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# Development and Validation of the Successful Aging Quiz

by

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A dissertation presented to the
Department of Psychology at Lakehead University
in fulfillment of the dissertation requirement for the degree
Doctor of Philosophy in Clinical Psychology

Thunder Bay, Ontario, Canada, 2004

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# Canada

## DEDICATION

This dissertation is dedicated to the loving memory of my grandmothers, Germaine Kourie Mayer and Jeanne Tessier Knight.

Nana Knight's experience of stroke in later life, and our family's struggle in coping with her ill health, inspired me to pursue a Ph.D. in Clinical Psychology, specializing in Geriatrics. Watching her smile through her frustration, and sharing in the challenges of her rehabilitation, and later, palliation, made me eager to learn how to ease the emotional pain of illness, promote psychological health and well-being and help patients and families deal with changes brought about by age, lifestyle, disease and disability.

Grandma Mayer, who was just four months shy of her 90th birthday when she passed away two and half years ago, was strong role model of successful aging for me. She had a joie de vivre and strength of character that is unparalleled, and a contagious laugh that will echo in my memory forever. She taught me the importance working hard, of family, and of always showing love and kindness to all living things.

# ACKNOWLEDGEMENTS

This dissertation would not have been possible without the help and support of several wonderful people. First, I would like to thank my supervisor and mentor, Michael J. Stones. I am indebted to him for the wisdom, humor, support and consistent encouragement that he has provided over many years. From the inception of our successful aging research at the CLSC René-Cassin, to my own forays into qualitative research on the topic at the University of Waterloo, and now to the development of the Successful Aging Quiz at Lakehead University, Michael has been a marvelous teacher, colleague and friend. Also a sincere thank you to Michel Bédard, my second reader, for his guidance and support of this project, and to Leeann Holowka for providing a great deal of assistance with data collection.

I would like to acknowledge the support of the Successful Aging Project Advisory Committee, and their community partners: Lakehead University, the Centre for Education and Research in Aging and Health, Lakehead Social Planning Council, the Council on Positive Aging, the Center for Rural and Northern Health Research, the Thunder Bay District Health Unit, the Northwestern Ontario District Health Council, the Thunder Bay 55 Plus Center, and West Thunder 55 Plus Center. Also, thank you to St. Joseph's Care Group, the Canada Games Complex, the Herb Carroll 55 Plus Center and the Port Arthur Curling Club for their involvement in this research, and to all those individuals who completed the Successful Aging Quiz and contributed to the development of this valuable assessment tool.

This research was made possible through the financial support a Doctoral Fellowship from the Social Science and Humanities Research Council of Canada and a Doctoral Scholarship from the Foundation for Vital Aging, CLSC René-Cassin and the Institute of Social Gerontology

Finally, I would like to thank my family and friends for their unconditional support, faith and encouragement.  Specifically, I would like to thank my parents, Carol and Michael Knight, and my grandfather, Steve Mayer, for their love, support, and reassuring words. Mom, you have a resiliency of spirit that continues to inspire me during my own struggles. Thank you for instilling in me a love of learning, and always encouraging me to pursue my dreams.  A heart-felt thank you to my dear brother, Andrew Knight, for helping me keep things in perspective, for teaching me not to take myself too seriously, and for reminding me how to have a good time. Thank you to Brenda Goyetche, Susie Mudrovcic, Leanne Fitzgerald and Barry Pekilis, for their cherished friendship, pep talks, laughter, faith and words of wisdom. You have each provided a sanctuary for my sanity over my many years of graduate school, and it was much appreciated. Finally, I would like to acknowledge the support, faith and encouragement of Mark McDonnell, my love, my guiding light, my pillar of strength. Namasté.

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# ABSTRACT

The purpose of this dissertation was to evaluate the reliability, validity, and responsiveness of the Successful Aging Quiz (SAQ), a 70-item, self-administered, multi-dimensional assessment instrument designed to measure domains related to healthy aging. This was accomplished through a series of four separate studies designed to elicit relevant psychometric information. Results revealed a 4-factor solution for the SAQ - Negative Orientation, Positive Orientation, Activity and Health factors. The factors had good internal consistency and were stable, and were found to discriminate between hospital patients and active community residents in the expected direction. At the factor level the SAQ was not responsive to changes in the health status of these participants over time. However, two SAQ items were found to be responsive to this change. There was high test-retest reliability over a one-week period and the factors demonstrated convergent validity with a widely-used generic indicator of health status. An interviewer-administered version and a computerized version of the SAQ were developed, and found to be equivalent to the traditional pencil-and-paper SAQ. These new methods of administration were well-received and rated as easy to complete, even by those individuals who had never used a computer before. Finally, the implementation of an Internet-based SAQ provided strong convergent validity for the 4-factor model with a large and diverse sample of online users. In summary, the SAQ was found to be a useful tool for the brief assessment of healthy aging status of older adults in a wide variety of settings.

# INTRODUCTION

The rapid growth of Canada's aging population, and its relevance to health care requirements, community support needs and health economics are well documented. In 1998, 12% of the total population was over 65 years of age, up from 10% in 1981, and more than twice the figure in 1921, when only 5% of people living in Canada were seniors (Health Canada, 2002). Statistics Canada (Health Canada, 2002) projects that by 2021, there will be almost seven million adults over the age of 65, representing 18% of the population, and that by 2041, older adults will account for 23% of all Canadians. Improved standards of living and advances in medical technology have also meant that life expectancy after 65 has doubled over the past century, with a woman who is 65 today expected to live an additional 20 years, and a 65-year old man expected to live an additional 16 years (National Advisory Council on Aging; NACA, 2001).

While most older Canadians enjoy reasonable health and report their overall health as relatively good, advanced age is associated with declining health status, chronic illness, activity limitation, physical disability, and increased dependence on others (Health Canada, 2002). In 1997, 82% of seniors living at home suffered from at least one chronic health condition, and one in four Canadian seniors had a long-term disability or handicap. Health care utilization tends to increase with age, with seniors reported to utilize approximately half of all hospital days and nearly all long term care facility days in Canada. Requirements for community care also increase with age, with expenditures on home care services in Canada nearly doubling in the last seven years (Health Canada, 2002).

Due to the fiscal and human costs required to provide high quality care to an aging population, "healthy aging" has emerged as the new thrust for health care and geriatric research

in the new millennium, both in Canada, and abroad. Health Canada (2002) describes healthy

aging as "a lifelong process of maximizing opportunities for maintaining and preserving health,

physical and mental well-being, independence and quality of life" (p. 26). They state that older

Canadians have the potential to improve their health and well-being, "as many age-related

diseases are preventable" (Health Canada, 2002, p. 26). In fact, the author of an editorial in the

Canadian Journal of Public Health (Macpherson, 1995, entitled "Healthy Elderly: Coming of

Age") suggested that individuals in middle and later life have become the prime candidates for

health promotion goals of public health programming. Healthy aging has implications that

extend beyond the health and well-being of the target population to include the well-being of

informal care-providers and potential fiscal savings in formal health care provision.

This dissertation describes the development and validation of the Successful Aging Quiz

(SAQ), a short, multidimensional assessment instrument for older adults specifically designed

with the conceptual model of healthy aging in mind.


**Conceptual Model of Healthy Aging**

Since the time the World Health Organization (WHO) first referred to health as an

optimum state of physical and mental well-being rather than the absence of disease, over 50

years ago, gerontologists have been conceptualizing frameworks to describe ideal outcomes of

the aging process. One of the most commonly used terms to describe a good old age is

"successful aging", often attributed to R.J. Havighurst (1961), who penned the first conceptual

journal article in the premier issue of *The Gerontologist*. The concept of successful aging has

since also been referred to as "healthy aging" (MacPherson, 1995), "optimal aging" (Baltes &

Baltes, 1990) or "aging well" (Folts, Ide, Johnson, & Crewe Solomon, 1995), and it is "perhaps

the oldest, most persistently investigated issue in the social scientific study of aging" (Maddox &

Campbell, 1985, p. 13). As Baltes and Baltes (1990) state, "a discussion of successful aging

converges with the search for factors and conditions that help us to understand the potential of

aging and, if desirable, to identify ways to modify the nature of humans' aging as it exists today"

(p. 4).

During the 1940s and 1950s there were various attempts to define and measure the

psychological well-being of older adults, "usually with the goal of using such a measure as an

operational definition of successful aging" (Neugarten, Havighurst & Tobin, 1961, p. 134).

Different terms were used (e.g., morale, Lawton, 1946; adjustment, Caven, Burgess, Havighurst

& Goldhamer, 1949), and different criteria employed, typically using quantitative research

strategies. But since the landmark work of Neugarten et al. (1961), life satisfaction has become

the most widely used empirically-based operationalization of successful aging. Their construct

of life satisfaction included the components of zest versus apathy ("enthusiasm of response and

degree of ego involvement"), resolution and fortitude (acceptance of "personal responsibility"

and of "life as meaningful and inevitable"), congruence between desired and achieved goals,

self-concept and mood tone (degree of "happy, optimistic attitudes and moods") (Neugarten et

al., p. 139).

However, Ryff (1982), Gubrium and Lynott (1986), and later, Fisher (1992), argued that

life satisfaction scales do not accurately tap how individuals respond to, and experience, their

lives, and further that the instruments are created without a true understanding of what

constitutes life satisfaction for older adults. Ryff (1982, 1989), spurred by the belief that research

on successful aging was not guided by an underlying theory, synthesized a guiding model of

successful aging by integrating life span development theories (e.g., Erikson's 1959 psychosocial

stage model), clinical theories of mental health (e.g., Birren & Renner, 1980) and theories of

personal growth across the life span (e.g., Maslow's 1968 view of self-actualization). From this

integration Ryff (1989) conceptually identified six features that she considered important for

successful aging: positive relations with others, autonomy, personal growth, self-acceptance,

purpose in life, and, environmental mastery. However, she cautioned that achieving positive

functioning in each of these domains requires continual growth and adaptation and is related to

developmental work across the whole life course (Ryff, 1989). Further, qualitative research by

Fisher (1992, 1995) that explored the meanings that older people attach to successful aging

indicated that the concepts of life satisfaction and successful aging should not be used

interchangeably. Although there was some overlap, Fisher's (1992) respondents described life

satisfaction in terms of past expectations and present circumstances, while successful aging was

more oriented to strategies for coping in later life and maintaining a positive outlook.

In contrast, there are some researchers who do not even include life satisfaction in their

definitions of successful aging, and instead focus purely on physical health and functional

ability. For example, in a large, longitudinal Canadian study examining the predictors of

successful aging, Roos and Havens (1991) considered someone to be aging successfully if they:

are not residing in a nursing home, are not receiving more than 59 days of home care per year,

self-rate their health as excellent to fair, are not dependent on any activity of daily living, are not

using a wheelchair, do not need help in going outdoors, are able to walk outdoors, and score

above the cut-off on a mental status exam. Essentially, for Roos and Havens (1991), successful

aging is defined in terms of an individual's ability to remain functionally independent.

Other researchers have taken a more multidimensional approach to the conceptualization

of successful aging. In a seminal article on the topic, Rowe and Kahn (1987) argued that

gerontological research has typically focused on the distinction between older people who are suffering from disease and/or disability and those that have neither, and that there has been a general neglect of the heterogeneity of so-called "normal" aging. They took the concept of normal aging and further broke it down into "usual aging" and "successful aging". Usual agers are described as individuals who demonstrate typical non-pathologic age-related losses that are brought about by lifestyle, whereas successful agers are those who exhibit little or no loss relative to their peers. Changes seen in successful agers are thought to have been brought about only by the passage of time (i.e., age-intrinsic change). Rowe and Kahn's (1987) goal was to stimulate research on the criteria and determinants of successful aging and to identify areas of potential intervention for "normal" elderly. They posited that the modifying effects of diet, exercise, and psychosocial factors such as autonomy, control and social support should be considered as possible strategies for the promotion of successful aging (Rowe & Kahn, 1987).

Based on 10 years of empirical research on the predictors of successful aging, conducted by an interdisciplinary team of researchers led by Rowe, the McArthur Foundation's Research Network on Successful Aging produced a plethora of scientifically-based recommendations aimed at improving the lives of older adults (Rowe & Kahn, 1997, 1998). Their model of successful aging is defined as "the ability to maintain three key behaviours or characteristics: a low risk of disease and disease-related disability; high mental and physical function; and active engagement with life" (Rowe & Kahn, 1998, p. 38). All three are important components, but they are to some extent hierarchical. Conceptually, having a low-risk of disease and disability increases the likelihood that an individual will have high physical and cognitive functioning, which in turn increases the person's potential to engage in activity. Rowe and Kahn's (1997, 1998) research has suggested that "many of the predictors of risk and of both functional and

activity levels appear to be potentially modifiable, either by individuals or by changes in their immediate environments", and thus the area is ripe for the development of interventions to promote successful aging (1997, p. 439).

Baltes and Baltes (1990), also recognizing the inevitable heterogeneity in aging, developed a framework of selective optimization with compensation as a prototypical strategy for successful aging. Their conceptual model involves three interacting elements and processes, the first being "selection, which refers to an increasing restriction of one's life world to fewer domains of functioning because of an aging loss in the range of adaptive potential" (p. 21). It is the adaptive task of the older individual to select those areas that are of high priority, since a high level of functioning cannot be maintained in all areas of the person's life. The second element is "optimization, which reflects the view that people engage in behaviours to enrich and augment their general reserves and to maximize their chosen life courses" (p. 22). The final element is "compensation", which becomes operational when particular "behavioural capacities are lost or are reduced below a standard required for adequate functioning" (p. 22). For example, compensatory efforts include the use of mnemonic strategies and external memory aids when normal memory functioning becomes impaired and internal strategies become insufficient. Baltes and Baltes (1990) contend that by using the strategies of selection, optimization and, compensation, older adults can contribute to their own successful aging.

Ryff (1989) holds views somewhat similar to Baltes and Baltes (1990), arguing that successful aging involves the ability of older adults to meet the unique challenges of later life. Related findings were reported by Knight (1999) who conducted interviews with older adults who were nominated by their peers as role models for successful aging. A hierarchical model was proposed, with positive attitude as an overarching theme that related to acceptance and

adaptation in the domains of activity, physical health, life satisfaction and having a sense of continuity in one's life. The activity domain included subcategories of social, mental and physical activity. The life satisfaction domain included subcategories of social support, autonomy and control, planning and security, career and retirement, spirituality and integrity of life experiences (Knight, 1999).

In summary, a clear understanding of the conceptual model of healthy or successful aging requires a delineation of its components, influences, and measures. Looking across the literature, components of healthy aging include the relative absence of preventable dysfunctions (i.e., a subset of physical or mental distress, or functional limitation), but also the positive adaptation and adjustment to such impairments that do occur (e.g., Baltes & Baltes, 1990; Knight, 1999; Rowe & Kahn, 1997, 1998; Wong, 1989).

The most robust influences on healthy aging have been found to include: an individual's degree of social involvement and social support (e.g., Antonucci & Akiyama, 1997; Glass, Seeman, Herzog, Kahn & Berkman, 1995; Krause, 1987); healthy behaviours and attitudes (e.g., Knight, 1999; Ory & Cox, 1994; Wankel & Sefton, 1994; Wolinsky, Stump & Clark, 1995); involvement in cognitive activity and use of mental resources (e.g., Baltes & Willis, 1980; Baltes, 1993; Salthouse, 1991); an individual's degree of preparation for the future (e.g., Krain, 1995); and coping strategies, personality traits and processes that foster adaptation and adjustment (e.g., Knight, 1999; McNeil, Stones, Kozma, & Hannah, 1986; Stones, Kozma, & Hannah, 1990). In fact, the extant research on healthy aging repeatedly cite the relevance of these factors (i.e., attitudinal, behavioural, emotional, interpersonal) to delay the occurrence of dysfunctions, to promote recovery from acute incidents, and to facilitate adaptation and adjustment to chronic conditions (e.g., Baltes & Baltes, 1990; Rowe & Kahn, 1998).

Individual measures that have been used for assessing healthy aging include indices of outcome and quality such as: health care utilization (e.g., numbers of physician visits, prescribed medications); symptoms and diseases; functional capabilities; perceived health, psychological well-being; and other domains of quality of life (e.g., Raphael, Brown, Renwick, Cava, Weir, & Heathcote, 1997; Rowe & Kahn, 1998; Sita, Stones, Csank, Knight, & Gauron, in press). Similarly to the development of the concept itself, the emergence of a comprehensive measurement tool for successful aging has been a process that has spanned over many years.

**Multidimensional Assessment of Older Adults**

Traditionally, the assessment of older adults focused primarily on physical health and functional status. However, the development of more comprehensive measurement tools in geriatrics stemmed from a need to improve planning for the provision of health services (Rubenstein & Wieland, 1990). The tools that follow were the first attempts at the comprehensive assessment of older people.

One of the first, and likely the best-known methodology for a more comprehensive assessment of older adults is the OARS Multidimensional Functional Assessment Questionnaire (OMFAQ; Duke University, 1978, as cited in Fillenbaum & Smyer, 1981). The development of the OMFAQ was initiated in 1972 by the U.S. Administration on Aging to "structure and conceptualize an approach to understanding a persistent issue of special relevance to an aging society – alternatives to institutionalization, or better, institutionalization as an alternative in a continuum of health and welfare services" (Duke University, 1978, p. 3, as cited in Fillenbaum & Smyer, 1981). As Fillenbaum and Smyer (1981) point out, the goal of the OMFAQ was to measure the service use and overall functional status of older adults. With the OMFAQ,

information about service use, social resources, economic resources, mental health, physical health, and activities of daily living is obtained in approximately 45 minutes by a trained interviewer using a combination of questions directed at the respondent, as well as judgments made by an informant (McDowell & Newell, 1996).

Lawton, Moss, Fulcomer and Kleban (1982) continued work in this area, developing the Philadelphia Geriatric Center Multilevel Assessment Instrument (MAI), which was built on Lawton's (1972) conceptual model of well-being in older adults, and which sought to deal with the deficiencies in the OMFAQ. In fact, Lawton et al. (1982) discussed three limitations of many assessment instruments used with the elderly, which they attempted to address with their new measure: (a) limited used of psychometric scaling techniques in the instrument's development; (b) inadequate representation of important dimensions; and (c) limited versatility of the component instruments as a result of their long length and time required for administration. With regards to the issue of representation of important dimensions, Lawton et al. (1982) argued that any assessment of the "good life" for older adults must include ratings of their perceived quality of life, psychological well-being, behavioural competence and environmental quality. The MAI, which made good use of psychometric techniques in its development, claimed to go beyond the OMFAQ by considering these other dimensions, but it was still very lengthy, taking 50 minutes to be administered by a trained interviewer (McDowell & Newell, 1996).

Spurred by the need for comprehensive, short, self-report scales, which would allow for lower costs and more universal use, researchers such as Linn and Linn (1984) and Morris and Buckwalter (1985) developed brief, multidimensional instruments that could be self-administered by older adults to determine their level of functioning. The Self-Evaluation of Life Function Scale (SELF; Linn & Linn, 1984) is a 54-item scale that purports to measure physical

disability, symptoms of aging, self-esteem, social satisfaction, depression and personal control.

The Iowa Self-Assessment Inventory (ISAI; Morris & Buckwalter, 1985; Morris, Buckwalter,

Cleary, Gilmer, Hatz & Studer, 1990) is a 56-item tool, largely based on the OMFAQ, which is

also intended to be a multidimensional assessment of an older adult's functional abilities. The

ISAI contains seven scales: economic resources, anxiety/depression, alienation, physical health,

mobility, cognitive status, and social support (Morris et al., 1990). While the ISAI and the SELF

may indeed be useful measures of overall functional status of older adults, they do not tap the

presence or absence of coping styles, traits, and processes that may foster adaptation among

older adults in the face of low functional abilities and poor health.

Although it also does not tap the constructs of coping or adaptation, the Minimum Data

Set (MDS) is worth mentioning as it represents a highly rigorous, multi-national effort in the

development of standardized comprehensive assessment for older adults. The MDS is an

assessment instrument that measures cognitive, behavioral, functional, and medical status, which

was initially developed in the late 1980s to ensure standardized evaluation and quality care for

nursing home residents. Its development was actually mandated in the United States by the 1987

Nursing Home Reform Law, which also required that it be implemented in all US long-term care

facilities (InterRAI, 2004). The tool has since been mandated for use in all chronic care facilities

in Ontario.

The MDS 2.0 is made up of over 400 items containing demographic variables, clinical

items such as diagnoses, syndromes, signs and symptoms, and treatments, as well as indicators

describing behaviour, mood, cognition, psychosocial well-being, and involvement in activities.

The MDS is administered by a trained assessor (usually a Registered Nurse) and it takes upwards

of one hour to compete. The full tool was designed to be administered upon admission to a

facility, annually, and upon significant change in resident function. A shorter form (Quarterly Review) containing a subset of key functional, psychosocial, and health items was designed for use on a quarterly basis to assist in identifying and managing emerging problems. Certain item responses are "triggers", which indicate the need for additional assessment using the Resident Assessment Protocols. Data from the MDS is used to develop outcome-oriented resident care plans to maximize quality of care and patient's quality of life through early recognition of problems and risk factors that can be avoided, managed, or reversed. Since the development of the original MDS for use in chronic care facilities, a family of related instruments have been developed by an international consortium of researchers (InterRAI) that include similar tools for home care clients, acute care, post-acute care, mental health, and palliative care (InterRAI, 2004).

While the instruments described in this section may be good at assessing the physical health, mental health, and functional status of older adults, they were not conceptualized as specific to healthy aging. Based on the notion that healthy aging is comprised of the relative absence of preventable dysfunctions (e.g., a subset of physical or mental distress, or functional limitation) and positive adaptation and adjustment to such possible impairments, there was a need to develop an instrument that works with the conceptual model of healthy aging, and which attempts to broadly screen not only for general physical health, mental health, and functional status, but also coping styles, lifestyle choices, self-perceptions, and processes that influence one's ability to age well.

**Assessment of Healthy Aging**

With the objective of developing a multidimensional, comprehensive measure of healthy aging, a group of researchers from the University Institute for Social Gerontology of Quebec assembled a series of questionnaires intended to measure the components, influences, and outcomes believed to be relevant to healthy aging. This series of questionnaires is referred to as the Well-Aging Assessment Battery (WAAB; Sita, Stones, Csank, Knight & Gauron, in press). The main dimensions of healthy aging measured by the WAAB include general health status and service utilization (number and type of diseases, frequency of doctor visits, number of prescription drugs taken, perceived health); social involvement (social support, support satisfaction, social skills, assertiveness); mental health (depression, happiness, affective style, coping style); health attitudes and behaviour (health locus of control, psychological hardiness, nutrition, activity involvement); cognition and neuromuscular function (cognitive screening, metamemory, autobiographical memory, visual-motor speed, unipedal balance); and future planning (retirement planning, future orientation).

In the WAAB, social support and satisfaction with social support was measured using the Social Support Questionnaire (Sarason, Levine, Basham, & Sarason, 1983). The Social Situations Questionnaire (as derived by Hundlund & Lindquist, 1984) measured social awareness, social skill and assertiveness in social situations. Depression was measured with the Geriatric Depression Scale (Brink, Yesavage, Lum, Herresma, Adey, Rose, & Smith, 1982). Psychological well-being was measured using the Short Happiness and Affect Research Protocol (SHARP; Stones, Kozma, Hirdes, Gold, Arbuckle, & Kolopack, 1995). The Measure of Intensity and Duration of Affective States (MIDAS; Martin & Stones, 1996) was used to measure the intensity and duration of positive and negative affect or mood. Coping styles (active, passive,

and avoidant coping) were measured using a shortened version of the COPE Questionnaire (Carver, Scheier, & Kumari-Weintruab, 1989). The Multidimensional Health Locus of Control Scales (Wallston, Wallston, & DeVellis, 1987) was used to measure the degree of belief that one's health is subject to personal control, external control, or chance. The Short Hardiness Scale (McNeil et al., 1986) measured a single dimension that included attributes of internal locus of control, sense of commitment, and positive reaction to life change. The Nutrition Inventory (Nathenson, 1984) was included to provide an assessment of eating behaviors and food consumption. The extent and type of activities an individual is involved in was measured using the Activities Checklist (Arbuckle, Pushkar-Gold, Chaikelson, & Lapidus, 1994). Cognitive screening was conducted using the Cognitive Capacity Screen (Jacobs & Bernhard, 1977). Perceptions of the participant's own memory capacity, memory change, and memory strategies were measured using three subscales from the Metamemory in Adulthood Questionnaire (MIA; Dixon, Hultsch, & Herzog, 1988). The Autobiographical Memory Scale (Csank & Conway, 1994) was used to assess experiential memory of the personal past. The Digit Symbol subtest of the Wechsler Adult Intelligence Scale (Wechsler, 1955) measured psychomotor speed and concentration. A test of Unipedal Balance (Stones, Hong, & Kozma, 1993) was included as an index of neuromuscular coordination. For this test, an individual balances on one foot, with eyes open, and it is timed to 60 seconds for both left and right feet. The Planning for Retirement Scale (Stones, 1996) measured preparation for different aspects of retirement. Finally, the Future Orientation Scale was developed especially for the WAAB and measured planning and preparation for later life (Sita et al., in press).

Psychometric investigation with older adults revealed adequate internal consistency of the component scales of the WAAB (i.e., a Cronbach Alpha in the range of .70 - .93 with a

median of .75), and a higher-order structure consisting of three factors: (a) positive affect/adaptive coping, (b) negative affect/poor coping, (c) cognitive efficiency/motor coordination. The factors demonstrated good concurrent validity when regressed against a composite measure of health, comprised of number of illnesses, medication use, and depression.

The target population for the WAAB included community-dwelling middle-aged and older adults without cognitive impairment or severe limitation to function because of illness or disability. Because the age of this population places it at risk for adverse chronic conditions, its members are prime candidates for the health promotion programming. The conception of the WAAB was to provide profiles of strengths and frailties to assist the design of individualized programs to promote healthy aging. Unfortunately, the comprehensiveness of the battery resulted in an extended administration time of approximately two hours. This precludes the use of the WAAB as a brief research or screening tool. For this reason, the Healthy Aging Quiz (HAQ; Stones, 2000) was derived from the WAAB to provide a short screening tool that triggers further assessment of possible problems. The intent of the HAQ was to provide a brief appraisal of the main parameters and processes of healthy aging as measured by the WAAB.

**Development of the Healthy Aging Quiz**

Included in the HAQ are items from the WAAB that tap basic demographics (i.e., age, gender, employment, living arrangements, financial satisfaction) health outcomes (i.e., perceived health, physician visits, number of illnesses), health and function predictors (e.g., smoking, alcohol use), social support (i.e., network size and satisfaction), nutrition, activities, and psychological measures. Because assessments of health outcomes, social support, activities, and psychological processes and outcomes were by multi-item scales, a hierarchical application of

four rules guided the process of selecting items from the WAAB for inclusion in the HAQ. The rules were that the retained items should: (a) adequately represent the scale of origin, (b) show diversity in content, (c) possess face validity, and (d) contribute to coherence and structure within the HAQ (Stones, 2000).

To ensure that the retained items represented the scales adequately, Stones (2000) computed corrected item-total correlations and factor analyses on items within the respective scales from the WAAB. Factor analysis was by the principal components method with varimax rotation, with the number of factors determined through scree plots. The items retained for potential inclusion were those with the highest coefficients. To ensure diversity in content, the second rule was to retain at least one item from each scale from the WAAB. More items were retained from scales with multiple factors (e.g., Activities Checklist; Arbuckle et al., 1994) or those previously found to contribute significantly to structural differentiation on the WAAB (e.g., MIDAS; Martin & Stones, 1996). The third rule was to select items with the higher face validity among those that otherwise represented their respective scales adequately. The purpose of this rule is to ensure that the respondents perceive the content of the HAQ to have relevance to healthy aging. The fourth rule aimed to ensure coherence and structural differentiation within the HAQ. Internal consistency and factor analyses were computed within and across categories of content. The items retained were those contributing positively to internal consistency and loading discretely and at least moderately (>.4) on the respective structural components (Stones, 2000).

Version 1.0 of the HAQ contained single item measures of the following: age, gender, height and weight, work situation, living arrangements, financial hardship, financial planning, smoking, use of alcohol, diet, social networks, and social support satisfaction. Multi-item measures on the HAQ included health and mental health outcomes, activity, and four indexes of

psychological processes. Because the response scales were not uniform within these indexes, expressions of reliability and level were by standardized alpha and factor scores, respectively.

The Physical Health Outcome Index comprised items on perceived health, physician visits, and number of illnesses. Analysis of structure revealed a single component with eigenvalue >1, and reliability analysis showed a standardized coefficient alpha of .72 (Stones, 2000).

The Mental Health Outcome Index included two items from each of the SHARP (Stones et al., 1995) and the GDS (Brink et al.,1982). A standardized coefficient alpha of .72 indicates adequate reliability, and factor scores on the index correlated with the full SHARP and GDS at $r = -.79$ ($p < .001$) and $r = .80$ ($p < .001$), respectively. The Mental Health Outcome index correlated with the Health Outcome index at $r = .43$ ($p < .001$) (Stones, 2000).

The Activity Index included ten items on social, intellectual, and physical activity, taken from the Activity Checklist (Arbuckle et al., 1994) and had a standardized coefficient alpha of .73. The Activity index correlated with total activity on the 23-item Activities Checklist on the WAAB at $r = .96$ ($p < .001$) (Stones, 2000).

The psychological process indices included items from the WAAB measures of social skill (Social Situations Questionnaire; Hundlund & Lindquist, 1984), affectivity (MIDAS; Martin & Stones, 1996), coping (COPE Questionnaire; Carver et al., 1989), health locus of control (Multidimensional Health Locus of Control Scales; Wallston, et al., 1987), psychological hardiness (Short Hardiness Scale; McNeil et al., 1986), metamemory (Metamemory in Adulthood Questionnaire; Dixon et al., 1988), autobiographical memory (Autobiographical Memory Scale; Csank & Conway, 1994), and future orientations (Future Orientation Scale; Stones, 1996). Analysis of the items included an exploratory factor analysis to

ascertain the main factors, and subsequent factor and reliability analysis of the items within each structural component to delineate the psychometric properties. Exploratory factor analysis revealed four main factors. The items retained after subsequent analyses were those that loaded highly on the unitary structures and contributed positively to internal consistency. The labels affixed to the four indexes were Positive Affectivity, Negative Affectivity, Confidence, and Fallibility, respectively (Stones, 2000).

The Positive Affectivity and Negative Affectivity indices were comprised of the two 6-item MIDAS scales. These scales measure positive and negative styles of affective expression, and contain items on the stylistic intensity and duration of the respective affective states. Both indexes had a standardized coefficient alpha of .86 (Stones, 2000).

Confidence and Fallibility include orientations toward personal resources and control. The Confidence Index included seven items related to the possession and application of personal resources to solve problems and retain health. The index had a standardized coefficient alpha of .74. Fallibility refers to a perceived deficiency in the usefulness of personal resources as a means to realize options and preferences. The 9-item index of Fallibility included items on poor social skill, low future orientation, denial or displacement in problem solving, and low expectations about the outcomes of personal resource utilization in health and employment. The index had a standardized coefficient alpha of .76 (Stones, 2000).

Validity coefficients of these four psychological process indices, against their respective, related scales on the WAAB ranged from $r = .40$ to $r = .96$, with a median of $r = .60$. Because these validity coefficients are higher than the inter-correlations among the indices themselves (i.e., a range from $r = 0$ to $r = .42$), these findings provide evidence for discriminant validity of the HAQ indices.

