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The assessment of financial aptitude and knowledge in the elderly: The Montréal Assessment of Financial Activities Scale (EMAF-EN)

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Abstract

With the increasing age of the population, there is a corresponding increase in dementias and other similarly limiting disorders. An objective assessment tool of when a person is no longer capable to handle his or her own finances could increase the validity and reliability of such determinations. In a society that values individual rights, this would be a valuable asset. Presently, there is only one known assessment tool of competence for managing one's finances designed for the Canadian monetary system and culture, the Montréal Assessment of Financial Activities Scale (EMAF-EN). This study created a sample of the English half of this test. It also investigated differences in EMAF-EN performance due to employment, income, age, education, cognitive well-being, and rating of difficulty of arithmetic and mathematics. Significant differences in EMAF-EN performance were found for education and employment but no other demographic variables. The difference in performance on the EMAF-EN found by years of education indicate that significant differences in performance can be expected by years of education. The statistically significant difference found by employment experiences went contrary to what was expected. Finally, the internal properties of the EMAF-EN and correlations within the EMAF-EN, the indexes of the EMAF-EN, and with the demographic variables used in this study were analyzed to consider internal consistency and redundancy. Few large correlations were found. This indicates the different subtests of the EMAF-EN measure different domains.

The assessment of financial aptitude and knowledge in the elderly: The Montréal Assessment of Financial Activities Scale (EMAF-EN)

Introduction

Dementia is a growing problem across the globe, particularly in the industrialized world (Verma & Silberfeld, 1997). Our society is fast becoming older with increases in the average age of individuals and greater life expectancies (Marson, 2002). The latest count from Statistics Canada states that there are over 31 million Canadians (2003). Of these, presently 30% are over 50 years of age (a rough average of the estimated earliest age of onset for Alzheimer disease; Statistics Canada, 2004). By 2026, Statistics Canada estimates that 21% of Canadians will be at or above 65 years of age (2003).

Presently there are an estimated 364,000 Canadians with Alzheimer disease and 131,040 people living with other forms of progressive dementias. This includes Lewy Body Dementia, Creutzfeldt-Jakob disease, Pick's Disease, and Vascular Dementia. The number of Canadians with Alzheimer disease alone is expected to increase to nearly half-a-million by 2031 (Alzheimer Society of Canada, 2004). These individuals have been shown to have significant impairment in their ability to make important basic decisions, such as about financial decisions (Earnst et al., 2001). The ability to reliably and validly detect such impairment would be beneficial in preparing for this demographic change.

The aging population is also falling prey to financial abuse. Of the various forms of elder abuse, a 1989 survey found that financial abuse was the most common, accounting for more than 50% of documented cases of elder abuse (National Clearinghouse on Family Violence, 1993). Determination of financial abuse can be very tricky. Proving financial abuse involves

"differentiating between misconduct and mismanagement, or distinguishing between acceptable exchange and exploitive conduct" (Nerenberg, 1996, p. 1). Making this determination about an individual with cognitive impairment or suspected cognitive impairment is even more difficult.

Complicating the situation further are the standards of proof and ethical standards of society. How a society treats individuals with decreased competence is reflective of its values (Carney, 1997). For a society that holds the rights of individuals so dear and tries to treat all adults the same, there are a number of social, legal, psychological, and medical issues surrounding the limitations to competence and capacity that results from dementia. Basically, these issues are centered around the ideas of competence and capacity for self-care. At present, there are a number of mechanisms available when competence or capacity are impaired (e.g., a family intervening in a case of moderate cognitive impairment) or in preparation for impaired competence or capability (e.g., an early diagnosis, such as of Alzheimer disease, allowing proper preparation by the individual; Marson, Schmitt, Ingram, & Harrell, 1994). In Ontario, for example, there is the Substitute Decisions Act, which includes a plethora of different options such as Ulysses Contracts or Power of Attorney for Personal Care (Ontario Ministry of Health, 2000; see Appendix A for a more comprehensive list and Appendix B for further explanation).

Given the emerging pressures of an increasing elderly population, the resulting increase in the number of cases of individuals with dementias, the large problem of financial abuse of the elderly, and western societies' values concerning the rights of individuals and protection of individuals, there is a need for a good assessment tool of financial abilities, and specifically of financial competence. Such a measure could greatly enhance the validity and reliability of decision making in this area.

Defining competency

At present there is no universally accepted definition of competence or its components, and little empirical research (psychological or otherwise) into the creation of a construct of competence. Generally, the law considers an individual to be competent to make and carry out his or her own decisions unless found incompetent. This shows a great predisposition towards individual rights because declaring an individual even partially incompetent can strongly infringe upon basic rights. This standard is appropriate in western society given its values such as innocent until proven guilty (Evans, 1997; Marson et al., 1994; Verma & Silberfeld, 1997).

There are a variety of definitions of competence available. In one of the simplest conceptions, Loring defines competence as simply the capacity of an individual to make decisions for him or herself and to manage his or her finances (1999). It largely considers competency as a 'there' or 'not there' phenomenon, simply presenting the idea that an individual is responsible for his or her own affairs, unless constrained by some malady.

Kershaw and Webber describe competence as a legal construct that is determined by the courts. Health care professionals, particularly in cases of pathology, are often consulted (2004). It is important to remember that the ultimate decision of an individual's competence is made by a court, not by mental health professionals.

Szasz (1990) went so far as to equate mental illness and incompetence—but this is far from the prevailing opinion. There is certainly some connection between irrational actions and mental illness. This includes such far ranging instances as receiving instructions from a neighbor's dog. However, just because an individual sometimes conducts himself or herself in a manner that others perceive as irrational does not mean that the individual is not competent to

handle all or even some of his or her affairs. In fact, Burra, Kimberley, and Miura suggest that competency decisions are more complicated than a diagnosis of mental illness (1980).

At its most basic level, competence is an effective interaction between an individual and the environment (Lawton, 1989). Lawton lists five attributes to competency (1972):

1. Competence refers to external phenomena, to tasks that are to be performed by the individual;
2. The task, performance, or behavior, is to be evaluated; evaluation of competence is frequently achieved by reference to incompetence;
3. The behavior to be evaluated occurs in contemporary time. Competence is not an enduring dimension, but it varies over time;
4. Full definition of competence is possible only when the opportunities and constraints of the environment are specified; and
5. Domains of competence are hierarchally arranged with respect to the degree of complexity of behavior in each domain (p. 122-123).

Lawton's construct presents the important ideas that the act must be one that the individual performs, the determination is to be evaluated and compared to other cases, that the competence of the individual can vary, the decision of competent or incompetent is dependent on the complexity of the decisions the individual faces regularly or is likely to face in the future, and the idea that there are different areas of competency—it is no longer considered an all-or-none phenomenon.

The basic framework of the legal decision making procedure for the assessment of competency is also important in understanding how competency is defined and assessed. It has five components (Grisso, 2003): functional, causal, interactive, judgmental, and dispositional.

The "functional component" of competence refers to the activities the individual can accomplish given his or her knowledge, understanding, and beliefs. It refers to a type of competency. This is similar to a diagnosis but is much more orientated to the specific task. It is a more direct, less theoretical or construct-driven, assessment. This may have parallels to but is not identical to a mental disorder. The more abstract, trait-based assessments complement but should not be used to replace this sort of assessment, "whenever possible, therefore, forensic examiners should observe directly the functional abilities associated with a legal competence." (Grisso, 2003, p. 26).

The "causal component" refers to the cause of the specific deficit (physical or mental). There are two reasons that the legal system is interested in the proper diagnosis of impairments and their causes: detection of malingering and justification for depriving an individual of his or her rights (Grisso, 2003).

The "interactive component" is concerned with the interaction between the individual and the context. Here the abilities of the person are compared to the skills necessary to properly and adequately perform the functions the individual faces. This may also be conceptualized as the degree of competency the individual possesses. It is not necessarily the abilities of the individual that determines competency but his or her abilities compared to what is needed. This concept allows the tailoring of the legal decision to the needs of the individual (Grisso, 2003).

The "judgmental component" compares how impaired an individual is and how difficult his or her pertinent activities are. A large enough difference warrants a finding of incompetence as prescribed by law in that legal jurisdiction. The legal-judicial system must decide if an individual's functional impairment is sufficient given his or her situation that harm is likely to come to the individual or others if a finding of incompetence is not made (Grisso, 2003).

Finally, the "dispositional component" considers the specific laws that apply to the particular situation. The legal-judicial system in different jurisdictions defines the amount of deficit between the individual's ability and the individual's circumstance that is necessary for a decision of incompetence (Grisso, 2003).

The construct of competency used by this study is important; however, a certain amount of flexibility must be kept in mind if it is to be used in a variety of legal jurisdictions. This includes the laws of the different provinces as well as the different legal systems—from the civil code of Québec which is based on the Napoleonic Code (Napoleonic Code, 2005) versus the Common Law found in the rest of Canada (Common Law, 2005).

Dimensions of competency

Competency has many dimensions that allow for adjustment to the individual case and situation permitting for the least restrictive alternative to be used. This includes "general competency" versus different "specific competencies." Finally, the other dimensions are "limited competency" and "intermittent competency." These different options allow for a range of different levels of interventions which allows for a least restrictive alternative (Verma & Silberfeld, 1997).

General competency is the ability of an individual to manage his or her own affairs adequately. In the past, this was the only type of competency used by the medical and legal fields. An individual was deemed competent or incompetent in general—the system did not seek a least restrictive alternative (Canadian Psychiatric Association, 1989). Rulings of general incompetence are still made but only for individuals who are sufficiently impaired in all the requisite areas as defined by the specific laws in that area. Finding of complete incompetence can be found in cases such as severe dementia or coma (Glass, 1997; Verma & Silberfeld, 1997).

Today, competency is conceptually broken down into different areas of competencies (referred to as specific competencies) as well as different levels of competency.

The specific competencies can be conceptually arranged according to the different abilities necessary to carry out these activities. For example, the cognitive and other capacities necessary for driving a car, consenting to medical treatment, or balancing a checkbook are not identical. These different categories are referred to as "specific competencies" in contrast to "general competency." One example of this, Ontario's Substitute Decisions Act 1992 defines a person as incompetent to managing property if "the person is not able to understand information that is relevant to making a decision in the management of his or her property or is not able to appreciate the reasonably foreseeable consequences of a decision or lack of decision" (Ontario Ministry of Health, 2000; See Appendix C for more examples of specific competencies).

These individual specific competencies parallel very closely Activities of Daily Living (ADL) and more specifically the more complex Instrumental Activities of Daily Living (IADL). Activities of Daily Living and IADLs are amongst the most basic activities an individual can engage in (Morris, Fries, & Morris, 1999). Examples of IADL include the ability to manage property or health decisions. These specific competencies can also be further broken down into different capabilities that make them up.

It is also possible to create a hierarchy of complexity within ADLs and IADLs (and thereby specific competencies) according to the level of cognitive or physical complexity involved. As a rule, ADLs refer to more basic functions IADLs. Within IADLs there is also a hierarchy of complexity. For example, the capacity to fly a plane is generally considered more complex than to drive a car which is generally considered more complex than the capacity to

choose a place of residence (Addington, 1998; Foti, 2001; Molloy, Darzins, Harrison, Stang, & Tuttle, 1999).

The competency of an individual can be further conceptually divided into different stages such as "limited competency" and "intermittent competency." Limited competency is used when it is no longer prudent for the individual to be left to handle certain aspects of his or her affairs (e.g., he or she can still do the checkbook but not the investment portfolio). Intermittent competency is used for individuals who are considered competent at some times, but not competent at other times, such as might be seen in some psychiatric disorders (Buchanan, 2004; Marson, 1994; Ontario Ministry of Health, 2000).

The use of general competency, specific competencies, limited competencies, and intermittent competencies allows legal decisions concerning the competency or incompetency of an individual to address the specific areas or times that the individual is incompetent. This process uses the least necessary legal intervention (Lowe, Kerridge, McPhee, Fairfull-Smith, 2000; Marson et. al, 1994; Marson et al., 2000).

Assessing competency

The assessment and treatment of the mentally ill has improved greatly over time. From around the 1500s until the 1900s individuals were simply declared "mad" and mostly shut-away from the rest of society. They were considered little better than animals and were given the same rights. It was not until the reforms of the early 1900s that the assessment and categorization started to become more complex. Treatment for people who were assessed to be still largely able to care for themselves began on a large scale. These individuals were able to retain much more of their rights as individuals, according to their abilities (Pols, 2005).

Nowadays, when considering cases of competency, the legal system must decide if an intervention is necessary, when an intervention is necessary, and how much intervention is necessary. These decisions are made even more complex in cases of progressive dementia. In these cases, the individual's condition, and thereby different competencies, can deteriorate considerably in a small amount of time. Additionally, the threshold of when an intervention is necessary changes relative to the complexity of the task. The clinician or judge must take all of this into consideration while holding to the ethical view of using the least necessary intervention (Verma & Silberfeld, 1997).

A set of standards would be helpful in determining when intervention is necessary in complex cases of incompetence, such as seen in cases of progressive dementia (at present there are limited objective standards made specifically for the assessment of financial competency). Testing seems to be the most logical procedure to use to assess the level of competency an individual possesses. Assessing with standardized tests offers many advantages. These include use of a comparison sample, measured validity, and greater reliability. At present, there are many tests, batteries, inventories, and other assessment techniques that can be used to evaluate competence. However, they are generally very focused measures designed to assess certain cognitive functions. These assessment techniques are much more abstract than necessary for a direct assessment of specific competencies, for example financial competence. An assessment scale that directly investigates a person's aptitude in handling finances could be very beneficial. Such a test would probably correlate with some aspects of cognitive function (e.g., mathematics) but would be looking specifically at a person's knowledge and aptitude for handling of finances. This method offers the advantage of greater ecological and face validity (Anastasi & Urbina, 1997).

Existing assessment methods have been attempted for the assessment of specific competencies. Brief mental status exams were considered. One study investigated use of the Mini-Mental State Examination (MMSE) to determine financial competence (Folstein, Folstein, & McHugh, 1975; Glass, 1997). As well established as some of existing methods may be the use of brief mental status testing is not necessarily an appropriate means of assessing financial competence. Whether or not an individual knows what date it is or other similar information does not necessarily mean this same individual still has the ability to balance a checkbook. The use of subjective clinical impressions is also problematic. It introduces a large potential for error or differences in judgment. This methodology contributes to the lack of reliability among borderline cases. A specialized instrument would be of great assistance in improving the reliability of these decisions (Glass, 1997; Marson et al., 1994).

There are a variety of ways of assessing competency in general, specific competencies, and IADLs in particular. Each type of assessment has its advantages and disadvantages. The assessment techniques can be roughly conceptualized as diagnostic, conceptual, and ecological (Anastasi & Urbina, 1997; Grisso, 2003). The existing assessments for IADLs include simple observation, checklists (Foti, 2001), and standardized instruments such as the Assessment of Motor and Process Skills (Fisher, 2004).

A diagnostic assessment is merely looking at the known characteristics of an individual and seeing what determinations can be made (e.g., medical conditions such as an unremitting coma or medical records). This refers largely to the Causal component of the five component legal decision-making framework (mentioned earlier).

Conceptual assessments are generally centered around a theoretical construct of a function. A model is made concerning how a psychological process works and a test is designed

to measure that psychological process in individuals using that model. For example, the Wechsler Abbreviated Scale of Intelligence, 3rd Edition measures an individual's ability on a theoretical construct—intelligence (Wechsler, 1999). This method often has many advantages. These advantages include allowing the comparison of an individual's performance with a normalized sample that shows a standardized profile of strengths and weaknesses—in these cases it would give a profile of the individual's cognitive abilities. It relates to the causal and in some cases the judgmental and dispositional components of the five component legal decision-making framework. For the Causal Component, it can be used to help diagnose disorders that are associated with findings of incompetence as well as the severity of such a disorder. A conceptual, standardized assessment can help inform the Judgmental and Dispositional Components by indicating the severity of the problem (Freedman, Stuss, & Gorden, 1991; Alexander, 1988).

One of the downsides of conceptual assessments is their limited ecological and content validity. The conceptual design of some conceptual-based assessments tools (including many traditional psychological and neuropsychological tests) may be inappropriate for the assessment of financial competence (Willis et al., 1998). There are undoubtedly a number of cognitive functions necessary to carry out financial activities and to be considered financially competent (Willis et al., 1998). However, assuming which cognitive functions are necessary and then using existing psychological and neuropsychological tests to measure these abilities may be inappropriate for the design of these instruments and be of insufficient validity for such an important determination. Some studies have looked into the viability of using existing psychological and neuropsychological tests to determine financial competency. However, the use of existing psychometric tests has not yet been clearly established or substantiated for

competency assessments (Allaire & Marsiske, 1999; Grifftith et al., 2003; Pfeffer, Kurosaki, Harrah, Chance, & Filos, 1982). Furthermore, the legal system generally requires a direct assessment of the individual performing the task in question (e.g., financial tasks), making the use of instruments that are only abstract inappropriate (Webber, Reeve, Kershaw, & Charlton, 2002).

Most existing instruments are conceptual. They are designed to assess cognitive functions. This can be beneficial by measuring different cognitive abilities of an individual whose competency is in doubt, but it is not exactly the same thing as measuring competence. These measures therefore may not be the best method for assessing financial competence or other specific competencies (Webber et al., 2002).

In one attempt to use existing conceptual assessments for competency assessment, Bassett conducted a study comparing performance on a brief financial competency questionnaire to MMSE scores, Trails A, some subtests of the Wechsler Adult Intelligence Scale-Revised, and the Consortium to Establish a Registry for Alzheimer's Disease (CERAD) of 20 individuals with mild to moderate Alzheimer disease (1999). Performance on the brief financial competency questionnaire was not significantly related to MMSE score ($r = 0.363$). A significant relationship was found between the brief financial competency questionnaire and Trails A ($r = 0.502$) and the CERAD's Word List Immediate Recall ($r = -0.501$). However, the financial competence questionnaire was only five questions, which seems too few questions for such an important and complex consideration.

In another attempt to adapt conceptual assessments to competency assessments, Kim and Caine investigated the relationship between the MMSE and the MacArthur Competence Assessment Tool, Clinical Research Version (MacCAT-CR), in a study involving 37 individuals

with mild to moderate Alzheimer disease (2002). In a receiver operating characteristic analysis the relationship between the MMSE and MacCAT-CR was high. MMSE scores of 19 or less had specificity between 85 and 94 percent. MMSE score of 26 had a sensitivity of 91 to 100 percent. This shows that the MMSE may be of some aid in considering the general competency of individuals, but may not generalize to financial competency. Further research is needed.

The final assessment technique is ecological. Its principle advantages over conceptual assessment are its ecological and content validity. Ecological assessments can range from simple observations, to developed and standardized tests, to interviewing the people involved in the individual's life (Addington, 1998; Campisi, Cook, Moore, Marson, & Parker, 2003). This type of assessment helps to inform the functional component, interactive component, judgmental component, and dispositional component of the five component legal decision-making framework. The functional component is directly assessed as the individual is asked to do the activity around which the competency question centers. The interactive component is considered as the individual is put into the context. The judgmental and dispositional components are informed by indicating the severity of the functional problem.

In an ecological assessment, the individual's ability to do different tasks is directly assessed by doing the task or a sample of the task itself. For financial competence, this involves a direct evaluation of performance in various activities related to money management (Myers, Holliday, Harvey, & Hutchinson, 1993), possibly with aid or input from close relatives (Perry & Hodges, 2000). Several groups of researchers have supported this "direct" or "functional" or "real-life" approach for the evaluation of ADLs (Griffith et al., 2003; Skurla, Rogers, & Sunderland, 1988; Willis et al. 1998). This type of evaluation has many advantages. It has great ecological and face validity, provides feedback to the family about necessary adjustments for the

individuals in question, has great potential for versatility, and collects large amounts of information (Hart & Nagele, 1996; Willis et al. 1998).

There are a number of problems and challenges for the assessment of different competencies. These include the validity and reliability of the instrument, the subjectivity versus objectivity of the instrument, what the instrument measures and how far these results can be generalized. An instrument that is designed ecologically has great advantages in these areas.

Currently, the assessment of competency in the elderly has questionable validity and reliability. Physicians and other professionals, who often have little or no training in making such evaluations, perform many of the assessments for competency. While there is generally consistent results among the extreme cases (cognitively healthy elderly and individuals with severe Alzheimer disease), these is much less consistency in the assessment of mild and moderate Alzheimer disease (Marson et al., 1994; Webber et al., 2002). The addition of standardized, ecologically valid instruments has great potential to improve this process.

Financial competence

The ability to handle one's finances is crucial to independent living. Unsubstantiated declarations of incompetency impinge upon an individual's basic rights to independence. By contrast, not declaring someone incompetent when the person is financially incompetent exposes the individual to great financial risk. This constitutes a major clinical and legal issue in gerontology and geriatrics (Grisso, 2003). In some legal jurisdictions, it constitutes the most common issue brought before the court (Kershaw & Webber, 2004).

