar, Arbuckle, Conway, Chaikelson and Mag (1997) also queried the accuracy of these reports. Their suggestion for future research was to examine whether similar results would be achieved when individuals' activity patterns were assessed by others.

In their investigation of the differences between self-report and observed measures of ADLs, Kempen, Steverink, Ormel and Deeg (1996) conceded that self-report measures were easier to administer than performance-based instruments. However, they found that self-reports of functional ability did not reveal a strong association with observed functioning in their sample of 753 independent or supported frail older adults. They found that depressive symptoms, perceived physical competence and mastery (or self-efficacy) influenced self-reported levels of functional ability. Study participants with high perceptions of physical competence and mastery, but low depressive symptoms, tended to overestimate their functional status. Where depressive symptomatology was high, but perceived competence and mastery low, ability to perform ADLs was underestimated.

Other researchers have also found that on self-report measures some older adults overestimate, whilst others underestimate their actual competence in everyday tasks (Kuriansky, Gurland & Fleiss, 1976; Little, Hemsley, Volans & Bergmann, 1986). Although effects were small, some evidence was also found by Kempen et al.

(1996) that cognitive functioning plays a role in the association between self-report and performance-based measures. According to Baltes et al. (1993), cognition, self-efficacy, mental health, socio-economic status and age are all associated with performance on IADLs. Tuokko and Crockett (1991) argued that memory functioning is the most sensitive cognitive measure in assessing everyday functioning.

Another issue is that studies assessing functional ability, or everyday competence, in older adults frequently use convenient populations seeking care at clinics, which makes generalisation to other community-residing adults difficult (Furner et al., 1995). Finally, Furner et al. pointed out that some chronic physical conditions, not uncommon amongst older adults, only affect specific IADLs. For example, a hearing deficiency may make phone use difficult, but not affect the ability to do housework. An individual who has had a stroke, on the other hand, may not be able to carry out household duties, but be competent in using the phone. Performance-based measures are therefore more likely to provide precise information on specific aspects of functioning than self-report instruments.

2.2.2 Cognitive Assessment

A brief cognitive screening test which predicts coping deficits in different areas of IADLs would be a useful tool in facilitating health and practical care delivery. Such an instrument would be comparatively inexpensive to administer and could consequently be widely used to determine where assistance may be required, to enable an older adult to continue functioning independently in the community. It could also serve as a tool to identify those in need of more comprehensive assessment.

The most commonly used cognitive screening instrument for older adults is the MMSE. It was developed in response to a need in geriatric drug studies to detect brain impairment, and is intended as a broad-ranging test, tapping briefly into a variety of skills. However, as Burgio and Locher (1996) reported, the MMSE was designed for brief testing of acutely ill patients, so may be inappropriate for assessing normally healthy, independently-living older adults.

A further estimation of the validity of an assessment tool can be expressed in terms of its sensitivity and specificity. Sensitivity in the current context refers to the extent to which individuals with cognitive impairment are correctly identified; specificity represents the extent to which *only* cognitively impaired individuals are classified as impaired, that is, correct exclusion of non-impaired people. Franzen and Martin (1996) cited several studies indicating that whilst the MMSE shows high specificity, sensitivity is generally low. With other words, individuals with cognitive impairment were inadequately identified. The MMSE was reported as being useful in identifying individuals in the early stages of AD, specificity as high as 99% being recorded. Sensitivity, however, ranged from 46% to 67%. For example, MMSE items testing the language domain are not suited to detecting mild cognitive impairment, with four of the five items included in the test showing sensitivity lower than 15% (Kaszniak, 1996).

When Tombaugh and McIntyre (1992) conducted a comprehensive review of the MMSE, they reached similar conclusions. Where mean scores for the individuals who had been classified as dementing patients were 15 or less, sensitivity was high. However, when the accepted cut-off score of 23 (out of 30) was used, levels of

sensitivity dropped to as low as 44%. As screening is used primarily to identify the need for further evaluation, a measure with high sensitivity is desirable. Of particular relevance in the context of the current study is Tombaugh and McIntyre's finding that sensitivity was higher in hospital than in community samples. The use of the MMSE as a screening instrument would therefore seem to be more appropriate in a population with probable brain impairment, rather than the majority independently-living older population the current study is addressing.

The MMSE is widely used in dementia research and its scores are reported to correlate very highly with other well-known screening tests of mental status (Reed, Jagust & Seab, 1989). Reed et al. used the MMSE to predict physical and instrumental ADLs in 59 geriatric patients with varying forms and levels of severity of dementia. They observed only a modest association between MMSE scores and ADLs in the low-functioning group and no significant association in the high-functioning group. At best, predictions explained considerably less than half the variance in ADLs.

The use of psychometric measures to predict cognitive decline was investigated by Flicker, Ferris and Reisberg (1991). They compared base-line cognitive status, as measured on the Global Deterioration Scale (GDS; Reisberg, Ferris, de Leon & Crook, 1982) with two-year follow-up results of mildly impaired (but not demented) individuals and normal controls. Their study population comprised 32 older adults (mean age = 71 years) who had been clinically identified as having mild cognitive deficits, and an equal number of age and education-matched unimpaired persons. People with mild impairment exhibited at least two of a set of seven symptoms, such as

getting lost when travelling to an unfamiliar location, poor retention of material read in a book, or reduced ability to remember names of newly introduced people.

Of interest for the current study is that differences in performance on several items relating to everyday functioning were measured in the mildly impaired participants compared to controls (Flicker et al., 1991). For example, scores on recent memory, visuospatial recall and several language tests were significantly lower for individuals with cognitive deficiencies. After a two year interval scores for 23 of the 32 mildly impaired participants revealed further decline. In particular, four tests yielded significantly lower scores at the two year follow-up, each of which impacted on performance of everyday activities. These were the recent memory test (verbal recall of a shopping list), visuospatial recall (misplaced objects task), and two language tests (the object function recognition task and the object identification task). It was argued that psychometric tests provide a useful tool in the prediction of future level of functioning of older adults who exhibit "questionable cognitive status" (Flicker et al., 1991, p. 1008).

2.2.3 Subjective Health Ratings

As opposed to subjective ratings of functional ability, self-reported health has been found to consistently predict morbidity and mortality among older adults (Heidrich & Ryff, 1993; Salthouse, Kausler & Saults, 1990; Walker, 1991). Walker argued that perceived health status can be effectively measured either by a single item or by a multiple-item scale. She further commented that many reasons have been postulated to explain why older adults' health self-ratings are meaningful predictors of morbidity and mortality. Whilst the mechanism remains unclear, Walker suggested it is

"prudent to listen carefully to what older adults say about their health and to consider that information to be as significant as more objective data" (Walker, 1991, p. 44).

In their study of the health and function of 113 old and very old individuals, Ford et al. (1988) found that in 68% of the sample self-report of health was correct when compared with the evaluation by a medical team. Eighteen percent of study participants reported themselves to be in poorer health than was determined by a medical examination, and the remaining 14% of the sample judged themselves to be in better health than determined by the formal medical examination. Ford et al. found that although self-health reports by older adults generally concur with those of their physician, medical practitioners are more likely to diagnose hearing loss and high blood pressure, whilst older individuals more frequently self-diagnose arthritis, poor vision and circulatory problems.

Heidrich and Ryff (1993) asserted that self-report measures of health are more reliable predictors of future health status than ratings by medical practitioners. In addition, Mulrow et al. (1994) found that the subjectively perceived health status of 194 frail older residents of a nursing home (mean age = 80 years) showed a significant positive correlation with observed performance on ADLs. On the other hand, chronic and acute medical conditions, summarised as a burden of disease score, correlated poorly with ADLs and not at all with the subjective health measure. The study highlighted in particular the concept that subjective health is complex and may be influenced by many factors including sociodemographic, cognitive and affective states.

When investigating the relationship between subjective physical and mental health and intellectual functioning in 127 adults aged between 20 and 90 years, Perlmutter and Nyquist (1990) found that particularly in older adults, self-reported health correlated with performance on standard intelligence tasks. Intellectual functioning was measured on five tests from the WAIS-R assessing both fluid (performance) and crystallised (verbal) intelligence, as well as a digit span memory task. The subjective health score was derived from a single-item, 11-point scale on which the participant compared themselves to the average person of the same age. As hypothesised, older adults reported more health problems than younger adults. Health conditions also accounted for a greater portion of individual differences in older adults' intellectual functioning than in younger adults. In particular, Perlmutter and Nyquist's study verified that subjective health status is related to intelligence test performance.

Salthouse et al. (1990) also examined the relevance of age and self-reported health to measures of cognition across adulthood. Their sample of 362 adults ranged in age from 20 to 79 years. A single-item 5-point scale rating subjective health was used, as well as asking participants the number of weekly prescription medications taken, and whether they had been treated for heart or blood pressure problems in the last five years. Four cognitive measures were included in the analyses: perceptual motor, spatial and verbal memory span, associative memory and inductive reasoning. Of interest was the finding that although there was no correlation between age and subjective health status, increased age was related to more prescription medications and a higher percentage of heart or blood pressure problems. With other words, older people do not necessarily perceive their health to have deteriorated merely because they now take medication or have specific health conditions.

Participants recruited for research involving intellectual functioning are generally relatively healthy community-dwelling adults (Cunningham & Haman, 1992). Further, health effects, as measured subjectively, are associated with cognitive performance and are more likely to influence tasks of fluid intelligence (basic information processing) than crystallised intelligence (knowledge based abilities) (Hultsch, Hammer & Small, 1993). The question may therefore be raised as to whether the relationship between self-reported health and cognitive measures would be even stronger if study populations were more diverse and less selective.

2.2.4 Relevance of Self-Efficacy

Bandura's (1977) self-efficacy theory postulated that efficacy expectations depend upon the belief that a particular behaviour can be successfully performed. Efficacy cognitions are not concerned with the skills involved in executing a particular behaviour, but with the perceived confidence in achieving the desired goal. "Mastery [self-efficacy] expectations influence performance and are, in turn, altered by the cumulative effects of one's efforts" (Bandura, 1977, p. 194). According to Bandura (1997), individuals who believe they can accomplish what they set out to do are healthier, more effective, and generally more successful than those with low self-efficacy expectancies. In particular, Bandura (1997) postulated that older adults who act on positive self-efficacy beliefs are more likely to exert control over the future direction of their lives.

Whilst research evidence indicates that self-efficacy is a consistent predictor of behavioural performance, studies have mainly focussed on anxiety disorders, smoking cessation, achievement in children, career development and exercise performance

(Davis-Berman, 1995). However, as Davis-Berman pointed out, little work has investigated the relevance of self-efficacy theory in the older adult population.

Some research has been undertaken on the association between self-efficacy and exercise performance of middle-aged individuals. In his study of the role played by efficacy cognitions in adherence to exercise behaviour in previously sedentary adults aged 45 to 64 years (mean age = 54 years), McAuley (1992) found that self-belief, or perceptions of physical ability, was an important predictor in determining initial exercise participation. However, once an individual was integrated into the programme, previous exercise behaviour was the major determinant of future participation.

Clark (1996), on the other hand, argued that although self-efficacy beliefs were recognised as being strong predictors of exercise adoption, little data was available on factors which affect self-efficacy in older people. Clark developed a conceptual model of exercise self-efficacy from information provided by two focus groups drawn from a senior citizens' centre. Preliminary evidence revealed that older age, female gender and low socioeconomic status impacted on the development of a strong sense of control, or positive self-efficacy beliefs. Clark also referred to data indicating that a low sense of control amongst older adults is related to decreases in health status and functional ability. In summary, "if, in general, one believes one is in control, one will be more likely to believe that behavior-specific outcomes are also under one's control" (Clark, 1996, p. 159).

Wahl (1991) examined self-efficacy in older adults from an interactional point of view, arguing that behaviour of older adults is a combination of "personal

competence and the physical and social environment" (Wahl, 1991, p. 238). Sense of control with relation to perceived efficacy expectations in 14 community-dwelling individuals receiving home health care (mean age = 79 years) was compared with that of 16 peers receiving nursing home care (mean age = 81 years). Data on self-care from both direct observational methods and verbal interviews with the participants and their professional caregivers was analysed. Results showed a significant association between perceived self-efficacy and independent self-care in both groups. With other words, individuals high in self-efficacy showed a greater sense of control and more independent behaviour. However, the community-dwelling group reported a greater sense of control in their self-care than the older adults living in a nursing home. In summary, whilst the environment plays a role in the independence of older adults, independent behaviour is mediated by perceived self-efficacy irrespective of functional health and other variables.