Stones (2000) concluded that levels of prediction of the Physical Health Outcome and Mental Health Outcome indices were similar irrespective of whether the predictors were indexes from the HAQ or fully administered measures from the WAAB ($R^2 = .38 - .45$). This comparability is remarkable given the differences in length and administration time between the two tools. With the exception of the financial planning item, which contributed to the prediction of both outcome indexes, the predictors were different for the health and mental health outcomes. Prediction of poor Physical Health Outcomes was by a combination of potency indicators (i.e., low Confidence and high Fallibility), and financial status indicators (i.e., financial hardship and low financial planning). Prediction of poor Mental Health Outcomes was by the evaluative indicators (i.e., low Positive and high Negative Affectivity) and other measures (i.e., smoking and financial planning). Stones (2000) states that interventions to promote healthier aging suggested by these findings include programs to promote social skills, improve memory self-efficacy, confidence and self-determination, positive affect and self-esteem, financial management, and smoking cessation.

**Refinement of the Healthy Aging Quiz: The Successful Aging Quiz**

Since the initial derivation of the HAQ from the WAAB, modifications have been made to the HAQ Version 1.0 to conform with suggestions made by participants regarding improving face validity and ease of completion. Namely, some items were rephrased slightly to improve clarity, and a uniform response scale was developed for the 29 items that make up the Mental Health Outcome Index, the Confidence and Fallibility Indices, and the Positive Affectivity and Negative Affectivity Indices. The most recent version of the HAQ, renamed the Successful Aging Quiz (SAQ) can be found in Appendix A.

As in the original HAQ, the SAQ contains single item measures of the following: age (item #3), gender (#1), height (#4), weight (#5), living arrangements (#23), financial hardship (#69), financial planning (#68), retirement status (#26), frequency of paid work (#27), smoking (#7), use of alcohol (#21), family support (#16), support from friends (#17), and social support satisfaction (#41). The original nutritional status measure was reworked, and now includes separate items about the frequency of: eating well-balanced meals (#19), eating junk food (#20), and of taking vitamins (#22). New items were added to the SAQ to assess: whether a participant managed their own home (#24), whether they were currently looking for employment (#25), whether they were a caregiver to someone who is sick or disabled (#29), hours of sleep (#15), and whether they were involved in things of a spiritual nature (#18). Since research has also shown that sexuality is an important component of quality of life across the entire lifespan (Stones & Stones, 1996), one item was added to assess participants' satisfaction with their sex life (#70).

The Physical Health Outcomes Index in the SAQ comprises the same items from the HAQ: perceived health (#8), number of doctor visits (#9), and number of illnesses (#12). However, the response scales for the number of doctor visits and number of illnesses were modified based on the distribution of responses from the original participants to provide more variability of responses, and a scale with more face validity. In addition, based on the literature of predictors of mortality and morbidity in older adults, new items related to health and functioning were added (e.g., Fried, Kronmal, Newman et al., 1998). These include: weight change over a three-month period (#6), frequency of dental checkups (#11), frequency of visits to an alternative health professional (#10), number of prescription medications (#13), and functional limitations (#14).

The Mental Health Outcomes Index of the SAQ still comprises two items from the SHARP (#47; #48); and two items from the GDS (#63; #67), and the Activity Index still contains the 10 items from the HAQ (#28 and #30 through #38).

With the Confidence Index one item was dropped with the SAQ due to poor face validity, and the Index is now made up of the SAQ items 42, 43, 45, 59, 60, and 61. These items refer to confident applications of personal resources to solving problems. One items from the Fallibility Index was also dropped with the SAQ due to poor face validity, and the Index is now comprised of the items 39, 40, 44, 46, 62, 64, 65, and 66. These Fallibility Index items tap perceived deficiencies in personal resources, avoidance coping, and a perception that other people possess higher resource potential. With the SAQ, the Positive and Negative Affectivity Indices were shortened by one item each. The Positive Affectivity Index is now made of up SAQ items 49, 50, 54, 55, and 57. The Negative Affectivity Index is made up of items 51, 52, 53, 56 and 58.

## STATEMENT OF THE PROBLEM

The SAQ represents a promising tool for assessing the healthy aging status of older adults and providing a conceptual framework for health promotion goals. Further, the development of the SAQ clearly represents an attempt to address the deficiencies identified by Lawton et al. (1982) in other assessment instruments geared towards older adults. The SAQ is self-administered, contains 70 items representing multiple dimensions related to healthy aging, and it requires only 15-20 minutes for a literate older adult to complete. If further validated, the SAQ could be widely used and form the basis for the psychometrically-sound evaluation of programs to promote healthy aging. In fact, the SAQ is currently being used as a pilot assessment tool for the Successful Aging Project, the mandate of which is to use Internet resources to provide assessment and programming to promote health and wellness among middle-aged and older adults in rural and under-serviced regions in Northwestern Ontario (www.successfulaging.ca).

The purpose of this dissertation, therefore, was to evaluate further the reliability, validity, and responsiveness of the SAQ through a series of four separate studies designed to elicit different psychometric information.

Study 1 examined the factor structure and psychometric properties of the traditional, self-administered, paper-and-pencil SAQ using a heterogeneous sample of adults who represented the normal population of community-dwelling adults aged 50 and older.

Using a sub-sample of participants recruited for Study 1, Study 2 examined the test-retest reliability of the SAQ, as well as the reliability of newly developed, alternate methods of administration of the SAQ (i.e., computerized SAQ and interviewer-administered SAQ).

Study 3 sought to determine if the SAQ was able to discriminate between inpatient geriatric rehabilitation patients and physically active community-dwelling older adults, and to

see whether the SAQ was able to detect changes in the healthy aging status of these participants over time. The SF-36 (Ware & Sherbourne, 1992), a widely-used generic indicator of health status, was used as a validity measure in Study 3. The 36-item scale assesses eight health concepts: physical functioning, role limitations due to physical health problems, role limitations due to emotional problems, social functioning, bodily pain, general mental health (psychological distress and well-being), vitality (energy and fatigue), and general health perceptions (Ware & Sherbourne, 1992).

Finally, Study 4 of this dissertation examined the convergent validity of the SAQ with a large sample of participants who completed a computerized SAQ via the Internet.

The following section reviews the types of reliability and validity commonly examined in scale development and applicable to the SAQ, and describes the rationale for their inclusion in this dissertation.

# RATIONALE AND OBJECTIVES

## Confirmation of Factor Structure

A first step in the continued development of the HAQ was to examine the factor structure of the latest version, the SAQ. As indicated earlier, with the development of the SAQ some of the original HAQ items were rephrased, the response scales modified and ten new items added, while three items were dropped. Using a new sample of community-dwelling older adults, item-analyses, exploratory factor analyses, and examination of the internal consistency of the resulting factors, were conducted on the SAQ to determine its stability and structure.

It was hypothesized that the factor structure of the SAQ would generally resemble that of the original HAQ, consisting of latent factors denoting physical and mental health, positive and negative affectivity, confidence and fallibility, and activity.

## Test-Retest Reliability

It is common practice in scale development to determine test-retest reliability, or temporal stability of an instrument. Test-retest reliability is the degree to which one's instrument yields stable scores over time among respondents who are assumed not to have changed on the domains being assessed. The rationale behind test-retest reliability is that "if a measure truly reflects some meaningful construct, it should assess that construct comparably on separate occasions", if it is known that there has been no change in the level of the phenomena under investigation over that time interval (DeVellis, 1991, p. 37).

Test-retest reliability of an instrument is important when you are measuring the responsiveness of the instrument to change (SAC; Scientific Advisory Committee of the Medical Outcomes Trust, 2002). The goal is actually to have a balance between an instrument's stability

and its sensitivity to change. With these issues in mind, it was important to determine the test-retest reliability of the SAQ. It was expected that the SAQ's test-retest reliability over a one-week interval would be fairly high.

**Construct Validity**

Validity is defined as the degree to which an instrument measures what it purports to measure. Known-groups validation is a construct validation procedure that involves demonstrating that an instrument can differentiate members of one group from another, based on their scale scores (Devillis, 1991). If the SAQ is a valid measure of healthy aging, then is should be able to discriminate groups of older adults who vary in their levels of healthy aging. If healthy aging is conceptualized as including the relative absence of preventable dysfunctions (e.g., physical or mental distress, or functional limitation), and also positive adaptation and adjustment to such impairments that do occur, then logically, the indications for unhealthy aging would be the presence of physical health problems, psychological distress, functional limitations, and compromised coping abilities.

A goal of this dissertation, therefore, was to determine if the SAQ was able to discriminate between groups of older adults known to differ based on their clinical health status, or illness severity. Information about validity in relation to clinical criteria is crucial to document the size of small and large differences on the SAQ and to advance understanding of how these differences should be interpreted (SAC, 2002). It was expected that active community-dwelling individuals would demonstrate the highest levels of functioning based on scores on the Physical Health, Mental Health and Activity Indices of the SAQ, and that individuals requiring hospitalization because of illness or deconditioning would demonstrate the most impairment on

these indices, and the most limitations to activity, as indicated on the Activity Index. More specifically, it was hypothesized that the SAQ item 8 (perceived health status), item 9 (number of doctor visits), item 12 (number of illnesses), item 13 (number of prescription drugs), item 14 (physical limitations), item 33 (attendance at community organizations), item 35 (participation in sports), item 47 (life is hard for me most of the time), item 48 (I am satisfied with my life today) and item 63 (I often feel downhearted and blue), would have the most discriminant power with these populations.

Another method of testing an instrument's construct validity is by examining convergent validity - seeing how closely a new measure is related to other variables and other measures of the same construct to which it should be related (Devillis, 1991). Thus, if the SAQ is said to have good construct validity, then measures of constructs that theoretically should be related to healthy aging should, in fact, be observed to be related to it. The flipside of convergent validity is divergent or discriminant validity, whereby measures of constructs that theoretically should not be related to each other are, in fact, observed to not be related to each other (Devellis, 1991).

The closest measure that has been extensively examined, has published norms for comparison, is good for use with older adults, is reliable, valid and responsive, and which shares some of the dimensions measured by the SAQ is the SF-36 (Ware & Sherbourne, 1992). As described earlier, the SF-36 is one of the most widely-used generic indictors of health status (McDowell & Newell, 1996). The 36-item scale assesses eight health concepts: physical functioning, role limitations due to physical health problems; role limitations due to emotional problems, social functioning, bodily pain, general mental health (psychological distress and well-being), vitality (energy and fatigue), and general health perceptions (Ware & Sherbourne, 1992). The eight scales also form two higher-ordered clusters – the Physical Health Summary measure

and the Mental Health Summary measure (McHorney, Ware, & Raczek, 1993; Ware, Kosinski &

Keller, 1994). Although the SF-36 and the SAQ only share a couple of identical items (i.e., SAQ

item 8 is identical to item 1 from the SF-36, "In general, would you say your health is..."; SAQ

item 63 is identical to item 9f from the SF-36, "Have you felt downhearted and blue?"), they

share the broader concepts of mental health and physical health, and thus the SF-36 would make

a good validity measure for some portions of the SAQ. It was expected that the two SF-36

summary measures, Physical Health and Mental Health, would demonstrate convergence with

the Physical Health and Mental Health Indices, respectively, of the SAQ. As well, it was also

expected that the physical functioning subscale, the physical role limitation subscale and the

general health perceptions subscales of the SF-36 would correlate strongly with the Physical

Health Index of the SAQ, and that the general mental health subscales of the SF-36 would

correlate with the Mental Health Index of the SAQ. In addition, the SF-36 social functioning

subscale was expected to correlate with the SAQ Activity factor.


**Sensitivity to Change**

Responsiveness, or sensitivity to change, is viewed as an important part of the

longitudinal construct validation process (SAC, 2002). If the SAQ is unable to detect real

change, then it will be ineffective as an outcome measure. The goal, therefore, was to examine

changes in SAQ items and factor scores over time, that occur with changes in one or more

domains that contribute to an individual's healthy aging status. For the present research,

sensitivity to change was examined not by the implementation of a novel intervention that sought

to elicit change, but rather by observing the natural progression of elderly rehabilitation

inpatients through the course of their standard hospital treatment, and examining the

corresponding changes in their SAQ scores over time. Pre- and post-measurement occurred at

hospital admission and discharge, respectively, since discharge assumes that the patient has

either reached their treatment goals, or their health status has changed to such an extent that

further care is needed. In either case, it was expected that the Physical Health and Mental Health

subscales of the SAQ would be sensitive to this change. More specifically, it was expected that

the SAQ item 8 (perceived health status), item 48 (I am satisfied with my life today) and item 63

(I often feel downhearted and blue) would be most sensitive to changes in this population.

The SF-36 was also used as a validity measure for assessing the SAQ's sensitivity to

change. As mentioned earlier, the SF-36 has been shown to be sensitive to change, as well as to

share some common domains with the SAQ. Also as already described, it was expected that

certain SAQ items and factors would be found to have convergent validity with certain SF-36

items and scales (hypothesized relationships described in the previous section). Applying this

hypothesized relationship to scale responsiveness, it is expected that both the SAQ and the SF-36

would change in the same way over time, corresponding to accompanying changes in the

healthy-aging status of participants over the course of their treatment.

**Reliability of Alternate Modes of Administration**

Alternate modes of administration used for the development and application of

assessment instruments can include paper-and-pencil self-report, interviewer-administered,

computer-assisted self-report, trained observer rating, performance-based measures, proxy-

report, and virtually any combination of these modes (SAC, 2002). While most assessment

instruments are initially developed as self-report paper-and-pencil versions, there are many

reasons why an alternate method of administration may be developed. In the case of older adults,

high rates of visual impairment and fine motor disabilities, which make reading and writing

difficult, may jeopardize response rates and data quality of standard self-report instruments. In

fact, in a study by Hayes, Morris, Wolf and Morgan (1995), it was found that 43% of elderly

participants in an ambulatory health setting were unable to self-administer the SF-36 for such

reasons. In addition, severely ill or frail participants who are residents in acute or chronic care

facilities may be unable to complete paper-and-pencil instruments for other functional

impairment-related reasons. For individuals with these limitations, interviewer-administered

instruments would be the method of choice because it reduces burden on the participant, as well

as ensures data quality. Due to these considerations, this dissertation sought to determine

whether the traditional pencil-and-paper version of the SAQ is equivalent to an interviewer-

administered version of the SAQ.

With advancements in computer technology there has been growing interest in the

development of electronic or computerized versions of standard pencil-and-paper instruments

(Boyes, Newell, & Girgis, 2002; Pouwer, Snoek, van der Ploeg, Heine & Brandt, 1998; Ryan,

Corry, Attewell & Smithson, 2002). There are numerous advantages to computerized or

electronic questionnaires, including time saved in data entry and manual computation of scores,

which translates into significantly reduced costs. Questionnaires that are completed

electronically and linked to a database virtually eliminate keying errors that occur during data

entry, and scores can be rapidly computed and feedback immediately provided to the examinees

(Barak, 1999; Pasveer & Ellard, 1998). In addition, computers can be programmed so that

participants cannot inadvertently skip questions, which reduces the number of missing values to

zero, a phenomena rarely seen with paper-and-pencil versions (Ryan et al., 2002). Scores can be

automatically added to databases for dynamic adjustment of norms, and the electronic format can

assure standardized timing and administration, in addition to reducing disposable materials, such as paper, which saves storage space (Barark, 1999). Further, Bloom (1998) points out that since participants directly enter their responses into a database, which provides more anonymity, electronic formats generally derive more complete responses to sensitive questions. In fact, research has shown that participants tend to prefer computerized formats over traditional methods (Barak, 1999; Epstein & Klinkenberg, 2001; Epstein, Klinkenberg, Wiley, & McKinley, 2001), even among older adults (Ryan et al., 2002), who have a tendency to be stereotyped as computer-phobes (Administration on Aging, 2004). A final major advantage of electronic questionnaires is that in addition to being used in the laboratory, when hooked up to a computer network, they can be used for providing assessments, and conducting research, over the Internet.

Since one of the superordinate goals for the SAQ is that it may be widely available in a web-based format for use over the Internet, it was important to examine the psychometric properties of a computerized version of the SAQ, since it will be the computerized format that will be used on the Internet. While it is understood that there are sampling biases inherent in collecting data over the Internet, which will be addressed in a later section, the objective here was to examine the equivalence of a computerized version of the SAQ with the traditional pencil-and-paper version within a community-based sample, as the first step in the development of an "Internet-ready SAQ". Do the same individuals respond the same way on the different versions? It was hypothesized that the new formats of the SAQ would be equivalent to the original pencil-and-paper version.

While it would be ideal to ask the same participants to complete each of the three different modes of administration of the SAQ (pencil-and-paper, interviewer-administered, and computerized) at one week intervals, it was felt that this would represent a substantial burden to

the participant, which may result in high refusal rates, high attrition and therefore high levels of

missing data. As well, given that the SAQ measures multiple domains thought to be related to

healthy aging, it was speculated that the longer the total interval between the first and last

administration, the greater the possibility of real change occurring in the healthy aging status of

the participant.

Participants' reported ease of use and stated preference was also compared across the

three modes of administration of the SAQ. The following American Psychological Association

guidelines (1986) for determining equivalency between conventional and computer

administrations were used both when examining the equivalence of the pencil-and-paper version

of the SAQ with the computer-administered version, as well as when examining the equivalence

of the pencil-and-paper version with the interviewer-administered version of the SAQ - "Scores

on conventional and computer administrations may be considered equivalent when (a) the rank

order scores of individuals tested in alternative modes closely approximate each other, and (b)

the means, dispersions, and shapes of the score distributions are approximately the same, or have

been made approximately the same by rescaling the scores from the computer mode" (APA,

1986, p. 18).


**Structural Validation from Internet-based Data**

As just described, a major advantage of electronic questionnaires is that they can be used

for providing assessments, and conducting research, over the Internet. While there are many

problems associated with web-based data collection, including sampling biases and questions of

data integrity (Epstein & Klinkenberg, 2001), there are some benefits to using the Internet for

research. The number of individuals using the Internet is growing at an exponential rate. In May

2002 there were approximately 167 million Internet users in the United States representing an increase of approximately 70 million users over three years (Neilson NetRating, 2002). With such a huge population of users, the Internet allows for large samples of individuals who, until now, may have been inaccessible (Pasveer & Ellard, 1998). From a clinical perspective, as Buchanan (2002) states, "it permits people who might have previously been unable (due perhaps to geographical or financial circumstances) to access mental health services" (p. 149). This is exactly the rationale underlying the current mandate of the Successful Aging Project, of which the SAQ is an integral assessment and evaluation component - to use Internet resources to provide assessment and programming to promote health and wellness among middle-aged and older adults in rural and under-serviced regions in Northwestern Ontario.

Other benefits of web-based questionnaires are that, like basic electronic questionnaires, since the Internet is perceived as less threatening and more anonymous, the medium may also facilitate greater honesty and self-disclosure (Bloom, 1998). At the same time, the Internet also allows participants to complete questionnaires at their own convenience (Davis, 1999), consequently allowing data from large numbers of participants to be collected in a very short amount of time. For example, Birnbaum (2000, as cited in Epstein & Klinkenberg, 2001), was able to collect 1224 responses in four months, nearly tripling the rate at which he had been collecting participants via traditional means.

While a lot of the Internet research to date has been concerned with collecting descriptive data about subgroups and their behaviours (e.g., political preferences of particular newsgroup users, Kaye & Johnson, 1999; illicit drug use, Nicholson, White & Duncan, 1998), other researchers have attempted to collect data via the Internet and demonstrate its validity by comparing results to those found in the literature, or a traditional comparison group. Epstein and

Klinkenberg (2001) report that "generally, attempts at establishing the convergent validity of web-based studies have been quite successful, with data collected in the laboratory showing the same psychometric properties as data collected via the Internet" (p. 308). For example, Pasveer and Ellard (1998) compared responses on a 20-item questionnaire on self-trust from a sample of 429 Internet users recruited via postings on newsgroups, and links from other webpages, to a sample of 760 volunteer undergraduate students. Despite marked differences in the demographics, the factor structure of the responses from the two samples was virtually identical (Pasveer & Ellard, 1998). Similar patterns of results have been found by numerous researchers (e.g., Buchanan & Smith, 1999; Davis, 1999; Krantz, Ballard, & Scher, 1997), suggesting that data collected from the Internet is often virtually indistinguishable from that collected from traditional samples. At the same time, however, Buchanan (2002) warns that there is some evidence to suggest that online and traditional versions of the same test may not always be identical, for example, with some items loading on the "wrong" factors. The important implication of these studies is that the psychometric properties of a web-based test cannot be taken for granted, even if it is a direct translation of a reliable and valid traditional instrument. The same is true even for the translation of a stand-alone computer-version to the web-based version of the same test, even if it appears that the only difference between the two is the presence of a network connection. In fact, the two formats potentially differ in the nature of the participants who complete the instruments, and the circumstances under which the test or instrument is likely to be taken (Buchanan & Smith, 1999). Therefore, the validity of any new versions - computer, web-based, or other, must be carefully assessed prior to their widespread use.

Buchanan and Smith (1999) recommend that to establish the functional equivalence of online and traditional pencil-and-paper tests, one should compare the factor structure of both instruments, with data obtained from independent samples of Internet users (for the online version) and traditional participants (for paper-and-pencil version). If the tests are equivalent, the same number of factors should account for similar proportions of variance and the same items should load on each factor (Tabachnick & Fidell, 2001), and the relationship between the factors should be the same. Buchanan and Smith (1999) suggest that this can be tested with confirmatory factor analysis, "if a model derived from exploratory factor analysis of a traditional test provides a good degree of fit to data obtained with a WWW equivalent, then we might say with some confidence that the two test versions had similar psychometric properties" (p. 133). It is reasoned that if the alternate formats reliability studies described earlier show that the paper-and-pencil version of the SAQ is equivalent to the computerized version, then any comparisons of the Internet-based SAQ with the pencil-and-paper SAQ can be extrapolated to also be true for the computerized (not Internet-based) version.

## SUMMARY OF RESEARCH QUESTIONS AND HYPOTHESES

This section summarizes the research questions that were derived from the literature review and rationale just outlined.

1) What is the factor structure of the SAQ? It was hypothesized that the factor structure of the SAQ would generally resemble that of the original HAQ, consisting of latent factors denoting physical and mental health, positive and negative affectivity, confidence and fallibility and activity.

2) Is the traditional self-report paper-and-pencil version of the SAQ equivalent to an interviewer-administered version, and to a computer-administered version of the SAQ? It was hypothesized that the new formats of the SAQ would be equivalent to the original pencil-and-paper version.

3) Does the SAQ demonstrate adequate test-retest reliability? It was hypothesized that if, in fact, the alternate modes of administration (described above) are deemed equivalent to one another, then there will be adequate test-retest reliability between two administrations of the same version, over a one-week interval.

4) Is the SAQ able to discriminate between groups of older adults known to differ based on their clinical health status, or illness severity? It is hypothesized that active community-dwelling individuals will demonstrate the highest levels of functioning based on scores on the Physical Health, Mental Health and Activity Indices, and that individuals requiring hospitalization

because of illness or disability will demonstrate the most impairment on theses indices, and

the most limitations to activity, as indicated on the Activity Index. More specifically, it was

hypothesized that the SAQ item 8 (perceived health status), item 9 (number of doctor visits),

item 12 (number of illnesses), item 13 (number of prescription drugs), item 14 (physical

limitations), item 33 (attendance at community organizations), item 35 (participation in

sports), item 47 (life is hard for me most of the time), item 48 (I am satisfied with my life

today) and item 63 (I often feel downhearted and blue), will have the most discriminant

power with these populations.

5) Does the SAQ demonstrate convergent validity with the SF-36? It was hypothesized that the

Mental Health Outcomes Index of the SAQ would be strongly correlated with the SF-36

Mental Health Summary measure, and that the Physical Health Outcome Index of the SAQ

would demonstrate convergent validity with the SF-36 Physical Health Summary measure. It

was also hypothesized that the physical functioning subscale, the physical role limitation

subscale, and the general health perceptions subscales of the SF-36 would correlate strongly

with the Physical Health Index of the SAQ, and that the general mental health subscales of

the SF-36 would correlate with the Mental Health Index of the SAQ. Finally, the SF-36

social functioning subscale was expected to demonstrate convergent validity with the SAQ

Activity factor.

6) How responsive is the SAQ to change? Is the SAQ sensitive to improvements or declines in

various domains conceptualized to contribute to one's healthy aging status that occur as part

of the standard treatment provided to geriatric rehabilitation hospital inpatients? It was

hypothesized that Physical Health and Mental Health subscales of the SAQ would be sensitive to changes in the health status of older adults and would change in the same way as the SF-36, a validity measure. More specifically, it was expected that the SAQ item 8 (perceived health status), item 47 (life is hard for me most of the time), and item 48 (I am satisfied with my life today) will be most sensitive to changes in this population.

7) Does the SAQ have convergent validity with a sample of respondents collected over the Internet? Is the factor structure of the traditional paper-and-pencil instrument maintained with the online version? It was expected that the factor structure of the SAQ would remain relatively stable with an online sample.

# STUDY 1: METHODS

The purpose of Study 1 was to examine the factor structure of the pencil-and-paper SAQ using a heterogeneous sample of adults who represent the normal population of community-dwelling adults aged 50 and older. A sub-sample of participants from this study also took part in Study 2, which examined the test-retest reliability of the SAQ and the equivalence of alternate formats of administration of the SAQ.

## Sample

A sample of 297 community-dwelling older adults aged 50 and older completed the paper and pencil version of the SAQ. To ensure a diverse sample, participants were recruited from a wide variety of settings. Information booths were set up at a local shopping mall, three senior's centers, and an annual health fair, and attended by the researcher and a research assistant. Advertisements were posted in the senior's centers, two grocery stores, and at the local college (see Appendix B). Brief information sessions were provided at a local curling club, at senior's fitness classes, at a community lecture geared towards older adults, and at an outpatient geriatric rehabilitation program.

Sixty-eight (22.9%) participants were recruited from an information booth at a local health fair, 53 (17.8%) were recruited from an information booth set up at a local shopping mall, 45 (15.2%) were recruited from fitness classes (i.e., low-impact aerobics, weight class) offered at the senior's centers, 36 (12.3%) were recruited from a local curling club, 27 (9.1%) were recruited from a senior's computer course, 20 (6.7%) were recruited following a community lecture on memory, 19 (6.4%) were recruited from senior's centers, 19 (6.4%) were recruited

from community advertisements and telephoned the researcher to participate in the study and 10

(3.4%) were recruited from a geriatric rehabilitation outpatient program.


**Procedure**

Individuals who learned about the study through advertisements or community posters

telephoned the researcher to obtain more information and to set up a time to begin the study. The

researcher or research assistant was available to meet the participant at the location of their

choice (i.e., participant's home, community center, or university office). Participants who were

recruited through the information booths or information sessions were provided with additional

information about the study at that time. All participants were provided with an information

sheet describing the study (see Appendix C), and gave informed consent (see Appendix D). They

were encouraged to complete the entire questionnaire, but informed that they could omit

questions that made them particularly uncomfortable.

Participants could complete the paper and pencil SAQ and immediately hand it in it to the

researcher, or they were able to take home a questionnaire to complete and return in a self-

addressed stamped envelope. Of 126 interested individuals who elected to take a SAQ home, 106

(84%) returned the questionnaire by mail. All participants who completed the SAQ were entered

in a random draw for $100.


**Questionnaires/Materials**

Pencil-and-Paper SAQ. The pencil-and-paper format of the SAQ consists of a 70-item

self-administered questionnaire, which has been described earlier (see Appendix A).

**Method of analysis**

Descriptive statistics (mean, standard deviation, skewness, and kurtosis) were computed

for each item of the SAQ. Prior to statistical analyses, the variables were examined for accuracy

of data entry, missing values, and fit between their distributions and the assumptions of

multivariate and univariate analysis.

To determine the factorial structure of the paper-and-pencil SAQ, an exploratory factor

analysis was performed on the sample of 297 participants. Since it was anticipated that the

emergent factors would be correlated, responses were analyzed with a principle components

analysis with oblique rotation. The number of factors retained was determined by a combination

of examination of scree plots, examination of eigenvalues greater than 1, and the interpretability

of the rotated factors (Steiner & Norman, 1995). Items with factor loadings greater than or equal

to 0.3 were included in the pool of potential items, and retained if they contributed to the internal

consistency of the scale, as evidenced by corrected item-total correlations greater than 0.2, and if

the inclusion of the item in the scale did not reduce the value of Cronbach's coefficient alpha.

The corrected item-total correlation (corrected for inflation of the item due to the inclusion of the

item in the total correlation) gives an indication of the degree to which an item contributes to the

total scale score, while Cronbach's alpha assesses the scale's reliability (i.e., homogeneity). All

analyses were performed using SPSS version 11.0 (Statistical Package for the Social Sciences,

SPSS, 2001).

## STUDY 1: RESULTS

**Pre-analysis issues**

Missing data. The dataset was examined for missing values. When they were completing

the SAQ, many participants commented on the response scale for items 27 through 38, which

asked about the frequency of participation in different types of activity (e.g., "I do paid work"; I

attend community organizations", with the response scale consisting of the options: less than

monthly; monthly; 2-3 times a week; weekly; a few times a week; and daily). Many participants

reported that they "never" participated in certain activities, and felt that there was not an

appropriate response option to reflect that. When they were submitting their completed SAQs to

the researcher, some participants took the opportunity to say that they had omitted some of the

activity-type questions altogether because they did not participate in them. Participants who

made comments such as this were encouraged to select the option "less than monthly".

Examination of the SAQs revealed that some participants would simply circle "less than

monthly", but write "never" beside the question. Since many participants indicated that they had

omitted some of these activity-type questions because there was no "never" response option, the

missing data were simply recoded as "less than monthly" to reflect this as best as possible. Table

1 displays the original missing data for all the items on the SAQ.

Since participants were instructed that they could omit questions that made them

uncomfortable, missing data were also examined for patterns. With the exception of the

aforementioned items, only two other questions indicated a systematic omission. The

problematic items were "I am satisfied with my sex life" (item 70; 5-point response scale ranging

from Strongly Disagree to Strongly Agree), which had 26 missing data points (8.75% of

participants omitted this question), and the item "I am looking for paid work" (item 25; yes/no

response scale), which had 31 missing data points (10.4% of the participants omitted this question). The number of missing responses for the remaining 56 items ranged from none to eight. In order to conduct the factor analysis on the largest sample possible, the missing data points were replaced with series means.