The impairment of cognitive functioning which in turn affects the adequate execution of daily activities is a hallmark of dementia (American Psychiatric Association, 2000; Marson, 2002). Instrumental Activities of Daily Living such as preparing food, using a telephone, and

managing finances, are the first affected by cognitive decline (Fitzgerald, Smith, Martin, Freedman, & Wolinsky, 1993; Lawton & Brody, 1969). Among these IADLs, the capacity to manage finances seems to be the most strongly associated with traditional measurement of cognitive functioning (Fitzgerald et al., 1993). Managing finances depends on a large number of cognitive skills such as semantic memory, arithmetic, language comprehension, executive functions, and judgment, which makes this type of activity particularly sensitive to even mild cognitive decline (Griffith et al., 2003; Marson et al., 2000; Willis et al., 1998).

The Canadian Psychiatric Association lists the attributes of financial competence similar to Lawton's five attributes of competency (1972), specifically for financial competence (Canadian Psychiatric Association, 1989):

1. Does the patient appreciate the importance of being financially competent and the reason for the examination?
2. Does the patient have some realistic appreciation of his/her strength or weaknesses in this area?
3. Does the patient understand the nature and extent of assets, liabilities, and expenses?
4. Has the patient, in the recent past demonstrated ability to make sound reasonable decisions with respect to his/her financial affairs and can he/she be expected to do so in the foreseeable future?
5. Has the patient, when necessary, used the available resources appropriately and indicated some willingness to do so in the future?

These attributes present the important ideas that the individual should understand the importance of financial competence, is not overconfident in his or her abilities, understands the basic

components of finances, has shown he or she is able to make sensible financial decisions, and uses assistance when available and needed.

For the purposes of this study, "financial competency" is defined as the ability to manage one's financial affairs and property. The different capabilities within this specific competency include being able to manage a bank account, knowing proper change when making purchases, and having an understanding of budgeting. He or she must also understand his or her strengths or weaknesses in financial manners. This means that individuals with more complicated financial affairs require more capabilities within this specific competence. In order for an individual to be deemed financially incompetent, he or she must be demonstrated to have a sufficient deficiency in one or more of these ways.

Assessing financial competence

Proper determination of financial competency, particularly in people with Alzheimer disease and other debilitating disorders, is a very important decision. Despite the seriousness of the consequences of the decision, little research is being done in this area. Existing ADL and IADL scales do contain some questions that pertain to financial competence, but these are fairly limited. These instruments measure the capacity to carry out several types of ADL and are not specific to the management of finances. They contain some items measuring the capacity to manage finances, but none of them covers the whole field and many are limited to simple tests such as "counting money" (Willis, 1996) or simply asking the individual "Can you manage your own money: without help / with some help or / are you completely unable to manage money?" (Comprehensive Geriatric Assessment, 2005). Other examples include the Direct Assessment of Functional Status (Loewenstein et al., 1989), the Assessment of Motor and Process Skills, 5th edition (Fisher, 2004), the Structured Assessment of Independent Living Skills (Mahurin,

DeBettignies, & Pirozzolo, 1991), Lawton Instrumental Activities of Daily Living Scale (Lawton & Body, 1969), and the Everyday Problems Test (Willis, 1996).

There are currently only two known psychometric instruments specifically designed to evaluate the specific aptitude required to manage personal finances—the Financial Capacity Instrument (FCI) and the Property and Finance Capacity Assessment (PFCA).

The FCI (Marson et al., 2000) was conceptualized on a model of financial capacity that comprises two levels: General domains of financial activity and specific financial abilities or tasks (Marson et al., 2000, p. 878). These concepts are covered in the eight domains of the FCI: Basic Monetary Skills, Financial Conceptual Knowledge, Cash Transactions, Checkbook Management, Bank Statement Management, Financial Judgment, Bill Payment, Knowledge of Personal Assets/Estate Arrangements. Each domain is made up of up to three tasks. The FCI has been subsequently modified to include a ninth domain: Investment Decision Making. These items were taken from the Financial Judgment Domain. The conceptual model was also expanded to include the overall score. Some of the items require confirmation from an informant.

The FCI was designed specifically for older adults. The coefficient alpha was high, a mean of 0.90, n = 73 across the six domains. The test-retest reliability of the FCI was also high, a mean of Pearson's correlation = 0.91, n=17 across the six domains. Cognitively-intact individuals had a mean total score of 287.2 of 307 total points. Participants with mild Alzheimer disease had a mean total score of 243.8 of 307 total points. Participants with moderate Alzheimer disease had a mean total score of 158.1 of 307 total points. It has been shown to be sensitive to mild cognitive impairment and to discriminate between patients with mild and moderate Alzheimer disease (Marson et al., 2000). Using the FCI, Griffith and colleagues

showed significant differences between non-impaired individuals, mildly cognitive impaired individuals, and individuals with mild Alzheimer disease (2003).

The FCI broke new ground in this field. It was designed as a standardized and ecological instrument. It has high internal consistency, high test-retest, and external validity. It shows statistically significant differences between diagnostic groups with respect to dementia. However, it does not take into account the financial experience of individuals or the cognitive requirements of the tasks. Also, the FCI was designed specifically for assessing the financial competence of the elderly; its use with other populations will require further study.

The Property and Finance Capacity Assessment (PFCA) is an Australian measure that was designed for measurement in various groups, not just older adults. The PFCA is still in the preliminary stages (M. M. K., personal communication, 9 November 2005). To determine the content of the PFCA, a survey was conducted amongst professionals whose field involves financial competence. The professionals surveyed included accountants, financial administrators, lawyers, medical professionals, psychologists, social workers and case managers, miscellaneous service providers, and students (students were used to form a non-professional comparison group).

The model of the PFCA started with four dimensions: Everyday Financial Abilities, Debt Management, Estate Management, and Financial Judgment. Two dimensions were later added: Cognitive Ability and Support Services. The Everyday Financial Abilities dimension includes activities that are done daily, weekly, or monthly. It includes understanding these tasks (e.g., what a phone bill means), knowing how to do them (e.g., making a check to pay for a bill), and budgeting. Debt Management involves testing to see if the participant knows how to live within appropriate limits (e.g., not taking on too many loans). Estate Management looks at the ability of

the participant to understand the sum of his or her assets. The specific content of the Financial Judgment section has yet to be determined. Cognitive Ability refers to the participant's grasp of basic literacy and mathematic skills. Support Services refers to the support being provided and the ability of the participant to seek assistance.

Thus far, the PFCA's use has been studied in a variety of clinical groups: dementia, acquired brain injury, schizophrenia, and mental retardation. Its use has been investigated with 230 individuals between the ages 21 and 82. The PFCA's application to older adults has also been studied between ages 55 to 91 (32 men and 45 women; Kershaw & Webber, 2004).

The concept used to create the PFCA was unique. The use of a survey of professionals to design the PFCA may result in it being used and understood by more professionals. It was also designed with use on a broader population in mind, making its use on other populations more appropriate than the FCI. However, it was not designed to consider the cognitive requirements of the individual tasks. Designing the test with consideration of the cognitive requirements allows for comparison with other instruments that measure cognitive abilities.

The use of the FCI and the PFCA in Canada may not be appropriate. The FCI was designed for use in the United States. The PFCA was designed for use in Australia. Neither was designed nor adapted for use by the legal systems within Canada or the Canadian financial and monetary system. Canada's coinage is different from both countries. In the U.S. dollar coins are rare and two dollar coins do not exist. In Australia there are no pennies. The sales tax is different throughout the U.S. (Taxes by State, 2006). Australia uses a Value Added Tax (Value Added Tax, 2006). Sales tax is also different in different provinces in Canada (Taxtips.ca, 2004). What products sales tax applies to also differs from place to place. Finally, the price of goods and services is different in all three countries.

Similar to the FCI and the PFCA, the Montréal Assessment of Financial Activities Scale (EMAF-EN) is a new test designed specifically for Canada. The EMAF-EN was recently developed to assess financial competence. The EMAF-EN is the English version of the Échelle de Montréal pour l'évaluation des Activités Financières (EMAF-FR). It uses a two-by-two model of financial competence (See Table 1 and Table 2). It was also designed so the individual subtests also parallel the different capabilities within the concept of financial competence.

Marson and colleagues' (2000) conceptual model of the FCI was the original financial competence assessment model. This concept was refined by Griffith and colleagues (2003) to consider the cognitive requirements of the tasks. The EMAF's conceptual model (Bédirian, Bertrand-Gauvin, Ouellet, & Scherzer, 2002) was designed to be a further refinement of Griffith and colleagues (2003).

Bédirian and colleagues (2002) further refined the approaches of Griffith and colleagues by grouping specific financial abilities or tasks in a manner that accounts for the cognitive requirements of the task. This allows further research into the relationship between these different areas of financial activity, the requisite cognitive requirements, and existing measures of these cognitive requirements. Clinically, the EMAF's arrangement allows comparison of the different subtests in its organization. The subtests are labeled by their cognitive ability. This allows use of similar testing instruments to compare them. This arrangement of the EMAF was also designed to be consistent with legal doctrine (Bédirian, Bertrand-Gauvin, Ouellet, & Scherzer, 2002). This test was also designed to be bilingual, using Canadian currency, and used samples of English and French participants.

Table 1. Conceptual Model of the Montréal Assessment of Financial Activities Scale

		Application	**Management of expenses and income**
Knowledge	Information	D) Knowing equivalent amounts T) Knowing taxes and tips	J) Knowing basic banking terms
	Identification	E) Identifying coins and bills	G) Identifying documents
	Procedure	C) Counting money U) Solving mathematical operations	O) Writing a cheque F) Conducting bank transactions
Abilities	Appraisal	B) Finding equivalent amounts	W) Knowing essential expenses
	Estimation/ Judgment	R) Estimating costs	P) Detecting potential frauds Q) Showing judgment
	Comprehension	V) Interpreting sales signs	I) Understanding a banking statement K) Understanding cheques L) Understanding a bill
	Evaluation/ Verification	A) Verifying change S) Calculating costs	H) Verifying bank transactions M) Verifying a bill N) Paying by installments
	Memorizing	Y) Remembering Purchases	X) Remembering bank transactions

Table 2. Order of the 24 subtests of the Montréal Assessment of Financial Activities Scale

Subtest A: Verifying change
Subtest B: Finding equivalent amounts
Subtest C: Counting money
Subtest D: Knowing equivalent amounts
Subtest E: Identifying coins and bills
Subtest F: Conducting bank transactions
Subtest G: Identifying documents
Subtest H: Verifying bank transactions
Subtest I: Understanding a bank statement
Subtest J: Knowing basic banking terms
Subtest K: Understanding cheques
Subtest L: Understanding a bill
Subtest M: Verifying a bill
Subtest N: Paying by installments
Subtest O: Writing a cheque
Subtest P: Detecting potential frauds
Subtest Q: Showing judgment
Subtest R: Estimating costs
Subtest S: Calculating Costs
Subtest T: Knowing taxes and tips
Subtest U: Solving mathematical operations
Subtest V: Interpreting sales signs
Subtest W: Knowing essential expenses
Subtest X: Remembering bank transactions
Subtest Y: Remembering purchases

The dimensions of the EMAF are in a two by two arrangement. The first dimension includes Knowledge and Abilities (vertical axis on Table 1). The second dimension includes Application and Management of Expenses and Income (horizontal axis on Table 2). Knowledge and Ability organizes the subtests by cognitive requirements, this allows for comparison with other psychometric instruments. Application and Management of Expenses and Income are the specific domains of activity. Each subtest is on both dimensions according to its content. For example, the subtest, "Identifying Coins and Bills," is considered a day-to-day activity, placing it

in the Application Index. Secondly, it requires knowing certain information for the identification of objects placing it in the Knowledge Index (see Table 1).

Moderators

There were a number of demographic variables that also may influence financial competence. They were measured in this study to see how they impact the assessment of financial competence. These variables were employment, income group, age, years of education, cognitive well-being, and rating of difficulty of arithmetic and mathematics. Differences in these variables may affect performance on the EMAF and result in poor validity. If any of these variables were found to have a clinically significant impact on EMAF-EN performance, an adjustment may be needed for the proper assessment of financial competency. This is common practice with other tests, such as the MMSE (Crum, Anthony, Bassett, & Folstein, 1993).

The employment of an individual may have an impact on his or her knowledge of finances and thereby affect his or her performance in this study. Years of practice or years or training in a financially related field may cause an increase in EMAF-EN score that is clinically significant. Employment has been linked to increased resilience to neurological damage. A difference due to employment could become especially important in measuring the financial competence in individuals with neurological damage (Cognitive Reserve, 2006).

Similarly, the income or socio-economic status of a person could affect his or her financial experiences and thereby affect his or her performance on tests of financial competence (Koivisto, et al., 1992). It is possible that individuals with different amounts of money have different experiences financially—this could cause a clinically significant difference in performance on psychometric tools.

Age could also cause changes in performance in this study. As people age there are a number of "cumulative, progressive, intrinsic, and harmful changes" to the individual (Moody, 2002, p. 4). Among other things, this process affects the brain at the physiological and anatomical level. Studies have shown these neurological changes occur in the absence of any pathology (Albert et al., 1995; Capitani, Barbarotto, & Laiacona, 1996; Park, O'Connell, & Thompson, 2003; Parkin & Java, 1999). The areas affected by the normal aging process include the frontal lobes, pre-frontal lobes, medial temporal lobe, occipital-temporal regions, and auditory areas of the brain (Constantinidou & Baker, 2002; Daselaar, Veltman, Rombouts, Raaijmakers, & Jonkers, 2003; Humes & Floyd, 2005; Parkin & Java, 1999).

Normal aging's effect on the brain leads to a decrease in functional and cognitive abilities. These deficits often manifests as small, largely non-debilitating, changes. However, these changes must be taken into account when assessing older adults. Decreases in performance have been found in different areas of mental ability in the elderly. These changes due to normal aging exist in the absence of timed tasks. This indicates that the difference in performance between young and old is not due to simple motor ability differences (Salthouse, 2001). Older adults also tend to perform lower than younger adults with novel problems, multi-tasking, complex tasks, word retrieval, and changing tasks (Ravdin, Mattis, & Lachs, 2004; Wingfield & Kahana, 2002). The cognitive areas that have been identified as being affected by normal aging include executive function, working memory, performance scores on intelligence scales, sequential learning, acquisition of new material, episodic memory, and attention abilities (Albert, 1988; Daselaar et al., 2003; Humes & Floyd, 2005; Moody, 2002; Ravdin et al., 2004).

The deficits in executive functions may be especially important in the study of competency. Executive functions refer to several cognitive functions including planning,

initiation of action, coordinating, monitoring behavior, and evaluation (Salthouse, Atkinson, & Berish, 2003; Vogels, Dekker, Brouwer, & de Jong, 2002). These functions are essential to conducting tasks for everyday living, such as ADLs and IADLs (Royall, Palmer, Chiodo, & Polk, 2004; Salthouse et al., 2003; Willis et al., 1998). The advance of age is believed to result in reduced frontal lobe function—harming executive functions (Royall et al., 2004). These reduced abilities in elderly executive function are similar to younger individuals with frontal lobe damage (Plumet, Gaonach'h, & Gil, 2005). The frontal lobes are closely linked to the Executive functions; Executive functions are sometimes referred to as frontal functions (Salthouse et al., 2003).

Having less years of education has also been associated with a decrease in performance on standardized tests. This may be due to a preventative effect or a compensation effect. One study used a standard neuropsychological battery. It found education differences in 28 of the 29 tests (in contrast, age differences were found 23 of the 29 tests). These differences included significant differences by education in orientation; immediate and delayed logical memory; immediate and delayed nonverbal recall; number of trials, immediate recall, and delayed recall of 10 words; verbal Fluency: semantic and phonological; block design; calculation; cancellation task; similarities; digit symbol; written description of a picture; abstraction; finger tapping (preferred and non-preferred hand); Rey-Osterrieth complex figure (copy and immediate recall); digits forwards, digits backwards, and 'A' auditory vigilance test; and recognition of unfamiliar faces (Ardila & Rosselli, 1989). Another study found educational background the strongest correlate of cognitive performance with income and race also found to be related (Albert et al., 1995).

The cognitive well-being of individuals could also have an impact on EMAF-EN performance. However, in this study participants were screened for cognitive impairments to create a sample of cognitively-healthy individuals. However, to create a basis for comparison for future studies, differences in cognitive well-being were investigated in this sample of cognitively-healthy participants.

An individual's skill in arithmetic and mathematics may also have some bearing on financial competence. Financial decisions and day-to-day affairs often have a mathematical or arithmetic component to them. Skill in these subjects, even with the aid of a calculator, may be an important factor of EMAF-EN performance.

All of these variables have the potential to change the performance of individuals on the EMAF-EN. To this end, many tests, such as the MMSE and the Dementia Rating Scale, 2nd Edition (DRS-2), have norms that change with both age and education (Crum et al., 1993; Jurica, Leitten, & Mattis, 2001). If clinically significant differences are found by these variables similar adjustments may be necessary for the EMAF-EN.

The present study

The goal then is to study whether the EMAF in both French and English provides an ecologically valid and reliable method for evaluating the specific IADL of financial competence which is unaffected or properly adjusted for differences in employment, income group, age, years of education, cognitive well-being, and rating of difficulty of arithmetic and mathematics. The objectives of this study were:

1) To enlist a sample of healthy English-speaking elderly from the area of Thunder Bay, Ontario to aid the standardization of this test. This sample will help to create a basis of comparison for the English version of EMAF and to allow its use with

English-speaking clinical populations. This sample was to consist of 12 to 15 participants per group in four groups stratified by age (60 to 69 and 70 to 81) and education groups (less than 12 years of education and 12 years of education or more).

2) To measure the impact of various demographic differences (employment, income group, age, years of education, cognitive well-being, and rating of difficulty of arithmetic and mathematics) on financial knowledge and aptitudes in the healthy elderly.
3) To investigate correlations within the EMAF-EN's subtests to consider any differences and similarities between them.

It was intended that a sample of English-speaking individuals would be recruited. The sample was to consist of 12 to 15 participants per group in four groups stratified by age (60 to 69 and 70 to 81) and education groups (less than 12 years of education and 12 years of education or more).

Demographic differences in EMAF-EN performance were expected within this sample. These demographic differences were looked at in three ways. The two indexes were considered (Application and Management of Expenses and Income, see Table 1) as well as the Total EMAF-EN score in individual linear regressions as well as one larger linear regression.

Individuals with experience in jobs that resulted in greater financial experience were expected to have a higher score on the EMAF-EN (as defined by an encoding system). Individuals who were in higher income groups were expected to have a higher score on the EMAF-EN. Older individuals were expected to have a lower score on the EMAF-EN. Individuals with higher education were expected to have a higher score on the EMAF-EN.

Individuals with higher cognitive well-being—indicated by a higher score on the Montréal Cognitive Assessment (MoCA), a screener for cognitive impairment—were expected to have a higher score on the EMAF-EN. Finally, an individual's skill in arithmetic and mathematics could possibly have a bearing on ability to handle finances. Individuals who find arithmetic and mathematics easier subjects were expected to have higher performance on the EMAF-EN.

Within the EMAF itself high scores were expected within this cognitively unimpaired sample (as defined by MoCA score). This was informally assessed with the use of basic descriptive statistics. Correlations within the EMAF-EN were also considered. Some high correlations (above 0.5 in a bivariate correlation) were expected. However, due to the different domains measured by each subtest, there were expected to be few bivariate correlations greater than 0.5.

Method

Participants

Participants were recruited from in and around the city of Thunder Bay, Ontario in four different ways. Firstly, information about the study was advertised via three local media outlets: 1) three airings of a three minute interview on Channel 5 for *Round Towner Community Clipboard*; 2) a brief statement on the study was posted on the local community access channel for over three weeks (channel 10, see Appendix D for the actual text that was displayed); and 3) the information was published in the *Community Corner s*ection of the Chronicle-Journal for three weeks (see Appendix E for the actual text). Secondly, participants were recruited from the Thunder Bay 55 plus Centre and the Herb Carrol 55 plus Centre at a table set up in the lobby during lunch hour. Thirdly, exercise and other classes at the senior centers were approached and

individuals were asked to volunteer. Fourthly, participants were recruited by referrals. A few individuals had friends or family who called and expressed an interest in the project. All of these methods were in keeping with the University's Ethics Board and were specifically approved in the experimental proposal. All recruitment at the senior centers was approved by the supervisors at each center. Before formal testing began, each participant was given general information about the purpose of the study and signed a consent form.

Participants had to meet some inclusion and exclusion criteria. There were two inclusion criteria. First, participants must have some life experience in handling financial affairs. This specifically included the areas experience in purchases, experience in paying accounts or bills, and experience in banking. This criterion was determined by a short questionnaire read to the participant. Second, only people between the ages of 60 and 81 were tested.

There were also some exclusion criteria. Participants with any uncorrected visual problems, uncorrected hearing problems, psychiatric disorders which were not controlled at the time of testing, or diseases of the central nervous system were excluded. Participants were asked if they met any of these exclusion criteria in the demographic questionnaires completed at the beginning of testing (see Appendix F). The cognitive well-being of participants was also considered. Recruits with cognitive impairment were excluded. This was accomplished by using the Montréal Cognitive Assessment (a dementia screener; Nasreddine et al., 2005). All participants with a score less than 26 were excluded.

Instruments

Two short questionnaires were prepared for this study. The first collected general information (age, education level, language, birthplace, vocational experience, etc.) and information related to health status (psychiatric disorders, neurological, auditory, visual, etc; see

Appendix F). The second questionnaire was related to the daily activities, education level, and professional financial experience (see Appendix G).