Few studies have examined the relationship of self-efficacy to everyday functioning of older adults, in particular, whether beliefs regarding intellectual competence are predictive of subsequent everyday performance (Willis et al., 1992). Willis (1996a) argued that cognitive competence in everyday tasks is a crucial component of functional health. Like Wahl (1991), Willis et al. found that the inability to perform cognitive tasks and to function independently is associated with lower self-efficacy beliefs.

2.3 Methodological Issues

Many of the difficulties inherent in the field of research are also evident in studies pertaining to the older population. When conducting the current study an

attempt was made to address many of these flaws. For example, on the question of generalisability, Cunningham and Haman (1992) argued that most research involving older non-dementing adults has been conducted with healthy, active volunteers living in the community. As particularly in old age there are many extraneous variables which may affect intellectual functioning, not the least of which is health, these samples may not be typical of the broader older population (Salthouse et al., 1990).

Further, Ward et al. (1990) found that when assessing cognitive functioning in older adults, results may be affected by the testing site. As part of a comprehensive geriatric assessment, scores on the MMSE given to 116 older adults both at home and in the clinic were analysed. The scores of 25% of the sample differed by more than five points (from a possible total of 30), with the higher score resulting from the at-home assessment. Ward et al. concluded that cognitive assessment of an older adult undertaken outside the home may underestimate the examinee's ability. Decisions regarding provision of services or future living arrangements may then become less meaningful.

Other researchers have commented on the use of inappropriate tests when assessing older adults' everyday task performance. For example, Willis and Marsiske (1991) referred to research findings which show non-significant correlations between a specific intellectual domain (e.g. verbal ability) and a specialised task (e.g. professional issues in business management). They commented that such highly specific tasks demand an expert knowledge base which is relevant in research on expertise, but not on everyday problem-solving.

Colonia-Willner (1998), on the other hand, examined age-related differences in relating crystallised ('tacit practical knowledge') versus fluid ('psychometric measures of reasoning') intelligence to performance amongst 200 bank managers aged 24-59 years. Whilst this age range is somewhat below that focussed on in the current research, the findings are relevant and of interest. It was found that older participants who were highly paid and positively evaluated in their profession scored higher on tacit practical knowledge, but lower on psychometric measures of reasoning. Colonia-Willner concluded that in keeping with other research on practical intelligence, intellectual ability as measured by psychometric tests does not contribute to complex decision-making to the same extent as tacit practical knowledge. She sounds a caution against the isolated use of psychometric tests as a predictor of performance, particularly with regard to older professionals.

In conclusion, in order to obtain information which may be useful in assessing an older person's everyday competence, it would be more meaningful if testing takes place where common tasks are usually undertaken, that is, at home. In particular, as it is well established that skills drawing on fluid intelligence are more affected by the ageing process than those related to crystallised intelligence, careful selection of assessment tools is likely to provide more relevant information in predicting an older person's functional ability.

To summarise, as pointed out earlier, everyday competence involves the ability of an older person to adapt to environmental demands and to adequately perform activities considered essential for living independently. Testing of this competence is consequently more likely to be of value if conducted in the home environment, if

extraneous factors such as health issues are considered, and if test instruments are relevant to the population being assessed.

CHAPTER THREE

3. Principles Underlying the Current Study

3.1 Theoretical Framework

The current study is based on the model of the relationship between psychometric intelligence (which refers to intelligence measured in a laboratory setting) and practical intelligence (or everyday competence) as proposed by Willis and Marsiske (1991). These authors have conducted extensive research on the relationship between mental abilities and everyday tasks and found that more than half of the variance in older adults' performance on everyday tasks could be accounted for by their intellectual performance, or mental ability. Their model is based on the following hypotheses:

- Basic cognitive processes are involved in executing practical intelligence tasks;
- These everyday problem solving tasks are related to more than one basic cognitive process; and
- Age-related change in performance on an everyday task is reflected in a related pattern of change in underlying abilities and processes.

Psychometric intelligence is commonly broken down into two components: fluid and crystallised intelligence (Cattell, 1971; Morris, 1997; Richardson, 1991). Fluid intelligence involves reasoning ability in novel and abstract situations, speeded responding and manipulation of information. Crystallised intelligence reflects learned skills and abilities gained over the life-span and involves mental processes such as verbal comprehension, judgement and understanding of rules and concepts.

Crystallised intelligence is generally believed to be maintained at a higher level during the ageing process than fluid intelligence (Perlmutter & Nyquist, 1990; Willis, 1996b; Willis & Marsiske, 1991). As fluid intelligence is seen to be related to abstract reasoning and problem-solving, the earlier decline of these cognitive processes is likely to affect the resolution of problems in everyday settings. The performance of older adults on everyday tasks can consequently be expected to show different patterns and rates of decline depending on whether the tasks draw mainly on fluid or crystallised abilities (Willis, 1996b).

Willis and Marsiske (1991) reported on research examining change in ability performance in older adults. Individuals aged 63-84 years of age were assessed on fluid and crystallised abilities on two occasions over a seven year interval. That is, 63 year olds were retested at age 70; 70 year olds were retested at age 77; and 77 year olds were retested at age 84. Fluid intelligence was found to decline in a linear pattern at an average of one standard deviation unit between the ages of 63 and 84 years. Crystallised intelligence, on the other hand, showed no discernible decline between the ages of 63 and 70 years, and exhibited an average downward change between 63 and 84 years of only one half of a standard deviation unit.

Data were also collected on the change in performance of specific everyday tasks, namely reading and interpreting printed material (Willis & Marsiske, 1991). Older adults are likely to be confronted with printed material on a daily basis, such as reading labels on medication packages, reading bus timetables and television programmes, and interpreting advertisements. According to Willis and Marsiske, older

adults frequently experience difficulty in reading and interpreting printed material, whereby misunderstanding of this information can impede the effectiveness of their abilities in everyday life. The pattern of change in performing everyday tasks involving printed material closely resembled that of change in fluid intelligence, being somewhat steeper than the decline in crystallised intelligence. The change was fairly linear, but showed an accelerated decline with increasing age: from 63-70 years less than .2 of a standard deviation unit; from 70-77 years .4 of a standard deviation unit; and from 77-84 years at .6 of a standard deviation unit.

These results show *average* performance decline for the respective groups assessed (Willis & Marsiske, 1991). However, at the same time, Willis and Marsiske emphasise the vast individual differences indicated in the rate and patterns of change in older adults. As Cunningham and Haman (1992) comment, the heterogeneity of older adults is well documented. Differences may relate to any number of specific health problems, but also to genetic programming. *Intra*individual patterns of change in older adults are also common over time.

Willis and Marsiske (1991) correlated basic mental abilities (distinguishing between fluid and crystallised intelligence) with performance on everyday tasks. They found that both fluid and crystallised intelligence as measured on the first assesment occasion were significant predictors of everyday task performance for each of the three age groups seven years later. On the other hand, further analyses revealed that everyday performance measured on the first occasion was not a strong predictor of everyday task performance seven years later. They concluded that "functioning on basic mental

abilities is a significant antecedent of everyday task performance" (Willis & Marsiske, 1991, p. 192).

3.2 Research Objectives

The objective of the current study was to investigate the general issue of whether intellectual test performance of older adults is associated with functional ability in everyday living situations. Of particular interest was whether individual cognitive variables were predictive of competency in specific practical domains. However, as there is evidence in the literature that these relationships may be complicated by health issues and beliefs of functional competence, a conservative test of predictability was chosen. The predictive relationship between cognitive and functional ability was evaluated after statistically controlling for subjective health status and self-efficacy beliefs.

Four research questions were investigated:

1. Does self-reported health status impact on actual functional performance?
2. Do older adults' beliefs about their intellectual abilities in everyday tasks correlate with measured performance?
3. Is there a relationship between performance on cognitive variables and ability in everyday competence?
4. Are specific components of a brief cognitive test salient predictors of individual domains of everyday functioning as evaluated by direct observation of functional ability, if self-efficacy and subjective health are statistically controlled?

It was hypothesised that both self-reported health and self-efficacy beliefs would correlate highly with measured functional performance. Cognitive variables were expected to have moderate predictive power in their relationship with everyday functioning. Further, it was anticipated that salient predictors of individual functional domains would be evident in specific cognitive variables.

CHAPTER FOUR

4. Method

4.1 Research Design

As the principal aim of the study was to explore the relative importance of predictors of everyday functioning in older adults, a correlational research design was used, specifically, hierarchical regression analyses. The dependent variable (DV) was the measure of performance-based functional ability. Three independent variables (IVs) were included: a subjective health rating, an intellectual self-efficacy inventory and a cognitive measure. The subjective health rating comprised only one variable. The self-efficacy measure, however, had six possible domains, and the cognitive instrument had five potential predictors, generating a total of 12 IVs.

To obtain meaningful results from a hierarchical regression equation "a bare minimum requirement is to have at least 5 times more cases than IVs" (Tabachnick & Fidell, 1989, p. 129), indicating a minimum requirement of 60 participants for the present study. Cohen (1992), however, asserted that to achieve the desired power of .80 for a medium effect size and at statistical significance of .05, a sample size of 107 is required when eight IVs are entered. As 12 IVs were currently entered for analysis, a minimum sample size of 118 was required.

4.2 Participants

Most samples of older adults participating in research involving cognitive testing represent a restricted range of health status, with a bias towards good health (Salthouse et al., 1990). In order to accurately evaluate potential associations between

health, self-efficacy, cognitive status and functional ability, no older individual was excluded from the current study because of a particular health condition. The present sample is consequently a broad representation of the general community-dwelling population of older adults. Whilst participants were not subjected to any health screening procedures, in addition to the health variable, general information was collected on chronic illnesses and consequent need for regular medication intake.

Soliciting of study participants was undertaken through advertisements in community newspapers, a late-night radio interview and applications to aged-care agencies such as Silver Chain and Wesley Mission, retirement villages, senior citizens' centres and local bowling clubs. Participants were required to be independently-living older adults, that is, adults aged 65 years and older, and not living in a nursing home or aged hostel where comprehensive care is provided. However, in order to obtain a representative range of older people living in the community, a balance of normally healthy individuals not presently receiving care assistance and individuals receiving some form of formal or informal home care was sought. Types of home care received were typically gardening and house cleaning assistance, as well as some help with shopping excursions.

One hundred and forty three older people registered their interest in participating in the research. Of these, nine (6%) could not be included in the final analysis: four cancelled the interview appointment due to acute illness, three withdrew without reason prior to the interview stage, and two had used the opportunity to avail themselves of a counselling session. The final sample consisted of 134 individuals, whose ages ranged from 60 to 93 years (mean age = 76.51 years, SD = 7.48).

As 65 years is an arbitrary definition of 'older adult', data from two slightly younger female participants, who took part together with their husbands, were included. The two paticipants were 60 and 61 years respectively. The ratio of male:female participants, at 25%:75%, was somewhat below the ratio of older males:females reported in the 1996 Australian census of 44%:56% (Gibson et al., 1997). However, the achieved proportion was considered adequately representative for the purposes of the current research.

Considerable interest was shown by older rural people to participate in the research. Whilst it would have been of interest to compare those from the country with city dwellers, insufficient resources were available to visit more than one rural locality.

Demographic characteristics of participants are provided in Table 1.

Table 1
Demographic Characteristics of Participants

Variables	*n*	% of Total
Gender		
Male	34	25
Female	100	75
Marital Status		
Married	38	28
Widowed	77	58
Divorced	16	12
Never married	3	2
First Language		
English	123	92
Dutch	3	2
German	3	2
Hungarian	2	1.5
Italian	2	1.5
Polish	1	1
Locality		
Urban	125	93
Rural	9	7
Ongoing Health Problems		
Reported	85	63
None reported	49	37
Regular Medication Use		
Reported	85	63
None reported	49	37
Home Care Assistance		
Reported	48	36
None reported	86	64

4.3 Measures

Four sets of measures were used.