Table 1. Missing Data From SAQ Items.

| Item # | Item | # of SAQs with Item Omitted (N=297) | % of SAQs with Item Omitted |
|---|---|---|---|
| 1 | Gender | 0 | 0.00 |
| 2 | Marital status | 2 | 0.67 |
| 3 | Date of birth | 4 | 1.35 |
| 4 | Height | 0 | 0.00 |
| 5 | Weight | 0 | 0.00 |
| 6 | Weight change in the last 3 months | 6 | 2.02 |
| 7 | Smoking | 0 | 0.00 |
| 8 | Current overall health | 0 | 0.00 |
| 9 | Doctor visits in the last year | 0 | 0.00 |
| 10 | Visits to other health practitioners in the last year | 7 | 2.35 |
| 11 | Dental checkups | 3 | 1.01 |
| 12 | Number of illnesses of an enduring or chronic nature | 4 | 1.35 |
| 13 | Current number of prescription drugs | 2 | 0.67 |
| 14 | I have no physical health limitations that make it difficult for me to manage work about the home | 0 | 0.00 |
| 15 | Hours of sleep per day | 1 | 0.33 |
| 16 | Relatives I can rely on for help | 2 | 0.67 |
| 17 | Friends I can rely on for help | 6 | 2.02 |
| 18 | I do things of a spiritual nature | 1 | 0.33 |
| 19 | I eat a well-balanced meal containing the four food groups | 2 | 0.67 |
| 20 | I eat a meal consisting of fast food, junk food, or processed food | 1 | 0.33 |
| 21 | Amount of beer, wine, or spirits consumed daily | 1 | 0.33 |
| 22 | I take vitamins | 3 | 1.01 |
| 23 | Living arrangements | 0 | 0.00 |
| 24 | I manage my own home | 8 | 2.69 |
| 25 | I am looking for paid work | 31 | 10.4 |
| 26 | I am retired | 4 | 1.35 |
| 27 | I do paid work | 22 | 7.41 |
| 28 | I do volunteer work | 4 | 1.35 |

| Item # | Item | # of SAQs with Item Omitted (N=297) | % of SAQs with Item Omitted |
|---|---|---|---|
| 29 | I look after a sick or disabled person | 21 | 7.07 |
| 30 | I socialize outside of my family circle | 0 | 0.00 |
| 31 | I read books or magazines | 1 | 0.33 |
| 32 | I engage in arts, crafts or hobbies | 11 | 3.70 |
| 33 | I attend community organizations | 11 | 3.70 |
| 34 | I write stories or letters | 12 | 4.04 |
| 35 | I participate in sports | 17 | 5.72 |
| 36 | I engage in political activity | 21 | 7.07 |
| 37 | I go to the cinema or theatre | 14 | 4.71 |
| 38 | I engage in fitness and exercise | 4 | 1.35 |
| 39 | I find it difficult to express needs and wishes to others for fear I will bother them | 3 | 1.01 |
| 40 | I find it difficult to know how I'm supposed to interact with people in social situations | 7 | 2.35 |
| 41 | If I have a problem, there are dependable people I can rely on for support | 4 | 1.35 |
| 42 | If I have a problem, I turn to other activities to take my mind off things | 4 | 1.35 |
| 43 | I am in control of my health | 0 | 0.00 |
| 44 | Health professionals control my health | 6 | 2.02 |
| 45 | I take my own actions to control my health | 7 | 2.35 |
| 46 | I do only what doctors tell me | 4 | 1.35 |
| 47 | Life is hard for me most of the time | 4 | 1.35 |
| 48 | I am satisfied with my life today | 2 | 0.67 |
| 49 | I am an enthusiastic person | 3 | 1.01 |
| 50 | If I'm cheerful, I stay cheerful for a long time | 1 | 0.33 |
| 51 | If I'm agitated, I stay restless for a long time | 2 | 0.67 |
| 52 | If I'm distressed, I appear tense | 3 | 1.01 |
| 53 | My feelings of uneasiness stay for a long time | 5 | 1.68 |
| 54 | When I'm having a good day, I feel cheerful | 2 | 0.67 |
| 55 | I remain happy longer than my friends | 8 | 2.69 |
| 56 | I get upset easily | 3 | 1.01 |
| 57 | My feelings of delight stay for a long time | 4 | 1.35 |
| 58 | I am tense for long periods at a time | 4 | 1.35 |
| 59 | I try to do something about my problems | 4 | 1.35 |
| 60 | I look for some good about my problems | 7 | 2.35 |
| 61 | If I have a problem, I make an action plan | 8 | 2.69 |
| 62 | If I have a problem, I deny its happening | 7 | 2.35 |
| 63 | I often feel downhearted and blue | 3 | 1.01 |
| 64 | Ordinary work is too boring for me | 7 | 2.35 |
| 65 | My memory is as good as it ever was | 1 | 0.33 |
| 66 | Memories of my past are as clear as a book | 0 | 0.00 |
| 67 | I often have trouble concentrating | 3 | 1.01 |

| Item # | Item | # of SAQs with Item Omitted (N=297) | % of SAQs with Item Omitted |
|---|---|---|---|
| 68 | I have planned for my long-term finances | 4 | 1.35 |
| 69 | I am financially comfortable | 3 | 1.01 |
| 70 | My sex life is satisfactory | 26 | 8.75 |

Face validity issues. Due to numerous comments from participants about face validity, three items were subsequently dropped from the SAQ. Many participants felt that item 25 ("I am looking for paid work"; response options: yes/no) had little face validity, since most of the participants were retired. In addition, the proceeding item asked about their retirement status (item 26; "I am retired"; response options: yes, no, or semi-retired), and two questions later participants are asked the frequency of doing paid work (item 29; "I do paid work; response options: less than monthly; monthly; 2-3 times a week; weekly; a few times a week; or daily). For reasons of low face validity and redundancy, the item "I am looking for paid work" was therefore dropped from the SAQ and from all further analyses in subsequent studies.

Many participants also commented, either directly to the researcher, or through written comments on the SAQ, that they do not go to the dentist because they wear dentures, and that the question about frequency of dental visits (item 11) does not reflect this. Therefore, it is possible that participants may have indicted "seldom or never" when they don't go to the dentist because they neglect their oral care, or because they do not go to the dentist because they wear dentures. Given that the item was intended to tap use of health services, with a higher score reflecting more preventative health behaviour, item 11 may not be accurately measuring this health indicator with the older population. Because of the low face validity of this item, and a question about the integrity of the responses, the dental visits item (11) was excluded from any further analyses.

Not surprisingly, many participants commented on the difficulty of understanding item 14, "I have no physical limitations that make it difficult to manage about the home" (response options: true/false), because of the double-negative phrasing that occurs when the item is combined with the response option. In fact, the test-retest portion of Study 2 found that the kappa coefficient for item 14, between the paper-and-pencil version of the SAQ and the computer-version (one week apart), was −0.30, and 0.53 between the paper-and-pencil version and the interviewer-version. Presumably, the reliability of the item was higher between the pencil-and-paper version and the interviewer-administered version because participants in that condition were able to have the item's meaning and response scale explained by the researcher if they became confused. Because of the low reliability of this item, it was also excluded from all further analyses.

Transformations of response scales. A few of the demographic and health-related items on the original SAQ scales had large response scales (>6 response options). These items were recoded into 5-point response scales because it would make it easier to later create factors with items of equivalent weight. Frequency distributions of the items in question were examined so that a normal distribution would be maintained after transformation.

Item 6, "Weight change in the last three months" was transformed from a 7-point response scale to a 5-point response scale by merging the response options "lost 2 lbs" and "lost 5 lbs" to create "lost 2-5 lbs", and by merging the response options "gained 2 lbs" and "gained 5 lbs" to create "gained 2-5 lbs". The transformed scale is now a 5-point response scale: lost 10+ lbs, lost 2-5 lbs, no change, gained 2-5 lbs, gained 10+ lbs.

Item 7, "Smoking" was transformed from a 6-point response scale to a 5-point response scale by merging the response option "smoke cigar or pipe daily" with the response option "smokes less than 10 cigarettes a day".

Item 8, "Current overall health" was transformed from a 6-point response scale to a 5-point response scale by merging the two middle options "Good" and "Satisfactory", and labeling it "Satisfactory". This item is now consistent with the General Health question from the SF-36 (Ware & Sherbourne, 1992).

Item 13, "Current prescription drugs" was transformed from a 10-point response scale (i.e., participants could select "none" up to "9+" medications) to a 5-point response scale. This was done by merging the number of medications to create ranges. The response options are now: None, 1, 2-3, 4-5, 6 or more.

Items 16, "Relatives I can depend on for help", and item 17, "Friends I can rely on for help", were also transformed from 10-point response scales (i.e., participants could select "none" up to "9+") to 5-point response scales. The response options are now: None, 1-2, 3-4, 5-6, 7 or more.

<u>Univariate outliers.</u>  The dataset was examined for potential within-group univariate outliers, defined as cases with standardized scores greater than $z = +/- 3.00$ (Tabachnick & Fidell, 2001). Potential outliers were identified as follows: three cases on the "Smoking" variable (item 7); two cases on the "I eat a meal consisting of fast food, junk food or processed food" variable (item 2); three cases on the "Amount of beer, wine or spirits consumed daily" variable (item 20); four cases on the "Living arrangements" variable (item 23); two cases on the "I engage in political activity" variable (item 36); three cases on the "If I have a problem, I deny it's happening" variable (item 62); and one case on the "I go to the cinema or theatre" variable

(item 37). The strategy suggested by Tabachnick and Fidell (2001) to reduce the influence of these cases while still preserving their deviancy with respect to other cases within the group was to recode their raw scores to one unit higher than the next most extreme score in the distribution. However, this was not possible in any of the cases, as the "outliers" were simply cases in which the raw score was already only one unit higher than the next most extreme score in the distribution. As such, no deletions or transformations were made to the dataset.

Multivariate outliers. Potential within-group multivariate outliers were sought out using Cook's D. With this strategy, a multivariate outlier is defined as a case that has a Cook's D greater than 1.00. These cases are considered outliers by virtue of their influence and deviancy when compared against other cases within the group (Tabachnick & Fidell, 2001). No multivariate outliers were found in the present dataset.

Normality, Linearity and Homoescedasticity. Normality was assessed via a within-group detrended normality plot for each variable, while linearity and homoescedasticity were examined via within-group bivariate scatterplots involving variables that were analyzed simultaneously in multivariate analyses (Tabachnick & Fidell, 2001). Analyses revealed that these assumptions were met.

Table 2 shows the descriptive statistics (mean, standard deviation, skewness and kurtosis) for each relevant item of the SAQ. Items are identified by their item number on the SAQ and by the label given to them for analysis in SPSS. See Appendix A for the complete SAQ.

Table 2. Descriptive Statistics of Relevant SAQ Items (After Transformation).

| Item # on SAQ | SPSS Item Label | $M$ | $SD$ | Skewness | Kurtosis |
|---|---|---|---|---|---|
| 4 | HEIGHT | 166.58 | 9.34 | 0.31 | -0.41 |
| 5 | WEIGHT | 73.85 | 12.24 | 0.12 | -0.23 |
| 6 | WEIGHT_C | 2.92 | 0.81 | -0.04 | 1.09 |
| 7 | SMOKE | 1.69 | 0.80 | 1.57 | 3.38 |
| 8 | HEALTH | 3.44 | 0.84 | -0.07 | 0.08 |
| 9 | DR_VISIT | 2.21 | 0.62 | .916 | 1.51 |
| 10 | OTHER_H | 1.63 | 0.91 | 1.26 | 0.46 |
| 12 | NUM_ILL | 1.90 | 1.08 | 1.07 | 0.28 |
| 13 | DRUGS | 2.70 | 1.14 | 0.17 | -0.69 |
| 15 | SLEEP | 2.53 | 0.73 | -0.09 | -0.24 |
| 16 | RELATIVE | 2.84 | 1.09 | 0.52 | -0.53 |
| 17 | FRIEND | 2.86 | 1.07 | .046 | -0.31 |
| 18 | RELIGION | 0.68 | 0.47 | -0.76 | -1.44 |
| 19 | FOOD_G | 5.55 | 0.92 | -2.90 | 9.92 |
| 20 | FOOD_B | 1.94 | 1.16 | 1.12 | 0.66 |
| 21 | ALCHOL | 1.34 | 0.55 | 1.76 | 4.11 |
| 22 | VITAMIN | 4.31 | 2.24 | -0.72 | -1.39 |
| 23 | LIVING | 1.76 | 0.62 | 0.80 | 2.32 |
| 24 | MANAGE | 0.96 | 0.20 | -4.67 | 20.06 |
| 26 | RETIRE | 0.97 | 0.38 | -0.37 | 4.09 |
| 27 | WORK2 | 1.57 | 1.47 | 2.34 | 3.78 |
| 28 | VOLUNT | 2.67 | 1.61 | 0.44 | -1.13 |
| 29 | SICK | 1.60 | 1.48 | 2.25 | 3.41 |
| 30 | SOCIAL | 4.24 | 1.28 | -0.95 | 0.54 |
| 31 | READ | 4.90 | 1.52 | -1.41 | 0.93 |
| 32 | CRAFT | 3.30 | 1.95 | -0.01 | -1.59 |
| 33 | COMMUN | 2.54 | 1.54 | 0.56 | -0.98 |
| 34 | LETTER | 1.81 | 1.33 | 1.58 | 1.51 |
| 35 | SPORT | 2.19 | 1.78 | 1.00 | -0.73 |
| 36 | POLITIC | 1.16 | 0.74 | 5.36 | 29.40 |
| 37 | CINEMA | 1.30 | 0.69 | 2.74 | 9.27 |
| 38 | EXER1 | 4.10 | 1.94 | -0.72 | -1.11 |
| 39 | WISHES | 2.46 | 1.10 | 0.27 | -0.83 |
| 40 | INTER | 2.08 | 0.96 | 0.69 | -0.20 |
| 41 | PROB1 | 4.10 | 0.76 | -1.43 | 4.03 |
| 42 | PROB2 | 3.62 | 0.96 | -1.02 | 0.80 |
| 43 | CONT1 | 4.00 | 0.79 | -1.09 | 2.10 |
| 44 | CONT2 | 2.60 | 1.13 | 0.27 | -0.95 |
| 45 | CONT3 | 3.85 | 0.86 | -1.37 | 2.25 |
| 46 | CONT4 | 3.06 | 1.04 | -0.12 | -0.85 |
| 47 | HARD_LI | 1.94 | 0.96 | 1.22 | 1.43 |
| 48 | SAT_LI | 3.99 | 0.89 | -1.34 | 2.48 |

| Item # on SAQ | SPSS Item Label | *M* | *SD* | Skewness | Kurtosis |
|---|---|---|---|---|---|
| 49 | ENTHU | 3.91 | 0.77 | -1.34 | 2.48 |
| 50 | CHEER | 3.90 | 0.73 | -0.69 | 1.07 |
| 51 | AGIT | 2.43 | 0.96 | 0.66 | -0.20 |
| 52 | DISTRES | 3.16 | 0.99 | -0.65 | -0.70 |
| 53 | UNEASY | 2.39 | 0.94 | 0.53 | -0.46 |
| 54 | GOOD_DA | 4.25 | 0.53 | -0.94 | 8.35 |
| 55 | HAPPY | 3.41 | 0.76 | 0.16 | 0.27 |
| 56 | UPSET | 2.48 | 1.01 | 0.46 | -0.55 |
| 57 | DELIGHT | 3.78 | 0.72 | -0.38 | 0.18 |
| 58 | TENSE | 2.21 | 0.88 | 0.89 | 0.76 |
| 59 | PROB3 | 4.05 | 0.58 | -1.07 | 5.66 |
| 60 | PROB4 | 3.83 | 0.67 | -0.59 | 1.22 |
| 61 | PROB5 | 3.78 | 0.70 | -0.82 | 0.98 |
| 62 | PROB6 | 2.11 | 0.76 | 1.04 | 2.15 |
| 63 | BLUE | 2.17 | 0.91 | 0.80 | 0.34 |
| 64 | ORDIN | 2.46 | 0.93 | 0.71 | 0.18 |
| 65 | MEM1 | 2.78 | 1.02 | 0.34 | -0.86 |
| 66 | MEM2 | 3.35 | 1.03 | -0.33 | -0.80 |
| 67 | CONCEN | 2.60 | 0.98 | 0.39 | -0.64 |
| 68 | MONEY1 | 3.94 | 0.81 | -1.34 | 2.85 |
| 69 | MONEY2 | 3.77 | 0.87 | 1.17 | 1.54 |
| 70 | SEX | 3.08 | 1.03 | -0.44 | -0.24 |

## Characteristics of the sample

A total of 297 participants contributed data to the analysis. The average age was 71.3 years ($SD$ = 8.6), with ages ranging from 51 to 92 years. Seventy-three (24.6%) participants were in the 50 to 64 year-old age category, 159 (53.5%) participants were between the ages of 65 and 79, and 61 (20.5%) participants were over 80 years of age. Four individuals did not indicate their year of birth. The majority of the participants were women ($n$ = 185; 62.3%). Most participants were married ($n$ = 193; 65%), 69 (23.2%) were widowed, 22 (7.4%) were separated or divorced and 11 (3.7%) were single. Most of the participants lived with their partners or spouses ($n$ = 188; 63.3%), 93 (31.3%) lived alone, 9 (3.0%) lived with other family members, and 7 (2.4%) had another type of living arrangement. The majority of participants were fully retired ($n$ = 251;

84.5%), 16 (5.4%) described themselves as semi-retired and 26 (8.8%) indicated that they were

still working.

**Factor Structure**

Only the items that made up the original SAQ multi-item indices (i.e., Physical Health

Outcome Index, Mental Health Outcome Index, Activity Index, Positive Affectivity Index,

Negative Affectivity Index, Confidence Index, and Fallibility Index), and new items that were

added to the SAQ and that were anticipated to load on one of those factors (i.e., items 13, 6 and

10) were included in the factor analysis. The original single-item measures (i.e., items 1, 3, 4, 5,

7, 16, 17, 21, 23, 26, 27, 41, 69, and 68) as well as new items that were added to the SAQ (i.e.,

items 2, 15, 19, 20, 22, 24, 29, and 70) were not included in the factor analysis.

Four interpretable factors emerged from the analysis of the 44 items. The first four

eigenvalues ranged from 7.29 to 2.09, and trailed off gradually for subsequent eigenvalues. Fully

13 factors emerged with eigenvalues greater than 1. Table 3 shows the eigenvalues of the first 13

factors.

Table 3. Eigenvalues for the First 13 Factors.

| Component | Eigenvalues | % of Variance | Cumulative % |
|---|---|---|---|
| 1 | 7.23 | 16.06 | 16.06 |
| 2 | 2.88 | 6.41 | 22.47 |
| 3 | 2.60 | 5.78 | 28.25 |
| 4 | 2.07 | 4.60 | 32.85 |
| 5 | 1.79 | 3.97 | 36.82 |
| 6 | 1.73 | 3.85 | 40.67 |
| 7 | 1.51 | 3.36 | 44.03 |
| 8 | 1.43 | 3.17 | 47.20 |
| 9 | 1.35 | 2.99 | 50.19 |
| 10 | 1.26 | 2.80 | 52.99 |
| 11 | 1.15 | 2.55 | 55.54 |
| 12 | 1.11 | 2.48 | 58.02 |
| 13 | 1.05 | 2.32 | 60.34 |

The scree plot suggested the existence four interpretable factors with eigenvalues greater than 2

that each accounted for more than 4% of the variance. Together these four factors accounted for

32.85% of the variance. With a cut-off of .30 for inclusion of a variable in interpretation of a

factor, five of the 44 variables failed to load on any factor. Table 4 shows the obliquely-rotated

pattern matrix for the four factors.

Table 4. Pattern Matrix.

| SAQ Item # | SPSS Item Label | Factor 1 | Factor 2 | Factor 3 | Factor 4 |
|---|---|---|---|---|---|
| 53 | UNEASY | -.771 | | | |
| 51 | AGIT | -.724 | | | |
| 58 | TENSE | -.697 | | | |
| 52 | DISTRES | -.640 | | | |
| 56 | UPSET | -.623 | | | |
| 63 | BLUE | -.613 | | | |
| 40 | INTER | -.557 | | | |
| 67 | CONCEN | -.510 | | | |
| 47 | HARD_LI | -.492 | | | |
| 39 | WISHES | -.478 | | | |
| 64 | ORDIN | -.332 | | | |
| 38 | EXER1 | | .532 | | |
| 30 | SOCIAL | | .483 | | |
| 34 | LETTER | | .483 | | |
| 33 | COMMUN | | .482 | | |
| 32 | CRAFT | | .446 | | |
| 31 | READ | | .434 | | |
| 36 | POLITIC | | .432 | | |
| 37 | CINEMA | | .372 | | |
| 28 | VOLUNT | | .353 | | |
| 62 | PROB6 | | -.328 | | |
| 10 | OTHER_HE | | | | |
| 35 | SPORT | | | | |
| 13 | DRUGS | | | -.765 | |
| 12 | NUM_ILL | | | -.761 | |
| 9 | DR_VISIT | | | -.641 | |
| 8 | HEALTH | | | .629 | |
| 44 | CONT2 | | | -.595 | |
| 46 | CONT4 | | | -.372 | |
| 50 | CHEER | | | | .627 |
| 59 | PROB3 | | | | .580 |
| 65 | MEM1 | | | | .536 |
| 57 | DELIGHT | | | | .526 |
| 60 | PROB4 | | | | .488 |
| 49 | ENTHUS | | .304 | | .485 |
| 66 | MEM2 | | | | .483 |
| 51 | PROB5 | | | | .479 |
| 45 | CONT3 | | | .350 | .437 |
| 55 | HAPPY | | | | .433 |
| 42 | PROB2 | | | | .402 |
| 48 | SAT_LI | | | | .375 |
| 43 | CONT1 | | | .307 | .316 |
| 54 | GOOD_DA | | | | .308 |
| 6 | WEIGHT_C | | | | |

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. Rotation converged in 15 iterations. Only factors loadings of >= 0.3 are shown.

Items with the highest factor loadings on Factor 1 pertain to having a negative orientation

towards life (e.g., negative style of affective expression, negative coping style, feelings of

sadness) (see Table 5 below). In fact, all the items from the original SAQ's Negative Affectivity

Index loaded on this factor (i.e., items 51, 52, 53, 56, and 58), in addition to three of the eight

items from the original Fallibility Index (i.e., items 39, 40, and 64), and three of the four items

from the original Mental Health Index (i.e., the three negatively phrased items – 47, 63, and 67).

These 11 potential items were later subjected to an item-analysis to determine whether or not

they would be retained in the final scale. Factor 1 was labeled "Negative Orientation" and

accounts for 16.06 % of the variance. A high total score on this factor suggests a more negative

orientation towards life.

Table 5. Items Loading >=0.3 on Factor 1, Negative Orientation.

| SAQ Item # | Item Label | Item |
|---|---|---|
| 53 | UNEASY | My feelings of uneasiness stay for a long time.* |
| 51 | AGIT | If I am agitated, I stay restless for a long time.* |
| 58 | TENSE | I am tense for long periods at a time.* |
| 56 | UPSET | I get upset easily.* |
| 52 | DISTRES | If I'm distressed, I appear tense.* |
| 63 | BLUE | I often feel downhearted and blue.* |
| 47 | HARD_LI | Life is hard for me most of the time.* |
| 67 | CONCEN | I often have trouble concentrating.* |
| 40 | INTER | I find it difficult to know how I am supposed to act with people in social situations.* |
| 39 | WISHES | I find it difficult to express needs and wishes to others for fear that I will bother them.* |
| 64 | ORDIN | Ordinary work is too boring for me.* |

* Response Scale - Strongly Disagree=1; Disagree=2; Neutral=3; Agree=4; Strongly Agree=5

Items with the highest factor loadings on Factor 2 pertain primarily to participation in

non-work related activity (See Table 6 below). In fact, nine of the 10 items from the original

SAQ's Activity Index loaded on this factor (i.e., items 28, 30, 31, 32, 33, 34, 36, 37, and 38).

The tenth item from the Activity Index, which, incidentally, did not load on any factor, was item

35 ("I participate in sports"). Also loading (negatively) on Factor 2 was one item from the

original Fallibility Index (item 62). These 10 potential items were later subjected to an item-

analysis to determine whether or not they would be retained in the final scale. Factor 2 was

labeled "Activity", and it accounts for 6.41 % of the variance. A high total score on this factor

suggests greater level of participation in non-work related activity.

Table 6. Items Loading >=0.3 on Factor 2, Activity.

| SAQ Item # | Item Label | Item |
|---|---|---|
| 38 | EXER1 | I engage in fitness and exercise.* |
| 30 | SOCIAL | I socialize outside of my family circle.* |
| 31 | READ | I read books or magazines.* |
| 28 | VOLUNT | I do volunteer work.* |
| 34 | LETTER | I write letters or stories.* |
| 33 | COMMUN | I attend community organizations.* |
| 32 | CRAFT | I engage in arts, crafts or hobbies.* |
| 37 | CINEMA | I go to the cinema or theatre.* |
| 36 | POLITIC | I engage in political activity.* |
| 62 | PROB6 | If I have a problem, I deny it's happening. [2] |

* Response Scale – Less than monthly=1;Monthly=2; 2-3 times a month=3; Weekly=4; A few times a week=5; Daily=6
[2] Response Scale – Strongly Disagree=1; Disagree=2; Neutral=3; Agree=4; Strongly Agree=5

Items with the highest factor loadings on Factor 3 pertain to health and health-related

locus of control (see Table 7). Not surprisingly, all three of the items from the original SAQ's

Physical Health Index (i.e., items 8, 9, and 12) loaded on this factor, as well as item 13, a newly-

created health indicator item. As well, two of the four items that measure health-related locus of

control also loaded most highly on this factor (i.e., items 44 and 46). Items 44 and 46, both from

the original Fallibility Scale, loaded negatively on Factor 3. Two health-related locus of control

items from the original Confidence Scale, items 43 and 45, loaded positively on Factor 3.

However, items 43 and 45 were also found to load positively, but more strongly, on Factor 4. All

eight items that loaded on Factor 3 were later subjected to an item-analysis to determine whether

or not they would be retained in the final scale. Factor 3 was labeled "Health" and accounts for

5.78 % of the variance. A higher score suggests worse health and/or lower levels of perceived

personal control over health.

Table 7. Items Loading >=0.3 on Factor 3, Health.

| SAQ Item # | Item Label | Item |
|---|---|---|
| 13 | DRUGS | Current number of prescription drugs.[1] |
| 12 | NUM_ILL | Number of illnesses of an enduring or chronic nature (e.g., heart disease).[2] |
| 8 | HEALTH | Current overall health.[3] (Reversed) |
| 9 | DR_VISIT | Number of doctors visits in last year.[4] |
| 43 | CONT1 | I am in control of my health.[5] (also loads on Factor 4)  (Reversed) |
| 44 | CONT2 | Health professionals control my health.[5] |
| 45 | CONT3 | I take my own actions to control my health.[5]  (also loads on Factor 4) (Rev) |
| 46 | CONT4 | I do only what my doctors tell me.[5] |

[1] Response Scale – None; 1; 2; 3; 4; 5; 6; 7; 8; 9+
[2] Response Scale – No enduring illnesses=0, 1 illness=1; 2 illnesses=2; 3 illnesses=3; 4 or more illnesses=4
[3] Response Scale – Poor=1; Fair=2; Satisfactory=3; Good=4; Very Good=5; Excellent=6
[4] Response Scale – No visits at all=1; 1-4 visits=2; 5-12 visits=3; More than 12 visits this year=4
[5] Response Scale – Strongly Disagree=1; Disagree=2; Neutral=3; Agree=4; Strongly Agree=5

Items with the highest factor loadings on Factor 4 clearly pertain to having a positive

orientation towards life (e.g., positive style of affective expression, active coping style, positive

outlook on cognitive skills) (see Table 8 below). In fact, all the items from the original SAQ's

Positive Affectivity Index loaded on this factor (i.e., items 49, 50, 54, 55, and 57), in addition to

all six from the Confidence Index (i.e., items 42, 43, 45, 59, 60, and 61), the positively-phrased

item from the original Mental Health Index (i.e., item 48), and two of the positively phrased

items from the original Fallibility Scale (i.e., items 65 and 66). These 14 potential items were

later subjected to an item-analysis to determine whether or not they would be retained in the final

scale. Factor 4 was labeled "Positive Orientation" and accounts for 4.60% of the variance. A

high score suggests a more positive orientation towards life.

Table 8. Items Loading >=0.3 on Factor 4, Positive Orientation.

| SAQ Item # | Item Label | Item |
|---|---|---|
| 50 | CHEER | If I'm cheerful, I stay cheerful for a long time.* |
| 57 | DELIGHT | My feelings of delight stay for a long time.* |
| 49 | ENTHUS | I am an enthusiastic person.* |
| 54 | GOOD_DA | When I am having a good day, I feel cheerful.* |
| 55 | HAPPY | I remain happy longer than my friends.* |
| 42 | PROB2 | If I have a problem, I turn to other activities to take my mind off it.* |
| 59 | PROB3 | I try to do something about my problems.* |
| 60 | PROB4 | I look for some good about my problems.* |
| 61 | PROB5 | If I have a problem, I make an action plan.* |
| 45 | CONT3 | I take my own actions to control my health.* (also loads on Factor 3) |
| 65 | MEM1 | My memory is as good as it ever was.* |
| 66 | MEM2 | Memories of my past are as clear as a book.* |
| 48 | SAT_LI | I am satisfied with my life today.* |
| 43 | CONT1 | I am in control of my health. * (also loads on Factor 3) |

*Response Scale - Strongly Disagree=1; Disagree=2; Neutral=3; Agree=4; Strongly Agree=5

**Item-Analysis**

As indicated earlier, items with factor loadings greater than or equal to 0.3 were included

in the pool of potential items, and kept if they contributed to the internal consistency of the scale,

as evidenced by corrected item-total correlations greater than 0.2, and if the inclusion of the item

in the scale did not reduce the value of Cronbach's coefficient alpha. If a potential item was

found to load on more than one factor, and an item-analysis revealed that the item met the above

criteria equally well on both factors, the item was included on the factor with which it made the

most conceptual sense. Because the response scales were not uniform for all the factors/scales,

the internal consistencies were expressed by a standardized alpha, when indicated.

Table 9 shows the corrected-item total correlations, and what the Cronbach's coefficient alpha is with the item deleted, for all the items with loadings greater than or equal to 0.3 on Factor 1, Negative Orientation.

Table 9. Initial Item-Total Correlations and Cronbach's Alpha for Factor 1.

| SAQ Item # | Item | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|
| 53 | UNEASY | .65 | .80 |
| 51 | AGIT | .59 | .80 |
| 58 | TENSE | .60 | .80 |
| 56 | UPSET | .55 | .81 |
| 52 | DISTRES | .43 | .82 |
| 63 | BLUE | .59 | .80 |
| 47 | HARD_LI | .46 | .82 |
| 67 | CONCEN | .46 | .81 |
| 40 | INTER | .51 | .81 |
| 39 | WISHES | .40 | .82 |
| 64 | ORDIN | .26 | .83 |

All 11 items met the criteria for inclusion in the scale and make sense conceptually in that all items pertain to having a negative orientation towards life. All of the items from Factor 1 correlate moderately with the total scale score, and the internal consistency (Cronbach's Alpha) of the scale is high, at .83.

Table 10 shows the corrected-item total correlations, and what the Cronbach's coefficient alpha is with the item deleted, for all the items with loadings greater than or equal to 0.3 on Factor 2, Activity.

Table 10. Initial Item-Total Correlations and Cronbach's Alpha for Factor 2.

| SAQ Item # | Item | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|
| 38 | EXER1 | .37 | .61 |
| 30 | SOCIAL | .39 | .61 |
| 31 | READ | .35 | .62 |
| 28 | VOLUNT | .30 | .63 |
| 34 | LETTER | .45 | .60 |
| 33 | COMMUN | .33 | .63 |
| 32 | CRAFT | .33 | .63 |
| 37 | CINEMA | .20 | .65 |
| 36 | POLITIC | .24 | .64 |
| 62 | PROB6 (reversed) | .27 | .64 |

This factor was not expected to have a very high alpha coefficient because an individual's activity choices are not necessarily heterogeneous. A person may participate in more solitary activities such as reading and writing letters, but rarely become engaged in political activity or attend community organizations.

While item 62 meets the statistical criteria for inclusion on Factor 2, it does not fit well with the theme of the factor - non-work related activity, and so it was not included in the final scale. Item 62 is more related to coping style, or the Negative Orientation factor, than a factor made up of types of activities individuals participate in. The remaining nine items correlate moderately with the total scale score, and the internal consistency (Cronbach's Alpha) of the revised scale is satisfactory at .64. An alpha of .64 is considered reasonable given the heterogeneous nature of the activities included in the scale.

Table 11 shows the corrected-item total correlations, and what the Cronbach's coefficient alpha is with the item deleted, for all the items with loadings greater than or equal to 0.3 on Factor 3, Health.