The Montréal Cognitive Assessment was used (MoCA; Nasreddine et al., 2005). It is a short cognitive inventory specifically designed for the evaluation of light cognitive dysfunctions. It was given one-on-one with the participant, and took approximately 10 to 15 minutes. The test consists of 12 sets of questions and 30 possible points, with an additional point added to the score of all individuals with less than or equal to 12 years of educations (see Appendix H).

The MoCA had greater sensitivity than the MMSE. The MMSE had greater specificity than the MoCA (Nasreddine et al., 2003). On the MoCA, a result of 25 points or less out of 30 points in French or English is considered abnormal and correctly categorizes 87% of individuals without cognitive impairment (specificity), 90% of the people having mild cognitive impairment (sensitivity) and 100% of the people affected by Alzheimer disease (sensitivity; Nasreddine et al., 2003). There are French and English versions of this inventory. It is considered equivalent in both languages (Nasreddine et al., 2005).

The Montréal Assessment of Financial Activities Scale (EMAF-EN) is an English translation and adaptation of the Échelle de Montréal pour l'évaluation des Activités Financières (EMAF-FR; Bédirian & Scherzer, 2004). Two translations were done in order to ensure linguistic equivalence; following translation of the French version into English, the English version was retranslated into French by a third person. The individual items were also approved for their content and construct validity by experts in the field. This included two neuropsychologist/researchers, geriatric psychiatrist, family physician, researcher in the area of dementia, occupational therapist, a notary experienced in the preparation of wills for the elderly

and a financial planner (Bédirian, Bertrand-Gauvin, Ouellet, & Scherzer, 2002; P. S., personal communication, August 2006).

The EMAF-EN: This scale was specifically developed to measure the skills necessary for the management of finances in elderly individuals living in Canada. This scale has a number of realistic tasks and other items relevant to financial competence. It is divided into two basic areas: Capacities and Knowledge. These areas are further broken down. Capacities include the areas of Generation, Estimation and Judgment, Comprehension, Evaluation and Verification, and Memorizing. Knowledge includes the areas of Information, Identification, and Procedure. A more extensive breakdown of the different areas of the EMAF as well as the order of their application may be seen in Table 1 and Table 2. There are 142 individual questions in 25 subtests. Total scores range from 0 to 142. Each item was scored as correct or incorrect for one or zero points, depending on the participants performance. A higher score indicates a higher level of financial ability, and thereby, a stronger indication of financial competency. The individual items then combine into an overall index score of the individual's abilities. It is administered one-on-one with the participants and takes approximately 30 to 60 minutes to complete.

The author of the EMAF made two small protocol changes after the data collection phase of the experiment. First, Detecting potential frauds (Subtest P) and Showing judgment (Subtest Q) were combined because of their content similarity. Second, item 83 of Subtest P was dropped. Too many participants answered it incorrectly. In this sample 37.5% of participants answered this particular question correctly, compared to a mean of 97.5% Subtest P and Q combined (with that question excluded). This also reduced the total number of EMAF-EN questions scored to 141.

The raw score obtained from each of the EMAF-EN's 24 subtests was transformed into a percentage within that subtest. This gave each subtest equal weight independently of the number of items within it. The total score of the EMAF-EN and two indexes of the EMAF-EN were derived by taking the mean of the percentages of the different appropriate subtests.

Procedure for first hypothesis

All participants met individually with the experimenter to complete the study. During this time, the participants were given a letter explaining the project (see Appendix I) and provided informed consent (see Appendix J). The financial experience questionnaire, the health and language experience questionnaire, and the MoCA were used to screen participants. The participants who met the inclusion criteria then completed the EMAF-EN. This process took on average a little over 60 minutes. All data collection was done in participants' homes, at the 55+ Centre, or at Lakehead University. The aim was to recruit 12 to 15 participants per group in four groups stratified by age (60 to 69 and 70 to 81) and education groups (less than 12 years of education and 12 years of education or more).

Procedure for second hypothesis

Demographic and performance data was collected from the participants. This included employment (a), income group (b), age (c), education (d), and cognitive well-being (e) (MoCA score). This information's relationship to EMAF-EN score was investigated by several individual linear regressions as well as one combined linear regression.

The employment experience of an individual may influence his or her ability to handle finances (as measured by the EMAF-EN). For example, accountants may be better at handling their finances and doing the requisite math than say a psychologist. Participants' employment-

related financial experience was encoded to allow comparison and analysis. This encoding was originally suggested by the author of the EMAF (V. B., personal communication, May 2005):

- First a score is awarded on the basis of type of employment:
  - Job with no financial experience or no job = 0 points
  - Clerical job that handles money only = 1 points
  - Clerical job that handles products, billing, or inventory = 2 points
  - Assistant Accountant or bank teller = 3 points
  - Manager of a business = 4 points
  - Bank officer = 5 points
  - Accountant = 6 points
- Next extra points were added on the basis of experience:
  - No job = +0 points
  - 1 or 2 level job for less than 1 year = +0 points
  - 1 or 2 level job for 1 year or more = +0.5 points
  - 3-6 level job for less than 5 years = +0 points
  - 3-6 level job for 5 to 10 years = +0.5 points
  - 3-6 level job for more than 10 years = +1 point

The relationship of income group and financial ability was also examined. The income of individuals was coded into 5 groups on the demographics questionnaire: Less than $10,000; Between $11,000 and $25,000; Between $26,000 and $40,000; Between $41,000 and $55,000; and $56,000 or more (see Appendix G).

Three other demographic variables examined included age (in years), education (in years), and cognitive well-being (in MoCA score). Age and education may have an effect on the deterioration of cognitive abilities with the concept of normal aging. MoCA score was analyzed, despite its limited range in this study, to provide a basis of comparison for any future analysis done with the EMAF. These predictor variables were each entered individually into a linear regression with the Application Index percent, Management of Expenses and Income percent, and Total EMAF-EN percent as dependant variables.

The final variable measured was the rating of difficulty of arithmetic and mathematics. Participants were asked to rate how difficult they found arithmetic and mathematics. This was done with a simple four-item survey question given in the screener questionnaire. They possible responses were: very easy subjects, easy subjects, difficult subjects, or very difficult subjects (see Appendix G).

Procedure for third hypothesis

A final objective of this study was to investigate the internal properties of the EMAF-EN. Basic descriptive statistics of the subtests, two indexes, and total score were compared as well as well as correlations among the subtests, indexes, and total score of the EMAF-EN. The descriptive statistics (mean, median, mode, standard deviation, minimum, and maximum) of these variables were considered and several bivariate correlation were done. Bivariate correlations above 0.50 were considered as indications of potential redundancy between subtests.

Results

Hypothesis one: Success of sample

A total of 79 individuals showed interest in the study. Of these 79 individuals, 20 later refused, did not return the follow-up telephone call, or did not show up for the appointment. Of the remaining 59 individuals, ten participants did not meet one of the inclusion criteria. Three participants were excluded for being too young (less than 60). One participant was excluded for being too old (more than 81). One participant was excluded due to a learning disability. Five participants were excluded due to strokes, concussions, or similar physical health problems. This left 49 qualified individuals who were then given the Montréal Cognitive Assessment. Nine did not meet the minimum score of 26, leaving 40 individuals for whom a full set of data was available. This procedure took a little over an hour to complete. Of these 40 individuals, 31 were female. Nine were male. The mean age was 68.9 years. The median age was 68 years. The mean educational level was 14.8 completed years of education. The median educational level was 15 completed years of education.

The original proposal for this study called for the recruitment of 12 to 15 participants per group in four groups stratified by age (60 to 69 and 70 to 81) and education groups (less than 12 years of education and 12 years of education or more). This original recruitment goal was not met. Also, few individuals were recruited with less than 12 years of education (N=3 in the younger age group and N=2 in the older age group). Descriptive statistics of the sample by age, sample size, and sex can be found in Table 3.

Table 3. Descriptive statistics of sample broken into four age groups as well as overall total.

Age Group (years)	*60-64*	*65-69*	*70-75*	*76-81*	*Total*
Sample Size (n)	13	9	10	8	40
Males per group	0	5	2	2	9
Females per group	13	4	8	6	31

Mean age per group (years)	61.8	66.9	72.8	78.1	69.0
Median age per group (years)	61	67	72	78	68
Standard Deviation of age per group	1.7	1.5	1.9	1.6	6.4
Minimum age per group (years)	60	65	70	76	60
Maximum age per group (years)	64	69	75	81	81
Mean educational level per group (years)	14.8	14.6	14	15.9	14.8
Median educational level per group (years)	15	15	13	17	15
Standard Dev. of educational level per group	3.3	3.2	3.3	4.2	3.4
Minimum educational level per group (years)	5	8	11	8	5
Maximum educational level per group (years)	18	18	22	21	22

Hypothesis two a: Employment experience

The employment experience of participants was collected and numerically coded for this study. The descriptive statistics of this coding are listed in Table 4 and a scattergram of each participant's employment rating compared to EMAF-EN percent can be seen in Figures 1, 2, and 3. The predictive value of the employment coding was determined in a linear regression on the Application Index, Management of Expenses and Income Index, and total score on the EMAF-EN. This coding of employment was statistically significant on the Application Index, $F(1, 39) = 5.42$, $p = 0.025$, R-squared = 0.125, $b = -0.006$; but not the Management of Expenses and Income Index $F(1, 39) = 0.002$, $p = 0.787$, R-squared = 0.002; or the total score on the EMAF-EN $F(1, 39) = 2.59$, $p = 0.116$, R-squared = 0.064. This indicates that employment has some predictive value for the Application Index of the EMAF-EN. On the Application Index for every increase of one by employment score, Application Index decreases by 0.6%. This runs contrary to the original hypothesis for the employment variable.

Table 4. Descriptive statistics of the employment experience of participants.

	Mean	**Median**	**Mode**	**Std Dev.**	**Minimum**	**Maximum**
Employment	2.25	1.25	0.00	2.30	0.00	7.00

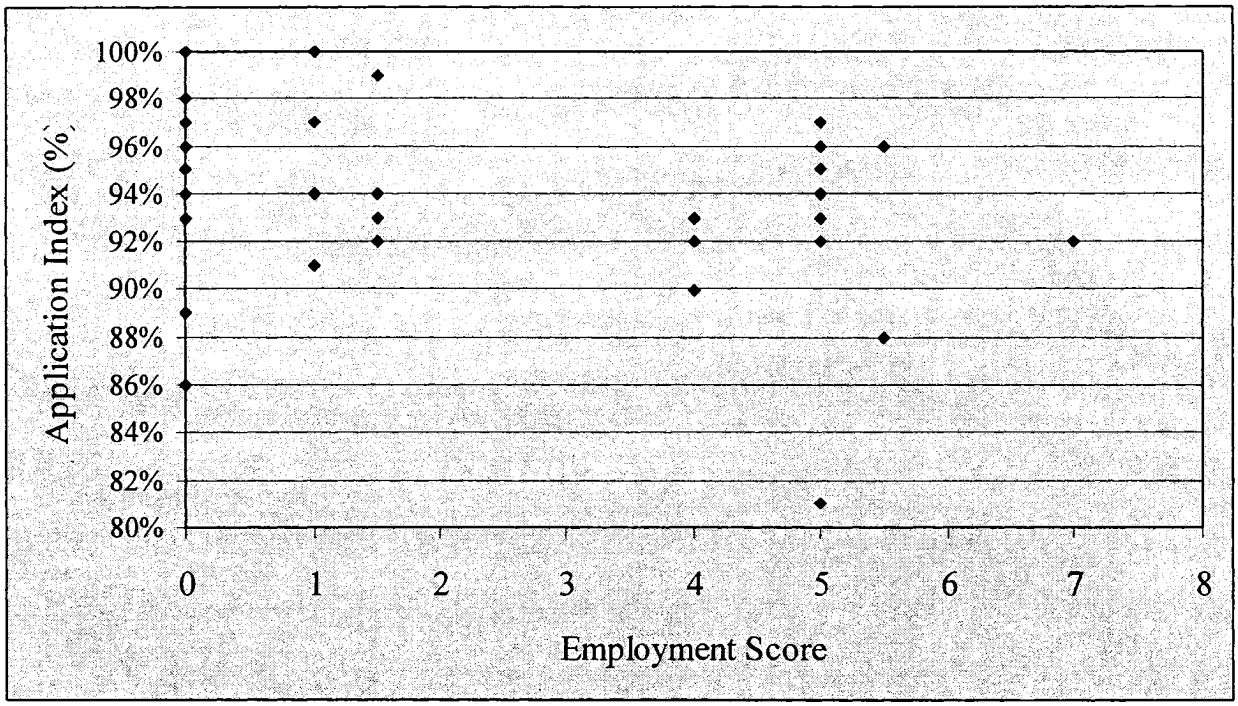

Figure 1. Scattergram of the Application Index (%) by employment score.

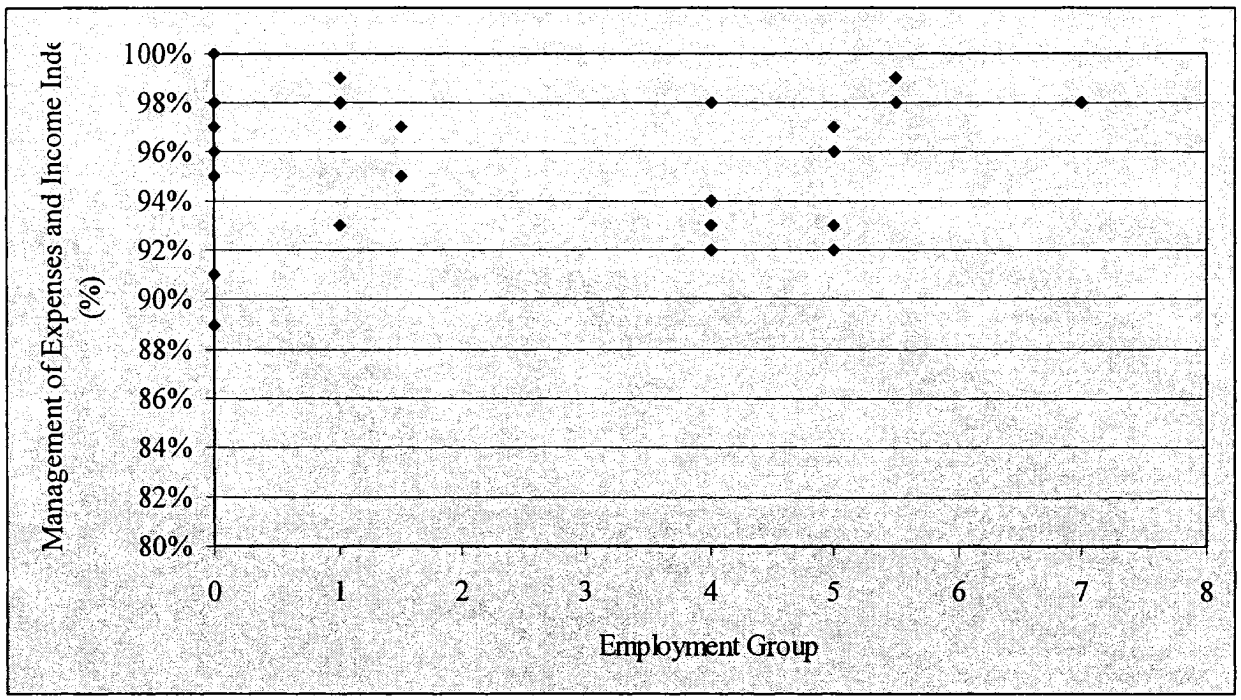

Figure 2. Scattergram of the Management of Expenses and Income Index (%) by employment score.

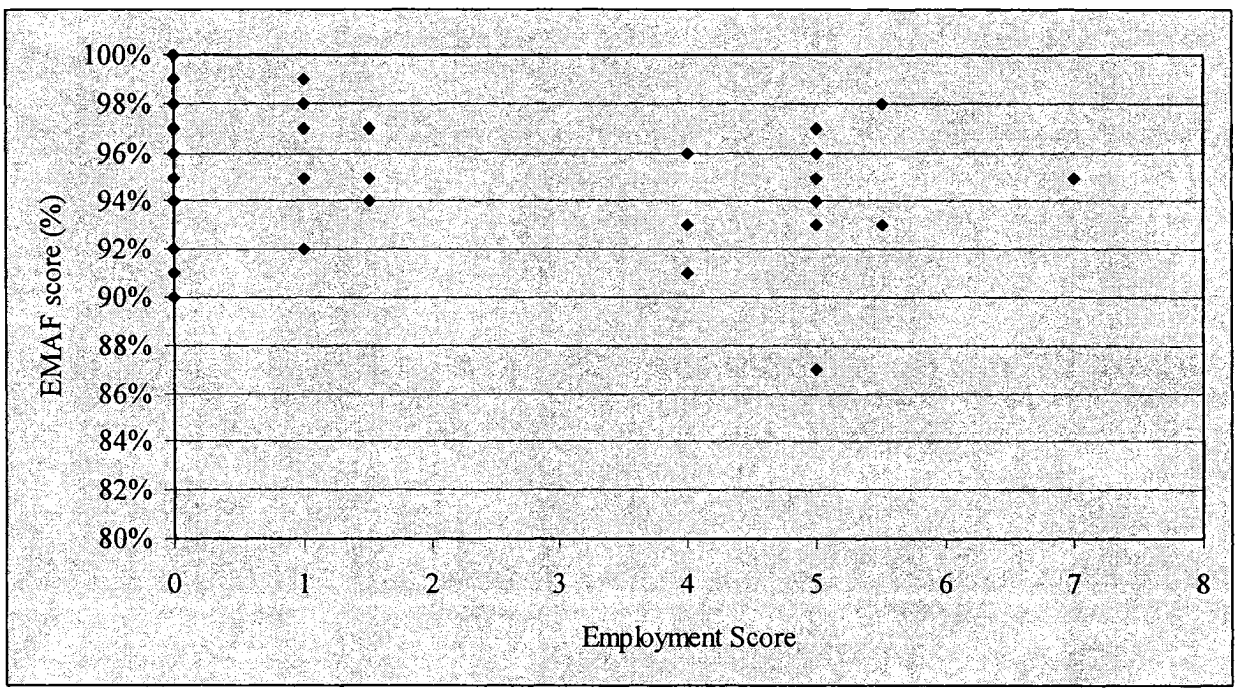

Figure 3. Scattergram of the EMAF-EN total (%) by employment score.

Hypothesis two b: Income group

The income group of participants was collected in this study. The descriptive statistics of this grouping is listed in Table 5 and a scattergram of these income groups on each index of the EMAF-EN can be seen in Figures 4, 5, and 6. The predictive value of the age of participants was determined in a linear regression on the Application Index, Management of Expenses and Income Index, and total score on the EMAF-EN. The predictive value of the income group of participants was determined in a linear regression on the Application Index, Management of Expenses and Income Index, and total score on the EMAF-EN. The predictive value of the income group of participants was not statistically significant on the Application Index, $F(1, 39) = 1.96$, $p = 0.169$, R-squared = 0.049; the Management of Expenses and Income Index $F(1, 39) = 2.28$, $p = 0.139$, R-squared = 0.057; or the total score on the EMAF-EN $F(1, 39) = 2.82$, $p = 0.101$, R-squared = 0.069.

Table 5. Descriptive statistics of the income group of participants.