4.3.1 Assessment of Functional Status

The DV was evaluated by the Direct Assessment of Functional Status (DAFS; Loewenstein et al., 1989), a measure of instrumental activities of daily living. DAFS is a behaviourally based rating scale, allowing for direct assessment of functional abilities. Seven domains are covered: time orientation, communication abilities, transportation, financial, shopping, eating, and dressing/grooming skills. However, as the current study sample only included non-dementing older adults, the rudimentary functional tasks of eating and dressing/grooming skills were excluded. Five domains remained available for analysis (see Appendix A for score sheet).

To establish the psychometric properties of DAFS, Loewenstein et al. (1989) assessed the performance of 12 patients with AD, 11 individuals diagnosed with primary depression and 18 normal controls. The mean age for each group was in excess of 75 years. Significant differences among groups relative to most functional domains were found. Interrater reliabilities were significant across all domains, ranging from .93 to 1.00. Test-retest reliabilities were likewise significant, ranging from .72 to 1.00. Convergent validity was determined through comparison with a well-established measure of general functional status, the Blessed Dementia Rating Scale. Significant correlations between -.59 and -.67 were found. Significant correlations between .59 and .65 were also established in discriminant validity analyses.

DAFS is an objective measure which has been widely used in the home environment as an assessment of functional competence in older adults with a diagnosis of schizophrenia or schizoaffective disorder, and as a screening device for dementia (e.g., Loewenstein et al., 1995; Patterson et al., 1998; Rankin & Keefover, 1998). According to Loewenstein et al. (1995) each of the IDAL domains tapped by DAFS has been identified in the literature as important in the assessment of older adults.

The sub-scale for each domain of DAFS comprises several individually scored items. Scoring is dichotomous: correct (score one or two points per item as indicated) or incorrect (score zero points per item). Some items reflect the more traditional male or female domains of everyday functioning for the current cohort of older adults (e.g. managing finances versus grocery shopping). In order to avoid gender bias and to help determine possible care needs of both men and women, all items were presented to each participant. Sub-scales were administered to each participant in the same order. A brief description of each sub-scale follows.

Time Orientation

The time orientation sub-scale has eight items with a maximum of 16 points. Participants were required to tell the time at four progressively difficult clock settings and name the day, date, month and year.

Communication Abilities

The communication sub-scale has 14 items, with a maximum of 14 points. Participants were required to demonstrate use of the telephone, including remembering and dialing an orally presented number, as well as preparing a letter for mailing, which included correctly addressing an envelope.

Transportation

The transportation sub-scale has 13 items, with a maximum of 13 points. Stimulus cards were prepared with 13 commonly encountered road signs, which were 'aken from the 'Drive Safe' handbook published by the Western Australian Traffic Board. Participants were asked how they would respond to each sign if driving a car. Those participants (34 in total) who had never held a driver's licence or who had relinquished their licence some years previously, were not asked to complete this sub-scale.

Financial Skills

The financial sub-scale has 21 items, with a maximum of 21 points. Participants were required to identify Australian currency (coins and notes), count change from a selection of currency, write a cheque, and balance a cheque book ledger.

Shopping Skills

The shopping skills sub-scale has 11 items, with a maximum of 22 points. Participants were required to select the six grocery items which 10 minutes previously had been presented to them from a mock grocery store containing 25 items. In addition,

participants identified four other grocery items using a provided shopping list, and provided correct change from $5 after 'paying' for these items.

Administration of the five sub-scales took approximately 20 minutes.

4.3.2 Cognitive Assessment

The first IV was the Neurobehavioral Cognitive Status Exam (NCSE or Cognistat; Kiernan et al., 1987), which was designed as a screening instrument, and provides a basis for formulating referral questions leading to more accurate diagnoses and appropriate treatment. It assesses intellectual functioning in five major ability areas using scales of language, constructional ability, memory, calculations and reasoning (see Appendix B for score sheet).

The instrument was developed on two groups of normally healthy adults (aged 20-30 years and 40-66 years), who performed almost perfectly in all areas. Because of this ceiling effect, test-retest reliability in normal populations was expected to yield high scores of no practical relevance. However, Mitrushina, Abara, and Blumenfeld (1994) found that use of the scales on a sample of 28 psychiatric patients demonstrated adequate test-retest reliability of the Cognistat scales. Normative data based on a group of 59 older people aged 70-92 years (mean age = 77.6 years) has been published in the Cognistat Manual (The Northern California Neurobehavioral Group, Inc., 1994). Although specificity was low, sensitivity as high as 100% has been reported (Franzen & Martin, 1996), an important criterion in a screening device.

In each ability area except memory, participants are first presented with a screen item. This is a demanding test which is failed by 20% of normal individuals, so that initial failure does not implicitly indicate a cognitive deficiency. If the screen is passed, no further testing is done in that area. If the screen is failed, a series of test items of increasing difficulty is administered.

A brief description of the five measures follows.

Language

This scale comprises a composite measure with three components: comprehension, repetition and naming. Comprehension involves verbal commands of one-, two-, and three-step tasks, implicating oral language comprehension and complex motor praxis. Repetition consists of phrases and sentences to be repeated after oral presentation, testing receptive and expressive language ability. Finally, naming requires visually presented objects and pictures of objects to be named, involving word retrieval. One or two points were scored for each correct response, as indicated, for a maximum of 28 points if all three components were passed on the screen items.

Constructions

In the screen item for this scale two complex figures are presented for 10 seconds, after which the participant is requested to reproduce them as accurately as possible. If the screen is failed, eight red and white squares are laid out and the participant is requested to construct three designs as presented in the test booklet. Concentration, visual memory and constructional ability are involved. This is a timed

test, with completion of each design required within 60 seconds in order to score points. A maximum of six points could be obtained.

Memory

The participant is asked to recall the four words (robin, carrot, piano, green) presented earlier in the cognitive assessment. There is no screen item for the memory scale. Points were credited according to free or cued recall, to a maximum of 12 points.

Calculations

The calculations scale consists of arithmetic calculations to be performed mentally after oral presentation. The task is timed and requires concentration and mental tracking. A maximum of four points was possible.

Reasoning

This scale comprises a composite measure combining scores on similarities and judgement tasks. Similarities involves asking the participants how two specific items are alike. Abstract relationships are implicated, with full points being credited for answers which are both abstract and precise. A maximum of eight points could be scored. The judgement section consists of common-sense questions commencing with "What would you do if ...?" and involves practical judgement. Fully appropriate responses received two points, and answers with some merit one point. A maximum of six points could be credited.

Cognistat took approximately five minutes to administer if only the screen items were administered, and about 30 minutes for the whole test if all screen items were failed.

4.3.3 Self-Efficacy Inventory

The self-efficacy scale administered was developed to measure older adults' beliefs and attributions regarding their own intellectual functioning in association with everyday situations (Lachman, Baltes, Nesselroade, & Willis, 1982). The Personality in Intellectual-Aging Contexts (PIC) inventory has six scales, based on standardised measures of personality dimensions: three locus of control scales (internal, chance and powerful others), as well as achievement motivation, anxiety, and morale scales. Each scale comprises 12 items, each of which related to intellectual ageing and the respective personality dimension.

Satisfactory psychometric properties were reported. Levels of internal consistency ranged from .76 to .91, and five-month test-retest correlations were reasonably high at .74 and .88. Convergent validity, measured on the PIC scale and the relevant personality dimension, is rated as moderate (average correlation of .40). Correlations between scales were reported as low, indicating acceptable discriminant validity.

Prior confirmatory factor analyses also identified two second order factors: intellectual self-efficacy and concern about intellectual ageing (Lachman, 1983). The efficacy factor, which comprised the internal control and achievement motivation scales, implicated perceived intellectual competence and control over intellectual

functioning, as well as a desire to maintain this competence. The concern factor comprised the chance, powerful others, anxiety and morale scales. Beliefs and feelings with regard to the loss of intellectual functioning were assessed.

Operational definitions for each scale are set out below. Appendix C details the allocation of the 72 items to the six scales, as well as instructions for completion of the inventory.

Locus of control – internal

Responsibility for modifications or maintenance of intellectual functioning lies within one's own control.

Locus of control – chance

Belief that there is nothing that can be purposefully done to preserve or modify intelligence; change in abilities is inevitable or due to external forces.

Locus of control – powerful others

Dependence and reliance on other people for accomplishing intellectual tasks, due to the belief that others are better able to carry out such tasks.

Achievement motivation

The desire to try and accomplish cognitive tasks; interest in trying new activities and to be competent in intellectual pursuits.

Anxiety

The degree of comfort or uneasiness usually encountered in intellectually oriented situations, including test-taking.

Morale

One's opinion about current level of intellectual functioning relative to the past; beliefs about the nature and direction of change in one's own intellectual processes.

Each item was scored on a six-point Likert response scale ranging from 'strongly agree' to 'strongly disagree', with some items being negatively scored. High scores indicate high beliefs about intellectual abilities in everyday task performance. The inventory was completed in approximately 20 minutes.

4.3.4 Subjective Health Rating

The subjective health measure comprised four items asking participants to rate their own health compared with earlier health status and their perception of peers' health (Liang, 1986). According to Liang, a subjective rating of health is a psychological definition, a function of both illness and role performance, that is, the process is biological as well as social.

Liang's (1986) measure satisfied face validity requirements by adequately describing the intended dimension. It was reported that results were consistently replicated across the four randomly divided subgroups of the original sample of 2,944 adults aged 65 years and over. Reliability was reported as being satisfactory, all items showing a minimum of 20% true variance in proportion to the total variance.

The questions are presented below.

1. In general, would you say your health is very good, good, fair, or poor?
2. Would you say your health is better, about the same, or worse than people of your age?
3. How is your health today compared to how it was last year, better, about the same or worse?
4. Comparing your health today with how it was when you were 60, is it better, about the same or worse?

Scores from the three- or four-point rating scales were summed to provide a composite subjective health score, with lower scores indicating perceptions of better health.

4.3.5 Demographic Information

Finally, a short questionnaire was administered requesting information on gender, marital status, age, years of education, first language, chronic health problems and medication intake (see Appendix D).

4.4 Procedure

The study was reviewed by the School of Psychology Ethics Committee at Edith Cowan University and approved as complying with the requirements outlined in the University's Policy for the Conduct of Ethical Research.

Telephone contact was made with each participant and a time agreed for a visit to their home for testing and completion of the questionnaires. Each participant was provided with an outline of the study for retention (see Appendix E), before being asked to sign a consent form (see Appendix F). The demographic questionnaire and subjective health scale were then completed, followed by the cognitive assessment, the self-efficacy scale and finally, the functional assessment. Total testing time was approximately one and a half hours per person. Participants were thanked and, if requested, a note was made to provide group data and summary findings when the study was completed.

CHAPTER FIVE

5. Results

5.1 Data Screening

Prior to analysis all variables across the 134 cases were examined for accuracy of data entry, missing values and assumptions of multivariate analysis. In testing the assumptions of normality which underlie the use of multiple regression, four cases were identified with some outlier values. The age range of these cases was 83 to 92 years. In one case, 12 of the 17 variables in the analyses were deviant. The other three cases deviated on seven, five and four variables respectively. Although deletion of these cases to minimise their influence on the findings was considered, a decision was ultimately made to retain the scores of all participants in the analyses. As the current research is investigating variables relevant to *all* independently-living older adults, generalisability of the findings to other community samples was deemed to become more meaningful if the full complement of 134 cases was retained.

When entering data from the self-efficacy inventory (PIC), it became apparent that nine participants had inadvertently turned over two of the 10 pages of the document at one time, thereby failing to respond to eight of the statements. There was no pattern to the missing data, the uncompleted pages differing across participants. The 72 items covering six scales were randomly distributed throughout the questionnaire, so that no single page contained items only from one scale. The maximum number of items missing from any scale for an individual participant was three from a total of 12 items. Missing data was therefore dealt with by calculating a participant's mean for the

respective scale, based on the recorded responses, and replacing the missing value(s) in that scale with the calculated mean.

Internal reliability analyses of the six PIC scales conducted on the current data yielded alpha coefficients of .68 to .93, with a mean of .82. Individual coefficients were: Internal = .68; Chance = .88; Powerful Others = .87; Achievement Motivation = .68; Anxiety = .93; and Morale = .86.

As previously reported, 34 of the 134 participants did not complete the items of the transportation sub-scale of the DV due to an inability to drive. Analyses were consequently conducted on the remaining 100 participants for this functional domain.