Table 11. Initial Item-Total Correlations and Cronbach's Alpha for Factor 3

| SAQ Item # | Item | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|
| 13 | DRUGS | .56 | .69 |
| 12 | NUM_ILL | .52 | .70 |
| 8 | HEALTH (reversed) | .51 | .70 |
| 9 | DR_VISIT | .42 | .72 |
| 43 | CONT1 (reversed) | .35 | .73 |
| 44 | CONT2 | .55 | .69 |
| 45 | CONT3 (reversed) | .34 | .73 |
| 46 | CONT4 | .28 | .74 |

All eight items met the criteria for inclusion on Factor 3. While items 43 and 45 also load on Factor 4, they contribute well to the internal consistency of Factor 3 and make sense conceptually as part of this factor (i.e., relating to health and health locus-of-control). The eight items correlate moderately with the total scale score, and the internal consistency (standardized Cronbach's Alpha) of the revised scale is reasonable at .74.

Table 12 shows the corrected-item total correlations, and what the Cronbach's coefficient alpha is with the item deleted, for all the items with loadings greater than or equal to 0.3 on Factor 4, Positive Orientation.

Table 12. Initial Item-Total Correlations and Cronbach's Alpha for Factor 4.

| SAQ Item # | Item | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|
| 50 | CHEER | .61 | .75 |
| 57 | DELIGHT | .55 | .76 |
| 49 | ENTHUS | .53 | .76 |
| 54 | GOOD_DA | .38 | .77 |
| 55 | HAPPY | .39 | .77 |
| 42 | PROB2 | .25 | .78 |
| 59 | PROB3 | .52 | .76 |
| 60 | PROB4 | .47 | .76 |
| 61 | PROB5 | .44 | .77 |
| 45 | CONT3 | .38 | .77 |
| 65 | MEM1 | .33 | .78 |
| 66 | MEM2 | .23 | .79 |
| 48 | SAT_LI | .38 | .77 |
| 43 | CONT1 | .40 | .77 |

The items 43 and 45, which also loaded on Factor 3, although less strongly, were found to make their greatest contribution, and to make the most conceptual sense as part of Factor 3, and thus will be kept with this factor and not included here.

The remaining 12 items correlate moderately with the total scale score, and the internal consistency (Cronbach's Alpha) of the revised scale is reasonable, at .76.

Table 13 shows the final items comprising each of the four factors, as well as the means, standard deviations, and internal consistency of each factor.

Table 13. Final items (item number on the SAQ and SPSS item label) comprising the four SAQ factors.

| Factor 1<br>Negative Orientation | Factor 2<br>Activity | Factor 3<br>Health | Factor 4<br>Positive Orientation |
|---|---|---|---|
| 39 – WISHES | 28 - VOLUNT | 8 - HEALTH  (Rev) | 42 - PROB2 |
| 40 - INTER | 30 - SOCIAL | 9 - DR_VISIT | 48 - SAT_LI |
| 47 - HARD_LI | 31 – READ | 12 - NUM_ILL | 49 - ENTHUS |
| 51 - AGIT | 32 - CRAFT | 13 - DRUGS | 50 - CHEER |
| 52 - DISTRES | 33 - COMMUN | 43 - CONT1    (Rev) | 54 - GOOD_DA |
| 53 - UNEASY | 34 - LETTER | 44 - CONT2 | 55 - HAPPY |
| 56 - UPSET | 36 - POLITIC | 45 - CONT3   (Rev) | 57 - DELIGHT |
| 58 - TENSE | 37 - CINEMA | 46 - CONT4 | 59 - PROB3 |
| 63 - BLUE | 38 – EXER1 | | 60 - PROB4 |
| 64 - ORDIN | | | 61 - PROB5 |
| 67 - CONCEN | | | 65 - MEM1 |
| | | | 66 - MEM2 |
| | | | |
| $N$ = 11 items | $N$ = 9 items | $N$ = 8 items | $N$ = 12 items |
| Possible scores  = 11 – 55 | Possible scores  = 9 – 54 | Possible scores = 8 – 39 | Possible scores = 12 – 60 |
| $M$ = 26.39 | $M$ = 26.01 | $M$ = 19.17 | $M$ = 44.66 |
| $SD$ = 6.42 | $SD$ = 6.69 | $SD$ = 4.55 | $SD$ = 4.99 |
| Skewness = 0.27 | Skewness = 0.10 | Skewness = 0.32 | Skewness = 0.18 |
| Kurtosis = 0.08 | Kurtosis =  0.23 | Kurtosis = -0.39 | Kurtosis = 0.62 |
| Alpha = .83 | Alpha = .64 | Alpha = .74 | Alpha = .76 |
| | | | |
| Higher the score, the more negative one's orientation towards life. | Higher the score, the more frequently one participants in non-work activity. | Higher the score, the poorer one's health and/or health locus of control. | Higher the score, the more positive one's orientation towards life. |

In summary, Study 1 examined the factor structure and psychometric properties of the traditional, self-administered, paper-and-pencil SAQ using a sample of community-dwelling older adults. Results of the exploratory factor analysis revealed a 4-factor solution for the SAQ. These factors were labeled Negative Orientation, Positive Orientation, Activity, and Health. Further analysis showed adequate internal consistencies of these four factors.

# STUDY 2: METHODS

The purpose of this study was to examine the test-retest reliability of the SAQ, and to examine the reliability of alternate modes of administration (i.e., paper-and-pencil, interview-administered, and computerized) of the SAQ.

## Sample

The 76 participants who took part in this study represent a sub-sample of the 297 participants obtained from the larger Study 1. To reiterate, in Study 1, participants were recruited from a wide variety of settings. Information booths were set up at a local shopping mall, three senior's centers, and an annual health fair, and attended by the researcher and a research assistant. Advertisements were posted in the senior's centers, two grocery stores, and at the college (see Appendix B). Brief information sessions were provided at a local curling club, at senior's fitness classes, at a community lecture geared towards older adults, and at a geriatric rehabilitation outpatient program.

Of the participants in Study 2, 27 (35.5%) were recruited from a senior's computer course at the local college, 19 (25%) were recruited from senior's centers, 10 (13.2%) were recruited from an information booth set up at a local shopping mall, and 20 (26.3%) were recruited from community advertisements and telephoned the researcher to participate in the study.

## Procedure

As indicated earlier, individuals who learned about the study through advertisements or community posters telephoned the researcher to obtain more information and to set up a time to begin the study. The researcher or research assistant was available to meet the participant at the location of their choice (i.e., participant's home, community center, or university office).

Participants who were recruited through the information booths or information sessions were provided with additional information about the study at that time. All participants were provided with an information sheet describing the study (see Appendix C), and gave informed consent (see Appendix D).

Each participant enrolled in Study 1 was then invited to take part in the present test-retest/alternate formats study as well, until the sub-sample of 76 people was attained. This sub-sample was achieved after 92 invitations had been offered. The original goal of a sample size of 60 was derived from calculations of available funding for the study, as well as the timing and resources available for data collection. Although all participants in Study 1 were entered in a random draw for $100, participants who completed this test-retest component were also paid $10 cash and had their names entered in the draw a second time, thereby increasing their odds of winning. When the sample size of 60 was actually reached for this study, it was determined that resources were still available to add 16 more participants.

The 76 individuals who agreed to take part in this test-retest/alternate format study were then randomly assigned to either group A (comparing pencil-and-paper version of the SAQ to the interview-administered version) or group B (comparing pencil-and-paper version to the computerized version of the SAQ). See Figure 1. Within each group, participants were asked to complete the pencil-and-paper SAQ, and either the interview-administered, or computerized SAQ, in random order, separated by an interval of one week. For example, if a participant was randomly assigned to group A, they were then randomly assigned to either complete the pencil-and-paper version, or the interview-administered version during the first session. A second session was set up for one week later, during which time the participant completed the second, alternate format of the SAQ. At the end of the second session, the participants were asked to

complete a short follow-up questionnaire on the use of both methods of administration (see

Appendix E). This randomized cross-over design was chosen to control for possible order effects

of the administration of the different versions of the SAQ.

Figure 1. Randomized Cross-Over Design.
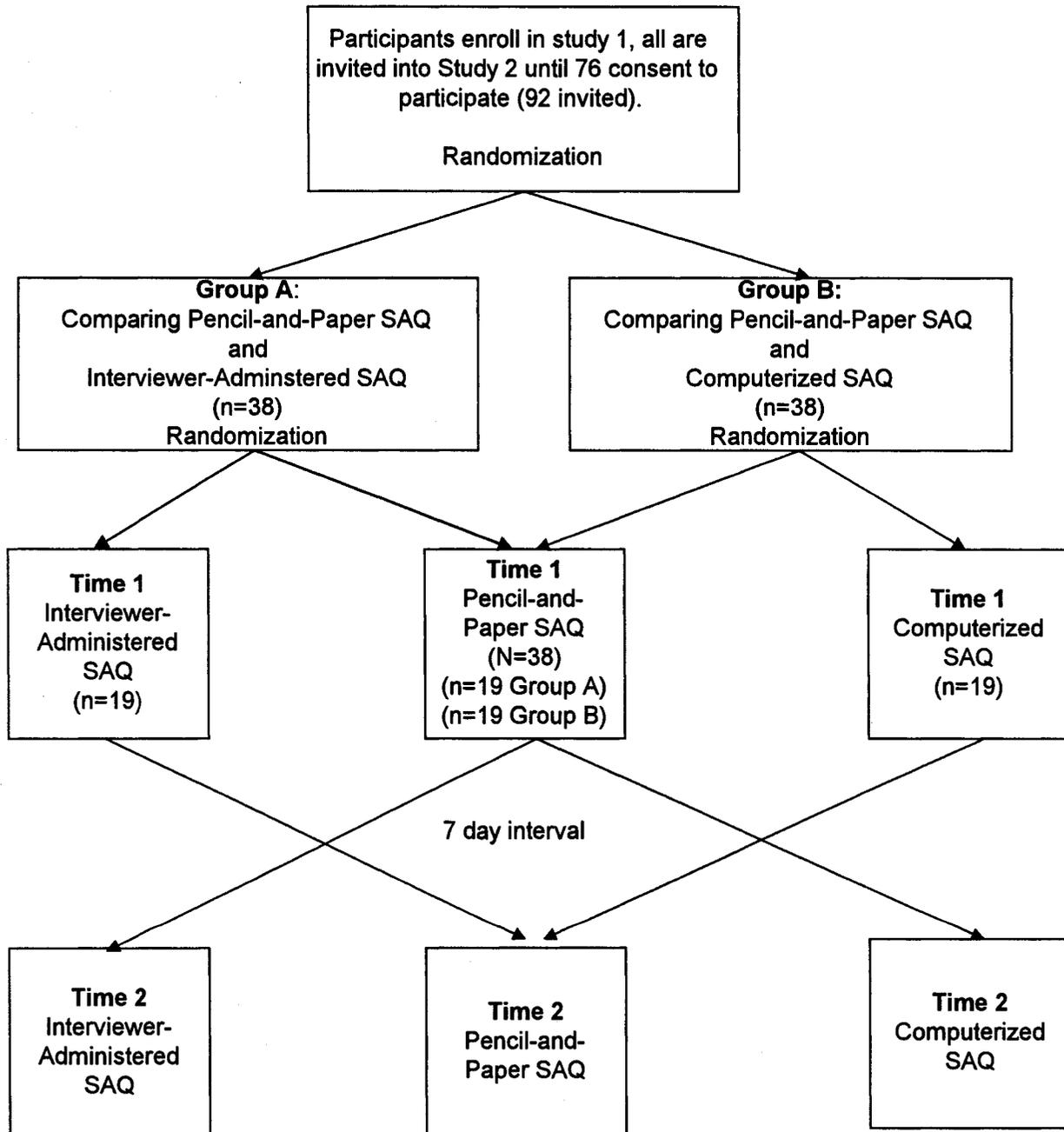
**Questionnaires/Materials**

Pencil-and-Paper SAQ. The pencil-and-paper format of the SAQ consists of a 70-item questionnaire, which has been described earlier (see Appendix A).

Interviewer-Administered SAQ. The interviewer-administered format is based on the pencil-and-paper version of the SAQ, except that the items have been rephrased into questions. For example, the paper-and-pencil SAQ item 30 appears as "I socialize outside my family circle:" and offers six options from which the participant must select one and place a check mark in the appropriate space (response categories: less than monthly, monthly, 2-3 times a week, weekly, a few times a week, daily). In the interviewer-administered version, the participant is asked "How often do you socialize outside of your family circle?", and he or she is then presented with a list of response categories to choose from. Each of the different response categories from the questionnaire (e.g., less than monthly, monthly, 2-3 times a week, etc..) are printed separately in 18-point font on a piece of laminated cardboard, and are presented as appropriate to the participant while the items are being read, so that they may visually examine their options before selecting a response. The researcher simply reads the items to the participant one at a time, and asking him or her to select the most appropriate answer from a list of response categories. The researcher then indicates the participant's response on the interviewer-administered SAQ form (see Appendix F).

Computerized SAQ. The computerized format is also based on the pencil-and-paper version of the SAQ, and includes the same instructions, questions and response categories, but instead of putting checkmarks or circling the desired response from a Likert scale, participants must use the computer mouse to select each answer from a pull-down list. The computerized SAQ was programmed in Microsoft Access, and therefore the computerized SAQ form that is

completed by each participant is linked to a database so that their responses are saved automatically. The computerized SAQ was housed on a laptop computer with external mouse so that it could be transported to any location where participant recruitment was occurring.

Follow-Up Questionnaire. Since test-retest reliability and alternate forms reliability is based on the premise that the respondents have not changed on the domains assessed over the time interval between administrations, upon completion of the second SAQ, participants were given an evaluation questionnaire and asked to record any significant life events that occurred during the previous seven days which may confound the reliability of the SAQ (e.g., major changes to health, living situation, socioeconomic status, psychological well-being). Participants were also asked to: select which method of administration they preferred; rate the level of difficulty of completing each format (response categories: very easy, easy, difficult, very difficult); and, indicate how often they use a personal computer (response categories: almost every day, every day, almost every week, every week, almost every month, every month, almost never, never) (see Appendix E).

## Method of Analysis

Alternate Formats: Participant Preferences. Participant preferences were assessed based on their stated preference for one format or the other and their ratings of level of difficulty of completing each format of the questionnaire.

Alternate Formats: Evaluation of Equivalence. As outlined in the APA guidelines (1986) for the evaluation of equivalence of computer and conventional formats of questionnaires, descriptive statistics (mean and standard deviation) were computed at the scale level for each format of the SAQ. The approach used to determine the equivalence of the different formats was

based on that used by Pouwer et al. (1998) and Boyes et al., (2002) in their studies comparing the equivalence of traditional and computerized versions of assessment instruments. A two (order of administration) x three (method of administration) between-subjects multivariate analysis of variance (MANOVA) was conducted on the four subscales. The subscales used for the analysis were based on those derived from the factor analysis in Study 1 (i.e., Negative Orientation, Positive Orientation, Activity, and Health).

To assess agreement between individual items on the paper-and-pencil and computerized SAQ, weighted kappa coefficients (Fleiss & Cohen, 1973) were calculated for matched pairs of items collected initially (format A) and one week later (format B). The same analyses were conducted to assess agreement between individual items on the paper-and-pencil and interviewer-administered versions of SAQ. Weighted kappa was selected as the reliability coefficient because it gives partial credit to near agreement. Reliability was determined based on Landis and Koch (1977)'s interpretation of kappa coefficients: below 0.0 = poor; 0.00 - 0.20 = slight; 0.21 - 0.40 = fair; 0.41 - 0.60 = moderate; 0.61 - 0.80 = substantial; 0.81 - 1.00 = almost perfect.

Test-Retest Reliability. It was hypothesized that if, in fact, the alternate modes of administration (described above) are deemed equivalent to one another, then it can also be assumed that there will be adequate test-retest reliability between two administrations of the same version, over the same time interval.

## STUDY 2: RESULTS

### Sample characteristics

A total of 76 participants participated in this study. The average age was 71.4 years ($SD =$ 8.9), with ages ranging from 54 to 92 years. Women represented the majority of the sample ($n =$ 57; 75%). Forty-four (57.9%) participants were married, 18 (23.7%) were widowed, 11 (14.5%) were either separated or divorced, and 3 (3.9%) were single.

As indicated, upon providing consent to take part in the study, participants were randomly assigned to one of four groups, those who: (a) completed the computerized SAQ at time 1, then the paper-and-pencil SAQ at time 2 ($n =$ 19); (b) completed the paper-and-pencil SAQ at time 1, then the computerized SAQ at time 2 ($n =$ 19); (c) completed the interviewer-administered SAQ at time 1 ($n =$ 19), then the paper-and-pencil SAQ at time 2; or (d) completed the paper-and-pencil SAQ at time 1, then the interviewer-administered SAQ at time 2 ($n =$ 19). There were no significant age or gender differences between those who were randomly assigned to the computerized SAQ ($n =$ 38) group or interviewer-administered SAQ ($n =$ 38) group ($F(1, 74) = 0.31$, $p = .58$, and $F(1, 74) = 0.07$, $p = .79$ respectively).

### Evaluation of Equivalence

Table 14 shows the mean scale scores and standard deviations by format (paper-and-pencil, computerized, and interviewer-administered) and order of administration (time 1 or time 2).

Table 14. Scale Scores By Order of Administration and Format.

| Scale | Group | Order and Format | M | SD | n |
|---|---|---|---|---|---|
| Negative Orientation | Group 1 | Time 1 – Computer | 24.82 | 7.54 | 19 |
| | | Time 2 – Paper and Pencil | 23.58 | 7.19 | 19 |
| | Group 2 | Time 1 – Paper and Pencil | 24.63 | 6.04 | 19 |
| | | Time 2 – Computer | 24.32 | 5.92 | 19 |
| | Group 3 | Time 1 – Interview | 26.37 | 6.46 | 19 |
| | | Time 2 – Paper and Pencil | 27.79 | 6.34 | 19 |
| | Group 4 | Time 1 – Paper and Pencil | 26.37 | 5.75 | 19 |
| | | Time 2 – Interview | 23.63 | 5.04 | 19 |
| Activity | Group 1 | Time 1 – Computer | 27.79 | 9.11 | 19 |
| | | Time 2 – Paper and Pencil | 27.53 | 7.99 | 19 |
| | Group 2 | Time 1 – Paper and Pencil | 27.84 | 8.15 | 19 |
| | | Time 2 – Computer | 28.79 | 5.92 | 19 |
| | Group 3 | Time 1 – Interview | 27.47 | 5.36 | 19 |
| | | Time 2 – Paper and Pencil | 25.95 | 5.09 | 19 |
| | Group 4 | Time 1 – Paper and Pencil | 27.84 | 7.57 | 19 |
| | | Time 2 – Interview | 29.63 | 7.73 | 19 |
| Health | Group 1 | Time 1 – Computer | 18.95 | 3.24 | 19 |
| | | Time 2 – Paper and Pencil | 19.21 | 3.47 | 19 |
| | Group 2 | Time 1 – Paper and Pencil | 17.63 | 5.47 | 19 |
| | | Time 2 – Computer | 17.58 | 5.18 | 19 |
| | Group 3 | Time 1 – Interview | 19.84 | 3.24 | 19 |
| | | Time 2 – Paper and Pencil | 20.74 | 3.89 | 19 |
| | Group 4 | Time 1 – Paper and Pencil | 17.21 | 4.01 | 19 |
| | | Time 2 – Interview | 17.26 | 4.23 | 19 |
| Positive Orientation | Group 1 | Time 1 – Computer | 45.68 | 5.20 | 19 |
| | | Time 2 – Paper and Pencil | 45.74 | 6.03 | 19 |
| | Group 2 | Time 1 – Paper and Pencil | 46.68 | 4.56 | 19 |
| | | Time 2 – Computer | 45.89 | 3.71 | 19 |
| | Group 3 | Time 1 – Interview | 44.63 | 5.34 | 19 |
| | | Time 2 – Paper and Pencil | 44.74 | 5.16 | 19 |
| | Group 4 | Time 1 – Paper and Pencil | 46.26 | 5.57 | 19 |
| | | Time 2 – Interview | 46.05 | 5.96 | 19 |

A MANOVA performed on the four factors (Negative Orientation, Positive Orientation, Activity and Health), showed no significant main effect of order of administration, Wilk's $F(4, 143) = 0.378$, $p = .824$, and no significant main effect of method of administration, Wilk's $F(8, 286) = 0.397$, $p = .922$. These results show that there is no statistically significant difference in participants' factor scores based on the order of administration or the SAQ format that was administered. The paper-and-pencil SAQ, computerized SAQ and interview-administered SAQ

can therefore be considered equivalent formats. Table 15 shows the level of agreement between

formats, using weighted kappa coefficients.

Table 15. Agreement (Weighted Kappa) Between Paper-and-Pencil and Computerized Versions and Between Paper-and-Pencil and Interview-Administered Versions for Each Item of the SAQ.

| Item # on SAQ | Item Label | Paper and Computer | Paper and Interview |
|---|---|---|---|
| 1 | GENDER | 1.00 | 0.93 |
| 2 | MARITAL | 0.96 | 0.99 |
| 3 | DOB | 1.00 | 0.99 |
| 4 | HEIGHT | 0.99 | 0.95 |
| 5 | WEIGHT | 0.75 | 0.99 |
| 6 | WEIGHT_C | 0.71 | 0.48 |
| 7 | SMOKE | 0.94 | 0.96 |
| 8 | HEALTH | 0.83 | 0.76 |
| 9 | DR_VISIT | 0.94 | 0.73 |
| 10 | OTHER_HE | 0.77 | 0.71 |
| 11 | DENTAL | 0.84 | 0.93 |
| 12 | NUM_ILL | 0.78 | 0.68 |
| 13 | DRUGS | 0.95 | 0.90 |
| 14 | FUNCTION | -0.30 | 0.53 |
| 15 | SLEEP | 0.74 | 0.64 |
| 16 | RELATIVE | 0.84 | 0.63 |
| 17 | FRIEND | 0.48 | 0.70 |
| 18 | RELIGION | 0.81 | 0.71 |
| 19 | FOOD_G | 0.74 | 0.48 |
| 20 | FOOD_B | 0.67 | 0.51 |
| 21 | ALCOHOL | 0.48 | 0.62 |
| 22 | VITAMIN | 0.77 | 0.73 |
| 23 | LIVING | 0.79 | 0.81 |
| 24 | MANAGE | 0.48 | 0.51 |
| 25 | WORK1 | 0.65 | 0.25 |
| 26 | RETIRED | 0.55 | 0.44 |
| 27 | WORK2 | 0.99 | 0.94 |
| 28 | VOLUNT | 0.79 | 0.85 |
| 29 | SICK | 0.53 | 0.59 |
| 30 | SOCIAL | 0.66 | 0.70 |
| 31 | READ | 0.85 | 0.32 |
| 32 | CRAFT | 0.78 | 0.56 |
| 33 | COMMUN | 0.42 | 0.47 |
| 34 | LETTER | 0.72 | 0.78 |
| 35 | SPORT | 0.30 | 0.75 |
| 36 | POLITIC | 0.75 | 0.82 |
| 37 | CINEMA | 0.79 | 0.82 |
| 38 | EXER1 | 0.65 | 0.60 |
| 39 | WISHES | 0.46 | 0.27 |
| 40 | INTER | 0.50 | 0.39 |
| 41 | PROB1 | 0.47 | 0.39 |

| Item # on SAQ | Item Label | Paper and Computer | Paper and Interview |
|---|---|---|---|
| 42 | PROB2 | 0.38 | 0.13 |
| 43 | CONT1 | 0.46 | 0.32 |
| 44 | CONT2 | 0.65 | 0.54 |
| 45 | CONT3 | -0.05 | 0.41 |
| 46 | CONT4 | 0.34 | 0.45 |
| 47 | HARD_LI | 0.66 | 0.58 |
| 48 | SAT_LI | 0.48 | 0.81 |
| 49 | ENTHUS | 0.32 | 0.77 |
| 50 | CHEER | 0.41 | 0.71 |
| 51 | AGIT | 0.44 | 0.34 |
| 52 | DISTRES | 0.54 | 0.57 |
| 53 | UNEASY | 0.56 | 0.40 |
| 54 | GOOD_DA | 0.54 | 0.41 |
| 55 | HAPPY | 0.47 | 0.38 |
| 56 | UPSET | 0.62 | 0.51 |
| 57 | DELIGHT | 0.36 | 0.65 |
| 58 | TENSE | 0.45 | 0.19 |
| 59 | PROB3 | 0.32 | 0.67 |
| 60 | PROB4 | 0.48 | 0.57 |
| 61 | PROB5 | 0.54 | 0.67 |
| 62 | PROB6 | 0.24 | 0.61 |
| 63 | BLUE | 0.37 | 0.51 |
| 64 | ORDIN | 0.62 | 0.54 |
| 65 | MEM1 | 0.70 | 0.82 |
| 66 | MEM2 | 0.28 | 0.73 |
| 67 | CONCEN | 0.59 | 0.60 |
| 68 | MONEY1 | 0.77 | 0.83 |
| 69 | MONEY2 | 0.74 | 0.63 |
| 70 | SEX | 0.70 | 0.59 |

Based on Landis and Koch's (1977) interpretation of kappa coefficients, 84% of

comparisons reported here suggest that the computerized SAQ and the interviewer-administered

SAQ demonstrate at least moderate agreement ($\kappa \geq 0.41$) with the traditional pencil-and-paper

version. In fact, the average level of agreement between items from the paper-and-pencil version

and the computerized SAQ was $\kappa = 0.61$, and between the paper-and-pencil and interviewer-

administered version was $\kappa = 0.63$. Substantial and almost perfect agreement can be seen

amongst the demographic and lifestyle-type items (e.g., height, sleep habits, vitamin use) and

amongst the health status and health utilization-type items (e.g., health status, drugs, doctor

visits). Levels of agreement for items making up the Negative Orientation, Positive Orientation,

and Activity factors, as well as the health locus-of-control items that make up part of the Health

factor were found to range from fair to substantial. The average level of agreement between the

paper-and-pencil and computerized version, and between the paper-and-pencil and interviewer-

administered version were $\kappa = 0.53$ and $\kappa = 0.45$, respectively for the Negative Orientation

factor; $\kappa = 0.44$ and $\kappa = 0.61$ respectively for the Positive Orientation factor; $\kappa = 0.61$ and $\kappa =$

0.60, respectively for the Health factor; and $\kappa = 0.71$ and $\kappa = 0.66$, respectively, for the Activity

factor.

As indicated earlier, item 14, which asks about an individual's functional abilities,

showed poor agreement between paper and computerized versions (i.e., −0.30), which is likely

related to the use of double-negatives in the phrasing of the item. For this reason, it was dropped

from all subsequent analyses. Item 14 was one of only four items that demonstrated slight or

poor levels of agreement.

Overall, the kappa coefficients, shown in table 15 and reported here suggest that there is

quite a reasonable level of agreement between different versions of the SAQ at the item and

factor level.


**Test-Retest Reliability**

Intra-class correlations between ratings at baseline and seven days later (via different

formats) for the 76 participants showed high test-retest reliability (Negative Orientation factor

ICC =.87, 95% CI = .80, .92; Positive Orientation factor ICC = .89, 95% CI = .82, .93; Activity

factor ICC = .90, 95% CI = .84, .94; Health factor ICC = .93, 95% CI = .89, .96). Since the

alternate methods of administration were found to be equivalent to each other over a one-week

time interval and to have high test-retest reliability, then it can be reasonably deduced that there

will be similar high levels of test-retest reliability between two administrations of the same format of the SAQ over the same time interval.

## Participant Preferences

The follow-up questionnaire was intended to be administered to every participant following completion of the second SAQ. However, the research assistant forgot to give the participants the follow-up survey in just over half the cases ($n = 41$). Eight of these respondents had completed the computer version first, then the paper version and 11 of these respondents completed the SAQs in the reverse order. Ten of the missed respondents completed the interview-administered SAQ first and then the paper version, while 12 of the missed respondents completed the SAQs in the reverse order. In all, 50% of the participants who were administered the computerized version of the SAQ completed the follow-up questionnaire, while 42% of those who completed the interview-administered SAQ also completed the follow-up survey.

Of the 35 participants who completed the follow-up survey, 25.7% rated the pencil-and-paper version as "very easy" to complete and 68.6 % rated it as "easy". Only two participants rated the paper-and-pencil version as "difficult" or "very difficult" to complete.

Of those 19 participants who were administered the computerized SAQ, 31.6% rated it as "very easy" to complete and 63.2% rated it as "easy" to complete. Only one participant found that the computerized SAQ was "very difficult" to complete. Forty-two percent of participants from the computerized SAQ group indicated that they had no preference for method of administration, while 36.8% preferred the computerized version and 21.0% preferred the paper-and-pencil version. A binomial test revealed no significant difference in the proportion of participants who preferred one version over the other ($p = .55$). Forty-two percent of those in the

computerized SAQ group reported that they have "never" used a personal computer, while another 42% stated that they used a personal computer "every day" or "almost every day". One participant reported "almost never" using a personal computer, one reported using a computer "every month" and one stated they used a computer "almost every week".

Of those 16 participants who completed the interviewer-administered SAQ, 37.5% rated it as "very easy" to complete and the remaining 62.5% found it to be "easy". Nineteen percent of participants from the interviewer-administered SAQ group indicated that they had no preference of method of administration, while 75% preferred the interviewer-administered version. Only one individual reported a preference for the paper-and-pencil version. The interviewer-administered version was definitely preferred over the traditional paper-and-pencil version ($p <$ .005)

Since test-retest reliability and alternate forms reliability is based on the premise that the respondents have not changed on the domains assessed over the time interval between administrations, upon completion of the second SAQ participants were given an evaluation questionnaire and asked to record any significant life events that occurred during the previous seven days which may confound the reliability of the SAQ (e.g., major changes to health, living situation, socioeconomic status, psychological well-being). Only two of the 35 participants surveyed indicated that they had experienced a significant life event – one participant experienced the death of a pet, the other experienced the death of a close friend. However, both felt that these events did not impact their responses on the SAQ.

Results of the follow-up survey show that participants found all versions of the SAQ to be easy to complete. Not surprisingly, of those who indicated a preference, the interviewer-

administered version was preferred over the paper-and-pencil version, and preferences for the

computerized or paper-and-pencil versions were not statistically different from each other.

In summary, Study 2 examined the test-retest reliability of the SAQ, as well as the

reliability of newly developed, alternate methods of administration of the SAQ (i.e.,

computerized SAQ and interviewer-administered SAQ). Results indicate that the new methods of

administration can be considered equivalent to the traditional, self-report paper-and-pencil

version of the SAQ, and that participants found both the interviewer-administered and

computerized-versions to be easy to complete. Test-retest reliability over a 7-day period, across

different formats of the SAQ was found to be high, suggesting that test-retest reliability across

two administrations of the same format of the SAQ should also be good.

## STUDY 3: METHODS

The purpose of this study was threefold: (a) to examine the convergent validity of the SAQ with a validity measure that is conceptualized to share some of the dimensions of the SAQ (i.e., SF-36), (b) to determine whether the SAQ was able to discriminate between groups of older adults known to differ in their clinical health status, and (c) to determine whether the SAQ was able to detect changes in the healthy aging status of participants over time.

**Sample and Recruitment**

One of the approaches to validation of the SAQ was through criterion groups that could be compared in terms of presumed levels of overall healthy aging (known-groups validation) and then followed over time to examine the SAQ's ability to detect change. Participants, matched by age and gender, were recruited from the following two criterion groups.

