

SELF-IMPOSED ACTIVITY LIMITATION  
AMONG COMMUNITY DWELLING ELDERS

by

Guifang Guo

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## ABSTRACT

This study explored the emerging Self-Imposed Activity Limitation (SIAL) theory among community dwelling elders. This theory was examined using the proposed Aging Well Conceptual model which was guided by Baltes' Selection, Optimization with Compensation model, Markus and Nurius' Envisioned Possible Selves theory, Kuypers and Bengtson's Social Breakdown Syndrome model, Bandura's Self-Efficacy theory, and Rotter's Locus of Control theory. The objectives of this study were to explore the relationships among multiple variables in a hierarchical model and to examine the explanatory power of the SIAL variables in predicting elders' well-being.

A correlational descriptive design with a causal modeling approach was used employing Structural Equation Modeling (SEM) techniques. The Aging Well model was tested through a secondary analysis of the National Survey of Midlife Development in the United States (MIDUS) database selecting respondents aged 65-74 years.

Two research questions guided this study. Research question one, how well does the Aging Well model fit with empirical sample data, was explored. The Aging Well model statistically approximated the MIDUS data after theoretical and statistical modifications and explained 76% of the variance of elder's well-being. The mediating effects of SIAL variables were determined by nested alternative model testing. Research question two, are the proposition statements in the Aging Well model valid, and was demonstrated empirically by the expected patterns of correlation and covariance among most of the variables in the Aging Well model.

SIAL as a composite factor had a large positive effect on elder's well-being. Elders' perceived constraints and perception of aging had no direct effect on well-being. The influences of these two factors on well-being were mediated by a common factor, SIAL. These findings supported the emerging SIAL theory by suggesting that the optimal use of SIAL would lead to adaptive outcomes promoting elders' well-being. In addition, SIAL mediated the effects of elders' sense of control and perception of aging on well-being. The full range of SIAL could not be examined due to limitations inherent in secondary data analysis.

## PRELUDE

A phenomenon commonly observed among community dwelling elders, Self-Imposed Activity Limitation (SIAL) was the inspiration for this dissertation. The following is a real life case which represents the phenomenon being explored in this study.

Mr. G. was an older man living in a big city. He had no confirmed medical diagnosis of any chronic disease. Mr. G. had a healthy lifestyle, ate a balanced diet and did not smoke nor drink. He normally rose very early every morning to participate with his friends for a daybreak walk in the park and volunteered in many community activities. At age 84, Mr. G broke his hip and was hospitalized. He received good hospital care and was discharged from the hospital with a satisfactory recovery. He was able to walk freely again. After he returned home, the family hired a personal assistant to help him with his activities of daily living. At this point, he discontinued volunteer work and group activities with his friends. When his children returned home, they found Mr. G. was more and more reluctant to get out of bed for meals. He preferred that his son give him a shower or bath, and later he did not even want to toilet himself. When his children asked Mr. G. to get out of bed and do things for himself, he would get upset. He thought they did not want to care for “their old guy” anymore. Mr. G. blamed his children for not being considerate of his age and health conditions. Gradually, over time he stayed in bed more and more until he could no longer care for himself. He lost his muscle strength and became weaker and weaker and died at age 88 after four years in bed.

From this exemplar, we can see that Mr. G made a choice, consciously or unconsciously, subsequent to his hip fracture, to limit his activity by performing fewer daily activities for himself. The result of his choice was that he gradually became confined to bed. His excuses were that he was too old and had just broken his hip. He believed he would break it again if he moved around or continued doing things for himself. He was influenced by his negative mind-set of what could happen. He tried to avoid an undesired future by limiting his activities.

Mr. G. experienced non-compensation which is an avoidance approach to difficult situation. Non-compensation can lead to disuse syndrome which is the loss of capability due to insufficient practice of organism functions, a byproduct of protracted disuse (Bortz, 2005). Mr. G's behaviors represented the phenomenon of Self-Imposed Activity Limitation (SIAL) with non-compensation. This dissertation will focus on the understanding of SIAL and the function of compensation among community dwelling elders.