5.2 Preliminary Analyses

The means and standard deviations for age and education level, as well as for each of the 17 variables used in the analyses, are presented in Table 2.

Table 3 shows the zero-order correlations of the functional domains with the subjective health, self-efficacy and cognitive variables. Correlations between the functional domains and the subjective health rating revealed only two low significant relationships: with Communication Abilities and Shopping Skills. The correlations with health status indicated that better self-reported health is significantly associated with satisfactory communication and adequate shopping skills.

The self-efficacy measures revealed variable correlations, within the low to moderate range. The six self-efficacy scales correlated highest with Financial Skills. In

Table 2
Means and Standard Deviations for Age, Education Level and Analysis Variables

	Mean	*SD*
Age – all participants	76.51	7.48
Females	76.57	7.67
Males	76.32	7.02
Years of education	10.77	3.14
Subjective health	7.78	1.74
PIC – internal	61.37	6.58
PIC – chance	43.01	13.35
PIC – achievement	57.61	7.92
PIC – morale	43.04	13.01
PIC – powerful others	50.59	13.13
PIC – anxiety	48.02	15.43
Cognistat – calculations	3.80	.63
Cognistat - reasoning	10.01	2.01
Cognistat – memory	10.06	2.22
Cognistat – constructions	4.49	1.36
Cognistat – language	25.73	2.74
DAFS - time orientation	15.75	1.02
DAFS - communication abilities	12.04	1.50
DAFS – transportation	11.51	1.28
DAFS - financial skills	18.97	2.86
DAFS - shopping skills	20.30	2.00

particular, the association of Powerful Others with the perceived ability to manage Financial Affairs is notable. Time Orientation revealed only low to moderate correlations with beliefs in one's own abilities, with two scales failing to show significant results, and no scale exceeding .25.

With the exception of the correlation between Transportation and Constructions, all cognitive variables presented a moderately to highly significant relationship with the five functional domains. Communication Abilities, Financial Skills and Shopping Skills show uniformly high correlations with all cognitive variables, indicating the range of higher order cognitive skills required in these everyday tasks.

Table 3
Correlations of Functional Domains with Predictor Variables

Predictor Variables	Time Orientation	Communication Abilities	Transportation	Financial Skills	Shopping Skills
Subjective health	-.04	-.24**	-.09	-.07	-.17**
PIC –					
Internal	.09	.26**	.23*	.39***	.23**
Chance	.18*	.41***	.38***	.36***	.28***
Achievement	.22**	.43***	.37***	.49***	.31***
Morale	.14*	.30***	.36***	.31***	.24**
Powerful others	.14	.39***	.40***	.52***	.30***
Anxiety	.24**	.41***	.31**	.46***	.31***
Cognistat –					
Calculations	.20*	.41***	.34***	.42***	.36***
Reasoning	.19*	.37***	.20*	.38***	.42***
Memory	.37**	.54***	.50***	.63***	.52***
Constructions	.32**	.50***	.15	.55***	.34***
Language	.28**	.54***	.44***	.48***	.45***

* $p < .05$
** $p < .01$
*** $p < .001$

However, simple correlations did not take into account the complexities in the relationships between the study variables. The data are therefore explored in more detail using multiple regression.

5.3 Hierarchical Regression Analyses

The primary goal of the study was to examine the relationship between everyday functional ability and cognitive performance of older adults. A series of hierarchical regression analyses was computed in an attempt to predict specific domains of functional ability from individual cognitive variables, while taking a conservative approach in testing predictability. The potentially confounding variables of older adults' beliefs about their own intellectual abilities in everyday tasks and their self-reported health status were statistically controlled by this procedure.

The subjective health measure was entered into each equation first because of the logical possibility that functional performance may be influenced by health status. The literature consistently reports that self-reports of health status are meaningful predictors of both morbidity and mortality in older people, and that they correlate positively with measures of intellectual functioning.

The self-efficacy variables were entered on the second step. Research evidence indicates that efficacy expectations are consistent predictors of behavioural performance. Positive self-efficacy beliefs have been found to exert positive control over future events in the same way that negative self-efficacy beliefs impact negatively on behaviour.

5.3.1 Analysis of Time Orientation

As can be seen in Table 4, neither subjective health status nor the composite self-efficacy measure contribute significantly to the variance of scores in the Time Orientation domain. The cognitive variables, however, make a significant unique

contribution of 15% to the variance, $F(12, 121) = 3.04, p < .001$. An examination of all variables entered into the equation indicates that the self-efficacy variables Powerful Others and Anxiety, as well as Memory and Constructions from the cognitive measures are significant predictors of performance for Time Orientation.

Table 4
Prediction of Time Orientation

Dependent Variable	Predictor	Beta	*R* square Change	*p*
Time orientation	Subjective health rating	-.04	.00	.65
	PIC – self-efficacy measures		.08	.11
	Self-efficacy scales:			
	PIC – internal	-.15		.16
	PIC – chance	.02		.88
	PIC – achievement	.12		.28
	PIC – morale	-.05		.69
	PIC – powerful others	-.32		.03
	PIC – anxiety	.28		.05
	Cognistat – cognitive measures		.15	.001
	Cognitive variables:			
	Cognistat – calculations	.09		.34
	Cognistat – reasoning	-.00		.99
	Cognistat – memory	.31		.003
	Cognistat – constructions	.21		.04
	Cognistat – language	.01		.94

5.3.2 Analysis of Communication Abilities

Scores on Communication Abilities, on the other hand, are significantly influenced by all three measures, as is revealed in Table 5. Subjective health accounts for 6% of the variance in this domain, $F(1, 132) = 7.67, p < .01$, whilst the self-efficacy variables contribute a further 20%, $F(7, 126) = 6.30, p < .000$. The cognitive variables

make a unique contribution of 25% to the variance, $F(12, 121) = 10.27, p < .000$. After the inclusion of all variables in the regression, four cognitive components emerge as significant predictors of Communication Abilities: Calculations, Memory, Constructions and Language. However, none of the individual self-efficacy scales show significant predictive power.

Table 5
Prediction of Communication Abilities

Dependent Variable	Predictor	Beta	*R* square Change	*p*
Communication abilities	Subjective health rating	-.23	.06	.006
	PIC – self-efficacy measures		.20	.000
	Self-efficacy scales:			
	PIC – internal	-.06		.50
	PIC – chance	.15		.22
	PIC – achievement	.15		.09
	PIC – morale	-.14		.16
	PIC – powerful others	-.18		.13
	PIC – anxiety	.13		.26
	Cognistat – cognitive measures		.25	.000
	Cognitive variables:			
	Cognistat – calculations	.16		.03
	Cognistat – reasoning	.05		.49
	Cognistat – memory	.28		.001
	Cognistat – constructions	.17		.04
	Cognistat – language	.19		.03

5.3.3 Analysis of Transportation

Table 6 presents details of predictability of Transportation from the independent variables. The subjective health rating does not make a significant contribution to the variance in this domain. However, both the composite self-efficacy measure and the

cognitive variables explain significant increases in the amount of variance accounted for. Self-efficacy accounts for 20%, $F(7, 92) = 3.38$, $p < .002$, and the contribution of cognition amounts to an additional 19%, $F(12, 87) = 4.68$, $p < .000$. Whereas the cognitive variables Memory and Constructions show significant predictive power in the ability to satisfactorily use transport, no single variable from the PIC inventory emerges as a major predictor.

Table 6
Prediction of Transportation

Dependent Variable	Predictor	Beta	*R* square Change	*p*
Transportation	Subjective health rating	-.09	.01	.37
	PIC – self-efficacy measures		.20	.002
	Self-efficacy scales:			
	PIC – internal	-.01		.96
	PIC – chance	.13		.41
	PIC – achievement	.10		.40
	PIC – morale	.03		.84
	PIC – powerful others	.22		.15
	PIC – anxiety	-.16		.26
	Cognistat – cognitive measures		.19	.000
	Cognitive variables:			
	Cognistat – calculations	.08		.46
	Cognistat – reasoning	-.06		.56
	Cognistat – memory	.37		.001
	Cognistat – constructions	-.28		.01
	Cognistat – language	.23		.06

5.3.4 Analysis of Financial Skills

The composite self-efficacy measure and the cognitive variables again reveal significant contributions to the variance in Financial Skills. As is evident in Table 7,

subjective health does not explain a significant amount of the variance in this domain. Self-efficacy makes a significant unique contribution of 33%, $F(7, 126) = 8.91, p < .000$, and the cognitive variables account for 24% of the remaining variance, $F(12, 121) = 13.52, p < .000$. Similarly to the Transport domain, self-efficacy variables are not revealed as being significant predictors of Financial Skills. The cognitive variables Memory and Constructions, on the other hand, again showed significant predictive power.

Table 7
Prediction of Financial Skills

Dependent Variable	Predictor	Beta	*R* square Change	*p*
Financial Skills	Subjective health rating	-.07	.01	.40
	PIC – self-efficacy measures		.33	.000
	Self-efficacy scales:			
	PIC – internal	.02		.76
	PIC – chance	-.10		.36
	PIC – achievement	.12		.15
	PIC – morale	-.12		.21
	PIC – powerful others	.09		.40
	PIC – anxiety	.19		.07
	Cognistat – cognitive measures		.24	.000
	Cognitive variables:			
	Cognistat – calculations	.12		.08
	Cognistat – reasoning	.01		.87
	Cognistat – memory	.40		.000
	Cognistat – constructions	.18		.02
	Cognistat – language	.10		.24

5.3.5 Analysis of Shopping Skills

As for all functional domains except Communication Abilities, subjective health makes no significant contribution to the variance of ability in Shopping Skills, accounting for only 3% of the variance, as shown in Table 8. In this domain, the composite self-efficacy measure accounts for 11% of the variance, $F(7, 126) = 2.89, p < .01$, whilst the cognitive variables make a unique significant contribution of a further 25% of the variance in Shopping Skills, $F(12, 121) = 6.38, p < .000$. Cognitive variables are again the only significant predictors, with Memory and Reasoning being the primary predictors. Once again, specific self-efficacy scales showed no predictive power of Shopping Skills.

Table 8
Prediction of Shopping Skills

Dependent Variable	Predictor	Beta	*R* square Change	*p*
Shopping Skills	Subjective health rating	-.17	.03	.05
	PIC – self-efficacy measures		.11	.01
	Self-efficacy scales:			
	PIC – internal	-.01		.90
	PIC – chance	.03		.85
	PIC – achievement	.06		.55
	PIC – morale	-.10		.35
	PIC – powerful others	-.10		.43
	PIC – anxiety	.09		.49
	Cognistat – cognitive measures		.25	.000
	Cognitive variables:			
	Cognistat – calculations	.15		.07
	Cognistat – reasoning	.20		.02
	Cognistat – memory	.34		.000
	Cognistat – constructions	.00		.99
	Cognistat – language	.15		.12

5.4 Correlations by Age Group

In the final analysis, the two cognitive variables which persistently emerged as predictors of most functional domains (that is, Memory and Constructions) were correlated with each DV according to three age groups (Table 9). The age break-down follows the conventional pattern of young-old, old-old and oldest-old.

Table 9
Correlation of Selected Cognitive Variables with Functional Variables by Three Age Groups

	Age Groups		
Variables	< 75 years (n = 56)	75-84 years (n = 55)	> 84 years (n = 23)
Correlation with Memory			
Time orientation	.13	.37**	.46*
Communication abilities	.25*	.55**	.68**
Transportation	.37**	.50**	.53*
Financial skills	.29*	.61**	.73**
Shopping skills	.52**	.45**	.51**
Correlation with Constructions			
Time orientation	-.14	.24*	.58**
Communication abilities	.26*	.48**	.59**
Transportation	.04	.12	.02
Financial skills	.26*	.48**	.65**
Shopping skills	.11	.36**	.17

* $p < .05$
** $p < .01$

For Memory, the correlation with functional abilities generally shows an increase from the youngest to the oldest age group. A systematic change across the three groups is evident between memory proficiency and Time Orientation, Communication Abilities, and Financial Skills. These results suggest an increased variability both in memory performance and the three functional domains as people age.