Rehabilitation Inpatients. Twenty-five participants were recruited from a unit of geriatric rehabilitation inpatients at a local chronic care and rehabilitation hospital. The Reactivation Service is "an in-patient rehabilitative program designed for older individuals who have experienced a recent decline in their independent functions, due to progressive debilitation and/or physical de-conditioning. The program addresses the needs of individuals whose clinical and/or social problems prevent them from coping adequately with the demands and activities of daily living in their own homes" (St. Joseph's Care Group, 2002). Criteria for admission to the Reactivation Service are that the client: (a) is de-conditioned (by inactivity or medical setback), (b) is medically stable, (c) is able to follow instructions, (d) would benefit from a multidisciplinary approach to their care needs, (e) is able to respond to rehabilitation and participate in their program, (f) has a significant degree of mobility, strength and cognition to actively participate in their transfers, (g) has the desire and motivation to participate in their

program, and (h) has the potential to be discharged home/back to the community (St. Joseph's

Care Group, 2002). The Reactivation Service is a 20-bed unit, where, on average, 67% of

patients are admitted from acute care; 31% are admitted from the Transition Service (sub-acute,

slow-stream rehabilitation), and 2% are admitted from the community. The average length of

stay on the unit is 33 days, the average age of patients is 78.9 years (51-99 years), and 40% are

male. The most common diagnoses include stroke, hip fractures, chronic obstructive pulmonary

disease and inability to cope (2002-2003 data; Dr. Elizabeth Moore, personal communication). A

patient is discharged from the Reactivation Service when one of the following occurs: (a) the

treatment goals have been achieved, (b) the client has reached his/her maximum functional

potential, (c) the client desires to leave the program, or (d) the client's medical condition

becomes unstable and requires transfer to an acute care facility. In 2002-2003, 80% of the

patients on the Reactivation Unit were discharged home, 14% were transferred to the Transition

Service, 5% were transferred to acute care, and 1% died while on the unit (Dr. Elizabeth Moore,

personal communication).

Active Community-Dwelling Older Adults. Forty-five participants were recruited from

fitness classes (i.e., low-impact aerobics, stretch and strengthen) run through local senior's

centres and 36 participants were recruited through a local curling club. Interested individuals

were excluded from participating if they were receiving homecare services. These 81 participants

provided the sample from which a sub-sample of 23 participants were selected that matched the

age and gender of 23 of the hospital participants. Two additional female hospital participants

could not be matched with a community-dwelling participant, as there were none that were over

90 years of age. Across all groups, individuals were excluded from the study if they were unable

to read English.

**Questionnaires/Materials**

Successful Aging Quiz. The SAQ, which has been described earlier, is a 70-item self-administered questionnaire that requires approximately 20 minutes to complete (see Appendix A). If a participant had visual impairment or requested assistance completing the questionnaire, the interviewer-administered SAQ was used instead. The interviewer-administered SAQ is based on the traditional pencil-and-paper SAQ, except the items have been rephrased into questions, and the interviewer records the responses provided by the participant. Results of study 2 indicate that the interviewer-administered SAQ is psychometrically equivalent to the traditional pencil-and-paper self-administered version of the SAQ (See Appendix F).

SF-36. The SF-36 (Ware & Sherbourne, 1992), also described earlier, is a 36-item self-administered generic measure of health status that takes approximately 15 minutes to complete (see Appendix G). As with the SAQ, if the participant had visual impairment or requested assistance completing the questionnaire, the SF-36 was administered by the researcher using the interview-format.

Modified Mini-Mental State Examination (3MS). The 3MS (Teng & Chui, 1987) is a widely-used brief screening of cognitive impairment that can be administered by a trained interviewer in approximately 20 minutes (see Appendix H). The 3MS was used to screen for cognitive impairment in the hospital participants, as there is a high incidence of dementia and cognitive difficulty among hospitalized elderly, which may impede their ability to accurately complete the SAQ or any other self-report instrument (Hickey, Clinch, & Groarke, 1997). The standard cut-off of 77 out of 100 on the 3MS is suggestive of cognitive impairment. Thus, patients who scored less than 77 were excluded from participating in this study.

**Procedure**

Hospital Patients. Each patient newly admitted to the Reactivation Service at St.

Joseph's Hospital beginning March 1, 2003 was considered eligible for the study. Within three

days of admission to the program, each new patient was assessed by the Occupational Therapists,

who administered the 3MS (Teng & Chui, 1987; see Appendix H) as part of their normal

assessment. If the patient scored above the cut-off (>77 out of 100), and the multidisciplinary

treatment team felt that they were not likely suffering from cognitive impairment and were able

to communicate sufficiently in English, they were invited by the researcher to take part in the

study.

The researcher then met with each potential participant, during a time when they were not

in active therapy. Potential participants were provided with an information sheet (see Appendix

I), and the researcher described what the study entailed. If the patient was interested in

participating, a signed informed consent was obtained (see Appendix J) and a time was set up to

complete the first SAQ. Hospital patients were recruited until there were a total of 25 participants

in the study. This required a total of 33 referrals from the Occupational Therapists, as eight

potential participants declined participation (a 75% response rate).

Within seven days of their admission, the researcher met with each participant to

complete the first SAQ. In order to examine the convergent validity of the SAQ, participants

were also asked to complete the SF-36 (Ware & Sherbourne, 1992). If a participant was unable

to read and/or complete the questionnaires on their own, due to visual or fine motor difficulties,

the researcher administered the questionnaires in an interview format, whereby she read the each

item to the participant and asked them to indicate their responses. The response categories from

the original questionnaire (e.g., not at all, a little, a lot) were printed in 18-point font on a piece

of laminated cardboard and presented to the participant while the items were being read so that they could visually examine their options before selecting a response.

In order to assess the SAQ's ability to measure sensitivity to change, participants were then asked to complete the SAQ and the SF-36 again, just prior to discharge or transfer from the Reactivation Service. Time of discharge was selected as the most appropriate time for retesting, rather than an arbitrary pre-specified time frame (e.g., 3 months), since discharge assumes that the patient has either reached their treatment goals, or their health status has changed to such as significant degree that further care is needed.

In addition to completing the SAQ and SF-36, at discharge both the participant, and the participant's treatment team as a whole, were asked to provide a rating of the participant's improvement, on a 1 to 5 scale (see Appendix K). As previously discussed when outlining discharge destinations, it was not expected that all participants would have improved over the course of their stay in the hospital, and therefore some participants were expected to do worse at retesting. It was hypothesized that the SAQ would change in the same direction as the SF-36, and that SAQ scores at discharge would correlate with participants' self-assessment of their improvement, as well as the treatment team's assessment of level of improvement over the course of treatment.

Active Community-Dwelling Older Adults.  Active community-dwelling older adults were first recruited through fitness classes run through local senior's centers and later from a local senior men's curling club. For the initial round of data collection the researcher attended the first class of four different fitness courses being offered through local senior's centers. At each fitness class the researcher provided the group with a short information session about the study, and distributed information sheets (see Appendix L) describing the study. Interested

participants provided informed consent (see Appendix M) and were given the SAQ and SF-36 in a self-addressed stamped envelope. Of 48 interested individuals who elected to take an SAQ home, 45 (94%) returned the questionnaire by mail. Since this sample was being collected at the same time that the hospital recruitment was occurring, a large number of community-dwelling participants was desired, since they were going to serve as matched controls. It was expected that the hospital recruitment process would be slow and that the ages and gender ratio of the hospital sample would be unknown at the time the community data were being collected, so a community sample at least double the size of the hospital sample was expected to be necessary to find adequate matches for each hospital participant.

In order to assess the SAQ's ability to measure sensitivity to change, fitness participants were asked to complete the SAQ and the SF-36 eight weeks later, or at the end of the fitness class session. The researcher therefore returned at the end of the 8-week session and distributed questionnaire packages to the participants who had completed the questionnaires at time 1. Five participants had to be contacted by telephone and mailed the package because they did not attend the last fitness class. At time 2, the participants were also asked to provide a rating of the improvement in overall health over the eight weeks, on a 1 to 5 scale (see Appendix K). It was not expected that this sample would show any significant change in their healthy aging status over that period of time.

Because of the low proportion of males in the fitness classes and the need for male participants to match those recruited from the hospital, the researcher also attended one pre-game morning meeting at a senior men's curling club. As with the fitness participants, the curlers were provided with a short information session about the study, and distributed information sheets (see Appendix N) describing the study. Interested participants provided informed consent (see

Appendix O) and were given the SAQ and SF-36 in a self-addressed stamped envelope that they

were encouraged to complete at home and return by mail. Of the 40 interested curlers who

elected to take a SAQ home, 36 (90%) returned the questionnaire by mail. Those seven

participants who were ultimately matched with hospital participants were contacted eight weeks

after completing their initial SAQs and SF-36s and asked to complete a time 2 package, that was

mailed to them in a self-addressed, stamped envelope. All seven participants returned their

completed questionnaires.


**Method of Analysis**

Convergent Validity. The convergent validity of the SAQ was assessed by examining

correlations of items and subscales from the SAQ with items and subscales from the SF-36. With

convergent validity, measures of constructs that theoretically should be related to each other are,

in fact, observed to be related to each other (DeVellis, 1991).

It was expected that both at time 1 and time 2, the items that the SF-36 and SAQ share in

common (i.e., SF-36 item 1, "In general, would you say your health is" is identical to SAQ item

8; SF-36 item 9f, "Have you felt downhearted and blue?" is identical to SAQ item 63), would

demonstrate convergent validity and thus correlate strongly (but negatively, as their response

scales are opposite). As well, it was expected that the SF-36 Physical Component Summary

Scale as well as the Physical Functioning, Role-Physical and General Health subscales would

correlate highly with the SAQ Health factor. In addition, the SF-36 Social Functioning subscale

was expected to correlate with the SAQ Activity factor and Health factor. The SF-36 Vitality

subscale, the Role-Emotional subscale, the Mental Health subscale, as well as the Mental

Components Summary scale were hypothesized to show convergent validity with the SAQ

Positive Orientation factor.

Known-Groups Validation. Factor scores from the SAQ (i.e., Positive Orientation,

Negative Orientation, Activity and Healthy, as measured at time 1 or admission) were compared

using multivariate analysis of variance (MANOVA) between the hospital and active community

groups to see if scores differed significantly in the expected direction.

Two individual logistic regressions were also performed to predict group membership

(hospital or active community) on admission or time 1 on the basis of: (a) the four SAQ factors,

and, (b) the individual items that make up the four SAQ factors. Stepwise logistic regressions

were selected because of the inter-correlations of the items and subscales under examination. In

each case, all the factors or items were entered together in one step.

Ratings of Improvement . Self-ratings of improvement in health over the course of the

study were calculated separately for the hospital and active community groups. Team's ratings of

improvement for the hospital group were also calculated, and correlated with the self-ratings. It

was expected that the hospital group's self- and team- ratings would be positive and would

correlate positively with each other, indicating that the participants improved over the course of

their hospitalization, while the active community group were expected to report no change in

their general level of health and functioning.

The self-ratings and team ratings were then correlated with the participants' time 2 SAQ

factor scores. It was expected that self-rated improvement would be correlated with the Health

factor.

Sensitivity to Change. Sensitivity to change at the factor level was examined using a

repeated measures analysis of variance (RM ANOVA), with Time (i.e., time 1 and time 2) and

SAQ factors (i.e., Negative Orientation, Positive Orientation, Health and Activity) as the within-subjects variables, and Group (i.e., hospital and active community participants) as the between-subjects factor. For this analysis, the factor scores were rescaled so that high scores indicate worse performance on all four factors. This was done to avoid possible interaction effects that may be an artifact of the original factors being scored in opposite directions (i.e. high scores on Activity and Positive Orientation were suggestive of more non-work activity and a more positive orientation towards life, while high scores on Health and Negative Activity suggested poorer health and a more negative orientation towards life). Also, since the SAQ factors are not on the same scale, Z-scores were computed and used for this analysis. Pillai's Trace was used to determine multivariate significant effects as it is the most robust criterion for use with unequal group sizes (Tabachnick & Fidell, 2001). The strength of association between the independent variable and the set of dependent variables was denoted by $\eta^2$, the proportion of variance accounted for in the linear combination of dependent variables (Tabachnick & Fidell, 2001).

Sensitivity to change at the item level was explored using paired-samples t-tests for each of the 40 items that make up the SAQ factors. To control the family-wise error rate and the number of Type I errors, calculations were only done with the group that was expected to show change - hospital patients. As well, a Bonferroni correction was calculated, $p < .003$, and used for the determination of significant results.

## STUDY 3: RESULTS

### Characteristics of the hospital sample

The hospital sample was made up of 25 participants ranging in age from 60 to 93 years ($M$ = 78.6 years, $SD$ = 8.09 years). Three (12%) participants were in their 60s, 7 (28%) were in their 70s, 13 (52%) were in their 80s, and 2 (8%) participants were over 90 years of age. Women represented the majority of the of the hospital sample ($n$ = 18; 72%). The majority of participants were widowed ($n$ = 14; 56%), 5 (20%) were separated or divorced, and only 6 (24%) were married. The average length of stay on the Reactivation Unit was 32.6 days ($SD$ = 22.9 days), and all of the clients returned home.

### Characteristics of the active community sample

The active community sample was made up of 23 participants ranging in age from 60 to 88 years ($M$ = 77.5 years, $SD$ = 7.4 years), who were selected from a larger pool of participants ($N$ = 81) recruited from senior's fitness classes and the local senior men's curling club, in an effort to match the hospital participants by age and gender. All but the two oldest hospital participants (ages 90 and 93 years) found adequate matches from the active community sample. A series of one-way analysis of variance found no significant differences between those selected as matches, and those from the larger active community sample on the four factors of the SAQ (Negative Orientation, $F(1, 80) = 0.01$, $p = .91$; Activity, $F(1, 80) = 2.88$, $p = 0.09$; Health, $F(1, 80) = 0.93$, $p = 0.34$; and Positive Orientation, $F(1, 80) = 0.40$, $p = .35$). However, not surprisingly, this sub-sample was significantly older than the larger community sample from which it was taken ($F(1, 79) = 35.6$, $p < 0.001$), with the average age fully 10 years older than

that of the active community sample ($M = 67.7$, $SD = 6.37$ years). Fifty-six percent of the sub-

sample of active community participants were married, while 43.5% were widowed.

**Convergent Validity**

Table 16 shows the inter-correlations of the SAQ factors and the SF-36 scales. Baseline

correlations can be found below the diagonal, while time 2 correlations can be found above the

diagonal.

As expected, at baseline the SF-36 scales correlated with each other at levels suggested

by Ware (1993). At time 2, many of the significant correlations between the SF-36 Scales and

the Role-Emotional scale, the Mental Health scale and the Mental Summary Scale were no

longer significant.

As expected the SAQ Negative Orientation factor and the Health factor both correlated

strongly, and negatively, with all the scales on the SF-36, at baseline and time 2. In other words,

having poor health or a negative orientation towards life is correlated with being limited in

performing physical activities (Physical Functioning Scale), having problems with daily

activities as a result of physical health (Physical-Role Scale), having severe and limiting pain

(Bodily Pain Scale), evaluating personal health as poor and likely to get worse (General Health

Scale), feeling worn out and tired most of the time (Vitality Scale), having interference in social

activities due to physical or emotional problems (Social Functioning), having problems with

daily activities as a result of emotional problems (Role-Emotional), and feeling nervous and

depressed (Mental Health Scale). Also, as hypothesized, both at baseline and time 2, the SAQ

Activity Scale was found to have a positive correlation with the SF-36 Physical Functioning,

Role-Physical, General Health, and Social Functioning Scales, as well as with the Physical

Component Summary Scale. At both baseline and time 2, the SAQ Positive Orientation factor was also correlated positively with the SF-36 Vitality Scale, Role-Emotional Scale, Mental Health Scale and Mental Health Summary Scale, which is consistent with the hypothesized relationship.

Table 16. Inter-Correlations of SAQ Factors and the SF-36 Scales (Baseline correlations are below the diagonal, time 2 correlations are above the diagonal).

| Measure | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. SAQ Negative Orientation | — | -.50* | -.05 | .38* | -.23 | -.36* | -.39* | -.42* | -.43* | -.37* | -.47* | -.51* | -.25* | -.57* |
| 2. SAQ Positive Orientation | -.49* | — | .00 | -.09 | .15 | .05 | .16 | .11 | .47* | .08 | .54* | .42* | .00 | .53* |
| 3. SAQ Activity | .05 | -.00 | — | -.46* | .55* | .40* | .22 | .30* | .04 | .47* | .03 | -.05 | .47* | .-.02 |
| 4. SAQ Health | .39* | -.22 | -.39* | — | -.66* | -.62* | -.64* | -.67* | -.44* | -.69* | -.16 | -.16 | -.72* | -.22 |
| 5. SF-36 Physical Functioning | -.35* | .28 | .51* | -.73* | — | .68* | .71* | .53* | .46* | .73* | .06 | .15 | .88* | .07 |
| 6. SF-36 Role-Physical | -.26 | .10 | .39* | -.43* | .63* | — | .63* | .62* | .54* | .83* | .14 | .22 | .83* | .26 |
| 7. SF-36 Bodily Pain | -.61* | .24 | .19 | -.66* | .69* | .56* | — | .59* | .51* | .70* | .11 | .16 | .84* | .15 |
| 8. SF-36 General Health | -.48* | .26 | .37* | -.76* | .66* | .69* | .69* | — | .48* | .59* | .13 | .30* | .70* | .27 |
| 9. SF-36 Vitality | -.59* | .41* | .20 | -.60* | .66* | .68* | .68* | .68* | — | .67* | .39* | .72* | .43* | .70* |
| 10. SF-36 Social Functioning | -.40* | .08 | .50* | -.63* | .75* | .73* | .73* | .66* | .66* | — | .13 | .15 | .81* | .30* |
| 11. SF-36 Role-Emotional | -.54* | .29* | .08 | -.42* | .26 | .49* | .49* | .44* | .35* | .20 | — | .44* | -.10 | .80* |
| 12. SF-36 Mental Health | -.60* | .29* | .22 | -.41* | .45* | .59* | .59* | .49* | .67* | .48* | .51* | — | .02 | .82* |
| 13. SF-36 Physical Component | -.34* | .19 | .44* | -.69* | .90* | .77* | .77* | .75* | .67* | .83* | .16 | .34* | — | -.04 |
| 14. SF-36 Mental Component | -.68* | .29* | .19 | -.49* | .38* | .63* | .63* | .56* | .69* | .54* | .78* | .87* | .31* | — |

* significant at p<0.05

Finally, the two items that the SAQ and SF-36 share in common were significantly correlated. As hypothesized, SAQ item 8 and SF-36 item 1 (i.e., "In general, would you say your health is..."), which have opposite response scales, were found to correlate at $r = -.91$, $p <.001$ and $r = -.67$, $p < .001$, at baseline and time 2 respectively. Also as hypothesized, SAQ item 63 and SF-36 item 9f (i.e., "Have you felt downhearted and blue?"), which also have opposite response scales, were found to correlate at $r = -.55$, $p <.001$, and $r = -.66$, $p < .001$, at baseline and time 2 respectively.

Together these findings provide good evidence of the convergent validity of the SAQ with a reliable, valid, and sensitive measure of general health status, the SF-36.

**Known-Groups Validation**

The two-way between-subjects MANOVA conducted on the baseline SAQ factors revealed a significant Group effect, $F(4, 43) = 16.80$, $p < .001$, $\eta^2 = .61$. Table 17 gives the mean baseline SAQ factor scores for the hospital and active community participants. The hospital patients were hypothesized to score higher on the Negative Orientation and Health factors (high scores indicating poorer health and more negative orientation), and lower on the Activity and Positive Orientation factors (lower scores indicating less activity and less positive orientation) than the active community participants. Results show that Negative Orientation, Health and Activity discriminated among the groups at a highly significant level in the hypothesized direction.

Table 17. Comparison of the Groups on Their Baseline SAQ Factor Scores by Multivariate Analysis of Variance.

| Factor Scores | Groups | | F-ratio |
|---|---|---|---|
| | Hospital (n=25) | Active Community (n=23) | |
| Negative Orientation | 25.64 | 21.87 | 6.29* |
| Positive Orientation | 42.64 | 44.26 | 1.07 |
| Activity | 18.88 | 27.61 | 25.14** |
| Health | 26.52 | 19.35 | 34.68** |

* p<0.05 ; **p<.001

A stepwise (i.e., forward continuous) logistic regression was performed to predict group membership on the basis of the four SAQ factors. See Table 18 below.

Table 18. Logistic Regression Predicting Group Membership on the Basis of SAQ Factors (variables in the equation).

| Step | Predictor | B | SE | Wald Statistic | Odds Ratio | 95% CI | |
|---|---|---|---|---|---|---|---|
| | | | | | | Lower | Upper |
| Step 1 | Health | 0.38 | 0.11 | 13.16** | 1.46 | 1.19 | 1.78 |
| Step 2 | Activity | -0.38 | 0.14 | 6.93* | 0.69 | 0.52 | 0.91 |
| | Health | 0.48 | 0.16 | 8.40** | 1.61 | 1.17 | 2.22 |

* $p < .01$, ** $p < .001$

Not surprisingly, there was a good model fit (discrimination among groups) on the basis of the Health factor, ChiSq(1) = 25.36, $p$ <.001, which suggests that participants with poorer health had almost one and a half times the odds of being in the hospital group than the active community group (Wald(1) = 13.16, $p < .001$). In addition, the Health factor alone was able to correctly identify 82.6% of the active community participants and 84% of the hospital

participants. However, the model showed reliable improvement with the addition of the Activity factor as a predictor, ChiSq(1) = 15.35, $p < .001$. This suggests that as participants' activity level decreases, a participant increases their risk of being in the hospital group (Wald(1) = 6.93, $p <$ 0.01). A combination of the Health and Activity factors were able to correctly predict group membership 91.7% of the time.

A stepwise (i.e., forward continuous) logistic regression was also performed to predict group membership on the basis of the forty individual items that make up the four SAQ factors. See Table 19 below.

Table 19. Logistic Regression Predicting Group Membership on the Basis of SAQ Items (variables in the equation).

| Step | Predictor | B | SE | Wald Statistic | Odds Ratio | 95% CI Lower | Upper |
|------|-----------|---|----|----------------|-----------|--------------|-------|
| Step 1 | DRUGS (item 13) | 1.52 | 0.45 | 11.47** | 4.56 | 1.90 | 10.97 |
| Step 2 | DRUGS | 1.90 | 0.62 | 9.51* | 6.67 | 2.00 | 22.28 |
| | EXER1 (item 38) | -0.99 | 0.35 | 8.20* | 0.37 | 0.19 | 0.73 |

* $p < .005$, ** $p < .001$

There was a good model fit (discrimination among groups) on the basis of the number of prescription medications a participant was taking (item 13), ChiSq(1) = 21.20, $p < .001$, which suggests that participants taking six or more medications had four and half times the odds of being in the hospital group than the active community group (Wald(1) = 11.47, $p < .001$). In addition, the number of medications variable was able to correctly identify 90% of the active community participants and 70.8% of the hospital participants. The model showed reliable improvement, however, with the addition of the question that asked how often a participant engaged in fitness and exercise (item 38), ChiSq(1) = 15.35, $p < .001$. This suggests that those participants who exercised frequently had greater odds of being in the active community group

than the hospital group (Wald(1) = 8.20, $p < .01$). A combination of the medication usage and exercise frequency was able to correctly predict membership in active community group 90% of the time, and in the hospital group 91.7% of the time.

## Ratings of Improvement

Table 20 shows the levels of improvement reported by the participants themselves, and by the hospital team, when appropriate, for the hospital and active community participants.

Table 20. Self-Reported and Team-Reported Levels of Improvement, By Group.

| Response Options | Hospital Group (n=25) | | | | Active Community Group (n=23) | |
| --- | --- | --- | --- | --- | --- | --- |
| | Self-Rated | | Team-Rated | | Self-Rated | |
| | n | % | n | % | n | % |
| Much Worse | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Little Bit Worse | 0 | 0.0 | 1 | 4.0 | 0 | 0.0 |
| Stayed the Same | 4 | 16.0 | 4 | 16.0 | 18 | 82.6 |
| Little Bit Better | 8 | 32.0 | 7 | 28.0 | 4 | 17.4 |
| Much Better | 13 | 52.0 | 13 | 52.0 | 0 | 0.0 |

With the exception of one participant who rated herself as having improved a little bit, while the team assessed her as having gotten a little bit worse, the self-ratings and team-ratings for the hospital group are similar. They correlated significantly at $r = .90$, $p < .001$.

Examining the hospital group alone, self-rated improvement was only found to correlate (negatively) with Negative Orientation ($r = -.58$, $p < .005$) at discharge. Team-rated improvement was not found to correlate significantly with any of the four SAQ factors. Examining the active community group alone, self-rated improvement was also not found to correlate significantly

with any of the SAQ factors. However, across both groups, self-rated improvement was found to

correlate with Activity ($r = -.41$, $p < .005$) and Health ($r = .51$, $p < .001$).

## Sensitivity to Change

A repeated measures ANOVA performed on the rescaled and standardized SAQ factors,

Negative Orientation, Positive Orientation, Health, and Activity, showed a significant Factor by

Group interaction, $F(3, 44) = 7.30$, $p < .001$, $\eta^2 = .33$. However, the homogeneity of covariance

assumption was violated for Factor, Mauchly's $W(5) = .64$, $p < .05$, so the Greenhouse-Geisser

correction was used. A significant interaction of Factor by Group was still found, $F(2.32, 33.88)$

$= 8.99$, $p < .001$, $\eta^2 = .16$. This interaction provides essentially the same information as the 2-

way between subjects MANOVA conducted earlier, that is, the hospital group scored

significantly worse on the Negative Orientation, Health, and Activity factors than the community

group. There was no significant effect of Time. Table 21 shows the mean rescaled and

unstandardized SAQ factor scores at time 1, time 2, and overall, for the two groups of

participants. Figure 2 depicts the Factor by Group Interaction.

Figure 2. Factor X Group Interaction.
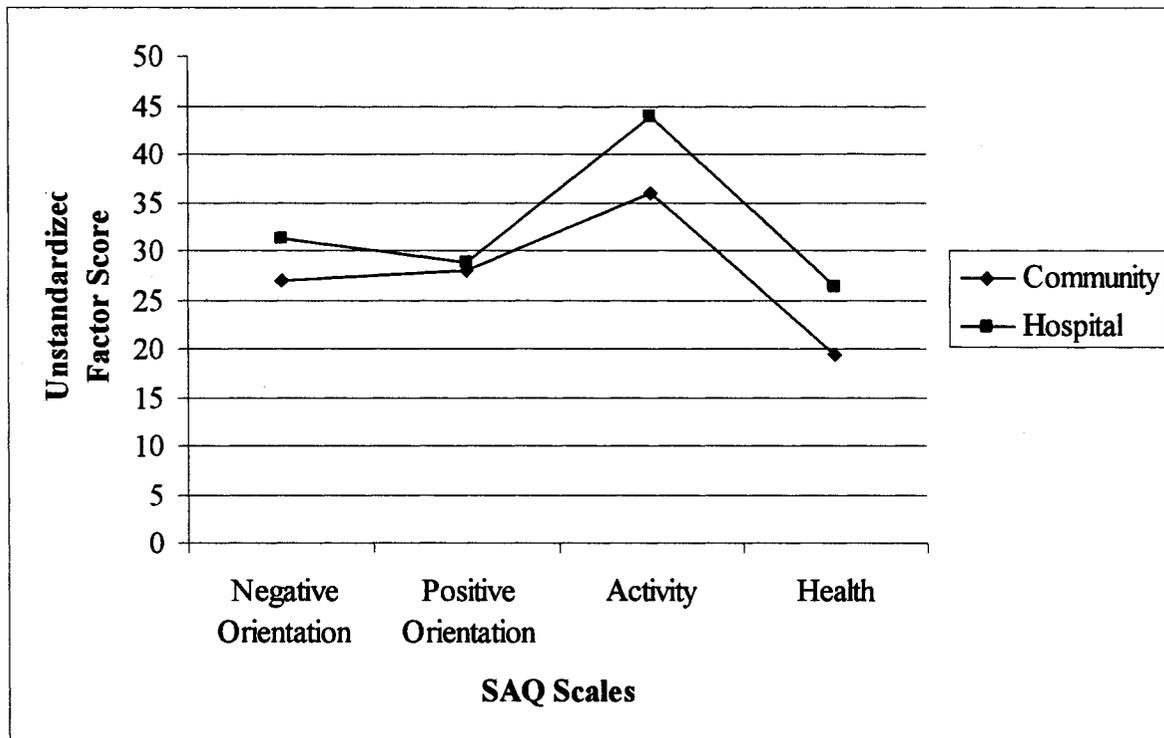


Table 21. Rescaled Means (and Standard Deviations) of SAQ Factor Scores as a Function of Group and Time.

| | Group | | | | | |
|---|---|---|---|---|---|---|
| | Active Community | | | Hospital | | |
| Factor | Time 1 | Time 2 | Overall | Time 1 | Time 2 | Overall |
| Negative Orientation | 26.56 | 27.35 | 26.96 | 31.20 | 31.20 | 31.20 |
| | (5.94) | (6.53) | (6.24) | (6.47) | (6.11) | (6.29) |
| Positive Orientation | 27.48 | 28.43 | 27.95 | 29.60 | 27.80 | 28.70 |
| | (3.89) | (5.60) | (4.75) | (6.71) | (6.45) | (6.58) |
| Activity | 35.39 | 36.39 | 35.89 | 18.88 | 19.32 | 19.10 |
| | (5.74) | (5.03) | (5.39) | (6.27) | (6.26) | (6.27) |
| Health | 19.35 | 19.52 | 19.44 | 26.52 | 26.16 | 26.34 |
| | (4.18) | (3.31) | (3.75) | (4.24) | (3.52) | (3.88) |

Sensitivity to change at the item level was explored in the hospital group using paired-samples t-tests for each of the 40 items that make up the SAQ factors. Using a Bonferroni correction of $p < .003$, two variables reached significance, perceived health status (item 8; $t(24)$ = 4.884, $p < .001$, 95% CI = .42, .1.02), and life satisfaction (item 48; $t(24)$ = -3.16, $p < .001$, 95% CI = -.77, -.19). These were two of the three variables (the other being item 47, "Life is hard for me most of the time") that were hypothesized to be most sensitive to changes in this population. As expected, over time hospital participants were found to rate their health status and life satisfaction as significantly higher on discharge than on admission.

In summary, Study 3 examined the convergent validity of the SAQ with the SF-36, a widely-used generic indictor of health status that shares some of the domains of the SAQ. Study 3 also sought to determine if the SAQ was able to discriminate between groups of older adults known to differ in their healthy aging status, and to examine whether the SAQ was responsive to changes in the status of these participants over time. As expected, strong associations were found between the SAQ factors and conceptually-related subscales from the SF-36. Results of Study 3 also indicate that the Negative Orientation, Health, and Activity factors are able to discriminate between hospitalized rehabilitation patients and active community dwelling older adults. At the item level, questions about number of prescription medication taken (item 13) and frequency of exercise (item 38) were able to accurately discriminate between the groups. Unfortunately, at the factor level, the SAQ was not able to detect changes in the health status of the hospital participants, which were reported by both the participants themselves as well as their health care team. At the item level, however, perceived health status (item 8) and life satisfaction (item 48) were found to have improved significantly over the course of their hospitalization.

# STUDY 4: METHODS

The purpose of this study was to determine whether the SAQ has convergent validity with a sample of respondents collected over the Internet. It was hypothesized that the 4-factor structure derived from the community sample would be maintained with the Internet version.