	Median	Mode	Minimum	Maximum
Income	Over $41,000	Over $56,000	Between $11,000 and $25,000	$56,000 and more

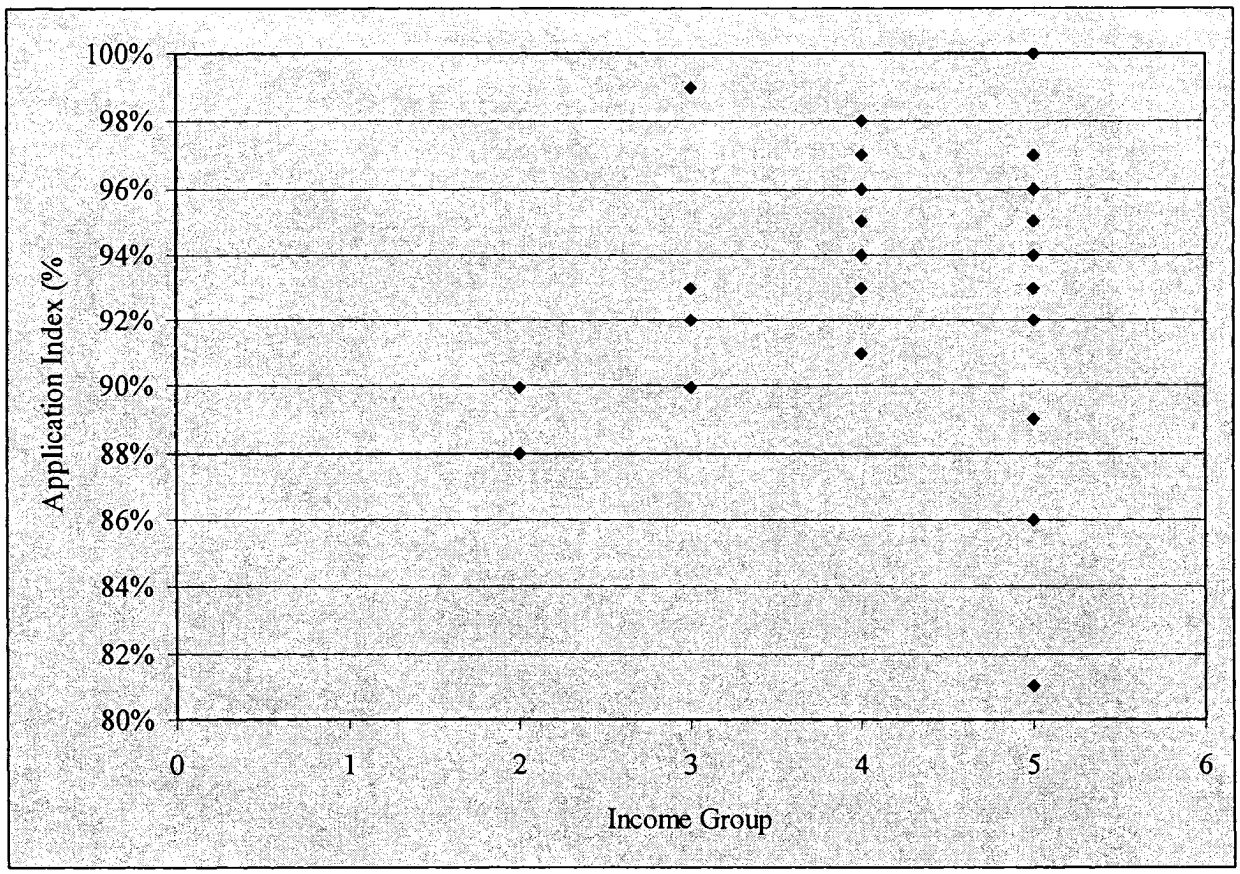

Figure 4. Scattergram of the Application Index (%) by income group. Group one is Less than $10,000; group two is between $11,000 and $25,000; group three is between $26,000 and $40,000; group four is between $41,000 and $55,000; and group five is $56,000 or more.

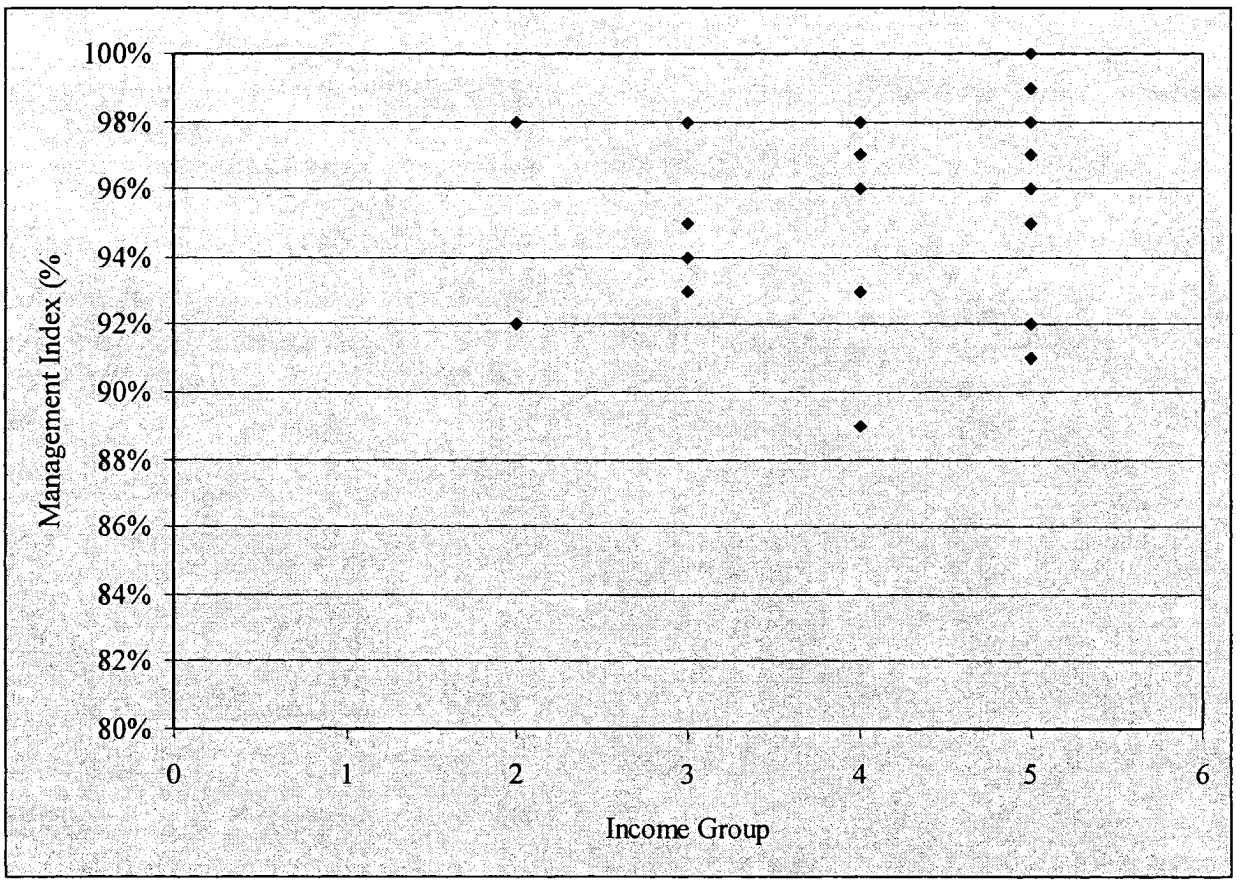

Figure 5. Scattergram of the Management of Expenses and Income Index (%) by income group. Group one is Less than $10,000; group two is between $11,000 and $25,000; group three is between $26,000 and $40,000; group four is between $41,000 and $55,000; and group five is $56,000 or more.

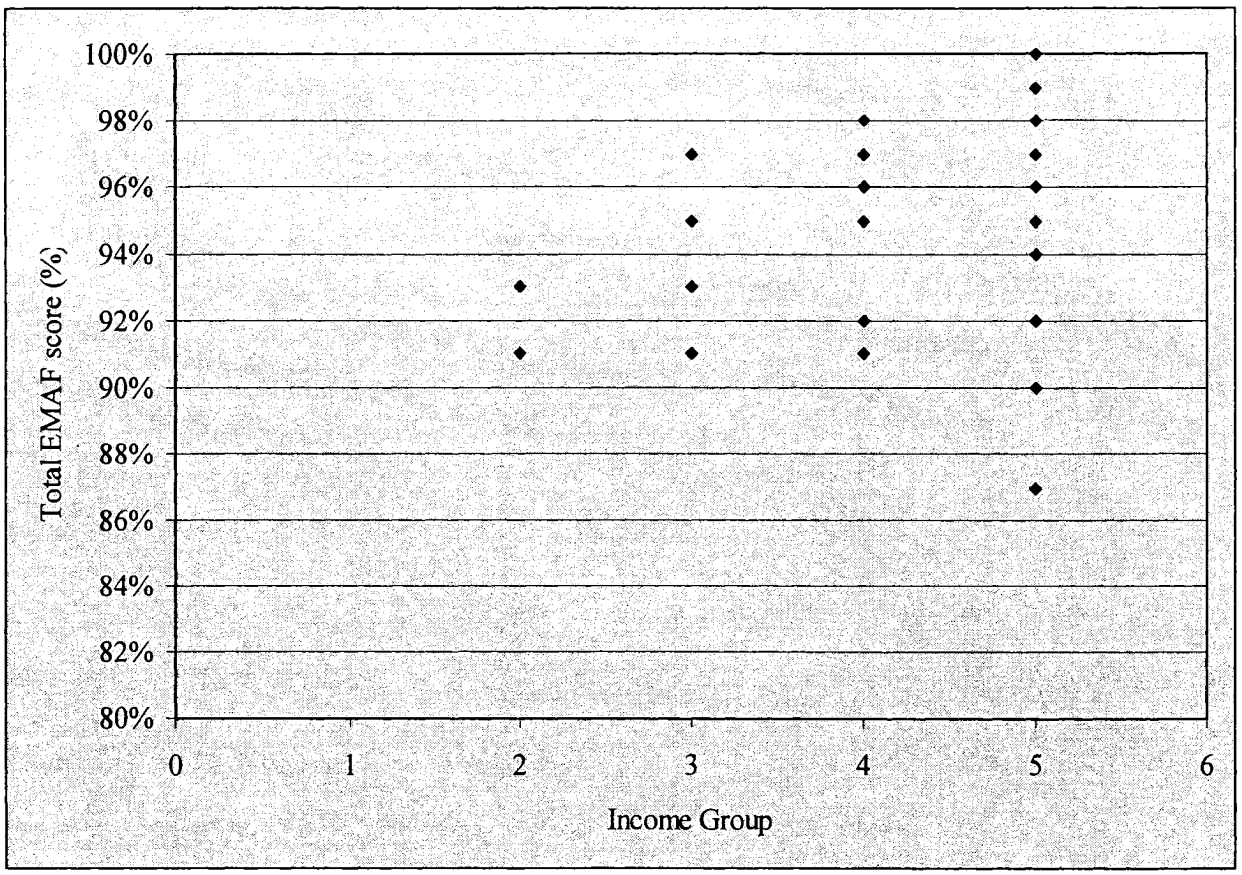

Figure 6. Scattergram of the EMAF-EN total (%) by income group. Group one is Less than $10,000; group two is between $11,000 and $25,000; group three is between $26,000 and $40,000; group four is between $41,000 and $55,000; and group five is $56,000 or more.

Hypothesis two b: Age

The age of participants was collected in this study. The descriptive statistics are listed in Table 6. A scattergram of these income groups on each index of the EMAF-EN can be seen in Figures 7, 8, and 9. The predictive value of the age of participants, as a continuous variable, was determined in a linear regression on the Application Index, Management of Expenses and Income Index, and total score on the EMAF. The predictive value of the age of participants was not statistically significant on the Application Index, $F(1, 39) = 1.34$, $p = 0.248$, R-squared = 0.035; the Management of Expenses and Income Index $F(1, 39) = 2.39$, $p = 0.130$, R-squared = 0.059; or the total score on the EMAF-EN $F(1, 39) = 2.38$, $p = 0.132$, R-squared = 0.059.

Table 6. Descriptive statistics of the age of participants.

	Mean	Median	Mode	Std Dev.	Minimum	Maximum
Age	69.00	68.00	61.00	6.44	60.00	81.00

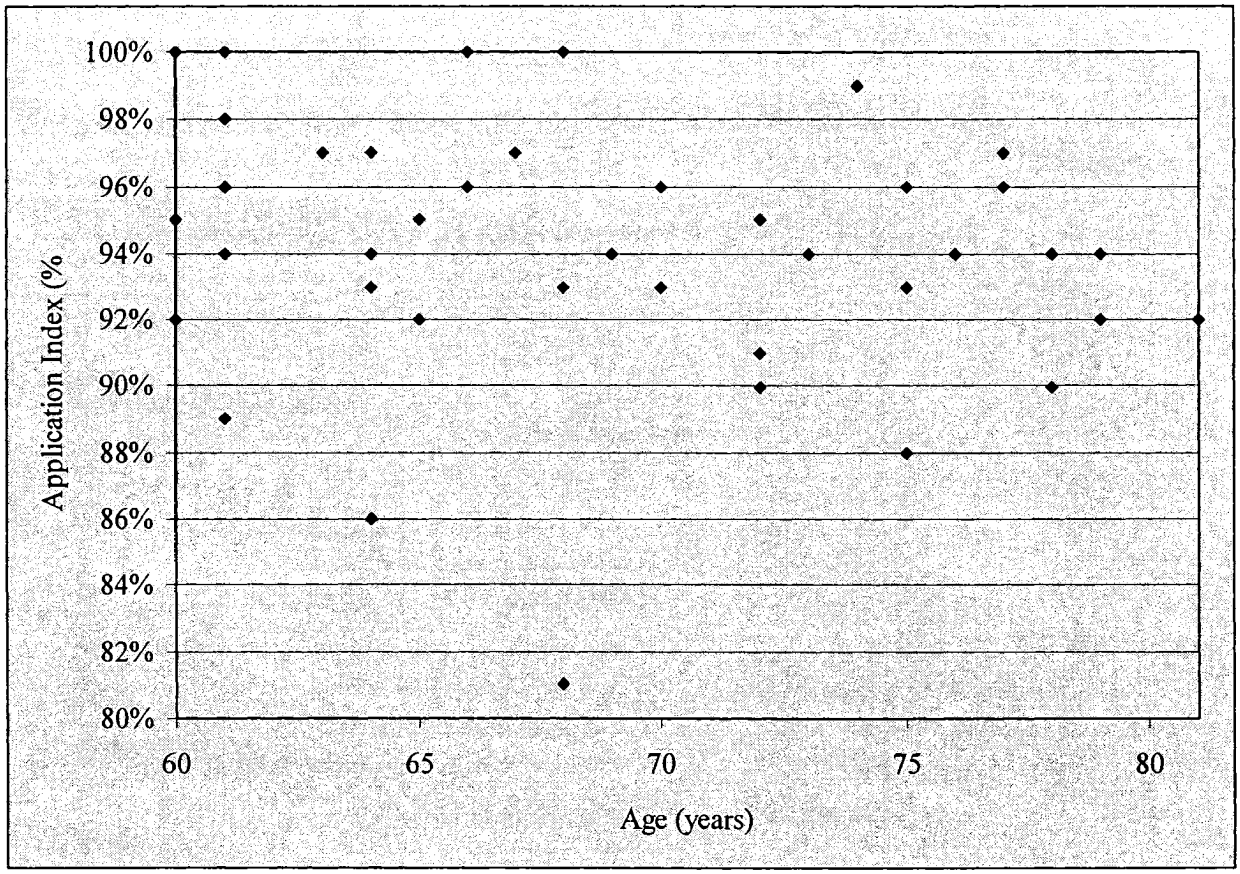

Figure 7. Scattergram of the Application Index (%) by age in years.

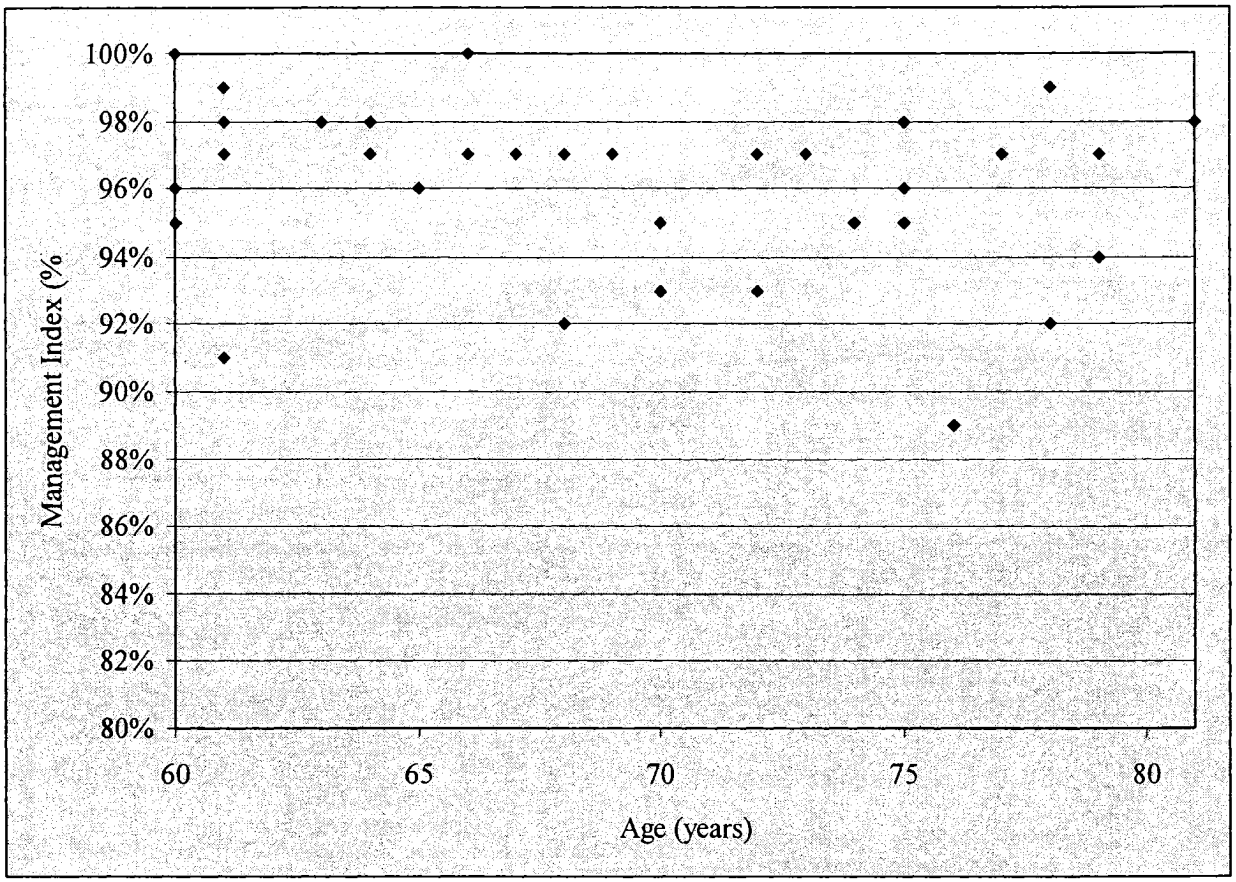

Figure 8. Scattergram of the Management of Expenses and Income Index (%) age in years.

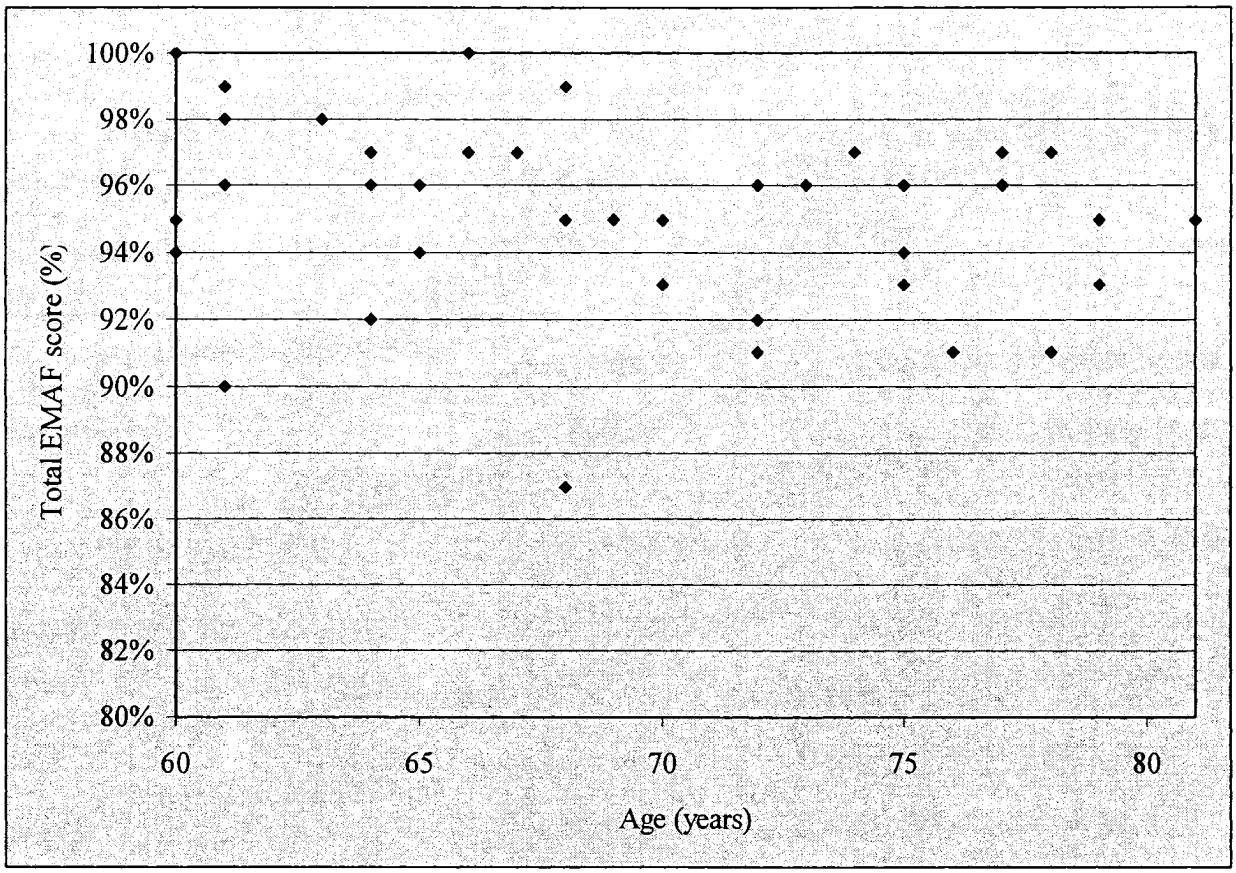

Figure 9. Scattergram of the EMAF-EN total (%) by age in years.