The relationship between Memory and Transportation revealed substantial change between participants younger than 75 years and those aged 75-84 years. However, the change from the old-old to the oldest-old was minimal, indicating that the

effects of memory abilities on this domain plateau from within the age-span of 75 to 84 years up to the oldest-old in the 90s.

Shopping Skills appear unaffected by age. Memory is associated with performance on this domain at an approximately equivalent level.

Similar findings are revealed in the age break-down for Constructions, with the association between visuospatial skills and functional abilities generally strengthening with increasing age. The progressive increase in correlations of Time Orientation, Communication Abilities and Financial Skills with Constructions suggests that as some people age, their visuospatial skills decline, which is negatively related to their functional ability in some domains, while the decline is less apparent in others.

The association between Transportation and Constructions, however, lacked significance in each of the age groups, the highest correlation showing in the 75-84 year olds. Correlations between Shopping Skills and Constructions revealed a similar trend to those between Transportation and Constructions, although changes were more pronounced. A significant correlation was evident in the old-old age group, showing a substantial increase from the young-old value. However, a marked decrease in the correlation was evident for the oldest-old. Shopping Skills do appear to be affected differentially across age groups according to visuospatial skills, but in an atypical pattern.

CHAPTER SIX

6. Discussion

The main purpose of this exploratory study was to investigate the degree to which cognitive variables are predictive of older independently-living adults' ability in specific tasks of everyday life, when subjective health status and self-efficacy beliefs are held constant. These two variables are known to influence older individuals' performance both in intellectual tasks and in functional domains.

Before discussing the predictability of everyday task performance from the three major sets of independent variables, the association between the respective data sets and the individual measures of functional ability will be discussed.

The hypothesised high correlation between self-rated health and everyday task performance is not supported. The association of subjective health with the functional domains is mostly negligible, with only two correlations showing significant results (Communication Abilities and Shopping Skills). In practical terms, it is understandable that better self-reported health is related to adequate Shopping Skills. However, the highest correlation in this data set is between subjective health and Communication Abilities. As the items in this DAFS sub-scale only involved use of the telephone and communication by mail, physical exertion, which may be expected to be strongly associated with a subjective health measure, is not implicated. Rather, as is evident in the correlations between Communication Abilities and the cognitive variables, cognitive skills, in particular memory and language competence, are strongly involved.

Other researchers (e.g. Hultsch et al., 1993; Perlmutter & Nyquist, 1990) have also found a positive relationship between cognitive performance and self-reported health measures. In particular, lower performance on tasks of fluid intelligence have been found to be associated with poor reports of perceived health status. Using the telephone and preparing a letter for mailing are basic tasks when a telephone number or an address is well known. However, when new information is orally presented and requires immediate processing, as in the Communication Abilities sub-scale, higher order cognitive skills are called upon.

The lack of association between subjective health and Transportation and Financial Skills was unexpected, particularly in view of the practical components involved in Transportation, as well as the visuospatial, attention, information manipulation and other cognitive processes implicated in each of these subscales.

When formulating the hypothesis of a high correlation between self-reported health and everyday competence in preparation of the current study, the complicated relations between perceived health status and other variables appear to have been inadequately taken into account. As reported earlier in this paper, Mulrow et al. (1994) found a significant positive correlation between observed performance on ADLs and a subjective health rating. However, in their study, both ADLs and the subjective health measure correlated poorly with actual medical conditions. Self-reported health is complex, and is likely to be influenced by many factors, not the least of which is cognitive competence.

This complexity is also evident in the current study, in which the full range of scores of subjective health is revealed. Ratings range from 4, indicating a perception of excellent health, to 13, suggesting a perception of very poor health. And yet all participants live independently in the community, coping with or without assistance with the environmental demands placed on them.

The correlations between the self-efficacy measures and everyday functional domains reveal varied information in partial support of the hypothesis based on the second research question. With the exception of Time Orientation, which indicates only low correlations with each of the PIC scales, the relationships between self-efficacy and everyday task performance are significant.

In particular, older adults' beliefs about their intellectual abilities especially relate to their competence in executing Financial transactions. The perceived effect of Powerful Others on this ability reveals the strongest relationship in this data set. However, all PIC scales show a highly significant association with performance in the Financial Skills domain. Although the items in this DAFS sub-scale are rudimentary tasks, it may be that some older individuals feel overwhelmed by the rapid changes in banking and commercial technology, especially in the last decade, and that this feeling has generalised to all financial matters. The propensity for others (e.g. family members, bank officers) to assume the responsibility of the financial affairs of an older person may lead to reduced confidence in their own ability in this area.

Not surprisingly, the highest overall correlations of everyday task competence are found with cognitive variables. Practical tasks such as going Shopping, managing

Finances and Communicating with others by telephone or mail are strongly associated with each of the cognitive skills assessed by Cognistat. In particular, three cognitive variables (Calculations, Memory and Language) show highly significant correlations with each of these functional domains. Cognitive processes which are involved in these skills include the ability to attend to environmental stimuli whilst performing mental operations, visuospatial and verbal memory functioning, and expressive and receptive language skills. As is the case with all correlational analyses, little causal information beyond that cognitive variables are related to functional abilities is evident. Any number of other moderating or mediating factors may also be involved in this association.

The results of the hierarchical regression analyses provide evidence consistent with the simple correlations. Specifically, there was partial support of the second, third and fourth research questions, but not of the first. To recapitulate, the research questions were:

1. Does self-reported health status impact on actual functional performance?
2. Do older adults' beliefs about their intellectual abilities in everyday tasks correlate with measured performance?
3. Is there a relationship between performance on cognitive variables and ability in everyday competence?
4. Are specific components of a brief cognitive test salient predictors of individual domains of everyday functioning as evaluated by a functional assessment measure, if self-efficacy and subjective health are statistically controlled?

6.1 Predictability of Functional Domains by Cognitive Variables

The simple correlations of this study reveal some significant predictive relationships of cognitive variables for everyday functioning. The hierarchical multiple regressions explored these relationships in more detail. These are discussed in turn for each domain of everyday functioning.

As noted in the Introduction to this study, literature addressing the relationship between cognitive and functional performance in normal ageing is essentially lacking (Backman & Hill, 1996; La Rue & Markee, 1995). Results of previous studies have reported strong relationships between general cognitive status and the ability to perform daily living tasks. However, little information is available about "how measures of specific neuropsychological functions relate to the ability to meet specific environmental demands" (McCue, 1997, p. 397). Contrasting the present findings with previous comparable research is consequently not possible. However, it is of interest to make a brief cross-reference within each functional domain to the findings of Loewenstein et al.'s (1995) investigation of the association between neuropsychological test performance and functional competence amongst older people with Alzheimer's Disease. Apart from the different population sample, Loewenstein et al. used a different battery of neuropsychological tests in their study to that currently used. However, the functional measure, DAFS, was also their choice of instrument for assessing functional competence.

6.1.1 Prediction of Time Orientation

Cognitive variables emerge as highly significant predictors of performance in the ability of older individuals to orient themselves to time, as evaluated by time of day

and day/date naming, making a unique contribution of 15% to the variance. Two of the Cognistat variables present as individual predictors of this functional domain, Constructions and Memory. These findings indicate the importance of visuospatial skills as they relate to an older adult's ability to locate themself within the time frame of everyday life. Of still greater importance is adequate memory functioning, whereby recent memory and memory for visuospatial stimuli are relevant.

Similar associations were reported by Loewenstein et al. (1995). They found that for patients with Alzheimer's Disease telling the time was most associated with attention and immediate memory, as well as visuoconstruction skills.

Of interest in this study is that although the composite self-efficacy measure does not make a unique contribution to the variance of Time Orientation, two individual self-efficacy variables come to light as significant predictors of performance: Powerful Others and Anxiety. The operational definition for the Powerful Others scale, indicating a reliance on other people for accomplishing intellectual tasks (see Appendix C), provides a plausible explanation for the relationship of this variable with the functional domain. The significance of Anxiety, suggesting unease in intellectually oriented situations (see Appendix C), is less obvious. It may be related to concern for keeping appointments and remembering events. Unexpectedly, performance on Time Orientation is the only functional domain where the predictive power of specific self-efficacy variables is evident.

Notwithstanding these clear results, I believe caution should be used when interpreting the data. Anecdotal evidence from the current study indicates that the

majority of independently-living older people, most of whom are retired from the structured workforce, see only limited value in explicitly remembering information such as the day and date. Most participants use a diary or calendar, to which they refer daily, as a reminder of events and appointments. With other words, whilst recall of day/date information may often be poor, a degree of conscious choice is involved in this apparent deficit. Problem-solving strategies (for example, use of a diary) are used to compensate for a possible decline in memory ability to enable adequate coping with everyday situations involving Time Orientation.

6.1.2 Prediction of Communication Abilities

As opposed to Time Orientation, where only cognitive variables accounted for a significant contribution to the variance, all three independent variables explain significant amounts of variance in Communication Abilities. Subjective health accounts for 6% of the variance, whilst the self-efficacy variables account for 20% and the cognitive variables for 25%. As already discussed, communication by telephone or mail requires a complex combination of cognitive skills, which has been found to be highly correlated with self-reported health. Of the five functional domains being investigated, Communication Abilities is the only area in which the subjective health rating plays a major role. The fact that all three independent variables are implicated in this analysis suggests the importance placed upon social interaction by older people, at least as it relates to telephone and mail contact. In providing services to older adults, particular consideration should be given to any difficulties which may negatively affect communication skills.

The Cognistat variable Memory is the strongest predictor in this functional domain. The importance of Memory, especially learning functions, in the ability to perform everyday activities in the maintenance of effective communication is implied. Verbal comprehension skills (Language), mental manipulation of new information (Calculations) and visuoperceptual judgement (Constructions) are also cognitive processes which are predictive of Communication Abilities.

Although Loewenstein et al. (1991) evaluated telephone skills and preparing a letter for mailing in older adults with Alzheimer's Disease as separate domains, similar cognitive variables to those in the current study emerged as best predictors of these everyday tasks. Visuospatial skills and verbal memory ability were reported to have the strongest associations with these functional domains.

The composite self-efficacy measure in this study accounts for a substantial portion of the variance explained in performance on Communication Abilities. However, none of the six scales is individually predictive of functional ability in this domain. The predictive value of the Achievement scale, although not statistically significant, suggests an interesting trend. The operational definition of this scale centres around the motivation to attempt and accomplish cognitive tasks (see Appendix C). The focus of the scale items is on intellectual pursuits, especially those involving verbal skills. As is indicated by the predictive power of Language in the cognitive variable set, verbal skills are of particular importance in remaining an integrated member of the community.

6.1.3 Prediction of Transportation

Both the composite self-efficacy measure and the cognitive variables explain significant amounts of the variance in the Transportation scale of DAFS. Self-efficacy, with 20%, accounts for marginally more of the variance than cognition, at 19%. However, none of the individual PIC scales are significant predictors of functional performance in their own right. Two cognitive variables, on the other hand, are significantly predictive of the ability to adequately use transport: Memory and Constructions.

No doubt due to their population sample, Loewenstein et al. (1995) did not include this functional domain in their study.

The functional measure of DAFS being predicted by Memory and Constructions in this study involved responding to commonly encountered road signs when driving a car. As the stimuli were taken directly from a Western Australian Traffic Board publication, a familiarity with these signs in local conditions can be assumed. Notwithstanding, only 24% of the participants in the current study sample scored the maximum 13 points for this scale. As Memory emerges as the most important predictor of the Transportation domain, it can be hypothesised that the meaning of some road signs has been forgotten by some older adults. Additionally, poor visuospatial skills, as implicated in the strong association between Transportation and the Construction cognitive variable, may be influencing the correct interpretation of some road signs.

In reviewing the Transportation component of DAFS prior to commencing this study, consideration was given to assessing performance using public transport rather than skills required when driving. However, the urban sprawl of Perth, Western Australia, and of most other Australian cities, results in public transport being less frequently used than private motor vehicles. This common observation is borne out in the current sample, with 75% of all participants, covering an age range from 60 to 93 years, using their own vehicle as the major mode of transport. Nonetheless, in consideration of these findings, some concern may be expressed regarding the inadequate knowledge of road signs by some older motor vehicle-driving adults.