## Sample and Recruitment Procedures

An online or Internet-based version of the SAQ was developed and a sample of online participants were recruited by means of messages that were posted to Usenet newsgroups selected for their relevance to health promotion for older adults (e.g., alt.usenet.seniors; alt.usenet.heath), a procedure suggested by Buchanan and Smith (1999) and Szabo and Frenkl (1996). The availability of the online SAQ was also announced on several health-related electronic mailing lists, and links to it were made available from the webpages of the Canadian Association on Gerontology, the Canadian Public Health Association, and Health Canada – Division of Aging and Seniors. Each posted message contained a brief invitation to participate in the study, the URL (Internet location) where the SAQ could be found, and contact details for the researchers (see Appendix P). Messages were posted at regular intervals over a 12-month period. A total of 913 SAQs were completed during this time.

The comparison sample was comprised of the 297 individuals described in Study 1, who were recruited from among local community-dwelling older adults using traditional means, and who were asked to complete the pencil-and-paper version of the SAQ.

**Data Screening**

As indicated earlier, an Internet-based study such as this entails the risk that some of the observations are actually multiple responses from the same people, particularly since the Successful Aging webpage (described later) encourages participants to redo the SAQ months later to see if their responses have changed. In order to avoid using data from the same participants more than once, a question asking if they have done the quiz before was included. If a participant indicated that they had completed the SAQ before, then that SAQ was not included in the analysis, as it was assumed that their previous SAQ was already part of the dataset. Twenty-one individuals (2.4%) indicated that they had completed the SAQ before.

It is also possible to identify the unique Internet address of the computer being used by the participant as this information is also automatically collected by our database. In previous studies (e.g., Buchanan & Smith, 1999) this information was used to identify any multiple responses from the same computer, so that all but the first (chronological) response coming from any such address may be deleted from the data file. While this approach to data screening makes sense, it is understood that for some of our community's older adults their only access to a computer is through the laboratories at the local senior's centers. In addition, many participants told the researcher that they have one computer at home and planned to have many of their friends come over to complete the SAQ from the same computer. With this in mind, multiple submissions from the same Internet addresses within the same 24-hour period were examined to determine if the responses were from different individuals (e.g., different ages, height, weight). Thirty-three completed SAQs were found to be exact duplicates (i.e., having completely identical responses to at least one other submission within the previous 24 hours from the same computer).

Further data screening revealed that 38 SAQs had more then 50% blank responses

(always the 2<sup>nd</sup> half of the questionnaire). These SAQs were also excluded from the analysis.

The number of SAQs finally obtained was 821 (89.9% of the original dataset).

**Development of the Online SAQ**

The Internet-based or online SAQ was developed by a local Internet development

company. The pencil-and-paper version of the SAQ was programmed in HTML (hypertext

markup language), and included the same instructions, questions and response categories as the

traditional version, but instead of putting checkmarks or circling the desired response from a

Likert scale, participants were required to use the computer mouse to select each answer from a

pull-down list. None of the response categories are pre-selected by default (i.e., the pull-down

list initially showed a blank selection). Participants, however, were able to skip questions, as it

was not programmed to require a response before participants moved on to the next question, or

submitted their questionnaire for feedback.

Participants were able to access the Internet SAQ from the homepage of the Successful

Aging Project, www.successfulaging.ca. Once on the homepage, they could open the SAQ page

by clicking on the centrally-located "Take the 12 minute Quiz" button, or the "Quiz" link,

located on the sidebar. Just after the brief description of the SAQ participants are reminded that

"In accordance with Lakehead University's code of ethics, all responses are 100% confidential".

The more detailed Information and Privacy Statements (see Appendix Q), were accessible from a

"Privacy" link on the sidebar, as well as a link that appears before the "Show My Results" button

at the end of the SAQ. These Information and Privacy Statements are the Internet-version of the

traditional information letter and consent forms, and they describe the nature of the research, tell

participants that the information obtained from completion of the SAQ is used for research

purposes, and assure participants that Secure Socket Layer (SSL) is used to encrypt confidential

information enroute to the web site. Participants were assured of their confidentiality and it was

stated that all names and e-mail addresses are removed from submitted surveys before they are

released for statistical analysis.

Once on the SAQ page, participants enter their response to each question by selecting

from a pull-down list. Upon pressing the "Show My Results" button at the bottom of the form

when they are finished, their responses are transmitted to the computer server. The server records

the date and time at which the questionnaire was transmitted, saves the responses in a database,

processes the input, and provides feedback to the participant. A new page then opens that

provides participants with feedback on their healthy aging status. The information generated for

this feedback page was very basic and was based on the comparison between the participant's

scores and normative data obtained from the original instruments from which the individual SAQ

items were derived (e.g., "Life is hard for me most of the time" is derived from the GDS; Brink

et al., 1982) or from Statistics Canada information about the health status of older Canadians. For

example, the following is the generic feedback regarding social activity and health status,

respectively:

**Social Activity**
Your Social Activity score is (insert response). This score compares with an average of 8 on
a 0-15 scale, in previous research in Canada, where higher scores imply higher activity.
Social activity is important to health and well-being. If your score is below average, take
steps to become more socially active.

**Current Health**
Your answers on the survey were that you have (insert response) illnesses of an enduring
type, and rate your current overall health as (insert response). More than three-quarters of
Canadians rate their current overall health as satisfactory or better. Even if you think your
health is good, make sure you have an annual check-up with your doctor. Your doctor will
recommend tests that help to detect health problems at an early stage, and thereby prevent

diseases from developing into serious conditions. Also, do not neglect your dental health. Visit your dentist for a check-up and cleaning at least yearly.

## Method of analysis

The factorial structure of the Internet SAQ was analyzed through maximum likelihood confirmatory factor analytic procedures in order to determine whether the dimensions measured by the Internet version were the same as those identified in the paper-and-pencil SAQ. More specifically, the approach taken was to specify a measurement model that relates the items on the Internet SAQ to the four factors found with the paper-and-pencil SAQ administered in Study 1 to 297 participants (i.e., Negative Orientation, Positive Orientation, Health and Activity factors). The desired result was that the data from the Internet participants would fit the community-based model, thus confirming the relationship between the items and factors of the SAQ.

The confirmatory factor analysis was conducted using the LISREL 7.2 statistical software program (Jöreskog & Sörbom, 1989). If the paper-and-pencil SAQ and the Internet SAQ are equivalent, the same number of factors should account for similar proportions of variance and the same items should load on each factor (Tabachnick & Fidell, 2001), and the relationship between the factors should be the same. In recommending confirmatory factor analysis, Buchanan and Smith (1999) state, "if a model derived from exploratory factor analysis of a traditional test provides a good degree of fit to data obtained with a WWW equivalent, then we might say with some confidence that the two test versions had similar psychometric properties" (p. 133).

## STUDY 4: RESULTS

**Participants**

Of the 821 participants who completed the Internet SAQ (sample 1), 541 were female (65.9%) and 278 were male (33.9%). Two participants did not specify their gender. Since the target audience was adults over the age of 50, the most recent date of birth that that was programmed into the pull-down list was "after 1970" (or $\leq 33$ years old). Unfortunately 159 participants indicated that they were born in or after 1970. Thirty-three years of age was therefore the youngest age that could be calculated for this sample, and thus the mean age of the whole sample is artificially high. Bearing this in mind, the participants ranged in age from 33 to 82 years ($M = 47.5$, $SD = 12.0$). Sixty-two percent of the participants were married ($n = 509$), 20.7% ($n = 170$) were single, 10.8% ($n = 89$) were separated or divorced and 4.3% ($n = 35$) were widowed. Eighteen participants did not indicate their marital status. Splitting the sample into young and old, there were 475 participants who were younger than 50 years (range = 33 - 49, $M$ = 39.1, $SD = 5.8$), and 346 participants who were older than 50 years (range = 50 - 82, $M = 59.2$, $SD = 7.8$).

The model under examination was derived from a community-based, heterogeneous sample of 297 older participants who completed the traditional paper-and-pencil version of the SAQ as part of Study 1. The participants ranged in age from 51-92 years, with the average age being 71.3 years ($SD = 8.6$). Four individuals did not indicate their year of birth. Women represented 62.3% of this sample. Sixty-five percent of the participants were married, 23.2% were widowed and 11.1% were separated or divorced.

## Fit of the Factor Solution

Exploratory factor analysis of the community-based data obtained in Study 1 revealed a model with four inter-correlated latent variables underlying the SAQ. Figure 3 depicts the model of the SAQ factors. The fit of such a model to the Internet data was thus tested in a maximum likelihood confirmatory factor analysis using LISREL 7.2. In the model, items were specified as loading on the same factors as those identified in Study 1: factor 1 (Negative Orientation) comprised items 39, 40, 47, 51, 52, 53, 56, 58, 63, 64 and 67; factor 2 (Activity) comprised items 28, 30, 31, 32, 33, 34, 36, 37, and 38; factor 3 (Health) comprised items 8, 9, 12, 13, 43, 44, 45, and 46; and factor 4 (Positive Orientation) comprises items 42, 48, 49, 50, 54, 55, 57, 59, 60, 61, 65 and 66. The four factors were permitted to correlate.

Figure 3. 4-factor Model of SAQ.
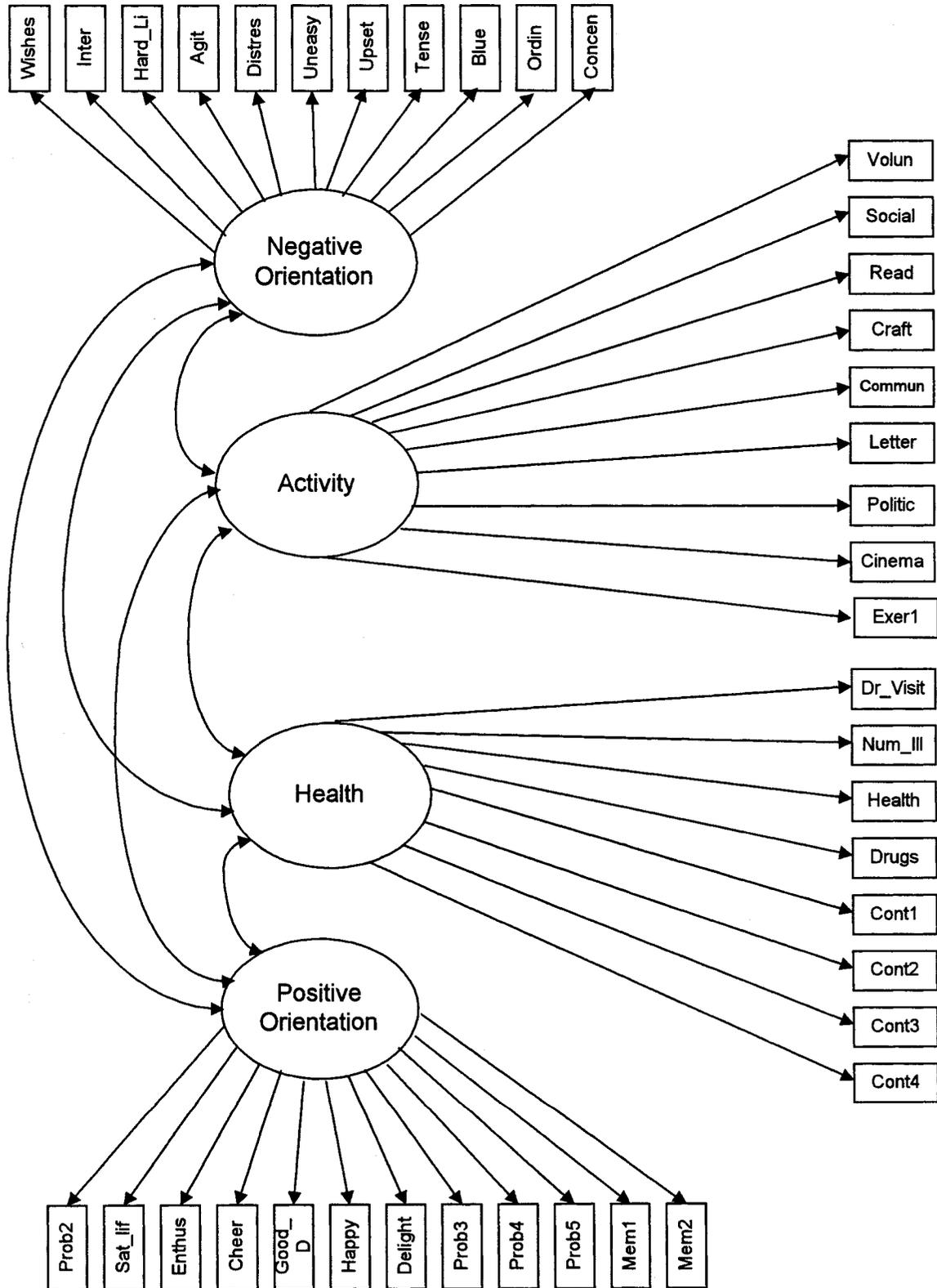
Confirmatory factor analysis uses the chi-square statistic to test the null hypothesis that the model fits the data (Crowley & Fan, 1997). When the hypothesized model was tested, the chi-square statistic was highly significant, with $\chi^2$ (944) = 3991.35, $p<.0001$, indicating moderate fit. However, it is known (e.g., Arbuckle, 1997; Crowley & Fan, 1997, Pedhazur, 1997) that with large samples (as is the case here) the higher power of the test may lead to rejection of a model which actually provides an acceptable fit to the data. For this reason, a number of other indices of model fit have been developed, and are used here in conjunction with the chi-square statistic to assess fit. The goodness of fit index (GFI) is a standardized overall measure of fit based on properties of the observed and reproduced values of the covariance matrix. The adjusted goodness of fit index (AGFI) is simply the GFI adjusted for the number of the model degrees of freedom. Jöreskog and Sörbom (1989) state that both these measures should be between zero (total lack of fit) and one (perfect fit). Another index of model fit is the root mean square residual (RMS), or the average of the fitted residuals from the covariance matrix (i.e., difference between an observed value and its corresponding reproduced or predicted value). With the RMS, values may range from zero (perfect fit) to 1 (total lack of fit) (Pedhazur, 1997).

For the Internet sample, the GFI of 0.80, AGFI of 0.78 and the RMS of 0.10 indicate a reasonable fit of the model to the data. The parameters are shown in Figure 4. Latent constructs are shown in ellipses and the observed variables are shown in rectangles. The total coefficient of determination for the structural equations was high, at .996.

Figure 4. Standardized Coefficients and their Standard Errors for the 4-Factor Model.
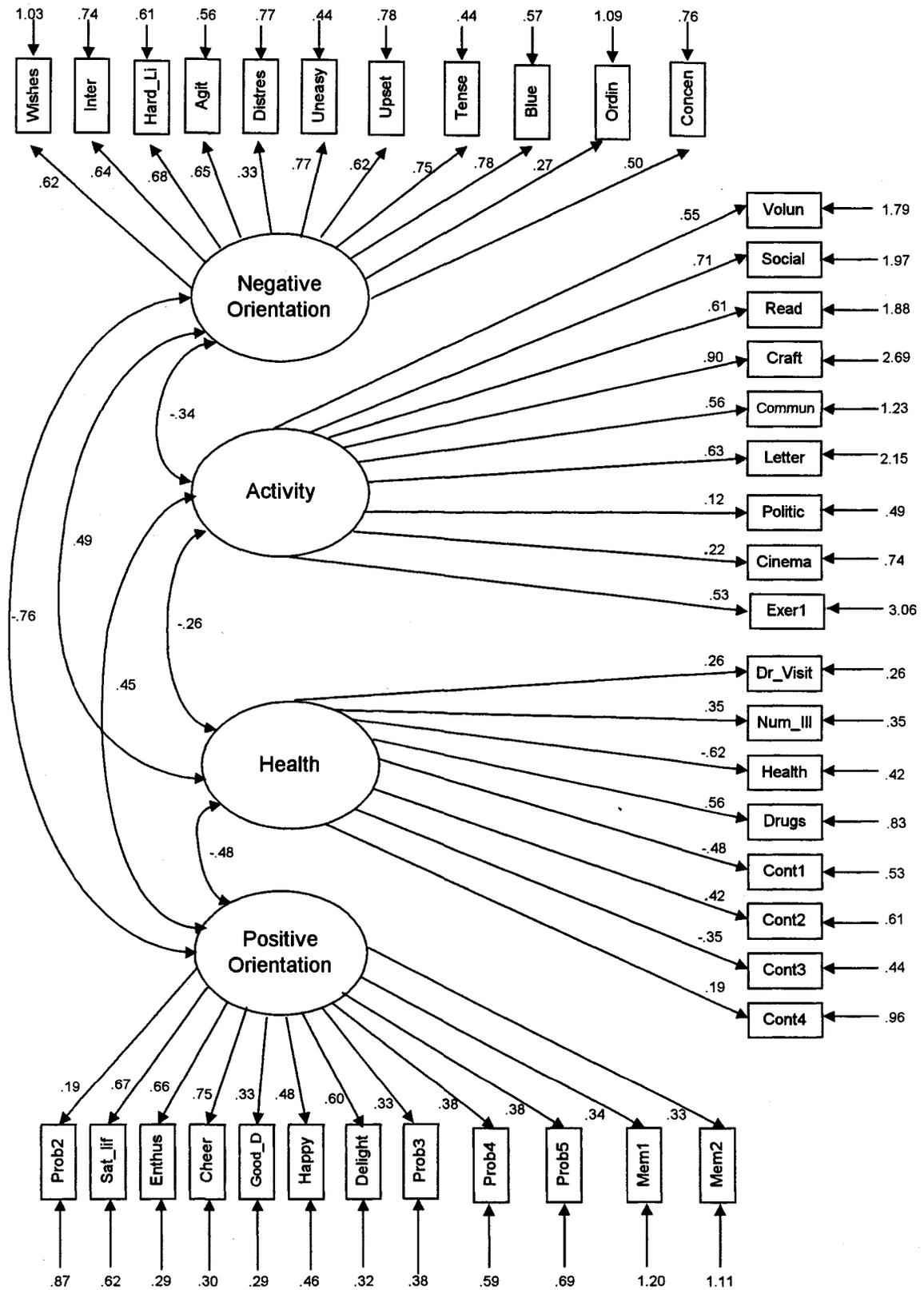
In summary, Study 4 examined the convergent validity of the SAQ with a large sample of participants who completed a computerized SAQ via the Internet. Results of the confirmatory factor analysis indicated that the 4-factor model of the SAQ, derived in Study 1 with the community-dwelling older adults, provides a good fit to the Internet data. This held true even though the ages of participants from Internet sample were quite a bit younger than conventional samples obtained throughout this dissertation.

## DISCUSSION

The purpose of this dissertation was to further evaluate the reliability, validity, and responsiveness of the SAQ, a promising tool for assessing the healthy aging status of older adults. Healthy or successful aging can be conceptualized as the relative absence of preventable dysfunctions (e.g., a subset of physical or mental distress, or functional limitation), and the positive adaptation and adjustment to impairments that do occur. Although multidimensional instruments exist for assessing older adults, they are not conceptualized as specific to healthy aging and therefore do not cover the broad areas thought to influence one's ability to age well.

The SAQ, which was derived from the comprehensive Well-Aging Assessment Battery (WAAB; Sita et al., in press), is a 70-item questionnaire that requires only 15-20 minutes to complete. The SAQ screens for health, including health status and health-related locus of control, participation in non-work related activity, negative orientation towards life (i.e., negative styles of affective expression, feelings of sadness, use of avoidant and/or passive coping styles, and perceived deficiencies in personal resources) and positive orientation towards life (i.e., positive styles of affective expression, life satisfaction, use of active coping styles and a positive outlook on personal skills and resources). The SAQ is a promising tool for the brief, psychometrically-sound assessment of successful aging, and for the evaluation of programs to designed to promote healthy aging.

This dissertation was made up of a series of studies designed to elicit different psychometric information about the SAQ that would contribute to an understanding of its properties, strengths, and limitations. To summarize, Study 1 examined the factor structure and psychometric properties of the traditional, self-administered, paper-and-pencil SAQ using a community-dwelling sample of older adults. Study 2 examined the test-retest reliability of the

SAQ, as well as the reliability of newly developed, alternate methods of administration of the

SAQ (i.e., computerized SAQ and interviewer-administered SAQ). Study 3 examined convergent

validity of the SAQ with a widely-used generic indictor of health status that shares some of the

domains of the SAQ. Study 3 also sought to determine if the SAQ was able to discriminate

between groups of older adults known to differ in their healthy aging status, and to examine

whether the SAQ was responsive to changes in the status of these participants over time. Study 4

examined the convergent validity of the SAQ with a large sample of participants who completed

a computerized SAQ via the Internet. The findings of each of these studies, their integration with

past research, and their theoretical and applied implications will be discussed below.

**Factor Structure**

As indicated earlier, the SAQ is a modified version of the HAQ (Healthy Aging Quiz),

which was derived from the much longer, comprehensive WAAB (Well-Aging Assessment

Battery). The original HAQ consisted of seven latent factors denoting physical and mental

health, positive and negative affectivity, confidence and fallibility and activity. However, with

the development of the SAQ some of the original HAQ items were rephrased, the response scales

modified and new items added, while some items were dropped. Using a large, new sample of

community-dwelling older adults, exploratory analyses were conducted in Study 1 to determine

the stability and structure of the SAQ. It was hypothesized that the factor structure would

generally resemble that of the original HAQ, that is, a 7-factor solution. However, the factor

analysis revealed a simpler, 4-factor solution for the SAQ. These factors were labeled Positive

Orientation, Negative Orientation, Health and Activity. Nonetheless, redistribution of the factor

loadings from the HAQ's 7-factor model to the SAQ's present 4-factor model makes conceptual

sense, and is described below.

As hypothesized, the items from the HAQ's Positive Affectivity and Negative Affectivity

indices loaded onto two separate factors in the SAQ. Since Bradburn's (1969) theory that

positive and negative affect are two distinct and orthogonal concepts, the two-factor structure of

affect has been repeatedly replicated in the literature (Diener & Lucas, 2000). The items from the

HAQ's Positive and Negative Affectivity indices measure positive and negative styles of

affective expression, including the stylistic intensity and duration of the respective affective

states. Also loading on the same factor as the positive affect items were all the items from the

HAQ's original Confidence Index, which relate to the confident application of personal

resources to solving problems (e.g., "I try do something about my problems", "I am in control of

my health"). Following this pattern of having positively-oriented items loading on the same

factor, the two positively phased items from the HAQ's Fallibility Index (i.e., "My memory is as

good as it ever was" and "Memories of my past are as clear as a book"), as well as the only

positively phrased item from the HAQ's Mental Health Index (i.e., "I am satisfied with my life

today") also loaded on the same factor as the items from the HAQ's Positive Affectivity Scale.

Hence, this factor was labeled "Positive Orientation". A high score on this scale denotes a more

positive outlook, including more positive affect and appraisal of resources, and the use of active

coping skills.

Loading on the same factor as the HAQ's Negative Affectivity items were three of four

items from the HAQ's Mental Health Index (i.e., the negatively phrased items, e.g., "I often feel

down-hearted and blue") and a third of the items from the HAQ's Fallibility Index, which tapped

perceived deficiencies in personal resources and a negative coping style. Hence, this factor was

labeled "Negative Orientation". A high score on this scale denotes a more negative outlook, including more negative affect, low expectations about the outcomes of personal resources, and the use of passive and/or avoidant coping skills.

The original HAQ Activity Index had the least amount of change with the development of the SAQ, with nine of the ten original Activity items being retained with the new quiz. A high score on this factor suggests greater level of participation in non-work related activity.

Not surprisingly the two items from the Fallibility Index that pertained to health-related locus-of-control (albeit an external locus of control, i.e., "Health professionals control my health" and "I do only what my doctors tell me") were found to load (negatively) on the same factor as the two items from the HAQ's Confidence Index which also pertained to health-related locus-of-control (in this case, an internal locus of control). Also loading on this factor were the expected four health-related items (i.e., current overall health, and number of medications, illnesses and doctor visits). This SAQ factor was labeled "Health". A high score suggests poor health and/or lower levels of perceived personal control over health. A potential issue with this factor is the notion of what the score truly means, with half the items pertaining to health-related locus of control, and half the items being more pure indicators of health status. Scores can range from 8 to 39, with 39 indicating that the highest possible responses were selected for all the items. A score of 16 would fall in the mid-range, and theoretically, one could argue that knowing only the factor score we would be unable to determine if, for example, this is because of ratings of excellent health and a feeling that health is controlled only by external factors, or if health is poor while the perception is that the onus of health is held by the individual. Or alternatively, that there is a balance of the two. However, the fact that the eight items all loaded strongly on the same factor suggests that they are tapping the same concept. In addition, there are significant

moderate correlations between the health status items and the locus of control items, suggesting,

for example, that strong feelings that professionals control one's health are related to poor self-

rated health ($r = .33$, $p < 0.01$), more illnesses ($r = .31$, $p < 0.01$), more visits to the doctor ($r =$

$.25$, $p < 0.01$) and use of more prescription medications ($r = .38$, $p < 0.01$). The likelihood,

therefore, is that a person with an internal health-related locus of control will report a more

positive health status, and an individual with a more external health-related locus of control will

endorse having a poorer health status. However, regardless of the origins of a high score on the

Health factor (e.g., high health status indicator items, high locus of control items, or a

combination), it should be perceived as a flag for further recommendations or intervention. A

high factor score suggests that an individual would benefit from assistance, either in the

provision of recommendations about how to improve health itself (e.g., exercise, stress

management) or education about how health beliefs are significantly associated with a variety of

health behaviors and outcomes. For example, internal locus of control has been associated

with the ability to stop smoking (Coan, 1973), ability to lose weight (Balch & Ross, 1975),

adherence to a medical regimen (Lewis, Morisky, & Flynn, 1978) and obtaining preventive

vaccinations (Dabbs & Kirscht, 1971). In addition, Duffy (1993) found that older adults with

good perceived health, strong internal locus of control, and high self-esteem frequently practiced

the health promotion activities of nutrition, stress management, interpersonal support, exercise,

and self-actualization. It has also been found that among the elderly, perceived health and

internal locus of control were the most consistent predictors of health promotion activities

(Speake, Cowart & Stephens, 1991).

The internal consistencies of the four SAQ factors were adequate and were relatively

consistent with those obtained for the original HAQ. The HAQ's Physical Health Outcome Index

had a Cronbach's coefficient alpha of .72 while the SAQ's Health factor had an alpha of .73. The

HAQ's Negative and Positive Affectivity indices both had alphas of .86, and the SAQ's Negative

Orientation factor was found to have an alpha of .83. The SAQ's Positive Orientation factor,

however, demonstrated an alpha of .76, which is more consistent with the internal consistencies

reported for the HAQ's Confidence and Fallibility indices, .74 and .76 respectively, which,

incidentally, make up more than half the items of the Positive Orientation factor. The SAQ's

Activity factor had a Cronbach's alpha of .64, which is somewhat lower than the .76 alpha

reported by Stones (2001) for the almost identical scale from the HAQ. However, given that an

individual's activity choices are not necessarily heterogeneous (e.g., a person may participate in

more solitary activities such as reading and writing letters, but rarely attend community

organizations), an internal consistency of .64 for such a diverse scale is not unreasonable.

According to Nunnally (1978), the reliability of the factors could be higher (i.e., >.80), although

Steiner and Norman (1989) state that "there is no sound basis for such a recommendation, any

more than there can be a sound basis for the decision that a certain percentage of candidates

sitting an examination will fail"(p. 89). As a research tool, the reported reliabilities for the SAQ

should be sufficient as researchers draw conclusions from factor scores averaged across a group

of participants, since the large "sample size will serve to reduce error or measurement in

comparison to group differences" (Steiner & Norman, 1989, p. 89).

      With the evolution of the HAQ to the SAQ, we see a simplification of the factor

structure. With the SAQ the negative and positive affect items continue to remain distinct from

each other, and in effect, the items from the HAQ's Mental Health, Confidence, and Fallibility

indices split into positively-oriented and negatively-oriented groups, which then load onto two

factors with the respective affect items. The activity and health items remain consistent, distinct

factors, and we see the health-related locus of control items loading on the general health factor.

Further support for the SAQ's 4-factor model is obtained from the confirmatory factor analysis

conducted with 821 participants for Study 4, which suggests that it is a reasonably good model

for explaining the data.

## Reliability of Alternate Formats of Administration

Given that the SAQ was designed to assess older adults, a population in which there are

high levels of fine motor difficulties and visual impairment, it was felt that an interviewer-

administered version of the SAQ would ensure data quality while also decreasing the likelihood

that potential subjects would refuse to participate due to these limitations. Results of Study 2

revealed that the interviewer-administered SAQ was well-received. All participants who

completed the follow-up survey reported that the interview was easy to complete, and they

preferred it over the traditional pencil-and-paper self-administered SAQ. Analyses also

demonstrated that that there were no statistically significant differences in participants' factor

scores based on which SAQ format that was administered, that is, participants responded the

same way on both versions. In addition, according to Landis and Koch (1977)'s interpretation of

kappa coefficients, on average, there was a substantial level of agreement between items from

the paper-and-pencil and interviewer-administered versions. Overall, results indicate that the

paper-and-pencil SAQ and the interview-administered SAQ are considered to be equivalent

formats. While the SAQ was originally designed for use with literate, relatively-independent,

community-dwelling older adults, the development of the interviewer-administered version

makes the SAQ much more accessible, allowing researchers to use the instrument with the frail

elderly, with those with visual impairment and fine motor difficulties, such as that seen in

individuals with Parkinson's Disease. Having a reliable and valid interviewer-administered version also greatly facilitated data collection for Study 3, in which over half of the hospitalized participants agreed to participate only if they did not have to read questionnaires themselves, due to poor vision or fine motor difficulty. Interestingly, almost 20 years ago the first attempts were made to do the opposite, to develop a self-administered version from the first comprehensive assessment instrument for older adults, the interview-based OARS Multidimensional Functional Assessment Questionnaire (OMFAQ), because of the desire to save time administering the instrument to large samples of older adults (Morris & Boutelle, 1985).

Due to advances in technology and the increasing number of older adults using personal computers and the Internet, it was felt that a computerized SAQ would be timely and well-received. In fact, Statistics Canada (2001) reports that in 1997, 13% of households headed by someone 65 and over, had a computer in their home - up from 5% in 1990. In addition, recent findings by Health Canada's Division of Aging and Seniors suggest that older adults are the fastest growing group of computer buyers and Internet users (2002). They report that in 1999 a quarter of households headed by a person between the ages of 55 and 64, and 10 percent of individuals over the age of 65, used the Internet at home, and that the over 65 group are estimated to be the fastest growing group of Internet users in Canada. (Health Canada, 2002). Research also indicates that older adults seek out health-related sites on the Internet more than any other type of information, and that they represent the largest proportion of online shoppers (Administration on Aging, 2004).

Not surprisingly, results of Study 2 indicated that a computerized SAQ was also very well-received. With the exception of one individual, all participants surveyed found the computerized SAQ easy to complete, even though fully 42% of these participants reported never

having used a computer before. There was no statistically significant difference in participants' factor scores based on whether they completed the pencil-and-paper SAQ or the computerized SAQ, and on average there was a substantial level of agreement between items from the paper-and-pencil and computerized versions. As with the interviewer-administered version, results indicate that the paper-and-pencil SAQ and the computerized SAQ can be considered to be equivalent formats.