## CHAPTER I

### INTRODUCTION

Nursing research has focused increasingly on the aging population and the successful aging process in recent years. One concern relates to how elders can be successful in growing older with compression of morbidity and functional impairment, instead of living with great burdens of disease and disability.

Successful aging refers to continuing adaptation to changes in life, minimizing disease and disability risks, maintaining mental and physical functioning, relating with others, and actively engaging in life (Herzog, Ofstedal, & Wheeler, 2002; Rowe & Kahn, 1998). Appropriate physical, social, spiritual, and mental activities are beneficial for elders and important for successful aging, because these activities can reduce the risk of certain chronic diseases, relieve depressive symptoms, maintain independent living and enhance overall quality of life (Simonsick, Lafferty, Phillips, Mendes de Leon, Kasl, Seeman, Fillenbaum, Hebert and Lemke, 1993; Everard, Lach, Fisher, & Baum 2000). Engaging in both physical and social activities is associated with increased function and a slower decline in functional status in older age (Everard et al., 2000; Seeman & Chen, 2002). Despite the benefits of activities, more than half of adults in the United States are not regularly active at the recommended levels (Price, 2005). The numbers of physically active older adults decline with age (Federal Interagency Forum on Aging-related Statistics, 2004; Cousins, 2003).

Activity limitation is one of the important risk factors for functional decline, chronic disease morbidity and mortality among elders (Dipietro, 2001). About half of the

limited activity experienced by elders is accounted for by their cutting down on their usual activities ( Gill, Desai, Gahbauer, Holford, & Williams, 2001). Activity limitation is not only a common phenomenon among disabled elders, but is also seen among community dwelling elders with no physical and mental disabilities (Mor, Murphy, Masterson-Allen, Willey, Razmpour, Jackson, Greer, & Katz, 1989; Simonsick et al., 1993).

Many factors such as disease and environmental factors that contribute to activity limitation and an inactive lifestyle among the aging population are discussed extensively in the literature (Chad, Reeder, Harrison, Ashworth, Sheppard, & Schultz, S., et al. 2005; Sallis, Johnson, Calfas, Caparosa, & Nichols, 1997). However, research and discussion about Self-Imposed Activity Limitation (SIAL) is lacking. While many studies about activity limitation have been conducted among disabled people, activity limitation among physically and mentally capable elders is less explored. Little is known about the impact of age-related changes on the intrapersonal motivation and choice of activities made by elders. As Cousins (2003, p. 439) said: “the mobilization of millions of unmotivated elders into a physically active lifestyle is a daunting health promotion task given our current level of understanding”. A better understanding of the intrinsic processes of choice and effort made by elders is needed in order to promote the health of elders to an optimal level.

#### Statement of the Problem

Activities have profound effects on people’s functional level. Despite co-morbidity among the elder population, few people are really prohibited from engaging in

physical activities such as moderate exercise and daily house hold activities (Phillips, Schneider, & Mercer, 2004). The Centers for Disease Control and Prevention reported that Americans have become more active in their leisure time compared to a decade ago (Price, 2005). However, the percentage of elders who engage in regular activities is still low. According to the key indicators of well-being among older Americans in 2004, only 26% of people ages 65-74, and 9% of people age 85 and over are involved in physical activities (Federal Interagency Forum on Aging-related Statistics, 2004). Lack of activity can lead to cognitive functional decline (Etnier, Salazar, Landers, Petruzzello, Han, & Nowell, 1997; Clarkson-Smith & Hartley, 1989). For elders, giving up activities has an independent effect on depressive symptoms even after controlling for health status and resources. As a result of giving up or restricting activities, elders experience preventable functional decline, loss of independence and increased disease burden (Phillips et al., 2004). Moreover, studies have shown that lack of physical activity results in psychological declines associated with aging (Burbank, Reibe, Padula, & Nigg, 2002). Disuse may account for as much as 50% of the functional decline commonly associated with aging (Smith, 1980).