6.1.4 Prediction of Financial Skills

The results of the analyses evaluating predictability of Financial Skills from cognitive variables closely mirror the findings in the Transportation domain. The unique contribution to the variance of the self-efficacy variables of 33% exceeds that of the cognitive variables, at 24%. However, the only individual self-efficacy variable which approaches significant predictive power is Anxiety. Reference to the operational definition of this scale reveals a focus on the degree of comfort experienced in intelligence test situations (see Appendix C). As already discussed, dealing with the ever-changing banking technology in recent times may be tantamount to taking an intelligence test for many of the current cohort of older adults.

This speculation is reinforced by the high predictive power of Memory in satisfactorily managing financial affairs. The multiple changes which have taken place in money handling and accounting practices in the more recent years of many older people may be a cause of confusion, which is often associated with memory deficits.

The significant predictive power of Constructions in the performance of Financial Skills, although considerably lower than Memory, implicates visuospatial skills. The handling of currency, in particular coins, as well as conducting accounting procedures, such as balancing accounts is likely to involve visuospatial perception.

The strongest predictors of abilities in this domain in Loewenstein et al.'s (1991) study were also memory variables. Recall of objects, verbal fluency and immediate memory for digits showed significant associations with Financial Skills.

6.2.5 Prediction of Shopping Skills

Finally, as for the majority of the functional domains, the composite self-efficacy measure (11%) and the cognitive variables (25%) both make significant contributions to the variance accounted for in Shopping Skills. Once again, however, none of the individual self-efficacy scales emerges as a significant predictor. As may be expected, the most important predictor of Shopping ability is again Memory. Naming and word retrieval skills (that is, memory processes), as well as visuospatial ability were the main predictors of Shopping Skills for Alzheimer's Disease patients in Loewenstein et al.'s (1995) study.

The nature of the main DAFS test item in this domain, requiring participants to select grocery items identified earlier in the testing session from a mock grocery store, particularly involves recognition and recent memory functions, but may also implicate visuospatial memory processes. However, when presented with a 'shopping list' of four items to 'buy' from the mock store, only a few participants in the current sample were unable to locate the correct items. Most participants related that they used a list when

shopping, and were 'lost' without it. As in Time Orientation, problem-solving strategies to compensate for memory deficits are commonly and usefully employed when going shopping.

Of especial interest is the other cognitive variable showing predictive power in Shopping Skills: Reasoning. This component of the Cognistat is a composite measure of both reasoning and judgement skills. As Bieliauskas (1996) comments, "tests of judgement and reasoning ... reflect ... subtle and complicated aspects of behavior in the elderly " (Bieliauskas, 1996, p. 272). In the current context, a cognitive aspect Bieliauskas refers to as a 'blinder' may be involved. For example, in the test situation for this study, the 25 grocery items in the 'store' were all commonly known items (e.g. jelly crystals, custard powder, laundry powder, toothpaste), purchased from a metropolitan supermarket. However, as frequently commented by study participants, selection of some items was difficult, because the brand name or packaging was different to their usual choice. Some participants also referred to their knowledge of the exact location of the most commonly purchased goods at their local store. Placed in an unfamiliar situation, abstract thought processes and making practical judgements about other grocery items may be confronting for some older individuals. Participants' comments also illustrate that compensatory coping strategies may be specific to particular situations and not easily generalisable by some older adults.

6.1.6 Summary of Predictability of Functional Domains by Cognitive Variables

The results of the hierarchical regression analyses make an important contribution to the fledgling literature addressing the relationship between cognitive

ability and functional competence in non-dementing older adults living independently in the community.

Subjective health adds significantly to the variance explained in only one instance. The importance of self-efficacy in everyday task performance shows considerable variation. The PIC inventory is a significant predictor in four of the five functional domains, with the amount of variance explained by the composite self-efficacy variable fluctuating from 11% to 33%.

When measures of self-efficacy and subjective health are held constant, cognitive variables emerge as significant predictors of everyday task performance in each of the DFS domains. The unique contribution made by the cognitive variables to the variance of the functional domains ranged from 15% to 25%. Although not of the same dimension as findings by Willis and Marsiske (1991), who found that more than half of the variance in older adults' performance on everyday tasks could be accounted for by their intellectual performance, these results imply the importance of cognitive competence in all areas of functional well-being. Loewenstein et al. (1995) also reported that cognitive variables such as memory, attention, language functions and perceptual ability were strongly associated with most functional domains assessed in their sample of Alzheimer's Disease patients. As has been found in the current study, they also commented that unique combinations of cognitive variables appeared to be associated with each functional domain.

Although the R^2 change for each regression equation is statistically significant, the combined variables explain a maximum of 57% of the variability of functional

performance in any domain (in the case of Financial Skills). In other words, a substantial proportion of the variance in performance on everyday tasks is not accounted for by the three study variables. This is no doubt due in large part to the high heterogeneity of older adults (Willis & Marsiske, 1991), which emphasises the care which should be taken when generalising the results of any measure used with this population group. It is logical that the topic of predictability is even more affected by the vast and varied combinations of extraneous factors which contribute to an older individual's functional abilities. As an example, predictors of functional ability in an older male with little formal education who enjoys sedentary activities such as watching television and collecting stamps and whose wife manages the household, may be very different to those in an age matched widowed female, who was a school teacher during her working years and is still active in the community as a volunteer in intergenerational programmes and Masters sporting events.

Notwithstanding these broad-ranging considerations, two individual cognitive measures emerge as strong predictors of functional ability. Memory has highly significant predictive power in all functional domains observed in DAFS. This is consistent with Tuokko and Crockett's (1991) assertion that memory functioning is the most sensitive cognitive measure in assessing everyday functioning. Constructions predicts performance in all domains except Shopping Skills. As the sample in the current study was adequate in both size and representation, these specific findings are of consequence and invite further discussion.

Memory is broadly regarded as a crystallised form of intelligence, which is subject to slower rates of decline in the ageing process than fluid abilities such as

abstract reasoning and problem-solving (Willis & Marsiske, 1991). However, it is useful to break down the ability to remember into components (Bieliauskas, 1996), some of which are more likely to be allocated to the fluid intelligence category. These include processing visuospatial stimuli and manipulating orally presented information in working memory. The current findings imply that these aspects of memory may be strongly involved in older adults' deficits in performing some everyday tasks.

As already discussed, many older adults knowingly or unknowingly employ coping strategies to compensate for a real or perceived decline in memory ability, which may impact on their day-to-day life (e.g. using a calendar as a reminder of appointments). With the increased interest in and knowledge of dementia, in particular Alzheimer's Disease, amongst members of the general community, discussions of memory, how it works, what affects memory ability, and strategies to retain and improve these skills, are common amongst older people. Practical advice at an easily understandable level is readily available, for example, in the form of books from the local book shop to formal 'memory improvement' courses.

However, those older people who are most likely to avail themselves of these opportunities are frequently those who also cope well in most everyday situations. Older adults who are likely to need health care and service provision are often socially isolated, less knowledgeable about community facilities, and less able to initiate assistance in dealing with possible deficits, such as memory decline. Identifying these individuals, assessing memory functioning and providing education about and assistance with memory training may be a major step towards improving the competence of these people in many everyday tasks.

Although Constructions, as evaluated by Cognistat, is a significant predictor of most of the functional domains assessed by DAFS, it carries far less weight than Memory. In consideration of the foregoing discussion, it would be of interest to establish whether improvements in memory ability would enhance the visuospatial skills required in the functional domains assessed in this study. A pretest-posttest control group design with a representative sample of older community dwelling adults participating in a memory training clinic may provide valuable information not only on cognitive processes themselves, but also on their association with functional competence.

6.2 Age Group Differences

As is evident in the discussion on the predictability of functional domains by cognitive variables, Memory and Constructions are consistently significant predictors of competence in everyday living situations. It was considered to be of interest and importance to investigate these cognitive variables in their relationship with each of the DAFS functional domains, as they relate to different age groups within the current sample. The age span of participants in the current study covers more than 30 years at a period when people are becoming increasingly heterogeneous. The three age groups considered are the young-old (74 years and younger), the old-old (75-84 years), and the oldest-old (85 years and older).

As detailed in the theoretical framework of this study, the third hypothesis in Willis and Marsiske's (1991) model of the relationship between psychometric and practical intelligence postulates that age-related changes in everyday task performance

reflect changes in underlying abilities and processes. In particular, fluid intelligence has been found to decline at a more rapid rate during the ageing process than crystallised intelligence.

Although the common conceptualisation of memory is as a form of crystallised intelligence, this interpretation implies that memory is primarily a knowledge base. I have argued, however, that memory is a ubiquitous cognitive process, with components of memory functioning being implicated in many mental operations. Two of the types of memory functioning which may be viewed as fluid processes and may be involved in any of the functional domains evaluated by DAFS are manipulation of information in immediate memory and memory for visuospatial stimuli. The findings of the current study of an increasing association of memory performance with some functional domains as people age, provides support for Willis and Marsiske's (1991) hypothesis that underlying abilities are associated with age-related changes in everyday task performance.

The comparative lack of change evident in the relationship between Transportation and Memory from the old-old to oldest-old age group is likely to be an artefact of this study. Only 14 individuals aged 85 years and older still drive a car, rendering this sub-sample too small for meaningful analysis. The ability to go Shopping is approximately equally associated with Memory across the three age groups.

The relationship between Constructions and the functional domains follows a similar pattern to that of Memory and functional performance, although correlations are generally weaker. The increase in the association of Constructions with performance in

Time Orientation, Communication Abilities, and Financial Skills with increasing age indicates a decline in visuospatial abilities. However, as discussed earlier, a deficit in some Memory functions may also be involved in these findings.

Modest differences across the age groups are also evident in the association between Constructions and Shopping Skills. The only significant correlation is in the old-old age group, with a marginal and very low association apparent for the young-old and oldest-old. It is difficult to provide a reasonable explanation for this atypical pattern, other than that it is a highly practised skill for most people. It may also be that with the wisdom of their years the oldest-old have become more circumspect in their performance in this very common task. All functional skills were assessed by direct observation, so that even if external assistance is provided on actual shopping excursions, the ability of the oldest age group to go shopping appears undiminished when compared with older adults a decade or two younger.

Finally, correlations between Constructions and Transportation are of negligible magnitude in all three age groups. Similarly to the association between Constructions and Shopping Skills, the highest correlation between Constructions and Transportation is evident in the old-old age group.

6.3 General Discussion

In recognition of the need to obtain information relevant to a broad cross-section of older individuals residing in the community, methodological flaws common in previous research are taken into consideration in the current study.

On the demographic questionnaire included in the current study, participants were requested to indicate whether they were troubled by any ongoing health problems (see Appendix D). Two thirds of the sample reported a continuing health condition for which they were receiving treatment, providing support for the findings of other researchers (e.g. Salthouse et al., 1990) that health complaints are prevalent amongst the older population. However, only one third of participants receives any form of home care assistance. With other words, the presence of a medical condition does not necessarily influence the ability of an older person to function independently in the community. As Salthouse et al. (1990) reported, the need to regularly take medication for a chronic illness does not necessarily lead to older adults perceiving themselves to be disabled or functionally inept. In order to obtain a representative sample of independently-living older adults, there is consequently a clear need to include not only putatively healthy individuals.

Further issues addressed in this study to ensure meaningful results are site of testing and type of test. If pertinent services are to be provided to independently-living older adults, the relevant need is more appropriately assessed where the service may ultimately be provided, that is, in their own home. As previous research indicates that in particular assessment of cognitive functioning is positively affected when testing takes place at home (Ward et al., 1990), all participants in the current study were assessed at their own residence.

In addition, the use of an instrument such as Cognistat, which assesses cognitive functioning in the major ability areas, appears to be a more appropriate tool for evaluating everyday competence in this population group than tests designed to assess

specialised tasks (Willis & Marsiske, 1991). The findings of the current study suggest that any intervention aimed at improving cognitive abilities is likely to have positive implications for several functional domains. Cognistat is inexpensive to administer, and has the potential to provide useful information relating to service provision for a community-dwelling older person. The facilitation of the relevant service can result in substantial cost savings and successful maintenance of independent living.

By virtue of its 'testing' implication any assessment is likely to include a degree of artificiality. However, an evaluation undertaken in the familiarity of the home setting, as in the current study, is likely to provide a more accurate indication of whether and what kind of assistance may be required. Although qualitative data were neither sought nor gathered in the current study, several of the participants expressed sentiments in this context. Reassurance was also necessary to many that the measures they were completing would not be used as an evaluation for their admission to an aged hostel or nursing home, but were attempting to identify areas of need in order to maintain individuals in their own homes.