Advantages to having a computerized SAQ include time saved in data entry, which translates to reduced costs, elimination of keying errors that occur during data entry, and reduction of paper usage (Barak, 1999). Although it was not done in this study, nor in Study 4 (i.e., the Internet-based SAQ study), computers can be programmed so that participants cannot inadvertently skip questions, which reduces the number of missing values to zero, and an electronic format can assure standardized timing (Ryan et al., 2002). A recommendation for the Internet-based SAQ would be to implement these programming improvements, as it significantly improves data quality and completeness. It has also been suggested that because participants directly enter their responses into a database, which provides more anonymity, electronic formats generally derive more complete responses to sensitive questions (Bloom, 1998). Based on examination of the missing data from the paper-and-pencil administration of the SAQ in Study 1, it appeared that item 70, (i.e., "I am satisfied with my sex life") might be considered a sensitive question, since 8.75% of participants omitted it, significantly more than any other item. However, it appears that the sub-sample of participants from Study 1 who took part in Study 2 were more comfortable about responding to a question about their sex life, with only 3.9% of the pencil-and-paper SAQs, 5.9% of the interviewer-administered SAQs and none of the computerized SAQs having an omission on this question. Analyses of these frequencies,

however, reveal that there is no significant difference in the number of missing responses to item

70 across the three different formats ($F(2, 149) = 0.92$, $p = 0.39$), suggesting that format does not

necessarily affect completion rates for sensitive items. Interestingly however, in Study 4, in

which all participants were totally anonymous, having completed the SAQ over the Internet, only

1.6% of participants omitted question 70, and there was no difference in omission rates for those

over 50, or under 50 years of age. This suggests that the anonymity provided by an Internet

survey lends itself to more complete responses for sensitive items. Although Bloom (1998) had

suggested that an electronic format generally results in more complete responses, participants in

the Study 2 filled out the computerized SAQ in the presence of the researcher, which may have

had an effect on how they answered item 70, which would explain why there was no difference

in omission rates for this question across the three methods of administration of the SAQ.


**Use of Internet Data**

A recent article in the American Psychologist (Kraut et al., 2004) described how the

Internet is changing the way psychological research is done. Perhaps the greatest advantage is

the facilitation of participant recruitment, with large, diverse samples available to complete

online surveys for a fraction of the cost of using traditional methods. Buchanan (2002) spoke to

the clinical implications of the Internet, stating that it provides greater access to mental health

services for people who may have been limited due to finances or geographic location. The latter

was the rationale for the Successful Aging Project, of which the SAQ is a part. The Project's

objective was to use Internet resources to provide assessment and programming to promote

health and wellness among middle-aged and older adults in rural and under-serviced regions in

Northwestern Ontario. Besides the SAQ, the Successful Aging Project webpage includes health

promotion information such as online workshops on stress management, self-esteem, nutrition, sexuality, and memory skills, as well as links to other resources for older adults. Internet users who visited the webpage were offered these resources at no charge, and were invited to complete the SAQ, which provided them with feedback on their health aging status. Since the SAQ was in development at the time, and a large normative sample had not yet been obtained, the feedback that was provided to users was based on the comparison between the their scores and Statistics Canada information about the health status of older Canadians or from normative data obtained from the original instruments from which the individual SAQ items were derived. While the data obtained as part of this dissertation was by no means a normative sample of older Canadians, but rather a convenience sample of adults aged 50 and older from Northwestern Ontario, and a sub-sample of Internet users, the data can be used to supplement the norms that are currently being used with the SAQ. As with any assessment instrument, however, validation is an on-going process, and the SAQ should be considered as a research tool for assessing successful aging. At the present time visitors to the Successful Aging Webpage should be reminded that the SAQ is a research screening tool, which should not be used as the sole clinical instrument for use at the individual level.

While the average age of individuals who completed the SAQ online for Study 4 was significantly younger than that of participants obtained by traditional means, it is consistent with the literature about the demographics of Internet users. According to Gardner (1997), the typical profile of the over-fifty population who are online is a 57-year-old grandparent who owns a car, has a higher than average education and has a household income in excess of $60,000 USD. Income, education and family composition data were not obtained as part of the SAQ, so these comparisons cannot be made. However, regardless of the age differences between the two

groups, the confirmatory factor analysis indicated that the factor structure of the responses from the two samples was almost identical, providing strong convergent validity for the 4-factor model. This finding is consistent with results found by numerous researchers (e.g., Buchanan & Smith, 1999; Davis, 1999; Epstein and Klinkenberg, 2001; Krantz, Ballard, & Scher, 1997; Pasveer & Ellard, 1998), suggesting that data collected from the Internet are often virtually indistinguishable from that collected from traditional samples. It also bodes well for the generalizability of the SAQ to younger age groups. Although the questionnaire was developed with the concept of health aging in mind, it has been argued that healthy aging is a lifelong process that does not begin only when one reaches retirement (Ryff, 1989). Future research should involve obtaining normative data on the SAQ for different age groups, ranging from young adults through to the oldest old.

**Test-Retest Reliability**

This researcher took a unique approach to the examination of test-retest reliability. Because it was strongly felt that the alternate formats of the SAQ would be found to be equivalent to each other, an examination of test-retest reliability was built into the alternate formats study to save time and burden on participants. It was hypothesized that if, in fact, the alternate modes of administration are deemed equivalent to one another, then it can also be assumed that there will be adequate test-retest reliability between two administrations of the same version, over the same time interval. Fortunately, the interviewer-administered, computerized, and pencil-and-paper versions of the SAQ were found to be equivalent to each other, and over a one-week time interval test-retest reliability across formats was found to be high, with intra-class correlations ranging from .87 to .93 for the four factors. It can be safely

deduced that there will be similarly high levels of test-retest reliability between two

administrations of the same format of the SAQ, over the same time interval.

**Construct Validity**

In an attempt to examine the convergent validity, and hence construct validity, of the

SAQ, participants in Study 3 were also asked to complete the SF-36, one of the most widely-

used generic measures of health status. As hypothesized, strong associations were found between

the SAQ factors and conceptually-related subscales from the SF-36, indicating that the SAQ does

in fact measure some of the domains that it was designed to measure, namely physical health,

activity, and negative and positive affect. However, health-related locus of control, coping skills

and the use, and appraisal of, personal resources to solve problems (i.e., items that loaded on the

Health factor and the Negative Orientation and Positive Orientation factors along with the

positive and negative affectivity items) are not tapped by the SF-36, and therefore the convergent

validity of these concepts was not determined. Understandably, if there was a gold standard by

which to examine all the domains assessed by the SAQ, then there would be little need for the

questionnaire.

A clinical test of validity was also used in this dissertation, whereby mutually exclusive

groups were formed based on their health status. Study 3 compared hospitalized rehabilitation

patients with physically-active community participants. Results showed that the Negative

Orientation, Health and Activity factors discriminated between these groups. Since the groups

differed the most in terms of their health and activity level, it is not surprising that a combination

of the Health and Activity factors were able to correctly predict group membership in over 90%

of the cases. Given that the sample size for this particular study was quite small, these findings

can be considered robust. Regarding differentiation between the two groups at the item level, number of prescription medications and exercise frequency were the most useful items. A limitation, however, is that that the criterion groups were very different in terms of their health status.

## Sensitivity to Change

When Study 3 was designed it was thought that the nature of the groups (i.e., hospitalized rehabilitation patients and active community-dwelling older adults) would provide a built-in test of sensitivity to change of the SAQ. While it was hypothesized that the vast majority of the active community group participants would report that their health remained the same over the eight weeks from time 1 until time 2, which they did, it was anticipated that the hospitalized patients would serve as a type of natural treatment group, in that, theoretically, by the time of discharge home it was expected that they would have improved in their health status. At the item level, statistically significant improvement was seen over time in participants' perceived health (item 8) and their life satisfaction (item 48). However, results indicated that at the factor level, the SAQ was not sensitive to change with this sample. Although 80% of the hospital participants were rated as having gotten at least a little bit better over the course of their stay, the general improvement that was noticed by the team and by the participants themselves was not detected by the SAQ factors. Although it was hypothesized that the SAQ would be responsive to this change, in retrospect, it is actually not surprising that this was not the case.

First, the sample size was rather small. The patients under examination were rehabilitation patients, not acute-care patients, and thus while their health was generally fair or poor on admission to the program, it was not life-threatening. Given the fiscal restraints of

hospitals and rehabilitation programs, the goal of therapy is to improve function enough that the individual is able to return to community living, safely. These patients are not in therapy long enough to see them return to the health of years earlier, but to stabilize them so that they may continue to live relatively independently in their own homes. Most patients from the Reactivation Service, however, return home with home care services in place for assistance with activities of daily living. So while the patients in this study, and their care team, did report improvement over the course of their stay, these changes were too small to be detected by the SAQ.

Second, many of the items in the SAQ, particularly those that make up the Positive and Negative Orientation factors, do not include a specific recall period, and thus participants are expected to respond based on the "answer that best describes how (they) typically think, feel, or behave". These instructions preclude the detection of subtle changes that occur over a period of weeks, since participants likely indicate an average of how they feel they have been thinking, feeling, and behaving over a longer span of time. These items may be perceived as more dispositional than situational, and thus are less likely to change over time. As well, some questions explicitly provide a recall period that is too long to be able to detect changes that occur over a short time frame (e.g., "Weight change in the last three months"; "Visits to other health practitioners in the last year"). With regards to the Health factor, two of the items (i.e., "number of illnesses of an enduring nature" and number of "doctor visits in the last year") will obviously not change over the course of a hospital stay. In fact, participants may find that at the end of their hospitalization that they have accumulated more doctor visits (having perhaps seen specialists) and may have been diagnosed with another chronic illness. It can also be expected that in most cases, participants will not see a decrease in the number of prescription medications that they receive (item 13). In fact, they might see a rise in this number as well. And while their self-rated

health may have improved, these changes cancelled out or lost when change over time is examined using an aggregate of numerous variables at the factor level.

Given that there is no recall period specified at all for the items from the Activity factor, hospital patients can conceivably answer the questions in two different ways. Note that although they complete the SAQ on admission and discharge, they are still in hospital when they complete the questionnaires. First, hospital participants may respond based on the activities that they participated in while they were home, and thus even on the discharge SAQ they recall their activity participation from the period of time prior to hospitalization. In this case we would not expect any change from time 1 (admission) to time 2 (discharge). Alternately, they may consider their present activity level while in hospital, which would mean that they do less volunteer work, less crafts, less socialization, etcetera, than if they were not in hospital. An individual who responds to the SAQ items this way may not notice any changes from admission to discharge, since at both times they are in hospital, and thus limited in their activities.

## Limitations and Future Directions

Weaknesses of the new SAQ included the face validity issues that plagued three of the items (i.e., #11, 14 and 25). Item 11, which asks about the frequency of dental visits, was intended to measure participation in preventative health behaviour, since research suggests that poor dental health is linked to increased mortality among elderly people (Hämäläinen, Meurman, Keskinen & Heikkinen, 2002). However, this item was dropped from analyses because of concerns about data integrity. Many participants commented that they never go to the dentist because they wear dentures, and so it was uncertain whether a response of "seldom or never" was referring to a general neglect of oral care, or merely a reflection of the fact that the

participant wears dentures. In the next version of the SAQ, this item should be rephrased to reflect denture use.

Poor wording was to blame for the difficulties encountered with item 14 ("I have no physical limitations that make it difficult to manage about the home", response options: true/false). Due to very inconsistent responses to this question across administrations of the SAQ, despite high levels of agreement on the vast majority of other items, it was determined that this item was unclear to participants. This oversight was disappointing as this item was intended to screen for functional ability, and it was hoped that it would load on the Health factor. Functional abilities are generally defined as the ability to conduct basic activities of daily living (i.e., bathing, dressing, toileting, feeding, transferring, and ambulating), as well as the complex instrumental activities of daily living, such as using the telephone, cooking, cleaning house, handling money, and shopping (Matteson, 1997). Since the assessment of perceived functional abilities or limitations is an important component of successful aging, the next version of the SAQ should include a general item that measures this concept, such as "Does your physical health limit you in your daily activities?", using a response scale such as that used in the SF-36 (Ware & Sherbourne, 1992; Not at all, A little bit, Moderately, Quite a bit, Extremely). A 5-point response scale would make the item consistent with the other items from the Health factor, and provide some indication of the perceived level of impairment that the individual is experiencing.

Finally, item 25 ("I am looking for paid work") was considered by many to be not applicable, and as a result, over 10% of participants omitted this question. However, it is felt that employment status is still adequately represented on the SAQ by items 27 and 29. Item 25 was therefore dropped from the SAQ and from all further analyses.

As indicated, another limitation of the present research was that the criterion groups used in Study 3 were very different in terms of their health status. Future validation research might examine the SAQ's ability to discriminate between less active, community-dwelling older adults and those that have less severe health problems that do not require hospitalization, or even examine groups of older adults who represent the continuum of health. As well, the present study examined only groups that differed in terms of physical health status. It would be interesting to examine the convergent validity of the SAQ with groups of individuals who differ based on mood, such as well elderly and inpatient and outpatient psychiatric clients, as was done with the SELF Scale (Linn & Linn, 1984) and the MAI (Lawton et al., 1982). It is speculated that with groups differing in mood and affect, it would be found that the Positive Orientation factor, and items such as "Life is hard for me most of the time", and "I am satisfied with my life today" would demonstrate the most discriminant power. Future research should also involve obtaining normative data on the SAQ for different age groups, ranging from young adults through to the oldest old.

Disappointingly, the SAQ was not found to be sensitive to change at the factor level, despite the fact that both patients and their care teams felt that improvement occurred over the course of their hospital stay. The lack of a specific recall period, or a recall period that could not possibility detect change, were suggested as possible reasons for the inability of the SAQ to be responsive to clinical improvement. A resolution to these issues might be to specify a recall period that is long enough to capture participation in certain activities that do not necessarily occur frequently (e.g., doctor visits, going to the cinema), but short enough to be able to detect changes that may occur due to a shorter intervention (e.g., hospitalization, time-limited intervention). Future research might replicate the hospital patient portion of Study 3, using a

range of different recall periods for the SAQ items, to determine which are most sensitive to clinical change over time. Alternately, the SAQ could be considered for use only over larger spans of time, for example, monitoring an individual's healthy aging status annually.

Finally, further examination of the convergent validity of the SAQ should focus on the adaptive processes or compensatory mechanisms thought to be integral to successful aging. Some promising validity measures include Folkman and Lazarus's (1988) Ways of Coping Questionnaire which assesses the processes that individuals use to cope with the stressful encounters of everyday living, and the Older Adults' Attributional Style Questionnaire (OAASQ; Isaacowitz & Seligman, in press), which is a version of the Attributional Style Questionnaire (ASQ; Peterson, Semmel, von Baeyer, Abramson, Metalsky, & Seligman, 1982) modified to be appropriate to the lives of older adults. The ASQ is a self-report instrument that yields scores for explanatory style for bad events and for good events using three causal dimensions: internal versus external, stable versus unstable, and global versus specific causes (Peterson et al., 1982).

## Conclusions

In conclusion, the SAQ is a useful tool for the brief assessment of healthy aging status of older adults in a wide variety of settings. The Negative Orientation, Positive Orientation, Activity and Health factors are stable and reliable and they can discriminate between hospital patients and active community residents in the hypothesized direction. Two SAQ items were found to be sensitive to change in the health status of participants over time, but at the factor level, the SAQ was not responsive to changes with this sample. There is high test-retest reliability over a one-week period and the factors demonstrate convergent validity with a widely-used generic indicator of health status. An interviewer-administered version was developed,

which was found to be equivalent to the traditional pencil-and-paper SAQ, and it was well-received both by healthy participants as well as hospitalized elderly who requested assistance completing the SAQ due to visual or fine motor difficulty. A computerized SAQ was also developed, which was also rated as easy to complete, even by those individuals who had never used a computer before. The computerized version also demonstrated psychometric equivalence to the original SAQ, and the implementation of an Internet-based SAQ provided strong convergent validity for the 4-factor model with a diverse sample of online users. Given the iterative and on-going nature of instrument validation, however, continued research should be conducted with the SAQ to provide a normative sample from which reliable and valid feedback may be provided to individuals and groups on their healthy aging status.

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**APPENDIX A:  Successful Aging Quiz**

# SUCCESSFUL AGING QUIZ

Please answer the following questions. All your responses will remain confidential.

1.  **Gender:**          _____Male      _____Female

2.  **Marital status:**      _____ Married        _____ Single

    _____ Widowed        _____ Divorced

3.  **Date of birth:** _____

4.  **Height:** _____

5.  **Weight:** _____

6.  **Weight change in the last three months:**

    _____ No change

    _____ Lost 2 lbs (1 kg)              _____ Gained 2 lbs (1 kg)

    _____ Lost 5 lbs (2.5 kg)           _____ Gained 5 lbs (2.5 kg)

    _____ Lost 10+ lbs (4.5 kg)        _____ Gained 10 lbs (4.5 kg)

7.  **Smoking:**

    _____ Never smoked              _____ 10-20 cigarettes a day

    _____ Quit smoking               _____ More than 20 cigarettes a day

    _____ Less than 10 cigarettes a day     _____ Smoke cigar or pipe daily

8.  **Current overall health:**

    _____ Excellent

    _____ Very Good

    _____ Good

    _____ Satisfactory

    _____ Fair

    _____ Poor

9.    **Doctor visits in last year:**

_____ No visits at all

_____ 1-4 visits

_____ 5-12 visits

_____ More than 12 visits this year

10.    **Visits to other health practitioners (e.g. nurse practitioner, homeopathic practitioner, physiotherapist, chiropractor) in last year:**

_____ No visits at all

_____ 1-4 visits

_____ 5-12 visits

_____ More than 12 visits this year

11.    **Dental checkups:**

_____ Seldom or never

_____ Alternate years

_____ Once a year

_____ Twice a year

12.    **Number of illnesses of an enduring or chronic nature (e.g., heart disease, emphysema):**

_____ No enduring illnesses

_____ 1 illness

_____ 2 illnesses

_____ 3 illnesses

_____ 4 or more illnesses

13.    **Current prescription drugs:**

None    1    2    3    4    5    6    7    8    9+

14.    **I have no physical limitations that make it difficult to manage work about the home.**

_____ True            _____ False

15.    **Hours of sleep per day:**

_____ Less than 5 hours

_____ 5-7 hours

_____ 7-8 hours

_____ 9 or more hours

16.    **Relatives I can depend on for help:**

None  1     2     3     4     5     6     7     8     9+

17.    **Friends I can depend on for help:**

None  1     2     3     4     5     6     7     8     9+

18.    **I do things of a spiritual nature (e.g.  attend church, regular meditation or support groups):**

_____ yes _____ no

19.    **I eat a well-balanced meal containing the four food groups  (e.g., meat or fish or protein sources such as tofu; milk products; bread or whole grain cereals; fruits and vegetables):**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |

20.    **I eat a meal consisting of fast food, junk food, or processed food  (e.g., hamburgers, deep fried food):**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |

21.    **Amount of beer, wine, or spirits consumed daily (regular sized drinks):**

_____ None

_____ 1-3 drinks

_____ More than 4 drinks

_____ More than 4 drinks, but not often

22.    **I take vitamins:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |

23.    **Living arrangements:**

        \_\_\_\_\_ I live alone

        \_\_\_\_\_ I live with my partner

        \_\_\_\_\_ I live with my relatives

        \_\_\_\_\_ other

24.    **I manage my own home:**      \_\_\_\_\_ yes    \_\_\_\_\_no

25.    **I am looking for paid work:**    \_\_\_\_\_ yes    \_\_\_\_\_no

26.    **I am retired:**              \_\_\_\_\_ yes    \_\_\_\_\_ semi-retired    \_\_\_\_\_no

**For each of the following questions, circle ONE answer that best describes the frequencies of your activities.**

27.    **I do paid work:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |
|---|---|---|---|---|---|

28.    **I do volunteer work:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |
|---|---|---|---|---|---|

29.    **I look after a sick/disabled person:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |
|---|---|---|---|---|---|

30.    **I socialize outside my family circle:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |
|---|---|---|---|---|---|

31.    **I read books or magazines:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

32.    **I engage in arts, crafts or hobbies:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |
|---|---|---|---|---|---|

33.    **I attend community organizations:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |

34.    **I write letters or stories:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |

35.    **I participate in sports:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |

36.    **I engage in political activity:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |

37.    **I go to the cinema or theater:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |

38.    **I engage in fitness and exercise:**

| Less than monthly | Monthly | 2-3 times a month | Weekly | A few times a week | Daily |


**For each of the following questions, circle ONE answer that best describes how you typically think, feel, or behave.**


39.    **I find it difficult to express needs and wishes to others for fear that I will bother them.**

| Strongly disagree | Disagree | Neutral | Agree | Strongly agree |

40.    **I find it difficult to know how I'm supposed to interact with people in social situations.**

| Strongly disagree | Disagree | Neutral | Agree | Strongly agree |

41.    **If I have a problem, there are dependable people I can rely on for support.**

| Strongly disagree | Disagree | Neutral | Agree | Strongly agree |

**42.     If I have a problem, I turn to other activities to take my mind off things.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**43.     I am in control of my health.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**44.     Health professionals control my health.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**45.     I take my own actions to control my health.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**46.     I do only what my doctors tell me.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**47.     Life is hard for me most the time.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**48.     I am satisfied with my life today.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**49.     I am an enthusiastic person.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**50.     If I'm cheerful, I stay cheerful for long time.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**51.     If I'm agitated, I stay restless for long time.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

**52.     If I'm distressed, I appear tense.**

   Strongly disagree     Disagree     Neutral     Agree     Strongly agree

53.   **My feelings of uneasiness stay for long time.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

54.   **When having a good day, I feel cheerful.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

55.   **I remain happy longer than my friends.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

56.   **I get upset easily.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

57.   **My feelings of delight stay for long time.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

58.   **I am tense for long periods at a time.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

59.   **I try to do something about my problems.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

60.   **I look for some good about my problems.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

61.   **If I have a problem, I make an action plan.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

62.   **If I have a problem, I deny its happening.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

63.   **I often feel downhearted and blue.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

64.   **Ordinary work is too boring for me.**

     Strongly disagree    Disagree    Neutral    Agree    Strongly agree

**65.    My memory is as good as it ever was.**

   Strongly disagree       Disagree       Neutral       Agree       Strongly agree

**66.    Memories of my past are as clear as a book.**

   Strongly disagree       Disagree       Neutral       Agree       Strongly agree

**67.    I often have trouble concentrating.**

   Strongly disagree       Disagree       Neutral       Agree       Strongly agree

**68.    I have planned for my long-term finances.**

   Strongly disagree       Disagree       Neutral       Agree       Strongly agree

**69.    I am financially comfortable.**

   Strongly disagree       Disagree       Neutral       Agree       Strongly agree

**70.    My sex life is satisfactory.**

   Strongly disagree       Disagree       Neutral       Agree       Strongly agree

**Have you filled in this quiz before?** _____ Yes  _____ No

**Today's date: (dd/mm/yy):** _____

**APPENDIX B: Poster/Advertisement for Study 1**

# Lakehead
UNIVERSITY

# Study on Healthy Aging
## Research participants wanted!

Christine Knight, a Psychology Doctoral Candidate and Dr. Michael Stones of the Department of Psychology at Lakehead University are conducting research to develop a short questionnaire for assessing whether or not an individual is aging well.

If you are over 50, you could help in this research endeavour by completing the Successful Aging Quiz.

Your confidentiality will be assured. All participants will be entered in a random prize draw for $100.

For more information, or to participate in this project, please contact Christine at 343-9062.

**APPENDIX C: Information Letter/Introductory Statement for Study 1**

Dear Sir or Madam,

In collaboration with Dr. Michael Stones at Lakehead University, I am conducting a research study entitled "The Development and Validation of the Successful Aging Quiz", which will form part of the research requirement for completion of my Ph.D. in Clinical Psychology at Lakehead University.

The purpose of this study is to develop a short questionnaire for assessing whether or not an individual is aging well. There is currently no single questionnaire available that is able to provide information about all the dimensions related to healthy aging. The ultimate goal of this research study is that the resulting questionnaire, entitled "The Successful Aging Quiz", may be available over the Internet so that middle-aged and older adults in rural and under-serviced regions in Northwestern Ontario will be able to quickly obtain a profile of their strengths and weaknesses. This healthy aging profile will assist in the development of individualized programs to promote health and wellness. The information collected from the study will help to make the development of this useful questionnaire possible.

I would like to invite you to participate in this research study. One part of the study involves taking 20 minutes to complete a questionnaire. Questions include, but are not limited to the following: age, gender, health status, mood, attitudes towards your health and functional limitations that you may experience. As a token of my appreciation, every participant will be entered into a random draw for $100 cash.

The other part of the study involves being assigned to answer similar questions, either: 1) in a 20-minute interview with me, *or* 2) by answering the questions directly on a computer. You do not need any previous experience with a computer to take part in this study. As a token of my appreciation, every person who also participates in this second part of the study will be paid $10 cash and be entered into the draw for $100 cash *again*. This will double your chances of winning.

Each part of the study is separated by one week. I will make myself available to meet with you at a location of your choice to complete the study. Please note that the order in which you take part in the study will vary. For example, some people will complete the regular questionnaire, and then one week later complete the computerized questionnaire, while other people will complete the interview first, and then complete the regular questionnaire one week later.

Your participation in this study is completely voluntary. You are free to decline the invitation to participate in this study, and you may withdraw your consent to participate at any time, without jeopardizing any services provided to you by the organizations or agencies that have helped to

advertise this study. Aside from making a contribution to the scientific study of healthy aging, there are no direct benefits, nor specific risks involved in participation.

Should you choose to take part, all of your responses and the information obtained from the study will remain confidential. Your identity will be protected by a numeric coding system whereby you will be assigned a "project ID number". The sheet that contains your name and ID will be kept in a locked filing cabinet and only I will have access to your responses. All information obtained from this study will be coded, analysed and securely stored at Lakehead University for seven years, as required by Canada's Research Council's guidelines . The data will be destroyed after that time period. A summary of the results will be written up as my doctoral thesis, and an article will be prepared for publication. I would be happy to send you a summary of the report when the study has been completed, if you so request.

This project has been reviewed by, and received ethics clearance through, the Research Ethics Board at Lakehead University. If you have any questions or concerns resulting from your participation in this study, please contact the Chair of the Lakehead University Research Ethics Committee at 343-8110.

**If you are interested in participating in *either* one or both portions of the study, please call me at 343-9062 and leave a message with your name and telephone number. I will then contact you to set up a time and location for you to begin the study.**

If you have any questions regarding this project, feel free to contact me at 343-9062.

Thank you for your assistance with this project.

Sincerely,

Christine Knight, M.A.Sc.
Doctoral Candidate in Clinical Psychology
Lakehead University
(807) 343-9062
cknight@flash.lakeheadu.ca

**APPENDIX D: Consent Forms for Study 1 and 2**

# CONSENT FORM

I agree to participate in the **Development and Validation of the Successful Aging Quiz** study being conducted by Christine Knight and Dr. Michael Stones of the Department of Psychology at Lakehead University.

By signing below:

- I acknowledge that I have made this decision based on the information I have received in the Information Letter and that I have had the opportunity to receive any additional details I want about the study.

- I understand that as a participant in the first part of the study, I will be asked to take 20 minutes to complete a questionnaire. I understand that as a participant in this portion of the study I will be entered into a random draw of $100

- I understand that the questionnaire will contain questions about my health status, mood, attitudes towards health and functional limitations, and that I may refuse to answer any questions that make me uncomfortable, or to which I do not want to make a response.

- I understand that as a participant in both parts of the study, I will be asked to complete the questionnaire described above, as well as being assigned to answer similar questions, either: 1) in a 20-minute interview, *or* 2) by answering the questions directly on a computer. I understand that the order in which I complete these sections of the study may vary, and that they will be separated by a one-week interval. I understand that as a participant in both parts of the study, I will receive $10 cash and be entered into a random draw for $100 *twice*.

- I understand that my participation in this study is completely voluntary, and that I am free to withdraw from the study or refuse participation at any time without jeopardizing my involvement in, or any other services provided to me by any of the organizations involved in advertising this project.

- I understand that there is no direct benefit to me for participating in this study. While there are no risks associated with participating, I understand that I have the right to decline answering any of the questions.

- I understand that all information I provide will be held in confidence, and kept in secure storage in the Psychology Department, Lakehead University for a period of seven (7) years after which time it will be destroyed. I also understand that I will not be identified by name in the thesis, report or publication.

Please place a CHECK beside which portion of the study you are consenting to participate in:

     \_\_\_\_\_ Part 1 ONLY – Completion of only the regular questionnaire.

OR

     \_\_\_\_\_ Part 1 AND 2  -  Completion of the regular questionnaire and
                             either the interview or computerized questionnaire.

If you are taking part in both portions of the study, you are also consenting to release your telephone number to the researcher so that she may contact you to set up a time and location to complete the second part of the study.

Participant's Telephone Number: _____ Date: _____

Participant's Name:_____ Participant's Signature: _____

Witness' Name:_____ Witness' Signature: _____

**APPENDIX E: Follow-Up Questionnaire for Study 2**

**Follow-Up Questionnaire**

*Participant ID Number:* _____

1.    In the past 7 days, have you experienced any significant life events, such as major changes in your health, living situation, financial status or psychological well-being?

_____ no       _____ yes

If yes, please briefly describe the nature of these changes or experiences.

_____

_____

_____

_____

2.    Which combination of Healthy Aging Quizzes did you complete? Check one of the following:

_____ Pencil-and-Paper Version AND Computer Version

OR

_____ Pencil-and-Paper Version AND Interview Version

3.    Which method of administration of the Healthy Aging Quiz did you prefer? Check one of the following:

_____ Pencil-and-Paper Version

_____ Computer Version

_____ Interview Version

_____ No preference

4.    Please rate the level of difficulty involved in completing **the Pencil-and-Paper Version** of the Healthy Aging Quiz. Check one:

_____ very easy

_____ easy

_____ difficult

_____ very difficult

5.    If applicable, please rate the level of difficulty involved in completing the **Interview Version** of the Healthy Aging Quiz. Check one:

_____ very easy

_____ easy

_____ difficult

_____ very difficult


6.    If applicable, please rate the level of difficulty involved in completing the **Computer Version** of the Healthy Aging Quiz. Check one:

_____ very easy

_____ easy

_____ difficult

_____ very difficult


7.    Please indicate how often you use a personal computer. Check one:

| | |
|---|---|
| _____ almost every day | _____ almost every month |
| _____ every day | _____ every month |
| _____ almost every week | _____ almost never |
| _____ every week | _____ never |

**APPENDIX F: Interviewer-Administered SAQ Form**

## SUCCESSFUL AGING QUIZ – Interview-Format

**Please answer the following questions. All your responses will remain confidential.**

1.      (complete without asking)  Gender:        _____Male   _____Female

2.      **What is your marital status?**     _____ Married      _____ Single

                                             _____ Widowed     _____ Divorced

3.      **What is your date of birth?** _____

4.      **What is your height?** _____

5.      **What is your weight?** _____

6.      **Have you experienced a weight change in the last three months? If so, approximately how much have you gained or lost?**

        _____ No change

        _____ Lost 2 lbs (1 kg)              _____ Gained 2 lbs (1 kg)

        _____ Lost 5 lbs (2.5 kg)            _____ Gained 5 lbs (2.5 kg)

        _____ Lost 10+ lbs (4.5 kg)          _____ Gained 10 lbs (4.5 kg)

7.      **How often do you smoke? (If they reply that they don't smoke, ask if they have quit, or if they never smoked).**

        _____ Never smoked

        _____ Quit smoking

        _____ Less than 10 cigarettes a day

        _____ 10-20 cigarettes a day

        _____ More than 20 cigarettes a day

        _____ Smoke cigar or pipe daily

8.      **Which of the following best describes your current overall health? (read list)**

        _____ Excellent

        _____ Very Good

        _____ Good

        _____ Satisfactory

        _____ Fair

        _____ Poor

9.    **How often have you visited a doctor this past year?**

_____ No visits at all

_____ 1-4 visits

_____ 5-12 visits

_____ More than 12 visits this year

10.    **How often you visited other health practitioners (e.g. nurse practitioner, homeopathic practitioner, physiotherapist, chiropractor) this past year:**

_____ No visits at all

_____ 1-4 visits

_____ 5-12 visits

_____ More than 12 visits this year

11.    **How often do you go for a dental checkup?**

_____ Seldom or never

_____ Alternate years

_____ Once a year

_____ Twice a year

12.    **How many illnesses do you have that are of an enduring or chronic nature (for example, heart disease, emphysema)?**

_____ No enduring illnesses

_____ 1 illness

_____ 2 illnesses

_____ 3 illnesses

_____ 4 or more illnesses

13.    **How many prescription drugs are you currently taking?**

None 1     2     3     4     5     6     7     8     9+

**14.    Do you have any physical limitations that make it difficult for you to manage work about the home?**

_____ Yes            _____No

**15.    How many hours of sleep do you get per day?**

_____ Less than 5 hours

_____ 5-7 hours

_____ 7-8 hours

_____ 9 or more hours

**16.    How many relatives do you have that you can depend on for help?**

None   1     2     3     4     5     6     7     8     9+

**17.    How many friends do you have that you can depend on for help?**

None   1     2     3     4     5     6     7     8     9+

**18.    Do you do things of a spiritual nature (e.g.  attend church, regular meditation or support groups)?**

_____ yes       _____no

**19.    How often you eat a well-balanced meal containing the four food groups  (e.g., meat or fish or protein sources such as tofu; milk products; bread or whole grain cereals; fruits and vegetables)?** (read options to them)

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**20.    How often do you eat a meal consisting of fast food, junk food, or processed food (e.g., hamburgers, deep fried food)?** (read options to them)

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

21.   **How many regular sized drinks of beer, wine, or spirits do you consume daily?**

_____ None

_____ 1-3 drinks

_____ More than 4 drinks

_____ More than 4 drinks, but not often

22.   **How how often you take vitamins?** (read options to them)

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

23.   **What are your present living arrangements (who do you live with?)**

_____ I live alone

_____ I live with my partner

_____ I live with my relatives

_____ other

24.   **Are you managing your own home?**   _____ yes   _____no

25.   **Are you looking for paid work?**        _____ yes   _____no

26.   **Are you retired? Check one**:        _____ yes   _____ semi-retired _____no

**For each of the following statements, select ONE answer that best describes the frequencies of your activities.** (for this section display the card with the 6 options for them to choose from).