From the perspective of life-span developmental psychology, human development can be understood as the outcome of ongoing, lifelong adaptive processes. Human development is conceived as not a monolithic process of progression and growth, but as an ongoing, changing, and interacting system of gains and losses. The essential problem of human aging is a search for an effective and reality-based mastery of the dynamics

between growth and decline; between expansion and construction; and between progress and deficits (Baltes, 1995).

Many factors are involved in searching for balances between gains and losses in aging. According to Walter Bortz (2005), four discrete agencies influence human developmental processes and health experiences both individually and collectively. The four agencies are: genetic factors, external agency (environment), internal agency (personal function), and aging. Since it is not possible to manipulate genetic aberrations or the process of aging, and the environment is only minimally controllable in many situations, personal function is a key malleable element in the adaptive process of human development. “External agency is a threat to well-being; internal agency connotes an appropriate and constant interplay of the host and environment” (Bortz, 2005, p390).

Due to age-related physical changes as well as extended exposure to environmental risks (external agency), it is difficult to avoid the presence of losses that accompany advanced age. How to maintain and promote well-being depends on the internal functioning of elders. Self-imposed activity limitation (SIAL) is one of the internal functions for dealing with the impacts of aging. SIAL can be used in adaptive or maladaptive ways. In adaptive use, elders use compensation, an adjustment process by which the functional impact of internal and external losses and limits are minimized. By exploring other internal or external resources and constructing alternative strategies, elders can make up for particular deficiencies or losses. In maladaptive use of SIAL, elders use non-compensation, a non-adjustment process by which no alternative strategies are applied to make up for the functional impact of internal and external losses and limits.

How individuals apply SIAL is individualized. People differ in their thoughts and actions, especially when facing challenges. They can be active, adaptive, constructive and engaged in life; or passive, maladaptive, indolent, and alienated (Ryan & Deci, 2000). For example, after suffering from a hip fracture, some people recognize their increasing frailty and become engaged in exercises to improve their condition or prevent further risks. They resume their previous responsibilities for carrying out daily activities by using compensation strategies. On the other hand, others may be terrified, restrict their daily activities and are unable to regain previous levels of physical and social functioning by using non-compensation strategies (Delbaere, Crombez, Vanderstraeten, Vanderstraeten, Willems, & Cambier, 2004).

#### Purpose of the Study and Research Questions

This study focused on understanding elders' use of Self-Imposed Activity Limitation (SIAL). The major objectives of the study were to explore whether or not the theoretical definition of SIAL and the proposed conceptual model for study SIAL—the Aging Well Model were useful for understanding activity limitation that is not imposed by disease and environment among community dwelling elders. The explanatory power and mediating effect of SIAL in predicting elders' well-being also was explored. Two research questions were examined: (1) how well does the proposed Aging Well Model fit with the empirical sample data? (2) are the proposition statements in the Aging Well Model valid?

### Significance of the Study

Growing old with vitality is an optimal goal of successful aging (Rowe & Kahn, 1998). One of the objectives of the healthcare profession is to improve or maintain the quality of life and independence of elders as long as possible. The most promising approaches to health promotion are those that minimize the negative functional consequences of disease and loss of aging and promote active engagement in life (Mor et al., 1989).

It is important to recognize that SIAL is an issue which impacts the well-being of elders and to realize that its negative consequences are preventable and reversible. How SIAL is used in later life may result in adaptive or maladaptive outcomes. Optimal use of SIAL can lead to successful aging in which elders can enjoy an effective later life with some normative limitations. On the other hand, excessive use of SIAL may lead to pathological aging that results in elders suffering from many negative health outcomes as a result of withdrawal from life. This study will contribute to the health sciences in three ways: (1) construction of a new concept that emphasizes this relatively understudied aging phenomenon; (2) development of a conceptual framework that generates a new theory in gerontology; and (3) identification of an important mediator between elder's perception of self and sense of control and their well-being which will facilitate the development of strategies in health promotion among community-dwelling elders.

### Theoretical Conceptualization of Self-Imposed Activity Limitation

Self-Imposed Activity Limitation (SIAL) among community dwelling elders is a new concept constructed by the researcher from personal and professional life

experiences and related theories. The conceptual and theoretical roots of SIAL will be discussed in the following section.