6.4 Summary and Conclusion

An attempt has been made in this study to identify cognitive variables from a brief instrument as predictors of deficits in everyday tasks which may contribute to a loss of independence in the lives of community-dwelling older adults. The greatest wish of this population group is to retain their independence in their own homes for as long as possible. To this end, and in the interests of quality of life, it may be necessary to provide different types of assistance for some older people.

The current study identifies the Cognistat variable Memory as the most powerful predictor of each of the functional domains evaluated. In addition, the relationship between Memory and everyday task performance increases in strength with increasing age. Whilst not all shortcomings in practical functioning can be accounted for by poor memory skills, I believe an amelioration of some deficits in everyday competence could be achieved by encouraging and providing memory training and application courses to a broad cross-section of the older independently-living population. This service may be particularly relevant for socially isolated individuals in the oldest-old category.

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APPENDICES

DIRECT ASSESSMENT OF FUNCTIONAL STATUS (DAFS)

by David A. Loewenstein, Ph.D.

Name

I. Time Orientation (16 points)

A. Telling Time (Use large model of a clock)	Correct (2 points)	Incorrect (0 points)
3:00		
8:00		
10.30		
12.15		

B. Orientation to Date	Correct (2 points)	Incorrect (0 points)
What is the date?		
What day is it today?		
What month are we in?		
What year are we in?		

II. Communication (14 points) (Using a pushbutton telephone)

(If at any point the patient dials, picks up, or hangs up the phone, he/she is given credit for items tapping these specific subskills.)

A. Using the telephone	Correct (1 point)	Incorrect (0 point)
Dial ~~Operator~~ Emergency (000)		
Dial number from book		
Dial number presented orally		
Dial number written down		
Pick up receiver		
Ability to dial		
Hang up phone		
Correct sequence across all previous trials		

B. Preparing a letter for mailing	Correct (1 point)	Incorrect (0 points)
Fold in half		
Put in envelope		
Seal envelope		
Stamp envelope		
Address (has to be exact duplicate of examiner's copy)		
Return address (has to put correct address in upper lefthand corner)		

III. Transportation (13 points)

(Patient has to correctly identify a driver's correct response to these road signs).

	Correct (1 point)	Incorrect (0 points)
Stop		
~~Yield~~ Give way		
One way		
No right turn		
Green light		
Yellow light		
Red light		
No "U" turn		
Railroad crossing		
Do not enter		
Double yellow line		
Passing line		
Speed limit		

At this point the examiner should instruct the patient that he/she will be going to a grocery store in 10 minutes and that the patient will be asked to pick out ~~four~~ six grocery items from memory. Patient is given each grocery item, repeats it and again is asked to commit the list of ~~four~~ six grocery items to memory.

IV. Financial (21 points) (Lay out one $10 bill, three $1 bills, one $5 bill, 3 quarters, 2 dimes, 1 nickel, 3 pennies.)

Subskills include making change for grocery items.

A. Identifying Currency	Correct (1 point)	Incorrect (0 points)
Identify ~~penny~~ 5 cents		
Identify ~~nickel~~ 10 cents		
Identify ~~dime~~ 20 cents		
Identify ~~quarter~~ 50 cents		
Identify dollar ~~bill~~ coin		
Identify $5 ~~bill~~ note		
Identify $10 ~~bill~~ note		
Identify $2 coin		

B. Counting Change	Correct (1 point)	Incorrect (0 points)
Lay out		
1–$10 ~~bill~~ note	15 cents	
1–$5 ~~bill~~ note	105 cents	
3–$1 coin	(in change)	
3–$1 ~~bill~~ coin	$6.75	
1 × 50c ~~3 quarters~~	$12.35	
2 × 20c ~~2 dimes~~		
1 × 10c ~~1 nickel~~		
3 × 5c ~~3 pennies~~		

C. Writing a Check	Correct (1 point)	Incorrect (0 points)
Signature		
Pay to order of		
Written amount		
Numeric amount		
Date (location) (Does not have to be correct)		

D. Balancing a Checkbook	Correct (1 point)	Incorrect (0 points)
Amount A ($500–$350) correct $150		
Amount B ($323–$23.50) correct $299.50		
Amount C ($21.75–$3.90) correct $17.85		
Amount D ($673.15 – 79.25 = $593.90		

V. Shopping (22 points) Patients told to look over the 20 grocery items and asked to select the ~~four~~ six which were presented to him/her 10 minutes earlier.

A. Memory for Grocery Items	Correct (2 points)	Incorrect (0 points)
Jelly		
Orange juice		
Soup		
Cereal		
Tuna fish		
Rice		

All of the items selected by the patient on the previous test are put back and the patient is given a written grocery list.

B. Selecting Groceries Given a Written List	Correct (2 points)	Incorrect (0 points)
Milk		
Crackers		
Eggs		
Laundry detergent		

C.	Correct (2 points)	Incorrect (0 points)
Correct change	5	

Give the patient a $5 bill and say the bill is $2.40. Put the money out in front of them (currency from the Financial Subskills Test) and ask them to count out the change they should receive ($2.55)

COGNISTAT

(THE NEUROBEHAVIORAL COGNITIVE STATUS EXAMINATION)

NAME:_____ OCCUPATION:_____

AGE:_____ DATE OF BIRTH:_____ DATE LAST WORKED:_____

HANDEDNESS (circle): Left Right DATE OF INJURY (if any):_____

NATIVE LANGUAGE:_____ EXAM LOCATION:_____

TOTAL YEARS EDUCATION:_____ DATE:_____TIME:_____

COGNITIVE STATUS PROFILE

	LOC	ORI	ATT	LANGUAGE			CONST	MEM	CALC	REASONING	
				COMP	REP	NAM				SIM	JUD
†AVG. RANGE	ALERT	12 (S)8 10	(S)8 6	(S)6 5	(S) 11	(S) 7	(S)5 4	6 10	(S)4	(S)6 5	(S) 1
MILD	--IMP--	--8--	--5--	--4--	--9--	--5--	--3--	--8--	--2--	--4--	--3--
MODERATE		--6--	--3--	--3--	--7--	--3--	--2--	--6--	--1--	--3--	--2--
SEVERE		--4--	--1--	--2--	--5--	--2--	--0--	--4--	--0--	--2--	--1--
Write in lower scores											

ABBREVIATIONS

ATT	-	Attention	JUD	-	Judgment	ORI	-	Orientation
CALC	-	Calculations	LOC	-	Level of Consciousness	REP	-	Repetition
COMP	-	Comprehension				S	-	Screen
CONST	-	Constructions	MEM	-	Memory	SIM	-	Similarities
IMP	-	Impaired	NAM	-	Naming			

* The validity of this examination depends on administration in strict accordance with the Cognistat Manual.

† For patients over the age of 65 the average range extends to the "mild impairment" level for Constructions, Memory and Similarities.

Note: Not all brain lesions produce cognitive deficits that will be detected by Cognistat. Normal scores, therefore, cannot be taken as evidence that brain pathology does *not* exist. Similarly, scores falling in the mild, moderate, or severe range of impairment do not *necessarily* reflect brain dysfunction (see section of the Cognistat Manual entitled "Cautions in Interpretations").

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Revised 5/95

I. LEVEL OF CONSCIOUSNESS: Alert_____ Lethargic_____ Fluctuating_____
Describe patient's condition: _____

II. ORIENTATION (Score 0, 1, 2, 3 or 4 points)

		Response	*Score*
A. Person	1. Name (0 pts.)		
	2. Age (2 pts.)		
B. Place	1. Current location (2 pts.)		
	2. City (2 pts.)		
C. Time	1. Date: month (1 pt.) _____ day of month (1 pt.) _____ year (2 pts.)_____		
	2. Day of week (1 pt.)		
	3. Time of day within one hour (1 pt.)		

Total Score_____

III. ATTENTION

A Digit Repetition

1. Screen: 8-3-5-2-9-1 (Response:_____) Pass____ Fail____
2. Metric: Score 1 for each correct sequence repetition; discontinue after 2 misses at one level.

Response	*Response*	*Response*	*Response*
3-7-2 _____	5-1-4-9 _____	8-2-5-3-9 _____	2-8-5-1-6-4 _____
4-9-5 _____	9-2-7-4 _____	6-1-7-3-8 _____	9-1-7-5-8-2 _____

Total Score_____

B. Four Word Memory Task (Clock Time:_____)
Give the four unrelated words from Section VI: robin, carrot, piano, green.
(Alternate list: table, orange, lion, glove.) Have patient repeat the four words twice correctly (see Manual).
Record the number of trials required to do this:_____.

IV. LANGUAGE

A. Speech Sample
Fishing Picture (Record patient's response verbatim.)

_____
_____
_____
_____

B. Comprehension (Be sure to have at least 3 other objects in front of the patient for this test.) If a, b, and c are successfully completed, praxis for these tasks is assumed normal.

1. Screen: 3-step command: "Turn over the paper, hand me the pen, and point to your nose."
Pass____ Fail____
2. Metric (Score 1 or 0.) If incorrect, describe behavior,

	Response	*Score*
a. Pick up the pen.		
b. Point to the floor.		
c. Hand me the keys.		
d. Point to the pen and pick up the keys.		
e. Hand me the paper and point to the coin.		
f. Point to the keys, hand me the pen, and pick up the coin.		

Total Score_____

C. Repetition

1. Screen: The beginning movement revealed the composer's intention.
_____
Pass____ Fail____
2. Metric: (Score 2 points if first try correct; 1 point if second try correct; 0 if incorrect on third try.)

	Response	*Score*
a. Out the window.		
b. He swam across the lake.		
c. The winding road led to the village.		
d. He left the latch open.		
e. The honeycomb drew a swarm of bees.		
f. No ifs, ands, or buts.		

Total Score_____

D. Naming

1. Screen: a) Pen_____ b) Cap or Top_____ c) Clip_____ d) Point, Tip, or Nib_____

Pass____ Fail____

2. Metric: (Score 1 or 0.)

	Response	*Score*		*Response*	*Score*
a. Shoe	_____	____	e. Horseshoe	_____	____
b. Bus	_____	____	f. Anchor	_____	____
c. Ladder	_____	____	g. Octopus	_____	____
d. Kite	_____	____	h. Xylophone	_____	____

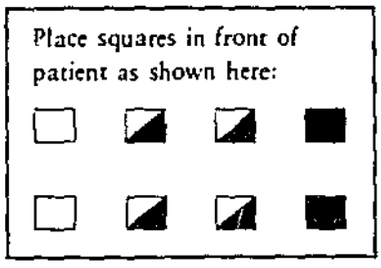
Total Score_____

V. CONSTRUCTIONAL ABILITY

A. Screen: Visual Memory Task (Present stimulus sheet for 10 seconds, then have patient draw the two figures from memory. Must be perfect to pass. The examiner may wish to have patients who fail the screen copy the two figures.)

Pass____ Fail____

B. Metric: Design Constructions (Score 2 if correct in 0-30 seconds; 1 if correct in 31-60 seconds; 0 if correct in greater than 60 seconds or incorrect.)



	Record incorrect attempts below	*Time*	*Score*
1. Design 1:		____	____
2. Design 2:		____	____
3. Design 3:		____	____

Total Score_____

VI. MEMORY (Score 3 points if recalled without prompting; 2 points if recalled with category prompt; 1 point if recognized from list; 0 if not recognized.) Check if correct. (Clock time:_____)

Words	*Check*	*Category Prompt*	*Response or Check*	*List (circle choice)*	*Score*
Robin	____	Bird	_____	Sparrow, robin, bluejay	____
Carrot	____	Vegetable	_____	Carrot, potato, onion	____
Piano	____	Musical instrument	_____	Violin, guitar, piano	____
Green	____	Color	_____	Red, green, yellow	____

Incorrect initial and/or confabulated response(s) :_____Total Score_____

VII. CALCULATIONS

A. Screen: 5 x 13 Response:____ Time:____ (Must be correct within 20 seconds to pass.)

Pass____ Fail____

B. Metric (Score 1 point if correct within 20 seconds.) Problems may be repeated, but time runs continuously from first presentation.