27.   **I do paid work:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

28.   **I do volunteer work:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**29.    I look after a sick/disabled person:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**30.    I socialize outside my family circle:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**31.    I read books or magazines:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**32.    I engage in arts, crafts or hobbies:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**33.    I attend community organizations:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**34.    I write letters or stories:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**35.    I participate in sports:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**36.    I engage in political activity:**

| less than monthly | monthly | 2-3 times a month | weekly | a few times a week | daily |
|---|---|---|---|---|---|

**37.     I go to the cinema or theater:**

| less than<br>monthly | monthly | 2-3 times<br>a month | weekly | a few times<br>a week | daily |

**38.     I engage in fitness and exercise:**

| less than<br>monthly | monthly | 2-3 times<br>a month | weekly | a few times<br>a week | daily |

**For each of the following statments, select ONE answer that best describes how you typically think, feel, or behave** (for this section display the card with the 5 options for them to choose from).

**39.     I find it difficult to express needs and wishes to others for fear that I will bother them.**

| 1 | 2 | 3 | 4 | 5 |
| strongly disagree | disagree | neutral | agree | strongly agree |

**40.     I find it difficult to know how I'm supposed to interact with people in social situations.**

| 1 | 2 | 3 | 4 | 5 |
| strongly disagree | disagree | neutral | agree | strongly agree |

**41.     If I have a problem, there are dependable people I can rely on for support.**

| 1 | 2 | 3 | 4 | 5 |
| strongly disagree | disagree | neutral | agree | strongly agree |

**42.     If I have a problem, I turn to other activities to take my mind off things.**

| 1 | 2 | 3 | 4 | 5 |
| strongly disagree | disagree | neutral | agree | strongly agree |

**43.     I am in control of my health.**

| 1 | 2 | 3 | 4 | 5 |
| strongly disagree | disagree | neutral | agree | strongly agree |

**44.     Health professionals control my health.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**45.     I take my own actions to control my health.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**46.     I do only what my doctors tell me.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**47.     Life is hard for me most the time.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**48.     I am satisfied with my life today.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**49.     I am an enthusiastic person.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**50.     If I'm cheerful, I stay cheerful for long time.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**51.     If I'm agitated, I stay restless for long time.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**52.    If I'm distressed, I appear tense.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**53.    My feelings of uneasiness stay for long time.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**54.    When having a good day, I feel cheerful.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**55.    I remain happy longer than my friends.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**56.    I get upset easily.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**57.    My feelings of delight stay for long time.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**58.    I am tense for long periods at a time.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**59.    I try to do something about my problems.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**60.   I look for some good about my problems.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**61.   If I have a problem, I make an action plan.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**62.   If I have a problem, I deny its happening.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**63.   i often feel downhearted and blue.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**64.   Ordinary work is too boring for me.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**65.   My memory is as good as it ever was.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**66.   Memories of my past are as clear as a book.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**67.   I often have trouble concentrating.**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| strongly disagree | disagree | neutral | agree | strongly agree |

**68.    I have planned for my long-term finances.**

|         1         |        2        |       3       |      4      |         5         |
|-------------------|-----------------|---------------|-------------|-------------------|
| strongly disagree |    disagree     |    neutral    |    agree    |  strongly agree   |

**69.    I am financially comfortable.**

|         1         |        2        |       3       |      4      |         5         |
|-------------------|-----------------|---------------|-------------|-------------------|
| strongly disagree |    disagree     |    neutral    |    agree    |  strongly agree   |

**70.    My sex life is satisfactory.**

|         1         |        2        |       3       |      4      |         5         |
|-------------------|-----------------|---------------|-------------|-------------------|
| strongly disagree |    disagree     |    neutral    |    agree    |  strongly agree   |

**Have you filled in this quiz before?**    _____ Yes   _____ No

**Today's date: (dd/mm/yy): _____**

**Thank you for completing the Successful Aging Quiz!**

APPENDIX G: SF-36

# THE SHORT-FORM HEALTH SURVEY (SF-36)

**INSTRUCTIONS:** This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. Answer every question by marking the answer as indicated. If you are unsure about how to answer a question, please give the best answer you can.

1. **In general, would you say your health is:**

                                                        (circle one)
        Excellent.......................................................1

        Very good....................................................2

        Good...........................................................3

        Fair..............................................................4

        Poor.............................................................5

2. **Compared to one year ago, how would you rate your health in general now?**

                                                        (circle one)
        Much better now than one year ago....................1

        Somewhat better now than one year ago.............2

        About the same as one year ago.......................3

        Somewhat worse now than one year ago.............4

        Much worse now than one year ago....................5

3. **The following items are about activities you might do during a typical day. Does your <u>health now limit you</u> in these activities? If so, how much?**

                                        (circle one number on each line)

| Activities | Yes, Limited A Lot | Yes, Limited A Little | No, Not Limited At All |
|---|---|---|---|
| a. **Vigorous activities**, such as running, lifting heavy objects, participating in strenuous sports. | 1 | 2 | 3 |
| b. **Moderate activities**, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf. | 1 | 2 | 3 |
| c. Lifting or carrying groceries. | 1 | 2 | 3 |
| d. Climbing **several** flights of stairs. | 1 | 2 | 3 |
| e. Climbing **one** flight of stairs. | 1 | 2 | 3 |
| f. Bending, kneeling, or stooping. | 1 | 2 | 3 |
| g. Walking **more than a mile.** | 1 | 2 | 3 |
| h. Walking **several blocks.** | 1 | 2 | 3 |
| i. Walking **one block.** | 1 | 2 | 3 |
| j. Bathing or dressing yourself. | 1 | 2 | 3 |

4. During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>?

(circle one number on each line)

| | YES | NO |
|---|---|---|
| **a.** Cut down on the **amount of time** you spend on work or other activities. | 1 | 2 |
| **b. Accomplished less** than you would like | 1 | 2 |
| **c.** Were limited in the **kind** of work or other activities | 1 | 2 |
| **d.** Had **difficulty** performing the work or other activities (for example, it too extra effort) | 1 | 2 |

5. During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)?

(circle one number on each line)

| | YES | NO |
|---|---|---|
| **a.** Cut down on the **amount of time** you spend on work or other activities. | 1 | 2 |
| **b. Accomplished less** than you would like | 1 | 2 |
| **c.** Didn't do work or other activities as **carefully** as usual. | 1 | 2 |

6. During the <u>past 4 weeks</u>, to what extent has your current physical health or emotional problems interfered with your normal social activities with family, friends, neighbors or groups?

(circle one)

Not at all...............................................................1

Slightly..................................................................2

Moderately...........................................................3

Quite a bit.............................................................4

Extremely.............................................................5

7. How much bodily pain have you had during the <u>past 4 weeks</u>?

(circle one)

None.....................................................................1

Very mild..............................................................2

Mild.......................................................................3

Moderate..............................................................4

Severe..................................................................5

Very Severe.........................................................6

8.  During the <u>past 4 weeks</u>, how much did pain interfere with your normal work (including both work outside the home and housework)?

                                                                (circle one)

        Not at all............................................................1

        Slightly...............................................................2

        Moderately..........................................................3

        Quite a bit...........................................................4

        Extremely............................................................5

9.  These questions are about how you feel and how things have been with you during the <u>past 4 weeks</u>. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks –

(circle one number on each line)

|  | All of the Time | Most of the Time | A good Bit of the Time | Some of the Time | A Little of the Time | None of the Time |
|---|---|---|---|---|---|---|
| a. Did you feel full of pep? | 1 | 2 | 3 | 4 | 5 | 6 |
| b. Have you been a very nervous person? | 1 | 2 | 3 | 4 | 5 | 6 |
| c. Have you felt so down in the dumps that nothing could cheer you up? | 1 | 2 | 3 | 4 | 5 | 6 |
| d. Have you felt calm and peaceful? | 1 | 2 | 3 | 4 | 5 | 6 |
| e. Did you have a lot of energy? | 1 | 2 | 3 | 4 | 5 | 6 |
| f. Have you felt downhearted and blue? | 1 | 2 | 3 | 4 | 5 | 6 |
| g. Did you feel worn out? | 1 | 2 | 3 | 4 | 5 | 6 |
| h. Have you been a happy person? | 1 | 2 | 3 | 4 | 5 | 6 |
| i. Did you feel tired? | 1 | 2 | 3 | 4 | 5 | 6 |

**10.** During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

(circle one)

All of the time................................................1

Most of the time.............................................2

Some of the time............................................3

A little of the time...........................................4

None of the time.............................................5

**11. How TRUE or FALSE is each of the following statements for you?**

(circle one number on each line)

|  | Definitely True | Mostly True | Don't Know | Mostly False | Definitely False |
|---|---|---|---|---|---|
| a.  I seem to get sick a little easier than other people | 1 | 2 | 3 | 4 | 5 |
| b.  I am as healthy as anyone I know | 1 | 2 | 3 | 4 | 5 |
| c.  I expect my health to get worse | 1 | 2 | 3 | 4 | 5 |
| d.  My health is excellent. | 1 | 2 | 3 | 4 | 5 |

**APPENDIX H: Modified Mini-Mental Status Examination (3MS)**
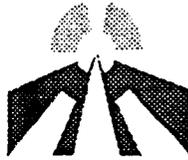
HE MODIFIED MINI-MENTAL STATE (3MS) Examination

ME: , _____    OCCUPATION: _____    EDUCATION: _____

__ DATE AND PLACE OF BIRTH

e: year _____, month _____, day ____
ce: town _____, province ____

__ REGISTRATION (No. of presentations ___)

iRT, BROWN, HONESTY
  SHOES, BLACK, MODESTY)
  SOCKS, BLUE, CHARITY)

__ MENTAL REVERSAL

o 1
  Accurate                         2
  1 or 2 errors/misses          0 1
ROW (WORLD)           0  1  2  3  4  5

__ FIRST RECALL
)
ontaneous Recall                 3
  :Something to wear"            2
..:S, SHIRT, SOCKS"            0 1

ontaneous Recall                 3
:er "A colour"                    2
.UE, BLACK, BROWN"            0 1

ontaneous Recall                 3
:er "a good personal quality"    2
DNESTY, CHARITY, MODESTY"    0 1

__ TEMPORAL ORIENTATION
5
ar
Accurate                          8
Missed by 1 year                  4
Missed by 2-5 years             0 2
ason
Accurate or within 1 month      0 1
onth
Accurate or within 5 days         2
Missed by 1 month               0 1
y of Month
Accurate                          3
Missed by 1 or 2 days             2
Missed by 3-5 days              0 1
y of Week
Accurate                         0 1

____ SPATIAL ORIENTATION
5
Country                        0  1
Province                       0  2
City (town)                    0  1
Hospital/office Building/home  0  1

____ NAMING
5
Forehead ____, Chin ____, Shoulder ____
Elbow ____, Knuckle ____

____ FOUR-LEGGED ANIMALS (30 Seconds)
10          1 point each

____ SIMILARITIES
6
Leg-Arm
  Body part; limb, etc.            2
  Less correct answer          0  1
Laughing-Crying
  Feeling; emotion                 2
  Other correct answer         0 .1
Eating-Sleeping
  Essential for life               2
  Other correct answer         0  1

____ REPETITION
5
"I WOULD LIKE TO GO HOME/OUT"          2
1 or 2 missed/wrong words             0  1
"NO IFS ___ ANDS___ OR BUTS ___"

____ READ AND OBEY "CLOSE YOUR EYES"
3
Obeys without prompting            3
Obeys after prompting              2
Reads aloud only                 0  1
(spontaneously or by request)

____ WRITING (1 minute)
5
( I ) WOULD LIKE TO GO HOME/OUT

____ COPYING TWO PENTAGONS (1 minute)
10
                                    Each Pentagon
5 approximately equal sides           4    4
5 unequal (>2:1) sides                3    3
Other enclosed figure                 2    2
2 or more lines                      0 1  0 1
                                    Intersection
4 corners                                  2
Not 4-corner enclosure               0     1

____ THREE STAGE COMMAND
3
____    TAKE THIS PAPER WITH YOUR
,       LEFT/RIGHT HAND
____    FOLD IT IN HALF, AND
____    HAND IT BACK TO ME

____ SECOND RECALL
9
(Something to wear)        0  1  2  3
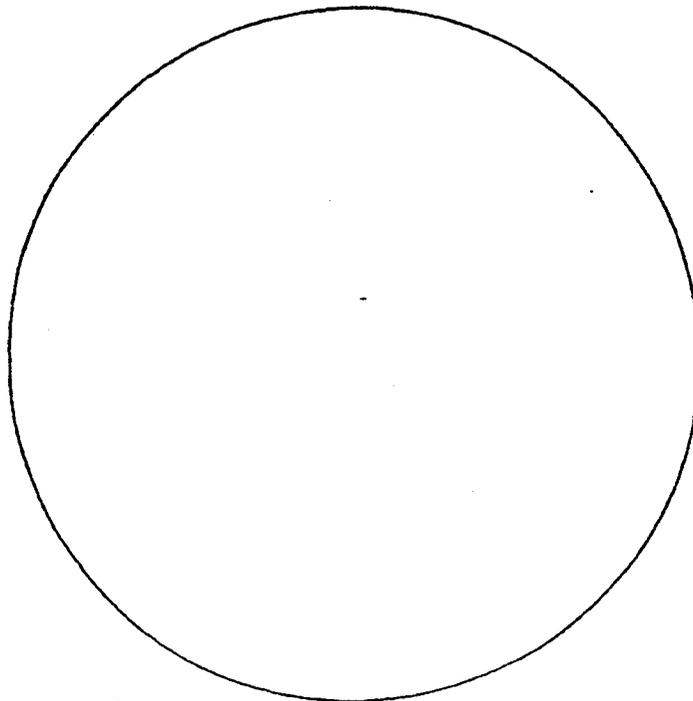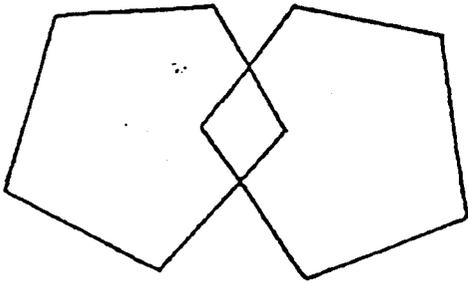(Colour)                   0  1  2  3
(Good personal quality)    0  1  2  3

ITE: _____    TIME: _____    SCORE: _____    SIGNATURE: _____

FF SCORE: _____77/100_____

# CLOSE YOUR EYES

SENTENCE _____

**APPENDIX I: Introductory Letter/Information Sheet for Study 3 Hospital Participants**

Dear Sir or Madam,

In collaboration with Dr. Michael Stones at Lakehead University, I am conducting a research study entitled "The Development and Validation of the Successful Aging Quiz", which will form part of the research requirement for completion of my PhD in Clinical Psychology at Lakehead University.

The purpose of this study is to develop a short questionnaire for assessing whether or not an individual is aging well. There is currently no single questionnaire available that is able to provide information about all the dimensions related to healthy aging. The ultimate goal of this research study is that the resulting questionnaire, entitled "The Successful Aging Quiz", may be available over the Internet so that middle-aged and older adults in rural and under-serviced regions in Northwestern Ontario will be able to quickly obtain a profile of their strengths and weaknesses. This healthy aging profile will assist in the development of individualized programs to promote health and wellness. The information collected from the study will help to make the development of this useful questionnaire possible.

I would like to invite you to take part in this research study. Participation would involve completing two questionnaires when you are first admitted to the Reactivation Service and then completing those same questionnaires again just before you are discharged from the hospital. The questionnaires will take approximately 30-45 minutes to complete each time. If you have difficulty reading or writing, I would be able to assist you in completing the questionnaires, if you so desire. Questions include, but are not limited to the following: age, gender, health status, mood, attitudes towards your health and functional limitations that you may experience. At discharge, I will also ask both you and your treatment team to provide a rating of how much your health improved over the course of your stay in the hospital. If it has not already been done as part of your care, you will also be asked to take part in brief structured activities used to examine skills that people rely on when filling out questionnaires, such as attention span and comprehension. As a token of my appreciation, every participant will be entered into a random draw for $100 cash.

Please note that your participation in this study is completely voluntary. You are free to decline the invitation to participate in this study, and you may withdraw your consent to participate at any time, without jeopardizing any services provided to you by St. Joseph's Care Group, simply by requesting to a staff member that you be removed from the study. Aside from making a contribution to the scientific study of healthy aging, there are no direct benefits, nor specific risks involved in participation.

Should you choose to take part, all of your responses and the information obtained from the study will remain completely confidential. All information obtained from this study will be coded, analysed and securely stored at Lakehead University for seven years, as required by Canada's Research Council's guidelines. The data will be destroyed after that time period. A summary of the results will be written up as my doctoral thesis, and an article will be prepared for publication. I would be happy to send you a summary of the report when the study has been completed, if you so request.

This project has been reviewed by, and received ethics clearance through, the Board Ethics Committee at St. Joseph's Care Group and the Research Ethics Board at Lakehead University. If you have any questions or concerns resulting from your participation in this study, please contact the Chair of the St. Joseph's Board Ethics Committee at 346-2431.

A consent form has been included with this letter of introduction so that you may indicate if you are interested in taking part in this study. If you would like to take part, please complete and sign the consent form and return it to me.

If you have any questions regarding this project, feel free to contact me at 343-2431, Ext. 2318, or my research supervisor, Dr. Michael Stones, at 343-8994.

Thank you for your assistance with this project.

Sincerely,


Christine Knight, M.A.Sc.
Doctoral Candidate in Clinical Psychology
Lakehead University

**APPENDIX J: Consent Forms for Study 3 Hospital Participants**

# CONSENT FORM

I agree to participate in the **Development and Validation of the Successful Aging Quiz** study being conducted by Christine Knight and Dr. Michael Stones of the Department of Psychology at Lakehead University.

By signing below:

- I understand that as a participant in the study I will be asked to complete two questionnaires when I am first admitted to the Reactivation Service, and then complete those same questionnaires when I am discharged from the hospital. I understand that the questionnaires will take approximately 30-45 minutes to complete each time. I understand that at discharge both myself, and my treatment team, will be asked to provide a rating of how much my health improved over the course of my stay in hospital.

- I understand that the questionnaires will contain questions about my health status, mood, attitudes towards health and functional limitations, and that I may refuse to answer any questions that make me uncomfortable, or to which I do not want to make a response.

- I understand that if it has not already been done as part of my care, I may also be asked to take part in brief structured activities used to examine skills that people rely on when filling out questionnaires, such as attention span and comprehension. These activities will take 20 minutes of my time.

- I understand that as a participant in this study I will be entered into a draw for $100.

- I understand that my participation in this study is completely voluntary. I understand that I am free to withdraw from the study or refuse participation at any time without jeopardizing any care or services provided to me by St. Joseph's Care Group, simply by requesting to a staff member that I be removed from the study.

- I understand that my responses and all the information gathered for this study will remain completely confidential. I also understand that I will not be identified by name in the thesis, report or publication.

- I understand that there is no direct benefit to me for participating in this study. While there are no risks associated with participating, I understand that I have the right to decline answering any of the questions.


Participant's Name:_____

Participant's Signature: _____

Date: _____

**APPENDIX K: Ratings of Improvement**

**Self-Report for Hospital-Based Participant:**

Please circle one of the options below to indicate how much you feel that your health has changed over the course of your stay in the hospital:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| got much worse | got a little bit worse | stayed the same | got a little bit better | improved a great deal |

---

**Team Assessment for Hospital-Based Participant:**

Please circle one of the options below to indicate how much the teams feels that participant X's health has changed over the course of his/her stay in the hospital:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| got much worse | got a little bit worse | stayed the same | got a little bit better | improved a great deal |

---

**Self-Report for Fitness Class Participant:**

Please circle one of the options below to indicate how much you feel that your health has changed over the your fitness program:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| got much worse | got a little bit worse | stayed the same | got a little bit better | improved a great deal |

**APPENDIX L: Information Letter/Introductory Statement for Study 3 Fitness Participants**

Dear Sir or Madam,

In collaboration with Dr. Michael Stones at Lakehead University, I am conducting a research study entitled "The Development and Validation of the Successful Aging Quiz", which will form part of the research requirement for completion of my PhD in Clinical Psychology at Lakehead University.

The purpose of this study is to develop a short questionnaire for assessing whether or not an individual is aging well. There is currently no single questionnaire available that is able to provide information about all the dimensions related to healthy aging. The ultimate goal of this research study is that the resulting questionnaire, entitled "The Successful Aging Quiz", may be available over the Internet so that middle-aged and older adults in rural and under-serviced regions in Northwestern Ontario will be able to quickly obtain a profile of their strengths and weaknesses. This healthy aging profile will assist in the development of individualized programs to promote health and wellness. The information collected from the study will help to make the development of this useful questionnaire possible.

I would like to invite you to take part in this research study. **Participation would involve completing a questionnaire package now and then again eight weeks later.** The questionnaires will take approximately 30 minutes to complete each time. Questions include, but are not limited to the following: age, gender, health status, mood, attitudes towards your health and functional limitations that you may experience. **As a token of my appreciation, every participant will be entered into a random draw for $100 cash.**

Your participation in this study is completely voluntary and all of your responses and the information obtained from the study will remain confidential. No person will be identified in the research. A summary of the results will be written up as my doctoral thesis, and an article will be prepared for publication. I would be happy to send you a summary of the report when the study has been completed, if you so request. This project has been reviewed by, and received ethics clearance through the Research Ethics Board at Lakehead University and the Board Ethics Committee at St. Joseph's Care Group. If you have any questions or concerns resulting from your participation in this study, please contact the Chair of the Lakehead University Research Ethics Committee at 343-8110.

**If you are interested in participating please complete the accompanying consent form and questionnaire, and return them by mail in the self-addressed stamped envelope provided. I will come back to your fitness class in eight weeks to give you the second questionnaire, which you can complete on your own and mail back in the self-addressed stamped envelope that will be provided. The consent form will also serve as your ballot in our random draw for $100. I will telephone you if you win the draw.**

If you have any questions regarding this project, feel free to contact me at 343-9062 or 346-2318. Thank you for your assistance with this project.

Sincerely,


Christine Knight, M.A.Sc.
Doctoral Candidate in Clinical Psychology
Lakehead University

**APPENDIX M: Consent Form for Study 3 Fitness Participants**

# CONSENT FORM

I agree to participate in the **Development and Validation of the Successful Aging Quiz** study being conducted by Christine Knight and Dr. Michael Stones of the Department of Psychology at Lakehead University.

By signing below:

- I understand that as a participant in the study, I will be asked to complete a questionnaire package during the second week of my fitness course, and again during the final week of my fitness course. I understand that as a participant in this study I will be entered into a random draw of $100

- I understand that the questionnaire will contain questions about my health status, mood, attitudes towards health and functional limitations, and that I may refuse to answer any questions that make me uncomfortable, or to which I do not want to make a response.

- I understand that my participation in this study is completely voluntary, and that I am free to withdraw from the study or refuse participation at any time. I understand that my responses and all the information gathered for this study will remain confidential. I also understand that I will not be identified by in any thesis, report or publication.

**By signing below you are also consenting to release your telephone number to the researcher so that she may contact you if you are the winner of the $100 cash draw.**

Name:_____

Telephone Number: _____

Signature: _____

Date: _____

What is the name of the fitness course you are enrolled in? _____

What days and times do you usually attend this fitness course? _____

Please complete the attached questionnaire and return this entire package by mail in the self-addressed stamped envelope provided.

**Thank you in advance for your interest and participation!**

**APPENDIX N: Information Letter/Introductory Statement for Study 3 Curlers**

Dear Sir or Madam,

In collaboration with Dr. Michael Stones at Lakehead University, I am conducting a research study entitled "The Development and Validation of the Successful Aging Quiz", which will form part of the research requirement for completion of my PhD in Clinical Psychology at Lakehead University.

The purpose of this study is to develop a short questionnaire for assessing whether or not an individual is aging well. There is currently no single questionnaire available that is able to provide information about all the dimensions related to healthy aging. The ultimate goal of this research study is that the resulting questionnaire, entitled "The Successful Aging Quiz", may be available over the Internet so that middle-aged and older adults in rural and under-serviced regions in Northwestern Ontario will be able to quickly obtain a profile of their strengths and weaknesses. This healthy aging profile will assist in the development of individualized programs to promote health and wellness. The information collected from the study will help to make the development of this useful questionnaire possible.

I would like to invite you to take part in this research study. **Participation would involve completing a questionnaire package now and then again eight weeks later.** The questionnaires will take approximately 30 minutes to complete each time. Questions include, but are not limited to the following: age, gender, health status, mood, attitudes towards your health and functional limitations that you may experience. **As a token of my appreciation, every participant will be entered into a random draw for $100 cash.**

Your participation in this study is completely voluntary and all of your responses and the information obtained from the study will remain confidential. No person will be identified in the research. A summary of the results will be written up as my doctoral thesis, and an article will be prepared for publication. I would be happy to send you a summary of the report when the study has been completed, if you so request. This project has been reviewed by, and received ethics clearance through the Research Ethics Board at Lakehead University and the Board Ethics Committee at St. Joseph's Care Group. If you have any questions or concerns resulting from your participation in this study, please contact the Chair of the Lakehead University Research Ethics Committee at 343-8110.

**If you are interested in participating please complete the accompanying consent form and questionnaire, and return them by mail in the self-addressed stamped envelope provided. I will come back to the Curling Club in January to give you the second questionnaire, which you can complete on your own and mail back in the self-addressed stamped envelope that will be provided. The consent form will also serve as your ballot in our random draw for $100. I will telephone you if you win the draw.**

If you have any questions regarding this project, feel free to contact me at 343-9062 or 346-2318. Thank you for your assistance with this project.

Sincerely,

Christine Knight, M.A.Sc.
Doctoral Candidate in Clinical Psychology
Lakehead University

**APPENDIX O: Consent Forms for Study 3 Curlers**

# CONSENT FORM

I agree to participate in the **Development and Validation of the Successful Aging Quiz** study being conducted by Christine Knight and Dr. Michael Stones of the Department of Psychology at Lakehead University.

By signing below:

- I understand that as a participant in the study, I will be asked to complete a questionnaire package within one week of receiving it, and again eight weeks later. I understand that as a participant in this study I will be entered into a random draw of $100

- I understand that the questionnaire will contain questions about my health status, mood, attitudes towards health and functional limitations, and that I may refuse to answer any questions that make me uncomfortable, or to which I do not want to make a response.

- I understand that my participation in this study is completely voluntary, and that I am free to withdraw from the study or refuse participation at any time. I understand that my responses and all the information gathered for this study will remain confidential. I also understand that I will not be identified by in any thesis, report or publication.

**By signing below you are also consenting to release your telephone number to the researcher so that she may contact you if you are the winner of the $100 cash draw.**

Name:_____

Telephone Number: _____

Signature: _____

Date: _____

What days and times of the week do you usually curl with the Port Arthur Curling Club?

_____

Please complete the attached questionnaire and return this entire package by mail in the self-addressed stamped envelope provided.

**Thank you in advance for your interest and participation!**

**APPENDIX P: E-mail/Listserv Invitation to Participate in Study 4**

To be posted on listservs and usenet groups for older adults and health promotion:

Christine Knight, a Doctoral Candidate in Clinical Psychology, and Dr. Michael Stones, a Professor at Lakehead University, are conducting a research study entitled "The Development and Validation of the Succcessful Aging Quiz. The purpose of this study is to develop a short questionnaire for assessing whether or not an individual is aging well.

We invite you to participate in this research study by joining the Successful Aging Project and completing the Successful Aging Quiz online.

Visit www.successfulaging.ca and complete the Quiz. It is free, and your confidentiality is assured. Visit the site to hear about the latest news and tips for healthy aging, participate in our moderated discussion forum on health promotion for older adults and obtain feedback about your healthy aging status.

For more information about the Successful Aging Project, please contact Christine Knight at cknight@flash.lakeheadu.ca, or Dr. Michael Stones at mstones@flash.lakeheadu.ca or (807) 343-8994.

# APPENDIX Q: Information and Privacy Statements

# Information and Privacy Statements

The Successful Aging Project respects your privacy.
All the information you provide is treated as confidential.

We recognize the importance of protecting the privacy of all information provided by users of our web site and all of our members. We created this policy with a fundamental respect for our users' right to privacy and to guide our relationship with our users. This privacy statement discloses our privacy practices.

- We ensure that names are removed from submitted surveys before those surveys are released for statistical analysis.

- We do not sell, trade, or rent to others any personally identifiable information we collect online.

- We use Secure Socket Layer (SSL) to encrypt confidential information enroute to our web site.

- We provide easy "Opt-Out" capability for members who do not wish to receive occasional email related to their membership.

- All information obtained through this web page is held in confidence, and kept in storage in the Psychology Department, Lakehead University for a period of seven (7) years after which time it is destroyed.

- No person will be identified by name in any thesis, report or publication that results from this data.

The Successful Aging Project aims to provide individuals with free access to scientific and empirically validated information about healthy aging. The Successful Aging Project is grounded on the belief that prevention is the key to good health and well-being throughout life. Our focus is on lifestyle information and personal assessment as a motivator for making change. We are not a medical site. If you have medical concerns, please see your doctor. If you have questions regarding this project, or require further
information, direct your enquiries to:

The Successful Aging Project • C/O The Pottery House
Lakehead University • 955 Oliver Road • Thunder Bay, ON P7B 5E1 •
Canada • (807) 343-8563 • manager@successfulaging.ca

By taking the quiz you acknowledge having read and understood the Privacy Statement and give consent for the information you give on the quiz to be used for research purposes.