### *Definition of the Concept--Self-Imposed Activity Limitation*

#### *Definition of SIAL*

Self-imposed activity limitation is an incremental process of self-determined, self-initiated, and self-reinforced constraints on physical, mental, or social actions by a person who possesses control over a situation. SIAL is a two-dimensional construct with multiple domains. The two dimensions are: 1) cognitive and 2) behavioral. The cognitive dimension is an elder's choice to use compensation. The behavioral dimension is the elder's engagement in physical, mental and social activities. Major domains of SIAL include Self-Imposed Physical Activity Limitation (SIPAL), such as giving up daily exercise; Self-Imposed Social Activity Limitation (SISAL), such as withdrawal from previous social responsibilities; and Self-Imposed Mental Activity Limitation (SIMAL), such as avoiding learning about new technologies.

#### *Descriptive Statements of SIAL*

SIAL is a shaping process of thoughts and actions. This process is based on a person's cognitive appraisal of an encountered situation. It is a common mechanism used by elders. SIAL is conceptualized on a continuum ranging from adaptive to maladaptive with consequences ranging from well-being to disuse syndrome.

#### *Major Attributes of Self-Imposed Activity Limitation (SIAL)*

Major attributes of SIAL include its characteristics and modifying factors.

### *Major Characteristics*

From the exemplar given in the prelude and definitions provided above, one can identify several major characteristics of SIAL. SIAL is a personal conscious or unconscious choice that is based on an individual's appraisal of a situation. It is an incremental process of self-determination, self-initiation and self-reinforcement. It consists of actions that are brought about as if by force or by established self-authority to constrain activities. It involves all domains of physical, mental, and social activities.

A major attribute of SIAL is its self-imposed nature. Elders choose for themselves whether or not they have the capacity to perform physical, social, and mental activities. SIAL is different from activity limitations imposed by other factors such as disease or environment, which have been discussed extensively in the literature. SIAL can range from adaptive to maladaptive behavior, or from Selection, Optimization with Compensation (SOC) described by Baltes (1995), to Selection Non-optimization with Non-compensation (SNONC) constructed by the researcher of this study. SOC and SNONC will be described and discussed in the theoretical basis section of this report.

### *Modifying Factors*

Modifying factors of SIAL are within the personal and socio-cultural domains. There are ten modifiers of SIAL in the personal domain. These include: previous life experience; affective state such as depression, anxiety and fear (fear of falling, pain, symptoms, high technology); perceived sick role; psychosomatic responses; aging processes; need to conserve energy; change in interests; need to prioritize actions; personal maturity; and personality. There are eight modifiers of SIAL in the socio-

cultural domain which include: image of aging, stereotypes of aging, learned helplessness and learned hopelessness, expectations for caregivers, changed living conditions, role changes, culture (e.g. filial piety) and demographic background. In the current study, only depression was selected as a modifying factor for its close relationships to well-being and activity as documented in the literature.

*Theoretical Basis for SIAL, the Aging Well Model*

A deductive-derivation approach was used in the conceptual development of SIAL and the Aging Well model. In this approach, the relations and hypotheses were deduced from existing theories. Theories were examined from psychology and sociology because they described the attributes of human beings, elders, society, and the internal function of human beings such as sense of control, self concept and choice of compensation strategy. A conceptual meaning of SIAL, a conceptual framework, Aging Well Model (Figure 1) for a special population in nursing, (i.e., community dwelling elders with self-imposed activity limitations), was derived from the review of these theories. In Figure 1, the smaller oval circles with solid line represent constructs in the study; the larger oval circles with dotted line represents the construct of SIAL, which is a composite factor of compensation strategy and activity.