Hypothesis two c: Education

The years of education of participants was collected in this study. The descriptive statistics are listed in Table 7. A scattergram of the years of education on each index of the EMAF-EN can be seen in Figures 10, 11, and 12. The predictive value of the years of education of participants, as a continuous variable, was determined in a linear regression on the Application Index, Management of Expenses and Income Index, and total score on the EMAF-EN. The predictive value of the years of education of participants was statistically significant on the Application Index, F (1, 39) = 8.85, p = 0.005, R-squared = 0.189, b = 0.005; was not statistically significant on the Management of Expenses and Income Index F (1, 39) = 3.69, p = 0.062, R-squared = 0.089; and was significant on the total score of the EMAF-EN F (1, 39) = 8.68, p =

0.005, R-squared = 0.186, b = 0.004. On the Application Index for every increase of one of years of education, Application Index increases by 0.5%. On total EMAF-EN percent for every increase of one by employment score, total EMAF-EN increases by 0.4%.

Table 7. Descriptive statistics of the employment experience of participants.

	Mean	Median	Mode	Std Dev.	Minimum	Maximum
Education	14.80	15.00	16.00	3.39	5.00	22.00

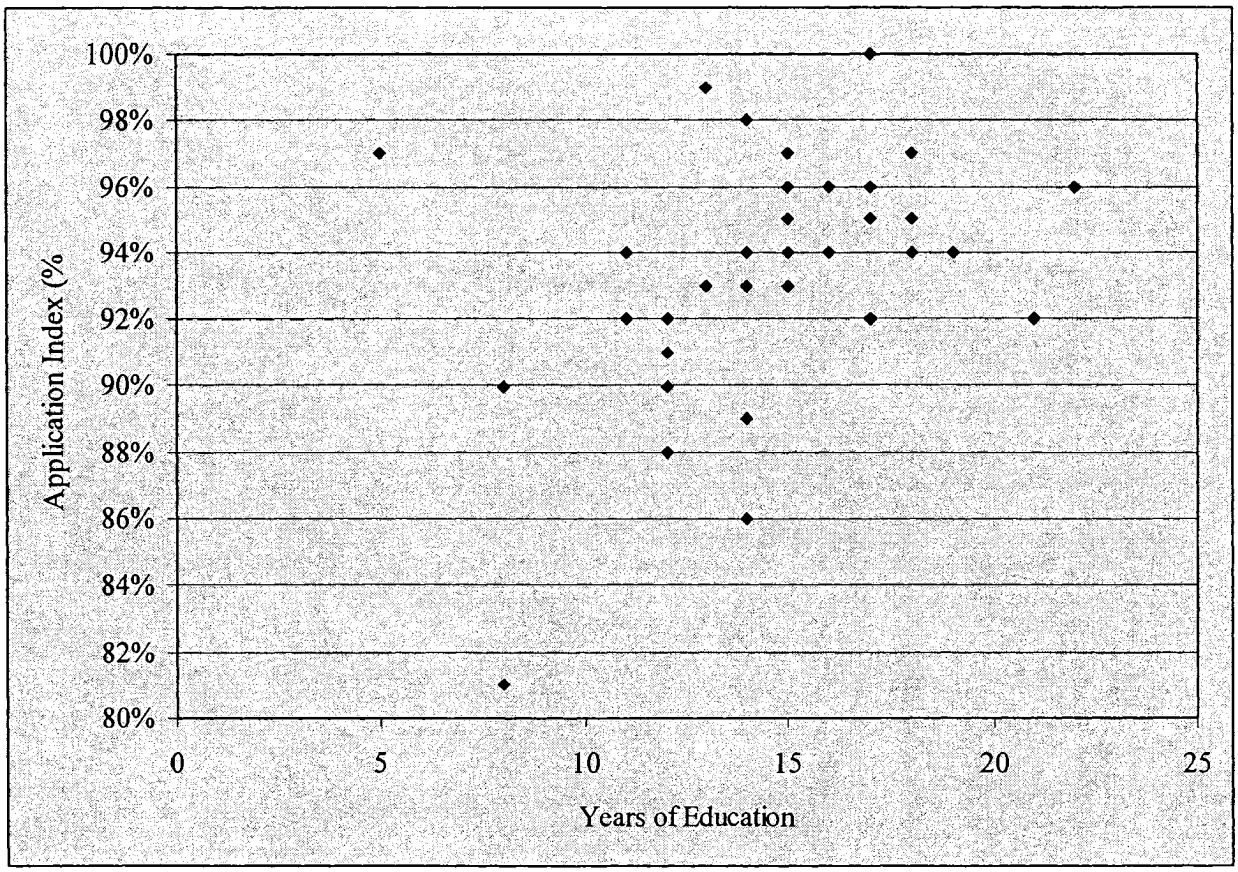

Figure 10. Scattergram of the Application Index (%) by years of education.

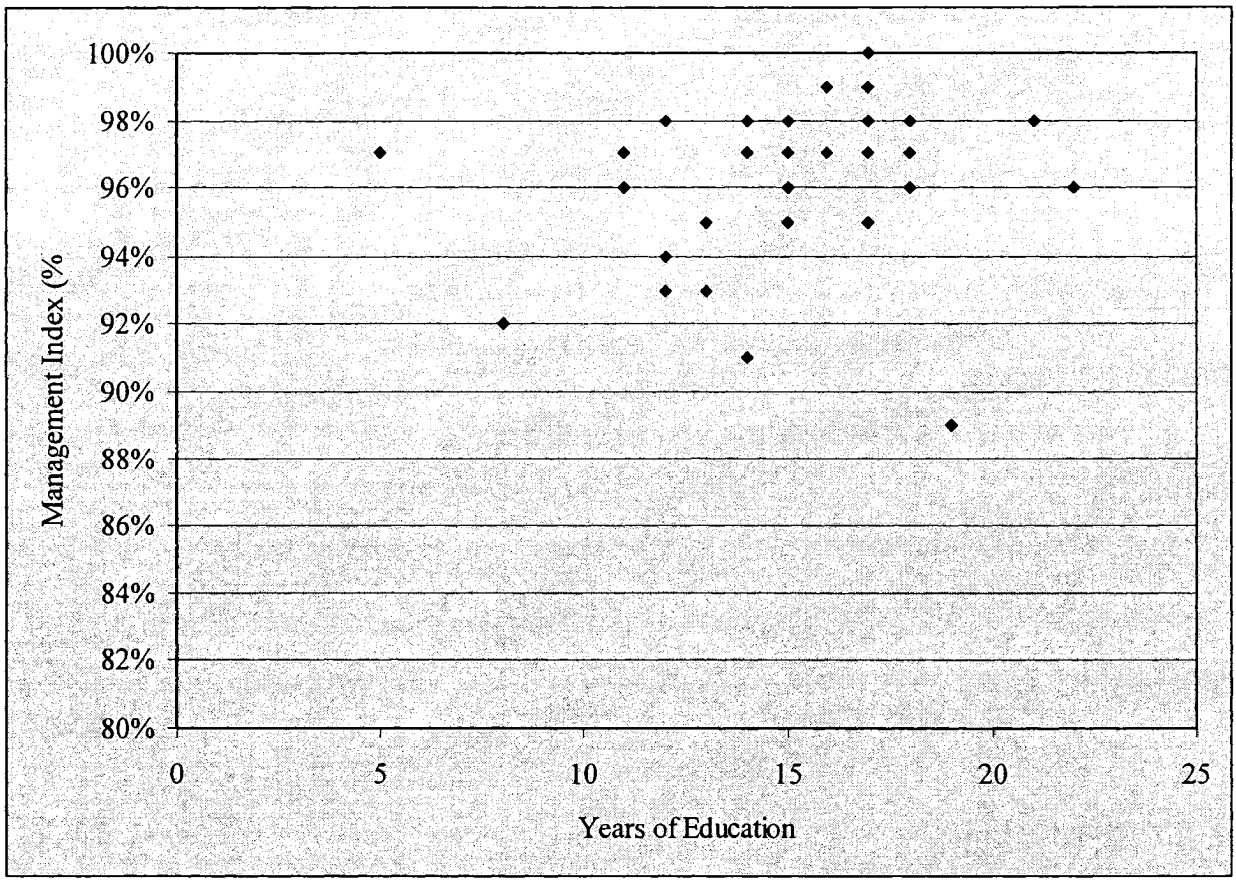

Figure 11. Scattergram of the Management of Expenses and Income Index (%) by years of education.

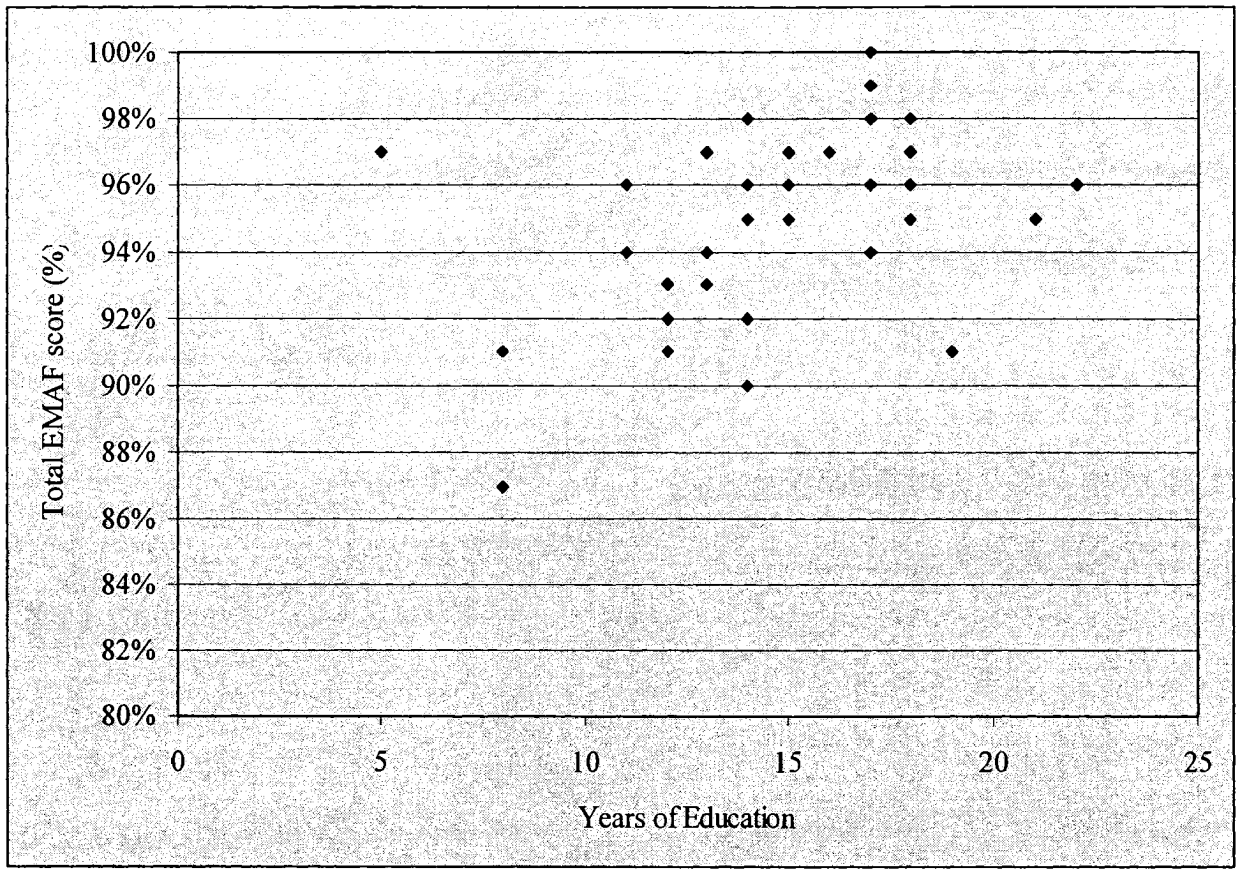

Figure 12. Scattergram of the EMAF-EN total (%) by years of education.

Hypothesis two d: Cognitive well-being

Because the MoCA was used for screening purposes its distribution was limited in this study. Nonetheless, its predictive ability of the EMAF-EN was investigated as a basis for comparison with later samples and studies with the EMAF-EN. The descriptive statistics are listed in Table 8. A scattergram of the years of education on each index of the EMAF-EN can be seen in Figures 13, 14, and 15. The predictive value of the MoCA was used in a linear regression on the Application Index, Management of Expenses and Income Index, and total score on the EMAF-EN. The predictive value of the MoCA was not statistically significant on the Application Index, $F(1, 39) = 2.76$, $p = 0.105$, R-squared = 0.068; the Management of Expenses and Income Index $F(1, 39) = 0.05$, $p = 0.827$, R-squared = 0.023; or the total score on the

EMAF-EN F (1, 39) = 0.90, p = 0.348, R-squared = 0.001. This indicates that with this group of individuals (which is limited as the MoCA was used as a screener) the MoCA had no significant predictive value of the EMAF-EN.

Table 8. Descriptive statistics of the MoCA score of participants.

	Mean	Median	Mode	Std Dev.	Minimum	Maximum
MoCA score	28.00	28.00	29.00	1.40	26.00	30.00

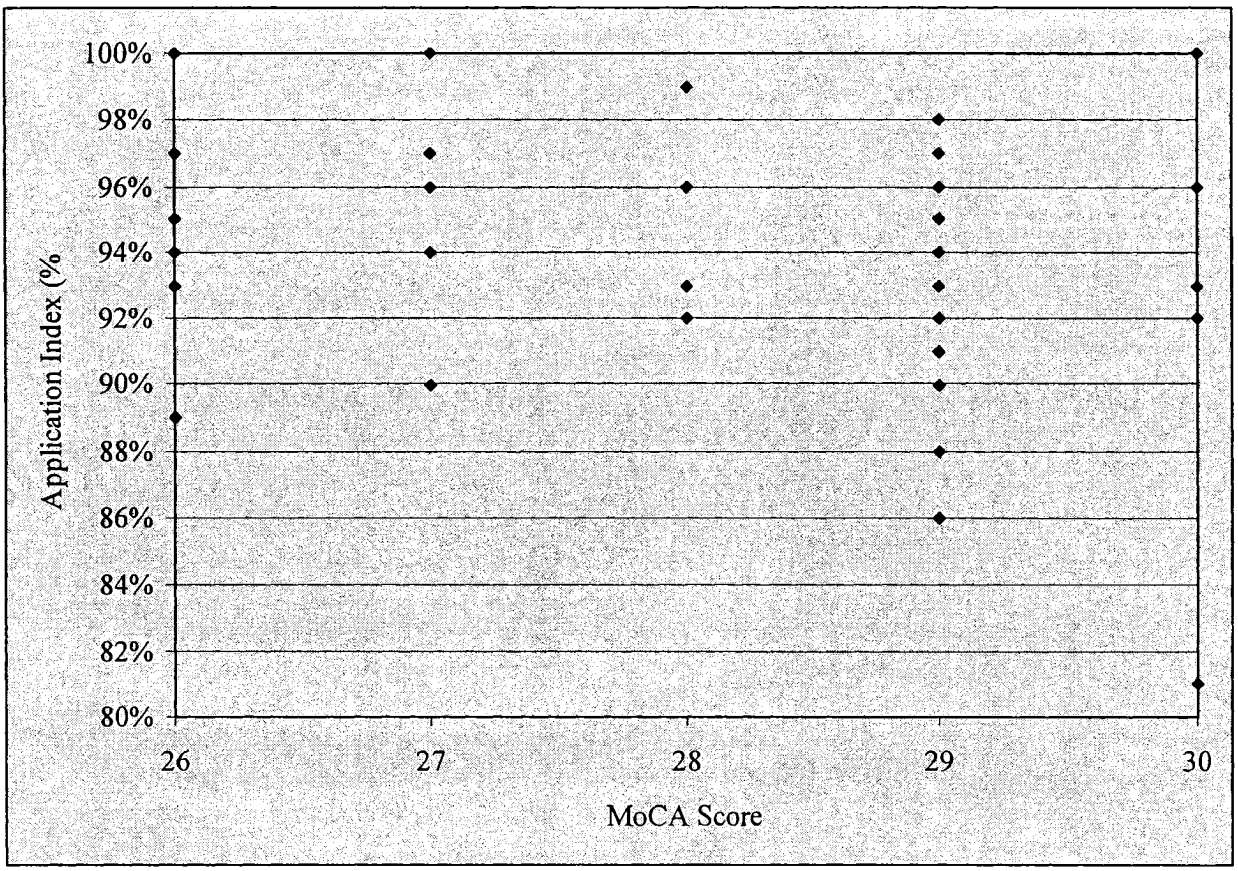

Figure 13. Scattergram of the Application Index (%) by MoCA score.

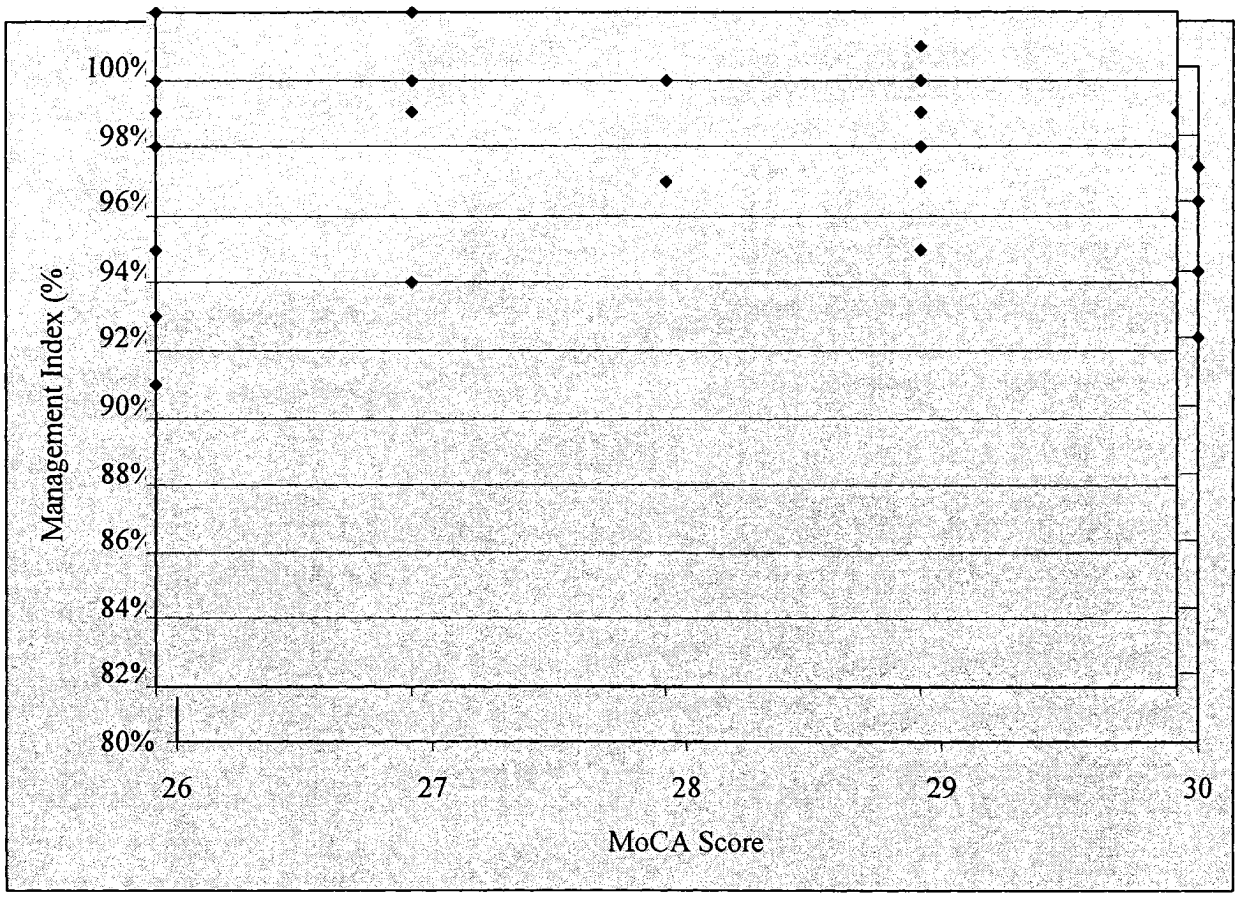

Figure 14. Scattergram of the Management of Expenses and Income Index (%) by MoCA score.