	Response	*Time*	*Score*
1. How much is 5 + 3?	_____	____	____
2. How much is 15 + 7?	_____	____	____
3. How much is 31 - 8?	_____	____	____
4. How much is 39 ÷ 3?	_____	____	____

Total Score_____

VIII. REASONING

A. Similarities (Explain: "A hat and coat are alike because they are both articles of clothing." If patient does not respond, encourage; if patient gives differences, score 0.)

1. Screen: Painting-Music (Must be abstract—only "art," 'artist," or "forms of art" are acceptable.)

_____ Pass____ Fail____

2. Metric: (Score 2 points if abstract; 1 point if imprecisely abstract or concrete; 0 if incorrect.) See Manual for examples. Check if correct abstract response is given.

	Check	*Abstract Concept*	*Other Responses*	*Score*
a. Rose-Tulip	____	Flowers	_____	____
b. Bicycle-Train	____	Transportation	_____	____
c. Watch-Ruler	____	Measurement	_____	____
d. Corkscrew-Hammer	____	Tools	_____	____

Total Score_____

B. Judgment

1. Screen: What would do if you were stranded in the Denver Airport with only $1.00 in your pocket?

_____

_____

Pass____ Fail____

2. Metric: (Score 2 if correct; 1 if partially correct; 0 if incorrect.)

a. What would you do if you woke up one minute before 8:00 a.m. and remembered that you had an important appointment downtown at 8:00 o'clock?

_____

_____

Score___

b. What would you do if while walking beside a lake you saw that a two year old child was playing alone at the end of a pier?

_____

_____

Score___

c. What would you do if you came home and found that a broken pipe was flooding the kitchen?

_____

_____

Score___

Total Score_____

IX. MEDICATIONS

List all medications taken either regularly or as needed and indicate dosages:

1. _____ 2. _____ 3. _____ 4. _____

5. _____ 6. _____ 7. _____ 8. _____

X. GENERAL COMMENTS

Motor, sensory or perceptual deficits: tremor, apraxia, dysarthria, visual field cut, impaired visual acuity, hearing loss, etc.:

_____

_____

"Process features": distractibility, frustration, exhaustion, pain, sleep deprivation, nature of cooperation, etc.:

_____

_____

The patient's impression of his or her performance:

_____

_____

Space for Visual Memory Task

Appendix C

PIC QUESTIONNAIRE

On the following pages are statements about how you feel or think about certain situations. Read each statement and select the answer on the right which best reflects what you believe is true for ***you*** in the given situation.

Circle the number in front of the answer which indicates the extent to which you agree or disagree with each statement. There are no 'right' or 'wrong' answers - we want to know which choice best describes you in each case. Please try to answer every question.

Here is an ***example***:

1. I like to read mysteries.

1. strongly agree
2. agree
3. slightly agree
4. slightly disagree
5. disagree
6. strongly disagree

Circle the number of the answer choice that best describes you. If you especially enjoy reading mystery stories, you would circle number 1. If you dislike mystery stories and never read such books you would circle number 6.

Here is another ***example***:

2. I'll never be able to learn to type well.

1. strongly agree
2. agree
3. slightly agree
4. slightly disagree
5. disagree
6. strongly disagree

If you already know how to type well you circle number 6. However, if you can type, but think you could improve, you might circle number 5. Circle number 1. if you believe you will never be able to type well.

As you answer the items on the next pages, please keep these points in mind:

- When you feel you can, please choose either the 1. or the 6. That is to say, try to avoid choosing the middle answers all the time, unless, of course, that is the best answer.
- Do not spend too much time thinking about your answer. Give the first natural answer as it comes to you, describing yourself in the given situation.
- Please try to answer every question, even if it doesn't seem to apply to you very well.
- Be as honest as possible about what is true of ***you.***
- ***Circle the number*** in the right column that corresponds to your answer.

Personality in Intellectual-Aging Contexts (PIC) Inventory

Scoring code of self-efficacy instrument, that is, allocation of total of 72 items to the six scales.

Locus of Control: ***Internal***

Operational definition:
Responsibility for modifications or maintenance of intellectual functioning lies within one's own control.

Inventory numbers and items:

2. *When paying in a restaurant for meals or in a store for clothes, I am able to understand the bill.
3. *If I studied a map carefully, I could figure out how to get around in a strange place.
12. *It's up to me to keep my mental faculties from deteriorating.
21. *I know if I keep using my memory I will never lose it.
24. *As long as I exercise my mind I will always be on top of things.
25. *After studying the answers to sample alphabet letter problems I could solve similar ones on my own.
31. *There would be ways for me to learn how to fill out a tax form if I really wanted to.
35. *If at first glance I couldn't make sense of a train timetable I'd be able to figure it out by studying it carefully.
46. *If I want to and work at it, I'm able to figure out quite a few puzzles and similar problems.
54. *I could remember important telephone numbers if I practised them.
56. *If I forget my friend's post code I'd be able to learn it again.
57. *I'd be able to keep an accurate record of my expenses so as to avoid financial problems.

Locus of Control: ***Chance***

Operational definition:
Belief that there is nothing that can be purposefully done to preserve or modify intelligence; change in abilities is inevitable or due to external forces.

Inventory numbers and items:

6. My problem solving ability depends on how health I am.
11. My crossword puzzle skills will go downhill even if I keep doing puzzles.
26. What I can learn now is determined by what I was taught when I was younger.
33. There's no doubt it will become harder and harder for me to add and subtract numbers.
40. I have little control over my mental state.
43. It's inevitable that my letter writing ability will deteriorate.
51. There's nothing I can do to preserve my mental clarity.

58. My mental acuity (sharpness) is bound to decline.
62. How much I can remember these days is related to the memory training I had in school.
66. It's inevitable that my intellectual functioning will decline as I get older.
68. It's becoming more hopeless to figure out complicated schedules as I get older.
70. I have no chance to improve my thinking abilities at my age.

Locus of Control: *Powerful Others*

Operational definition:
Dependence and reliance on other people for accomplishing intellectual tasks, due to the belief that others are better able to carry out such tasks.

Inventory numbers and items:

8. I would have to ask a sales person to figure out how much I'd save with a 20% discount.
10. I'd call the TV station for the program schedule rather than try to read it on my own.
15. I'd prefer the instructor to show me how to solve number problems rather than work them out myself.
30. I can only understand instructions after someone explains them to me.
32. When it comes to reimbursements or claims I need an expert's advice.
38. In order for me to have a nutritional diet a specialist would have to plan my meals.
41. I need someone to help me when it comes to solving difficult puzzles or games.
47. I wouldn't be able to figure out postal rates on a package without the postman's help.
49. I can't figure out sales prices of items unless someone helps me.
52. I couldn't learn to solve novel word problems without a teacher's help.
55. I couldn't fill out my own tax forms without an accountant's assistance.
71. The public authorities would have to help me to make sense of a bus schedule.

Achievement Motivation

Operational definition:
The desire to try and accomplish cognitive tasks; interest in trying new activities and to be competent in intellectual pursuits.

Inventory numbers and items:

4. *It's important that I'm very accurate when working with numbers.
5. I have no desire to fill out my own tax forms.
13. *I'm highly motivated to learn new things.
23. I really don't care whether or not I learn anything new.
29. *Keeping a close watch on my diet is important and worthwhile to me.
36. *I take a great interest in solving puzzles
37. It's no use teaching me new tricks: I'd rather stick with my old ones.
42. *It means a lot to me to be able to write coherent letters to my friends and relatives.

59. *I'm interested in figuring out how to get the most for my money when I'm shopping.
63. *I'd like to be good at solving word problems.
69. *It gives me great satisfaction to read on a wide range of topics.
72. *It's important to me that I be able to function on my own.

Anxiety

Operational definition:
The degree of comfort or uneasiness usually encountered in intellectually oriented situations, including test-taking.

Inventory numbers and items:

7. Reading instructions to an intelligence test or something similar would make me jittery at this time.
16. I'm usually uneasy when I attempt a problem that requires me to use my intelligence.
17. If I had to take a timed intelligence test or something similar right now, I'd worry whether I'd be able to finish it on time.
19. I am afraid that I wouldn't do very well on an intelligence test or a similar kind of test at this time.
27. *I'd be very comfortable taking an intelligence or similar kind of test today.
39. *When I have to make a quick decision I remain calm and collected.
48. Right now, I'd be threatened by unfamiliar test problems on an intelligence test or a similar test.
50. There's no way around it; I'll always be nervous when I take a test.
60. *I feel clear headed and ready for any kind of test at this moment.
61. I would feel on edge right now if I had to take an intelligence test or something similar.
64. I would feel tense and uneasy taking word tests right now.
65. Right now if I came to a difficult question on an intelligence test or something similar, I'd be upset.

Morale

Operational definition:
One's opinion about current level of intellectual functioning relative to the past; beliefs about the nature and direction of change in one's own intellectual processes.

Inventory numbers and items:

1. *I'm just as good at puzzles as I ever was.
9. I'm less efficient at managing my time than I used to be.
14. The older I get the harder it is to think clearly.
18. *I think I'm just as good at number problems as I've always been.
20. I used to be much better at working with numbers.
22. I'm not as good at remembering telephone numbers as when I was younger.
28. I have to use a lot more mental energy for solving difficult problems now that I used to.

34. *I can learn new things as well as always.
44. I can't expect to be good at remembering post codes at my age.
45. My letter writing skill has gone downhill.
53. *I'm as smart as I ever was when it comes to defining words.
67. I don't remember things as well as I used to.

*Negatively scored items

Appendix D

General Questionnaire

Please answer the following questions as accurately as you can. Remember that you will remain entirely anonymous. If there is any question you would prefer not to answer, simply leave it out.

Are you male or female? .....

Are you married, widowed, divorced, or never married? .....

How old are you? .....

How many years of formal education did you have? .....

What is your first language? .....

Are you troubled by any continuing health problems? .....

If yes, do you take regular medication to control these problems? .....

Appendix E

Does Intellectual Test Performance of Older Adults Predict Everyday Functional Performance?

The present study is investigating whether different components of a cognitive test are related to different elements of everyday tasks. The research is being conducted by a postgraduate student from Edith Cowan University as the thesis component of a Master of Psychology (Clinical Geropsychology) degree. The study is being supervised by Professor Ed Helmes, School of Psychology, at the Joondalup campus of Edith Cowan Univesity.

If you agree to participate, you will be required to complete a brief cognitive test, fill in three questionnaires and demonstrate everyday living skills such as handling money, using the phone and shopping from a compiled list. All tasks will be completed in your own home at a time suitable to you, and are generally completed within one and a half hours. Results of your tests can be provided to you on request, as well as general group findings.

This study is not a clinical assessment of any individual. The study is endeavouring to establish whether there is a relationship between intellectual and everyday functional performance of older adults as a group. However, should you be concerned about your personal results, information on appropriate referral services can be provided.

Your participation in this study is voluntary. You are not obliged to complete all items, and you are entitled to withdraw from the study at any time without further obligation.

All information obtained from the study is confidential. Results of the findings, which may be discussed with my supervisor, Associate Professor Helmes, and published at a later date in the form of a thesis, will only be in the form of group data. Your name will not be revealed in any way and there will be no personally identifying information included.

Please sign the attached letter to indicate:

- that you have read this Consent Form,
- that any questions you had have been answered to your satisfaction and that you accept the explanations provided, and
- that you have no objection to the results being published, provided you are not identifiable.

This Consent Form, signed by the researcher, is provided for your retention. Should you have any questions in the future regarding this study, please contact the researcher (Ms Joan Klinger) on 9387 6151 (after hours) or the supervisor (Associate Professor Ed Helmes) at the School of Psychology, Edith Cowan University, on 9400 5543.

Joan Klinger
Trainee Graduate Psychologist
School of Psychology
Edith Cowan University
Joondalup WA 6027

Associate Professor Ed Helmes
School of Psychology
Edith Cowan University
Joondalup WA 6027

Appendix F

CONSENT FORM

I agree to participate in the research study entitled

Does Intellectual Test Performance of Older Adults Predict Everyday Functional Performance?

provided my name is not revealed in any way and no personally identifying information is included.

I have read the Consent Form which has been provided for my retention and am satisfied that any questions I had, have been answered to my satisfaction.

....
Signature of Participant Date

....
Signature of Researcher Date