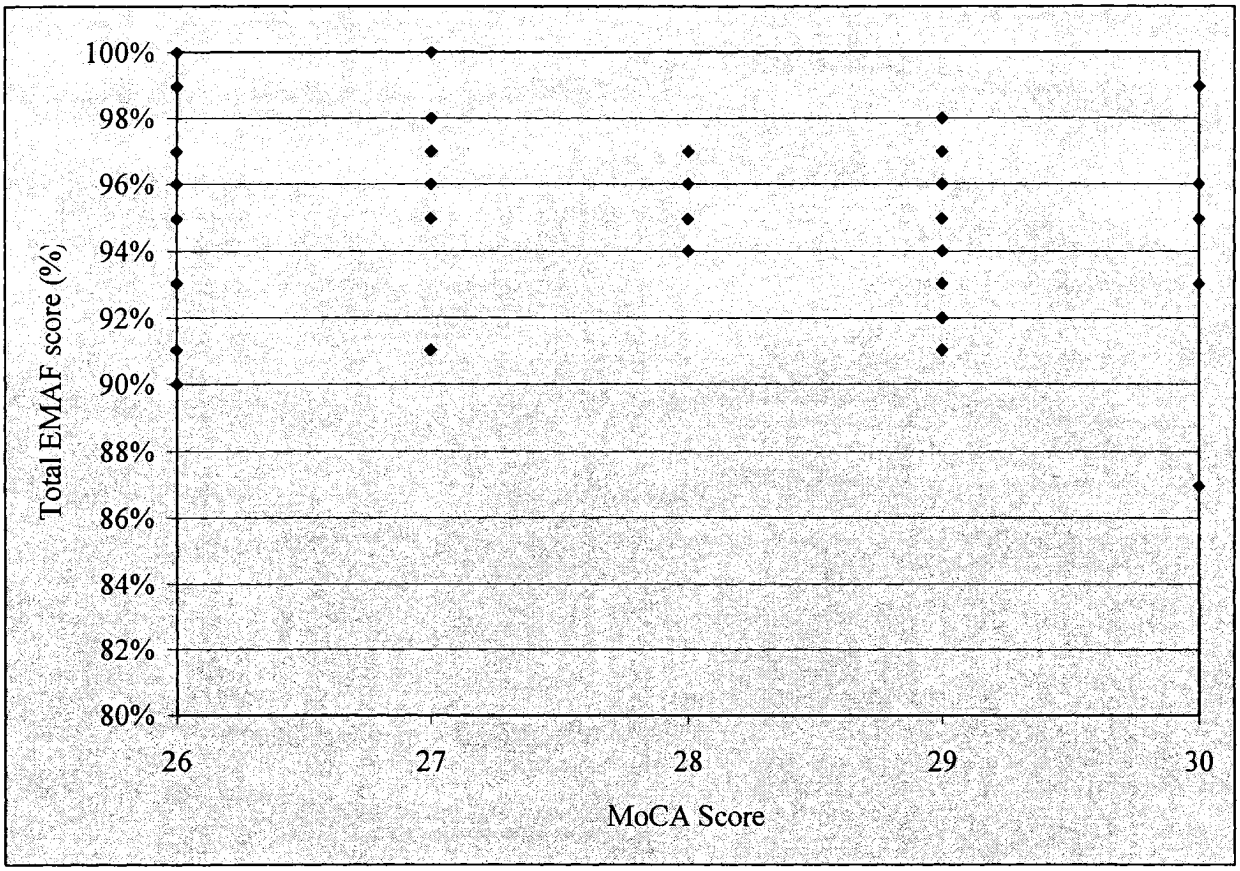

Figure 15. Scattergram of the EMAF-EN total (%) by MoCA score.

Hypothesis two e: Arithmetic and mathematics

Participants were asked to give a rating of difficulty of arithmetic and mathematics. They were asked to rate mathematics and arithmetic on a four point scale: very easy subjects, easy subjects, difficult subjects, or very difficult subjects (see Appendix G). The distribution of these answers favored a rating of two, "easy subjects". Most participants stated something to the effect of "by the time I got to <whatever grade level they took mathematics too> it was easy", 57.5% of participants found the subjects easy. The descriptive statistics are listed in Table 9. A scattergram of the rating of difficulty of arithmetic and mathematics on each index of the EMAF-EN can be seen in Figures 16, 17, and 18. The predictive value of the rating of difficulty of arithmetic and mathematics was used in a linear regression on the Application Index,

Management of Expenses and Income Index, and total score on the EMAF-EN. The rating of difficulty of arithmetic and mathematics was not statistically significant on the Application Index, $F(1, 39) = 3.26$, $p = 0.079$, R-squared = 0.079; the Management of Expenses and Income Index $F(1, 39) = 2.38$, $p = 0.131$, R-squared = 0.059; or the total score on the EMAF-EN $F(1, 39) = 3.86$, $p = 0.057$, R-squared = 0.092. This indicates that with this group of individuals and this way of measuring skill in arithmetic and mathematics there was no significant predictive value of the EMAF-EN or its indexes.

Table 9. Descriptive statistics of the rating of difficulty of arithmetic and mathematics of participants.

	Mean	Median	Mode	Std Dev.	Minimum	Maximum
Rating of Difficulty of Mathematics and Arithmetic	2.25	2.00	2.00	0.67	1	4

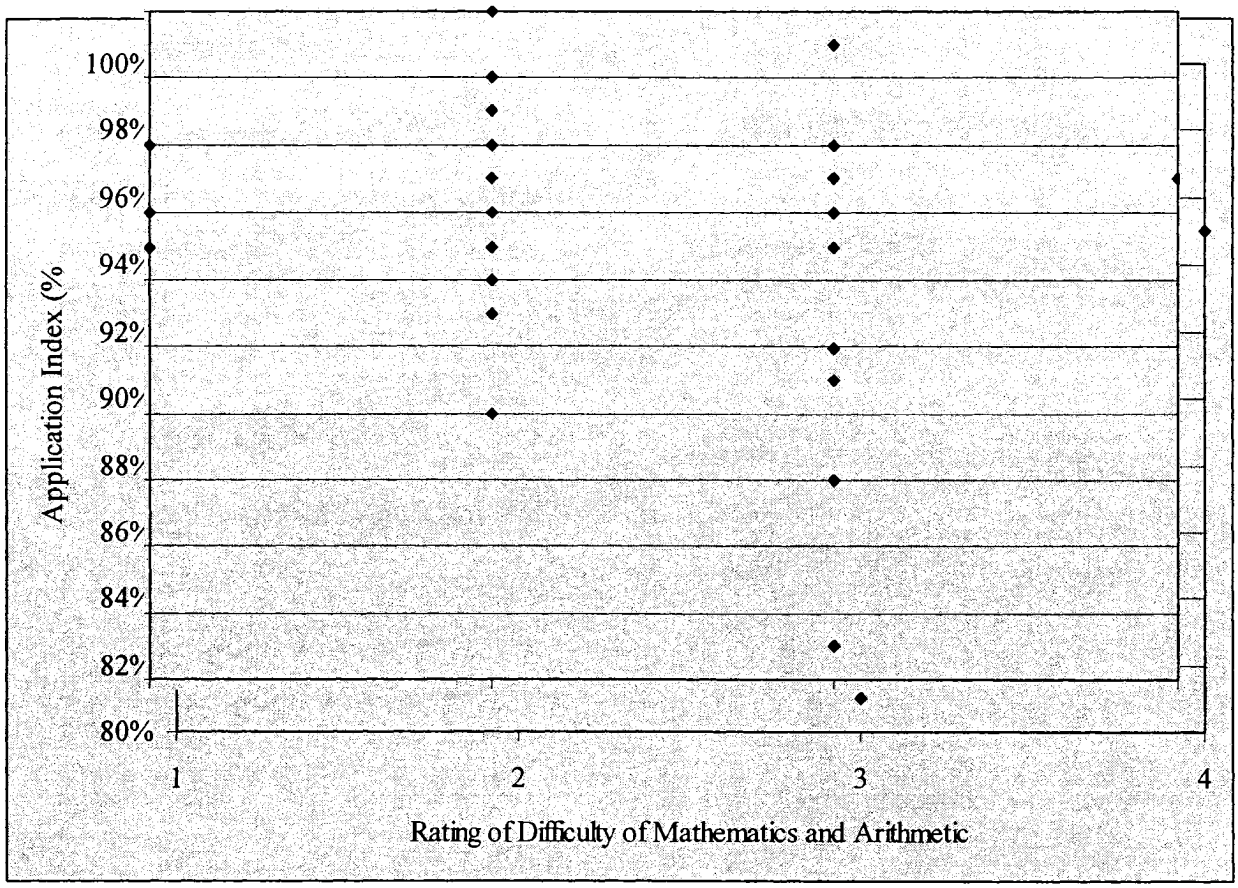

Figure 16. Scattergram of the Application Index (%) by rating of difficulty of arithmetic and mathematics. A rating of one indicated very easy subjects, a rating of two indicated easy subjects, a rating of three indicated difficult subjects, and a rating of four very difficult subjects.

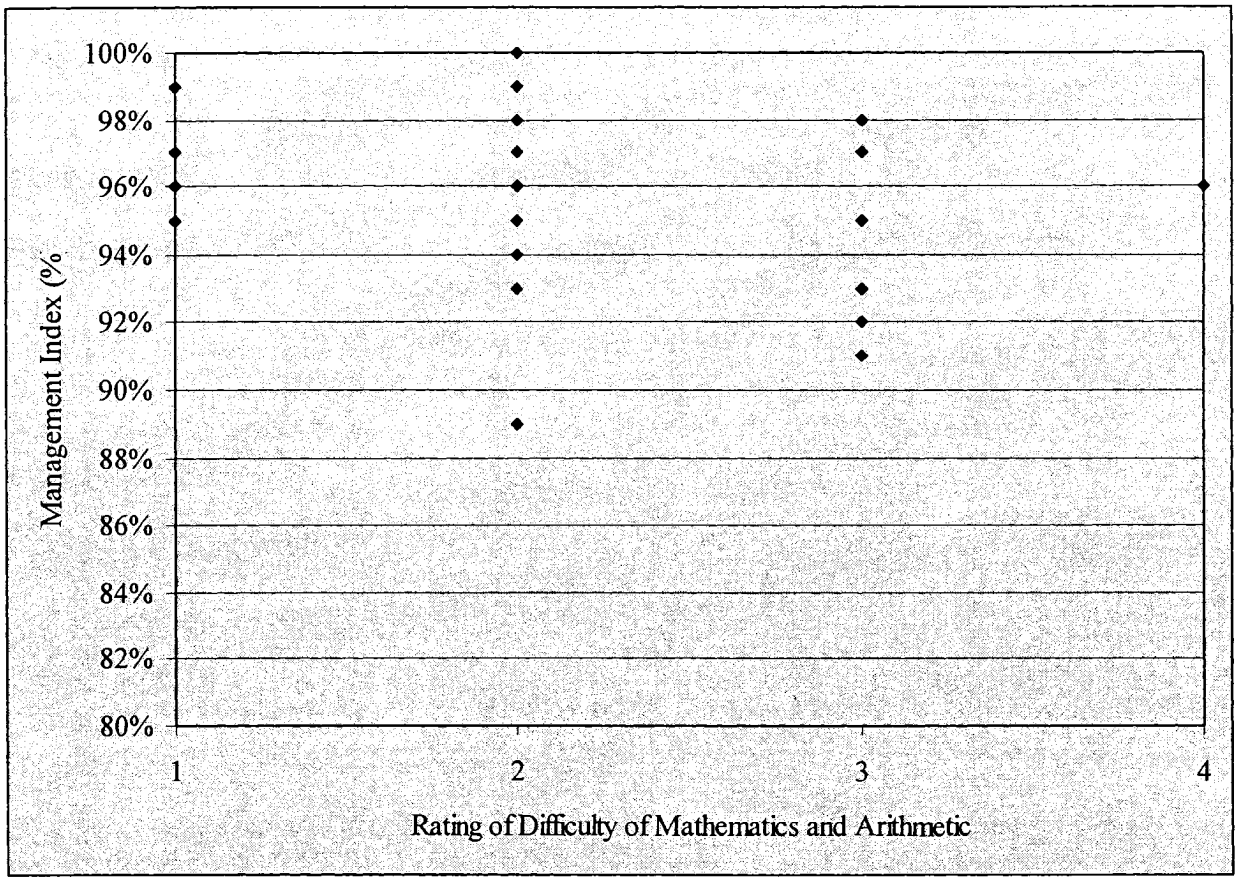

Figure 17. Scattergram of the Management of Expenses and Income Index (%) by rating of difficulty of arithmetic and mathematics. A rating of one indicated very easy subjects, a rating of two indicated easy subjects, a rating of three indicated difficult subjects, and a rating of four very difficult subjects.

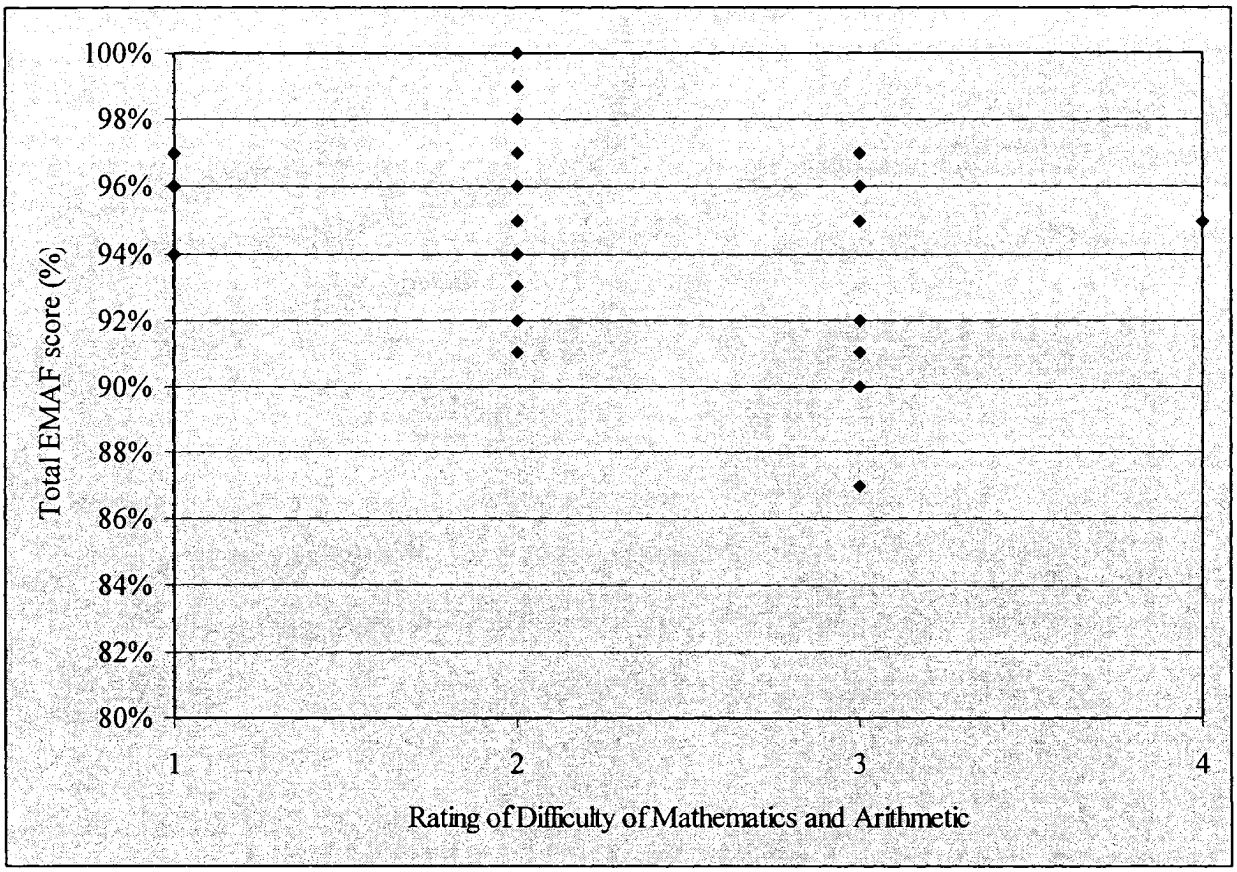

Figure 18. Scattergram of the EMAF-EN total (%) by rating of difficulty of arithmetic and mathematics. A rating of one indicated very easy subjects, a rating of two indicated easy subjects, a rating of three indicated difficult subjects, and a rating of four very difficult subjects.

Hypothesis two: Full linear regression

Combined, the independent variables collected in this study may have a different predictive ability of the EMAF-EN than they do individually. To determine the combined predictive ability of four of the variables investigated in this study (employment, income group, age, and education). Only these four variables were used so as to have 10 participants per independent variable. Cognitive well-being and rating of difficulty of arithmetic and mathematics were excluded due to the limited range of responses on these variables.

Employment, income group, age, and education were entered into linear regressions with the Application Index, Management of Expenses and Income Index, and total score on the

EMAF-EN. Cognitive well being and rating of difficulty of arithmetic and mathematics were not added to allow 10 participants per variable and because of their limited distributions. The predictive value of these combined variables was statistically significant on the Application Index, $F(4, 39) = 3.55$, $p = 0.016$, adjusted R-squared = 0.207. Of these variables, only education was significant, $t(39) = 2.63$, $p = 0.013$, $b = 0.005$. The predictive value of these combined variables was not significant on the Management of Expenses and Income Index, $F(4, 39) = 1.70$, $p = 0.172$, adjusted R-squared = 0.067. The predictive value of these combined variables was statistically significant on the total score on the EMAF-EN $F(4, 39) = 3.17$, $p = 0.025$, adjusted R-squared = 0.182, only education was significant, $t(39) = 2.65$, $p = 0.012$, $b = 0.003$. On the Application Index for every increase of one of year of education, the score on the Application Index increased by 0.005. On total EMAF-EN percent for every increase of one by employment score, total EMAF-EN increased by 0.3%. This result was the same as the individual regression of education and EMAF-EN.

Hypothesis three: EMAF-EN properties

The internal properties of the EMAF-EN were also considered in this study. The basic descriptive statistics were examined and the internal correlations were considered. The descriptive statistics of the EMAF-EN, indexes of the EMAF-EN, and subtests of the EMAF-EN were examined, see Appendix K. It is interesting to note that all means, medians, and modes of all subtests were above 80%. This high performance on the EMAF-EN was expected in this sample of cognitively intact individuals.

Within the EMAF-EN subtests only one pair of tests had a bivariate correlation greater than 0.5—Subtest N (Paying by installment) and Subtest J (Knowing basic banking terms). Higher correlations between two subtests may indicate redundancy between those subtests.

Several bivariate correlations were conducted with the sample. The EMAF-EN score, index scores, demographic variables, and EMAF-EN subtest scores were used. Among the subtests, bivariate correlations could not be obtained for Subtests D, E, F, and K due to lack of variability. All forty participants correctly answered every question within these subtests. This indicates these tasks are very simple for healthy, elderly individuals—creating a ceiling effect. Among the remaining subtests only Subtest N and Subtest J had a bivariate correlation over 0.50. For a table showing all of the correlations and the descriptive statistics of the subtests, see Appendix L.

Discussion

The EMAF-EN is a new test designed specifically to help in the determination of an elderly individual's competency to handle his or her finances. With the growing prevalence of dementia, society would greatly benefit from a reliable and valid approach to determining financial competency. It is expected that this instrument will become the valid, reliable, and ecologically sound psychometric instrument necessary to help psychologists, other potential health professionals, and the legal system in determining whether or not a person is competent.

Hypothesis one: Recruitment

A major goal of this study was to collect a normative sample of English-speaking elderly individuals. This sample was supposed to have an even distribution of ages and educational levels between different groups of these variables.

However, despite the variety of recruiting styles used, the variability in educational level was less than desired. This sampling limitation is especially unfortunate because the education level was found to be the most frequent and most significant predictor of EMAF-EN total score.

It was found to be statistically significant on more indexes than any other variable. This is discussed in greater detail later.

Finding education to be a predictor of EMAF-EN score parallels a recent line of work in dementia research that shows that having more years of education helps to compensate for or prevent cognitive deterioration as detected by psychometric instruments. This deterioration of cognitive function has even been found in participants who were screened for cognitive impairment, indicating that it is not due to any pathology (Ardila and Rosselli, 1989).

Hypothesis two: Demographic factors

Six individual linear regressions were done with employment, income, age, education, cognitive well-being, and rating of difficulty of arithmetic and mathematics as well as a larger combined linear regression on the total EMAF-EN percent and its indexes. These variables were selected for their potential effect on an individual's performance on the EMAF. If these variables had consistently shown a large enough effect on EMAF-EN performance they might become clinically significant. If a clinically significant difference were found by one of these variables a change in the EMAF-EN design, scoring, or interpretation may have been necessary. This difference could be especially important at different levels of impairment, e.g., mild cognitive impairment or intermittent competence.

This adjustment to the EMAF-EN could be done in a number of different ways. For example, the MoCA has one point added to the total points for individuals with less than 13 years of education (Nasreddine et al., 2005). The MMSE adjusts the interpretations of scores with a table of scores based on age and years of education (Crum, et al., 1993). It is also important to note that the EMAF-EN sample was of cognitively intact individuals. As a result their EMAF-EN scores were fairly high, as expected. All subtests had a mean over 81%. This

could create a ceiling effect, which could mask or reduce the effect of the demographic variables in the linear regressions.

With this sample, employment was found to be a statistically significant predictor of the Application index of the EMAF-EN, but not the EMAF-EN itself or the Management of Expenses and Incomes Index. This indicates that employment has some limited predictive ability on this scale, but it did not retain this significance in the multivariate model. This statistically significant difference found in this sample does not appear clinically significant. The prediction had a very small effect size and went in the opposite direction of what was hypothesized. From these results a change in scoring or interpretation of the EMAF-EN does not appear necessary. However, with a sample of greater variability they may become clinically significant. This sample had a ceiling effect of EMAF-EN scores (all subtests had a mean over 81%). A difference by employment may be found in a sample that includes cognitively impaired participants. This sample also had a higher mean of years of education than is expected within the general population. This may explain why employment was not statistically significant in the multivariate regression.

With this encoding of employment experience, participants with a higher employment score were found to have statistically significantly lower scores on the Application Index. This indicates that individuals with greater financial experience from their employment did worse on this index. The Application Index is considered the more straightforward and simple index. The concepts of the Application Index are considered more concrete. In comparison, the financial questions of the Management of Expenses and Income Index are considered more abstract. This means that the people with less financial experience through employment experience did better on the simple and concrete index but not the more difficult and abstract index.

Each participant was also asked his or her income group. It was not significant in any of the linear regressions. This indicates that socio-economic status does not impact an individual's performance on the EMAF. The income groups reported in this study seem representative of Canada in general. In this sample the participant's median income group was over $41,000. For 2004, elderly families reported an income of $45,400 (Statistics Canada, 2006). This suggests that income group is not a significant predictor of EMAF-EN performance in cognitively intact individuals. However, it is possible that income group will become significant with a sample that includes cognitively impaired individuals.

A wealthier person is probably more likely to have had more experience with stocks, more complex tax forms, and to have generally been more financially successful. The fact that income group was not a statistically significant predictor of EMAF-EN score could be caused by many things. There was a ceiling effect of EMAF-EN scores (all subtests had a mean over 81%). The design of the EMAF-EN could also have played a role. The areas the EMAF-EN covers are areas that most adults should have experienced, the EMAF-EN does not include stocks, income tax questions, or other more complicated financial questions. Participants were also required to have a certain level of financial experience (see Appendix G), though no participants were excluded from this sample for this reason. Finally, wealthier individuals may not have more financial experience, possibly because of the use of professional financial advisors (e.g., accountants). These examples could explain why income group was not found to be statistically significant individual or in some combination.

The works of other researchers suggested that age and education would be the interpersonal variables with the greatest potential for predicting performance on the EMAF-EN. Significant effects were found for education. However, these differences may very well prove to

be clinically insignificant. The difference between any potential groupings of these variables would only show a few percentage difference in index scores or EMAF-EN scores. From these results no adjustment in scoring or interpretation appears necessary to the EMAF-EN by these variables. Nevertheless, further investigation of interpersonal variables may still be necessary. Just because no clinically significant difference between age and education groups was found among healthy individuals does not mean that these variables will ultimately be unimportant in the assessment of individuals with impaired cognitive abilities. A ceiling effect of EMAF-EN scores (all subtests had a mean over 81%) may be disguising or reducing such differences. With a sample including individuals with cognitively impairment to eliminate or reduce the ceiling effect these variables may become clinically significant. Even in this limited sample education alone accounted for 18.6% of the variance of the Total EMAF-EN score.

The finding of education being significant on the Application Index but not the Management of Expenses and Income Index seems unusual. The Application Index subtests tended to be more straightforward than the more conceptual subtests on the Management of Expenses and Income Index. However, the Application Index is considered the more straightforward and simple index. The concepts of the Application Index are considered more concrete. In comparison, the financial questions of the Management of Expenses and Income Index are considered more abstract. For example, the Application Index's Verifying change subtest is more straightforward than the Management of Expenses and Income Index's Understanding a bill subtest. The effect of education seems like it should be more important on more conceptual subtests. Higher education has been found in the literature to help prevent decay abilities in executive functions, complex tasks, novel tasks, and goal directed activities. This suggests that education should be most beneficial on the more conceptual subtests of the

Management of Expenses and Income Index (Plumet et al., 2005; Ravdin et al., 2004; Royall et al., 2004).

Many studies have found a normal decline in cognitive abilities with age and a decrease in abilities in individuals by educational level (Crum et al., 1993; Park et al., 2003; Jurica et al., 2001). It is accepted practice on some psychometric instruments to adjust the norms to each individual's age and education level (Crum et al., 1993; Jurica et al., 2001). At present, it does not appear the EMAF-EN parallels these results, no clinically significant differences were found in this sample. Multiple statistically significant differences were found by education. These differences, while statistically significant, result from only a few percentage points difference on the EMAF-EN and are not presently considered clinically significant.

If larger differences are found in the future, any normative tables produced for publication of this test would require appropriate changes to be made to the corresponding interpersonal variable (education and/or age). A similar adjustment for other demographic factors is also a possibility.

The cognitive well-being of participants was also measured for screening purposes with the MoCA. The MoCA is brief mental status exam. It is sensitive even to Mild Cognitive Impairment. As it was used for screening purposes, the distribution of MoCA scores was limited in this experiment to scores between 26 and 30. However, its predictive abilities of the EMAF-EN were investigated as a basis for comparison with later samples and experimentation with the EMAF. The predictive value of the MoCA was not statistically significant in any of the linear regressions. This indicates that with this group of individuals (again, with a limited range of scores) the MoCA had no significant predictive value of the EMAF.

In the future, MoCA scores may be found to be statistically significantly related to EMAF-EN scores. It is expected, almost by definition, that individuals with Cognitive Impairment have difficult performing complex daily activities. This includes managing finances (Griffith et al., 2003; Marson et al., 2000; Willis et al., 1998). If future experiments allow a larger range of MoCA scores, which would include individuals with different forms of cognitive impairment, a statistically significant prediction of EMAF-EN score may be found.

A rating of difficulty of arithmetic and mathematics was also asked of the participants. This involved a survey with a simple four-item scale. Participants were asked if they found arithmetic and mathematics to be very easy subjects, easy subjects, difficult subjects, or very difficult subjects (see Appendix G). This type of measure had no significant predictive effect on EMAF-EN score. Arithmetic and mathematics are important cognitive abilities, particularly when considering most kinds of financial work. The lack of a statistically significant result with this variable could be do to the ceiling effect of EMAF-EN scores or the scale used to measure mathematic and arithmetic abilities. This four-item scale is a very crude measure of mathematic and arithmetic skill and had little variability. More sophisticated measures may reveal mathematic and arithmetic abilities to predict EMAF-EN performance.

A multiple linear regression was done to predict EMAF-EN scores based on employment, income group, age, and education. Cognitive well-being and rating of difficulty of arithmetic and mathematics were excluded from this regression to have a minimum of ten participants per independent variable and because of the limited variability in both of these variables. In this analysis only education was significant on the Application Index and the Total EMAF. This again indicates that education, despite the sampling limitation, was the best predictor in this study.

Hypothesis three: EMAF-EN properties

The internal properties of the EMAF-EN were also considered. This was done by simple descriptive statistics of the subtests, two indexes, and total score as well as correlations. The descriptive statistics showed the participants in this sample of cognitively healthy individuals had relatively high scores across all parts of the EMAF.

Looking at the various correlations within the EMAF-EN, one can see that few of these subtests had large correlations with each other (after excluding four subtests with no variability). Only one pair of subtests (Subtest N and Subtest J) had a bivariate correlation over 0.50, this indicates little overlap within the subtests of the EMAF. Perfect internal consistency within the EMAF-EN was neither expected nor desired. If the EMAF-EN had had perfect internal consistency between subtests, it would have indicated redundancy between them. Similarly, finding no internal consistency would also have been unexpected as the tasks do have similarity.

Some changes are being considered in the EMAF-EN to make it shorter and to remove some of these redundancies. This could help to shorten the EMAF. At present, the EMAF-EN alone generally took less than one hour to complete with cognitively healthy individuals and did not appear to fatigue them. However, with individuals who are not cognitively healthy and have a larger battery of tests to perform a shorter EMAF-EN may be advantageous.

Four subtests in particular may be found to be unnecessary. The forty participants in this study answered every question correctly on Subtest D (Knowing equivalent amounts), Subtest E (Identifying coins and bills), Subtest F (Conducting bank transactions), and Subtest K (Understanding cheques). This indicates that for elderly individuals who are cognitively-intact these tasks are too simple. However, these subtests may prove important in subsequent sampling

of individuals who are cognitively impaired. The ultimate goal in any such decision would be to retain as much of the EMAF's discriminative powers as possible.

There are two possible justifications for retaining these four simpler subtests. The first possibility is that they may become necessary for considering the full financial competence of individuals. It is reasonable to assume that an individual with sufficient cognitive impairment would have difficulty knowing equivalent amounts of money, naming different coins and bills, conducting bank transactions, and understanding checks. Individuals with dementia often present with aphasia, disturbance of executive function, and memory loss (APA, 2004). Any of these symptoms could impair an individual's ability to perform on any of these subtests. However, the discriminative power of these four simpler subtests may be made redundant by the other subtests of the EMAF. Any impairment detected by these subtests may be detected more reliably, more validly, earlier, or at a less severe level by the other subtests. In such a case these subtests would be unnecessary and redundant.

The second possibility is that these subtests may help in determining what level of limited competency an individual should be classified as. Within the concept of financial competence it is possible to conceive a hierarchy of difficulty of the different capabilities within financial competence. From this a hierarchy of difficulty of subtests of the EMAF-EN can also be conceived. Subtests that measure these different capabilities and their different levels of difficulty may become important when considering limited competency.

Future use of the EMAF-EN to determine the financial competence of different clinical groups may also reveal different subtests to be important. Different subtests may have different discriminative powers for different clinical groups. Alzheimer disease, Parkinson disease, stroke, and other conditions all affect different cognitive areas which may affect different

capabilities within financial competence in different ways. For example, a person with a stroke in only the right area may have difficulty naming coins, but otherwise have no difficulty in the other capabilities within this study's construct of financial competence.

Importance of findings

This study was done to create a sample of English-speaking Ontarians with the EMAF-EN, to determine the possible clinical implications of different interpersonal variables within that sample, and to explore the internal properties of the EMAF-EN to consider possible changes to the EMAF. The results created a limited normative sample. This sample had a limitation in the distribution of years of education of the participants as well as a potential limitation in the distribution of the income group of the participants.

Using several variables in individual linear regressions found three occasions that were statistically significant. However, none of these differences were large enough to be considered clinically significant, no changes to the scoring or interpretation of the EMAF-EN appear necessary from these results. This finding may change with better samples of cognitively intact individuals or in samples using cognitively impaired individuals.

The internal properties of the EMAF-EN were also investigated. This investigation found four subtests in particular that may be unnecessary as they are so simple that no participants in this sample of forty participants obtained less than full points. However, the importance of these subtests may be vindicated in subsequent use of the EMAF-EN on samples of cognitively impaired individuals. One pair of subtests, Subtest N and Subtest J, were found to have a bivariate correlation greater than 0.5, indicating that there may also be some redundancy between these two subtests.

Strengths and weaknesses

There were a number of limitations in this study. The sample obtained did not have the desired variations in education level. The sample appears to be overeducated compared to what the population is generally regarded to be. The sample tended to have higher numbers of younger participants (though this may reflect the population). This brings up questions of how representative the sample was.

Amongst the remaining individual variables a number of improvements and difficulties were found. Different encodings for employment should be considered. Individuals in the 60-64 years range may not have a proper distribution of household income (this may be due to individuals in their 60s who had a better income have retired and that individuals that are working at that age tend to be at the higher end of their pay-grade). The utility of the cognitive well-being measure was severely limited due to range restrictions. Finally, the use of 18 individual linear regressions increases the probability of a Type I error.

Other improvements could also be considered for future EMAF-EN use. An objective measure of the mathematical abilities of the participants could have been used. In this study each participant was asked what the last level of math completed was and to rate how difficult they found arithmetic and mathematics on a simple four-item scale: very easy subjects, easy subjects, difficult subjects, or very difficult subjects (see Appendix G). Future studies may consider testing math skills independently, such as available in the Wechsler Adult Intelligence Scale, 3rd edition (Wechsler, 1997). There was in general little variability in responses, 58% of participants declared them to be easy subjects. Participants would also often say something akin to, "Well, by the time I got up to <whatever level of math they stopped at>, it was hard" and then declare them easy subjects. Also, more questions could have been asked concerning the

financial experience of participants, and perhaps some form of codifying it could have been found (see Appendix G).

Practical and clinical applications

Due to the aging population, Canada is facing a large increase in the number of individuals who are at risk for various forms of cognitive impairment. Some of these individuals will also face competency issues, including financial competency issues. The present system is unreliable in making these determinations (Marson et. al, 1994). The EMAF-EN has the potential to improve this system as an objective measure, with known reliability, an ecological design, and measurable validity. Furthermore, due to its ecological design, the EMAF-EN may also help in determining financial competency for individuals with other forms of impairment (e.g., mental illness).

Proper determination of a person's financial competency helps to prevent wrongly taking away an individual's rights and helps protect cognitively impaired members of society from being financially abused. Wrongly classifying someone who is financially competent as financially incompetent unjustly takes away that individual's financial freedom and greatly harms his or her civil rights. By contrast, not declaring someone who is financially incompetent puts them at risk. Properly declaring someone as financially competent gives them some protection. It reduces or prevents financially inappropriate behaviors and financial abuse of this individual. This includes forcing elderly individuals into poor deals, tricking elderly individuals into losing their property, stealing from the elderly, and defrauding the elderly individual (National Clearinghouse on Family Violence, 1993; National Center on Elder Abuse, 1996).

Proper determination of financial competence and planning for impending financial incompetence has become a concern for professional financial planners as well. Professionals in

the financial field are concerned that some families are not properly prepared for issues surrounding competency and that the individuals taking responsibility for financial decisions are financially competent (Campisi, et al., 2003; National Clearinghouse on Family Violence, 1993). Banks are also asked to help prevent the financial abuse of the elderly with education seminar, media announcements of scams, training employees specifically to help the elderly, training employees to watch for abuse, watching for unusual account activity, and the creation of special accounts for the elderly (National Center on Elder Abuse, 1996).

Future research

There are a number of studies that could be done to further the EMAF. Due to the ecological nature of the EMAF, it has great potential for other uses in other impaired groups whose financial competency comes into question. However, further research should be done before the EMAF-EN is used in this way. In order to be used to examine different age groups, samples from these age groups should be collected, similar to other tests that can be used across the age ranges, such as the Stanford Binet Intelligence Scales, Fifth edition (Roid, 2003). Future studies could specifically investigate the validity of the EMAF-EN in determining the financial incompetence in individuals who have had a stroke, some form of progressive dementia, mild cognitive impairment, severe mental illness, and mild to moderately mentally retardation, similar to the PFCA and the MoCA (Kershaw & Webber, 2004; Nasreddine et al., 2005). Furthermore, the adaptations necessary for the EMAF-EN's use with the blind, deaf, or physically handicapped could be studied, similar to the Wechsler Adult Intelligence Scale, 3rd edition (Wechsler, 1997). In these groups there may be difficulty with some of the stimuli used in this experiment. For example, a person who has only recently developed severe cataracts may have more difficulty identifying different coins. A comparison and adjustment for the different

provinces of Canada may be necessary (sales tax is different among the provinces). Finally, its efficacy on different races, nationalities, and languages (besides French and English) could also be explored, similar to the Wechsler Adult Intelligence Scale, 3rd edition (Wechsler, 1997).

Other studies could identify which subtests of the EMAF-EN are most important. Changes could be made to shorten the EMAF-EN for convenience, simplicity, and to reduce any fatigue due to testing. The participants in this study did not appear fatigued by this study, the EMAF-EN itself generally took less than one hour to complete. At the end of testing nearly most participants were curious about the EMAF, wondering how they did, and wondering what their results meant. However, in clinical populations the EMAF-EN may take longer and be more fatiguing. This is especially true if the EMAF-EN is used with other tests. Looking at the correlations between the subtests in different clinical populations may reveal some of the subtests to be unnecessary—specifically Subtests D, E, F, and K which may be too simple.

The validity of the EMAF should also be further studied. The EMAF could be compared to the FCI, and to the PFCA. The EMAF-EN could also be compared with other clinical tests, such as the MMSE. The reliability of the EMAF-EN should be studied. Such studies should look at inter-rater reliability and test-retest reliability. The responsiveness of the EMAF-EN should be studied. In some cases a person's level of financial competence can fluctuate over time (Buchanan, 2004). The before and after scores of the EMAF-EN in cases where a person's cognitive abilities can be improved by treatment (e.g., Korsakoff's) should be studied. In particular in cases were the individual was declared financial incompetent, was treated, and was declared financial competent again. Finally, the validity of the EMAF-EN could be measured by comparing EMAF-EN results to the decisions of competency panels (perhaps even in different

legal jurisdictions). Comparing the EMAF to a gold standard such as this should be the highest priority.

Appendix A

There are a number of legal mechanisms that can give one person authority over another. In Ontario this includes Continuing Power of Attorney for Property, Statutory Guardians of Property, Power of attorney for Personal Care, and Court-Appointed Guardians.

The Continuing Power of Attorney for Property authorizes another person with authority over another's property. They have the right to do all things the grantor could do except make a will. Statutory Guardians of Property authorizes the Public Guardian and Trustee to manage the property of individuals who are incapable and are in a psychiatric facility. Powers of Attorney for Personal Care allows a person to pre-select, while capable, an individual who will make decisions about the grantor's personal care. The Court-Appointed Guardian of the Person may be applied for by another person seeking the right to be guardian for another incapable person (Ontario Ministry of Health, 2000)

Appendix B:

The Hierarchy of Substitute Decision Makers was made to establish protocol for selection and ranking of Substitute Decision makers. A Substitute Decision Maker only has authority when the individual in question is incapable, and must be over 16 years of age or be the individual's parent. They must assume this responsibility and be capable of communicating decisions within a reasonable time period. People can fill more than one of the below roles (adapted from Evans, 1994):

I. Individual's guardian appointed under the Substitute Decision Maker's Act, 1992, if so empowered

II. Individual's Attorney for Personal Care under the Substitute Decisions Maker's Act, 1992, if so empowered

III. The representative appointed by the Consent and Capacity Board, if so empowered

IV. The individual's spouse or partner

V. The individual's child, parent, children's aid society, or other lawful agent empowered to give consent by the parent

VI. A parent who only has right of access

VII. The individual's brother or sister

VIII. Any other relation by blood, marriage, or adoption

IX. If none of the above are available the decision abilities are granted to the public guardian or trustee. The trustee also makes the decision if there is a disagreement between substitute decision makers of equal rank

Appendix C:

As the breadth of human actions is vast, so are areas in which one's capacity to function. Different areas of specific functioning include driving, creating advance directives (very important in progressive cases such as AD), consenting to medical treatment, and management of personal affairs and property (Marson et. al, 1994). These areas of activity are further expanded as Activities of Daily Living and Instrumental Activities of Daily living.

Appendix D: Channel 10 Advertisement

Looking for participants for a LU study.

Study is investigating the ability to handle finances in the elderly. Participants should be cognitively healthy individuals between ages of 60 and 81. We are especially looking for individuals with less than 12 years of education. If interested please call Neil Pascoe at 343-8888 ext. 5211

Appendix E: Chronicle Journal Advertisement:

Community Corner. (2005, 3/14, 3/21, 3/28). *Chronicle Journal*, 7A.

* * *

A Lakehead University master's student in the psychology department is conducting **a study of English-speaking healthy elderly people**. This is to gain an understanding of the ability to handle finances between healthy and cognitively-impaired elderly such as in Alzheimer's. No more than 1 1/2 hours is required for a one day. You will be asked a number of questions and asked to complete several simple tasks. This can be done in your home or any other setting where you would be comfortable. Information: Neil Pascoe, 343-8888 ext. 5211.

Appendix F

HEALTH AND ENGLISH LANGUAGE QUESTIONNAIRE

a) How old are you? _____ years

b) Do you have health problems that concern you that have not been diagnosed by a doctor? YES NO

If yes, for how long? How have the symptoms evolved/changed? _____

_____

_____

c) When you were child or adolescent, did you ever have...

1. Attention deficit disorders? YES NO
2. Learning disabilities (problem with reading/writing, dyslexia, etc.)? YES NO
3. A serious childhood disease? YES NO

Which? _____

_____

_____

d) Have you ever been under the care of a neurologist or psychiatrist?

If yes, for what reasons or diagnosis? _____

_____

_____

e) Have you previously had...

1. a head trauma? YES NO

2. a stroke (CVA)? YES NO

3. a fainting Spell? YES NO

4. epilepsy? YES NO

Explain: _____

_____

_____

f) Do you suffer from any other diseases? Which? _____

_____

_____

g) Are you currently taking any medications? Which? _____

_____

_____

h) Do you have any untreated hearing problems? YES NO

_____

i) Do you have any untreated visual problems? YES NO

_____

j) Do you have any difficulty writing (physical disabilities)? YES NO

_____

k) Where were you born?_____

l) How many years have you lived in Canada? _____ **years**

m) Which is your first language? _____

If it is not English:

At which age you did learn English? _____ years

What language do you use more at home? _____

What language do/did you use more at work?_____

What language do you speak best?_____

Appendix G

FINANCIAL EXPERIENCE QUESTIONNAIRE

School Experience

a) What was the last year of school that you completed? _____

b) What diplomas or degrees do you have?

High School? ___ Bachelors? ___ Masters? ___ Doctorate? ___

Other? _____

c) Fields of studies: _____

_____

_____

d) Please name what you would consider to be your academic...

Strengths: _____

Weaknesses: _____

e) How would you describe mathematics and arithmetic :

____ 1. Very easy subjects

____ 2. Easy subjects

____ 3. Difficult subjects

____ 4. Very difficult subjects

Professional experience

a) Are you currently working? YES NO

b) If so, what is your current job? _____

c) Are you involved in community activities? YES NO

d) If so, which? _____

_____

e) What is your employment history? _____

_____

_____

f) Have you had jobs involving money handling, money management, a lot of calculation, accounting, bookkeeping, finances, etc. (which)?* _____

_____

_____

If an employment is named from the f question:

How many years have you had this kind of job? _____ years

If you no longer have this kind of job, how long has it been since you left? _____ years

What were the principal financial tasks carried out for this position?_____

Daily Living Experience

a) Do you currently live with other people? YES NO

b) If so, how many? _____

c) Are they family members (which)? YES NO

_____

_____

d) I will read you 3 sentences, tell me which best describe to your situation:

____ 1. You make the MAJORITY of your purchases

____ 2. You make SOME of your purchases *

____ 3. You do not make ANY of your purchases *

If the person answered 2 or 3:

*Why don't you make the majority of your purchases yourself?*_____

It must be clear from the answer that one of the 3 following reasons applies. If not, continue your examination of the cause.

____ *1. You have physical disabilities which prevent you*

____ *2. You have mental problems which prevent you*

____ *3. It's the normal sharing of household chores*

How long has it been since you made the majority of your purchases? _____years

e) I will read you 3 sentences, tell me which best describe to your situation:

____ 1. You carry out the MAJORITY of your banking transactions (depositing cheques, making withdrawals, etc.)

____ 2. You carry out SOME of your banking transactions*

____ 3. You do not carry out ANY of your banking transactions*

If the person answered 2 or 3:

Why don't you carry out the majority of your banking transactions yourself?

_____

It must be clear from the answer that one of the 3 following reasons applies. If not, continue your examination of the cause.

____ *1. You have physical disabilities which prevent you*

____ *2. You have mental problems which prevent you*

____ *3. It's the normal sharing of household chores*

How long has it been since you carry out the majority of your banking transactions? _____years

f) I will read you 3 sentences, tell me which best describe to your situation:

____ 1. You personally pay the MAJORITY of your bills (Bell, Hydro-Ontario, etc.)

____ 2. You personally pay SOME of your bills*

____ 3. You do not personally pay ANY of your bills yourself*

If the person answered 2 or 3:

*Why don't you pay the majority of your bills yourself?*_____

It must be clear from the answer that one of the 3 following reasons applies. If not, continue your examination of the cause.

____ *1. You have physical disabilities which prevent you*

____ *2. You have mental problems which prevent you*

____ *3. It's the normal sharing of household chores*

How long has it been since you personally paid the majority of your bills?

_____years

g) What is your approximate household income?

___Less than 10,000?
___Between 11,000 and 25,000?
___Between 26,000 and 40,000?
___Between 41,000 and 55,000?
___56,000 and more?

h) What was your previous household income, if significantly different from now?

___Less than 10,000?
___Between 11,000 and 25,000?
___Between 26,000 and 40,000?
___Between 41,000 and 55,000?
___56,000 and more?

i) Have you previously or presently had the following things?

___Checking account?
___Savings account?
___Owned a home that you live in?
___Owned a building with one or more rented units?
___Owned a business?
___Owned shares on the stock market?
___Owned shares in a mutual fund?
___RRSP?
___Term deposit?
___An account in an investment company?
___Others, specify: _____?

Appendix H: Montréal Cognitive Assessment

Appendix I: Cover Letter

Printed on Lakehead University Letterhead

The assessment of financial aptitude and knowledge in the elderly:

The Financial Aptitude and Knowledge Scale (FAKS)

Dear Potential Participant:

We are conducting a study of English-speaking healthy elderly persons. This study will help us to better understand the ability to handle finances in the elderly, specifically differences in the ability to handle finances between healthy and cognitively-impaired elderly (such as in Alzheimer disease).

The intent of this research project is 1) form a basis of comparison of healthy elderly from this area in the ability to handle finances, 2) to investigate how good our idea of what mental abilities are needed for handling finances, 3) to investigate any differences between persons (educational level, employment, socio-economic status, previous financial knowledge and abilities) on financial abilities in the healthy elderly.

To accomplish this goal we would require no more than 1.5 hours your time on 1 day. During this time I will ask you a number of questions and ask you to complete several simple tasks. The evaluation can be done in any quiet setting (e.g. your home or other setting you would feel comfortable in).

There are no significant immediate benefits or risks from this study. The only potential risk is fatigue and you may discontinue participation at any time should you wish to do so without any penalty. The information you provide may help us better understand what abilities are needed to handle financial matters.

All information you provide will remain confidential and securely stored at Lakehead University for seven years. Your personal data will not be reported, only averages and other statistical compilations will be. However, the findings of this project will be made available to you at your request upon the completion of the project.

If you are interested in this study please call me at 343-8888 ext. 5211 and schedule an appointment.

Thank you for your cooperation.

Sincerely,

_____

Neil Pascoe

Further Information may by obtained by calling Prof. Michel Bédard, Ph.D. of Lakehead University at 807-343-8630 or by calling Dr. Yves Turgeon of the Campbellton Regional Hospital at 506-789 5509

Appendix J: Consent Form

Printed on Lakehead University Letterhead

Consent Form:

My signature on this sheet indicates I agree to participate in a study by *Mr. Neil Pascoe*, on the Financial Abilities and Knowledge Scale and it also indicates that I understand the following:

1. **I have read the cover letter and have had the study explained to me.**
2. **I fully understand what I will be required to do as a participant in the study.**
3. **I am a volunteer and can withdraw at any time from the study without penalty.**
4. **There is no apparent risk of physical or psychological harm.**
5. **The data I provide will be confidential and will be stored in the Department of Psychology for a period of 7 years.**
6. **I will receive a summary of the project, upon request, following the completion of the project.**

I agree to participate in the study

Signature of Participant Date

I wish to obtain a summary of the findings: Yes No

Address: _____

_____

_____

Signature of Witness Date

Appendix K. Descriptive statistics of the EMAF-EN, indexes of the EMAF-EN, and subtests of the EMAF-EN

Subtests	Mean (%)	Median (%)	Mode
EMAF total	**95.2%**	**95.7%**	**100.0%**
Application Index	**94.1%**	**94.4%**	**100.0%**
Management of Expenses and Income Index	**96.2%**	**96.8%**	**97.0%**
Verifying change (A)	89.0%	100.0%	100.0%
Finding equivalent amounts (B)	99.6%	100.0%	100.0%
Counting money (C)	99.2%	100.0%	100.0%
Knowing equivalent amounts (D)	100.0%	100.0%	100.0%
Identifying coins and bills (E)	100.0%	100.0%	100.0%
Conducting bank transactions (F)	100.0%	100.0%	100.0%
Identifying documents (G)	99.4%	100.0%	100.0%
Verifying bank transactions (H)	91.9%	88.9%	100.0%
Understanding a bank statement (I)	95.8%	100.0%	100.0%
Knowing basic banking terms (J)	99.4%	100.0%	100.0%
Understanding cheques (K)	100.0%	100.0%	100.0%
Understanding a bill (L)	95.0%	100.0%	100.0%
Verifying a bill (M)	93.6%	100.0%	100.0%
Paying by Installment (N)	97.1%	100.0%	100.0%
Writing a cheque (O)	98.0%	100.0%	100.0%
Detecting potential frauds, Showing Judgment (P-Q)	97.5%	100.0%	100.0%
Estimating costs (R)	81.7%	83.3%	83.0%
Calculating Costs (S)	84.3%	85.7%	100.0%
Knowing taxes and tips (T)	91.2%	100.0%	100.0%
Solving mathematical operations (U)	98.9%	100.0%	100.0%
Interpreting sales signs (V)	93.5%	100.0%	100.0%
Knowing essential expenses (W)	88.0%	100.0%	100.0%
Remembering bank transactions (X)	94.4%	100.0%	100.0%
Remembering purchases (Y)	97.5%	100.0%	100.0%

Appendix K <concluded>

Subtests	SD	Items	Minimum	Maximum
EMAF total	**0.03**	**141**	**87.0%**	**100.0%**
Application Index	**0.04**	**59**	**81.0%**	**100.0%**
Management of Expenses and Income Index	**0.02**	**82**	**89.0%**	**100.0%**
Verifying change (A)	0.18	5	40.0%	100.0%
Finding equivalent amounts (B)	0.02	7	86.0%	100.0%
Counting money (C)	0.02	3	67.0%	100.0%
Knowing equivalent amounts (D)	0.00	3	100.0%	100.0%
Identifying coins and bills (E)	0.00	4	100.0%	100.0%
Conducting bank transactions (F)	0.00	4	100.0%	100.0%
Identifying documents (G)	0.04	4	75.0%	100.0%
Verifying bank transactions (H)	0.09	9	67.0%	100.0%
Understanding a bank statement (I)	0.07	9	67.0%	100.0%
Knowing basic banking terms (J)	0.04	4	75.0%	100.0%
Understanding cheques (K)	0.00	7	100.0%	100.0%
Understanding a bill (L)	0.10	5	60.0%	100.0%
Verifying a bill (M)	0.09	7	71.0%	100.0%
Paying by Installment (N)	0.07	6	67.0%	100.0%
Writing a cheque (O)	0.06	5	80.0%	100.0%
Detecting potential frauds, Showing Judgment (P-Q)	0.06	9	75.0%	100.0%
Estimating costs (R)	0.14	4	50.0%	100.0%
Calculating Costs (S)	0.14	7	57.0%	100.0%
Knowing taxes and tips (T)	0.11	6	67.0%	100.0%
Solving mathematical operations (U)	0.04	7	86.0%	100.0%
Interpreting sales signs (V)	0.12	5	60.0%	100.0%
Knowing essential expenses (W)	0.16	5	40.0%	100.0%
Remembering bank transactions (X)	0.13	8	38.0%	100.0%
Remembering purchases (Y)	0.06	8	75.0%	100.0%

Appendix L: Correlation charts between the EMAF-EN, indexes subtests of the EMAF-EN (with their descriptive statistics), age, years of education, and MoCA score.

Key to all tables:

-Correlations were not available for Subtests D, E, F, and K due to lack in variability.

-N = 40 in all cases

-* **indicates $p < 0.05$**

-** **indicates $p < 0.01$**

Appendix L <continued>

	EMAF total	Applic. Index	Manage. Index	Employment	Income Group	Age	Education
EMAF total	XXX	**0.90****	**0.83****	-0.25	0.26	-0.24	**0.43****
Applic. Index	**0.90****	XXX	**0.51****	**-0.35***	0.22	-0.19	**0.44****
Manage. Index	**0.83****	**0.51****	XXX	-0.04	0.24	-0.24	0.30
Employment	-0.25	**-0.35***	-0.04	XXX	**-0.44****	0.10	-0.29
Income Group	0.26	0.22	0.24	**-0.44****	XXX	**-0.44****	**0.33***
Age	-0.24	-0.19	-0.24	0.10	**-0.44****	XXX	0.04
Education	**0.43****	**0.44****	0.30	-0.28	**0.33***	0.04	XXX
MoCA	-0.15	-0.26	0.04	0.29	-0.04	0.17	-0.08
Math	-0.30	-0.28	-0.24	-0.02	-0.16	-0.25	-0.28
A	**0.48****	**0.64****	0.13	**-0.42****	**0.45****	-0.27	0.16
B	-0.14	-0.08	-0.18	-0.23	-0.13	0.20	-0.11
C	0.19	**0.33***	-0.04	0.16	-0.13	0.12	0.04
G	0.00	0.10	-0.12	**-0.33***	0.24	-0.30	-0.30
H	0.26	0.12	**0.37***	0.21	**0.32***	-0.24	0.07
I	**0.47****	**0.36***	**0.47****	-0.06	-0.04	-0.05	0.15
J	0.29	0.20	**0.32***	0.16	-0.13	0.20	0.04
L	0.21	0.08	**0.31***	0.27	-0.07	0.00	0.04
M	0.20	-0.01	**0.41****	0.08	-0.2	0.15	-0.03
N	0.17	0.05	0.28	-0.02	0.00	-0.07	0.02
O	**0.46****	**0.42****	**0.39***	0.14	-0.18	0.04	0.00
P-Q	0.16	0.25	0.00	-0.19	0.26	-0.22	0.16
R	**0.36***	**0.36***	0.25	0.15	-0.21	0.03	0.02
S	**0.55****	**0.54****	**0.40***	-0.17	0.00	-0.21	0.13
T	**0.47****	**0.58****	0.20	-0.29	0.03	-0.04	**0.48****
U	**0.33***	**0.46****	0.05	**-0.36***	0.09	0.04	0.26
V	**0.66****	**0.56****	**0.59****	-0.14	0.17	-0.02	**0.49****
W	**0.44****	0.30	**0.51****	-0.27	0.17	0.02	**0.48****
X	0.28	0.12	**0.41****	-0.07	0.31	**-0.37***	0.00
Y	0.26	0.25	0.19	-0.15	**0.35***	-0.18	0.18

Appendix L <continued>

	MoCA	Math	Verifying change (A)	Finding equivalent amounts (B)	Counting money (C)	Verifying bank transactions (H)	Understanding a bank statement (I)
EMAF total	-0.15	-0.30	**0.48****	-0.14	0.19	0.26	**0.47****
Applic. Index	-0.26	-0.28	**0.64****	-0.08	**0.33***	0.12	**0.36***
Manage. Index	0.04	-0.24	0.13	-0.18	-0.04	**0.37***	**0.47****
Employment	0.29	-0.16	**-0.42****	-0.23	0.16	0.21	-0.06
Income Group	-0.04	-0.16	**0.45****	-0.13	-0.13	**0.32***	-0.04
Age	0.17	-0.25	-0.27	0.20	0.12	-0.24	-0.05
Education	-0.08	-0.28	0.16	-0.11	0.04	0.07	0.15
MoCA	**XXX**	-0.08	-0.27	-0.12	-0.12	0.05	-0.25
Math	-0.08	**XXX**	-0.28	0.06	-0.18	0.06	-0.08
A	-0.27	-0.28	**XXX**	-0.10	0.08	-0.10	0.24
B	-0.12	0.06	-0.10	**XXX**	-0.03	-0.14	-0.10
C	-0.12	-0.18	0.08	-0.03	**XXX**	0.25	-0.10
G	0.00	0.06	**0.44****	-0.03	-0.03	-0.14	-0.10
H	0.05	-0.08	-0.10	-0.14	0.25	**XXX**	0.20
I	-0.25	-0.13	0.24	-0.09	-0.09	0.19	**XXX**
J	0.24	-0.18	-0.10	-0.03	-0.03	-0.14	-0.10
L	0.08	-0.04	-0.10	-0.08	-0.08	0.05	-0.14
M	-0.12	-0.22	-0.14	0.15	-0.12	-0.06	0.14
N	0.17	-0.02	-0.24	-0.06	-0.06	-0.15	-0.23
O	0.06	-0.13	0.17	-0.05	**0.48****	0.22	**0.44****
P-Q	-0.04	0.247	0.22	-0.07	-0.07	-0.05	0.00
R	0.05	-0.14	-0.22	-0.02	**0.38***	**0.31***	0.12
S	-0.20	0.11	0.20	-0.18	-0.02	0.13	0.17
T	-0.14	-0.10	0.23	-0.12	**0.35***	0.04	0.18
U	-0.14	-0.18	**0.46****	-0.05	-0.05	-0.26	0.27
V	0.09	-0.30	0.27	-0.09	-0.09	-0.07	**0.32***
W	0.25	-0.28	0.10	-0.12	-0.12	-0.09	0.24
X	-0.27	0.06	0.14	-0.07	-0.07	**0.33***	0.16
Y	**-0.32***	-0.07	0.25	-0.06	-0.06	0.20	0.07

Appendix L <continued>

	Knowing basic banking terms (J)	Understanding a bill (L)	Verifying a bill (M)	Paying by Installment (N)	Writing a cheque (O)	Detecting potential frauds, Showing Judgment (P-Q)	Estimating costs (R)
EMAF total	0.29	0.21	0.20	0.17	0.46	0.16	**0.36***
Applic. Index	0.20	0.08	0.00	0.05	0.41	0.24	**0.36***
Manage. Index	**0.32***	**0.31***	**0.41****	0.28	0.39	0.00	0.25
Employment	0.16	0.27	0.08	-0.02	0.14	-0.19	0.15
Income Group	-0.13	-0.07	-0.20	0.00	-0.18	0.26	-0.21
Age	0.20	0.00	0.15	-0.07	0.04	-0.22	0.03
Education	0.04	0.04	-0.03	0.02	0.00	0.16	0.02
MoCA	0.24	0.08	-0.12	0.17	0.06	-0.04	0.05
Math	-0.18	-0.04	-0.22	-0.02	-0.13	0.25	-0.14
A	-0.10	-0.09	-0.14	-0.24	0.17	0.22	-0.22
B	-0.03	-0.08	0.15	-0.06	-0.05	-0.07	-0.02
C	-0.03	-0.08	-0.12	-0.06	**0.48****	-0.07	**0.38***
G	-0.03	-0.08	-0.12	-0.06	-0.05	-0.07	-0.22
H	-0.14	0.05	-0.06	-0.15	0.22	-0.05	**0.31***
I	-0.10	-0.14	0.14	-0.23	0.44	0.00	0.12
J	**XXX**	0.25	0.15	**0.66****	-0.05	-0.07	0.18
L	0.25	**XXX**	**0.48****	0.03	-0.17	0.00	0.19
M	0.15	**0.48****	**XXX**	0.18	0.03	-0.24	0.12
N	**0.66****	0.03	0.18	**XXX**	-0.13	-0.17	0.16
O	-0.05	-0.17	0.03	-0.13	0.04	0.04	**0.38***
P-Q	-0.07	0.00	-0.24	-0.17	**0.38***	**XXX**	0.08
R	0.18	0.19	0.12	0.16	0.13	0.08	**XXX**
S	0.14	0.05	0.10	0.13	**0.36***	0.23	0.11
T	0.11	-0.10	-0.28	0.11	0.22	0.06	0.23
U	-0.05	-0.15	0.10	-0.11	0.10	0.29	0.08
V	**0.44****	**0.32***	0.22	0.25	0.17	0.04	-0.02
W	0.08	-0.13	-0.04	0.20	0.10	0.01	-0.09
X	-0.07	-0.08	0.00	-0.06	-0.131	-0.14	-0.06
Y	-0.06	0.00	-0.05	-0.16	-0.126	0.04	-0.11

Appendix L <concluded>

	Calculating costs (S)	Knowing taxes and tips (T)	Solving mathematical operations (U)	Interpreting sales signs (V)	Knowing essential expenses (W)	Remembering bank transactions (X)	Remembering purchases (Y)
EMAF total	**0.55****	**0.47****	**0.33***	**0.66****	0.44	0.28	0.26
Applic. Index	**0.54****	**0.58****	**0.46****	**0.56****	0.30	0.12	0.25
Manage. Index	**0.40***	0.19	0.05	**0.59****	0.51	**0.41****	0.19
Employment	-0.17	-0.29	**-0.36***	-0.14	-0.27	-0.07	-0.15
Income Group	0.00	0.03	0.09	0.17	0.17	0.31	**0.35***
Age	-0.21	-0.04	0.04	-0.02	0.02	**-0.37***	-0.18
Education	0.13	**0.48****	0.26	**0.49****	**0.48****	0.00	0.18
MoCA	-0.20	-0.14	-0.14	0.09	0.25	-0.27	**-0.32***
Math	0.11	-0.10	-0.18	-0.30	-0.28	0.06	-0.07
A	0.19	0.23	**0.46****	0.27	0.10	0.14	0.25
B	-0.18	-0.12	-0.05	-0.09	-0.12	-0.07	0.25
C	-0.02	**0.35***	-0.05	-0.09	-0.12	-0.07	-0.06
G	-0.02	0.11	-0.05	-0.09	-0.12	-0.07	-0.06
H	0.13	0.04	-0.26	-0.07	-0.10	**0.33***	0.20
I	0.17	0.18	0.27	**0.32***	0.24	0.16	0.07
J	0.14	0.11	-0.05	**0.44****	0.08	-0.07	-0.06
L	0.05	-0.10	-0.15	**0.32***	-0.13	-0.08	0.00
M	0.09	-0.28	0.10	0.22	-0.04	0.00	-0.05
N	0.13	0.11	-0.11	0.25	0.20	-0.06	-0.16
O	0.13	**0.36***	0.22	0.10	0.17	0.10	-0.13
P-Q	0.23	0.06	0.29	0.04	0.01	-0.14	0.04
R	0.11	0.23	0.08	-0.02	-0.10	-0.06	-0.11
S	**XXX**	0.07	0.26	0.19	0.27	0.079	0.01
T	0.07	**XXX**	0.06	**0.32***	0.20	0.02	-0.088
U	0.26	0.06	**XXX**	0.16	0.14	-0.12	0.07
V	0.19	**0.32***	0.16	**XXX**	**0.47****	0.05	0.11
W	0.27	0.20	0.14	**0.47****	**XXX**	-0.12	0.07
X	0.08	0.02	-0.12	0.05	-0.12	**XXX**	**0.40****
Y	0.01	-0.09	0.07	0.11	0.07	**0.40***	**XXX**

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