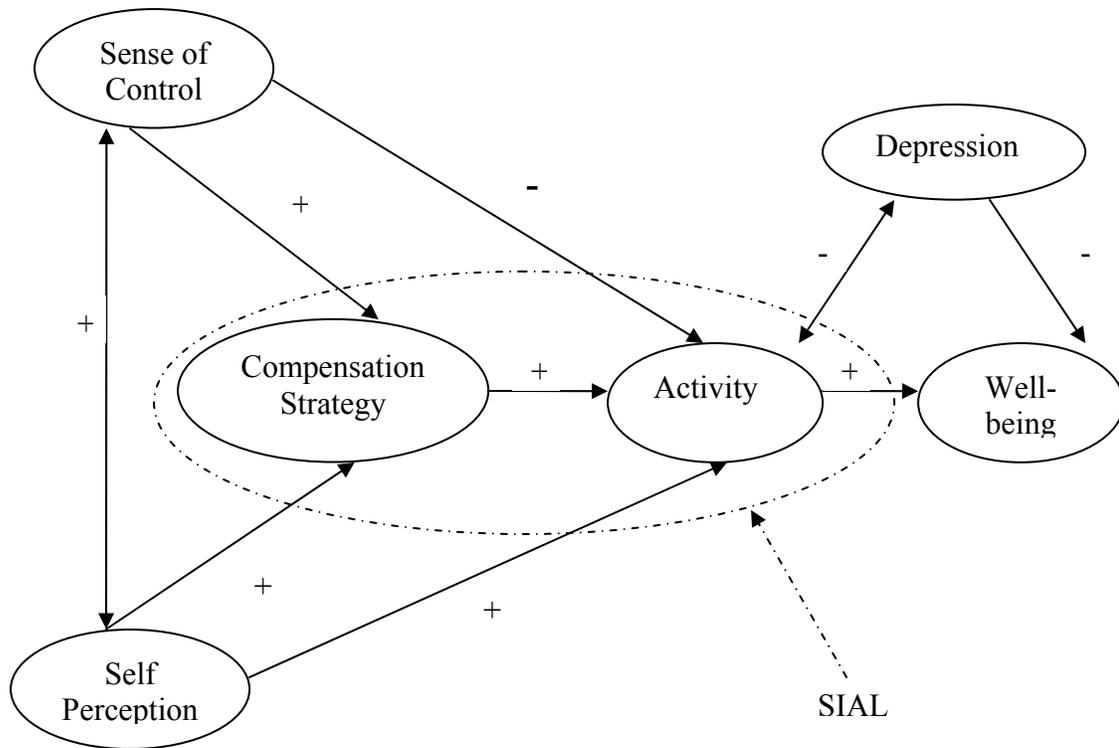


FIGURE 1. Basic Aging Well Model

*Concepts in the Self-Imposed Activity Limitation (SIAL) Study*

The SIAL study included six major concepts: well-being, activity, compensation strategy, sense of control, self perception and depression.

*Well-being* is a contested concept and there are different definitions such as “the state of being happy, healthy, or prosperous” (Merriam-Webster Online Dictionary, 2006); “a perceived state of harmony in all aspects of one’s life” (Orem, 1995, p83). In this study, well-being included three aspects: physical well-being such as perceived health, social well-being such as perceived social contribution, and psychological well-being such as life satisfaction.

*Activity* is generally defined as a quality or state of being active; vigorous or energetic action, natural or normal function as a process actually or potentially involving mental function; an active force; a pursuit in which a person is active; a form of organized, supervised, often extracurricular recreation; and an organizational unit for performing a specific function; also, its function or duties (Merriam-Webster Online Dictionary 2006). In this study, activity was indicated by elders’ engagement in both physical activity and engagement in social responsibility.

*Compensation* is a psychological mechanism by which feelings of inferiority, frustration or failure in one field are counterbalanced by achievement in another (Merriam-Webster Online Dictionary 2006). In this study, compensation was indicated by elders positively confrontation with situations, lowering their aspirations and seeking support.

*Sense of control* is a belief about how much power people have over their lives or situations and assumed internal states that explain why certain people actively and willingly try to deal with difficult circumstances whereas others do not (Moore, 2003). Sense of control was indicated in the current study by elders' health efficacy, personal mastery and perceived constraints.

*Self perception* is an awareness of the characteristics that constitute one's self or self-knowledge (Bem, 1972). Self perception was indicated in the current study by elders' perception of aging.

*Depression* is "a common mental disorder that presents with depressed mood, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, low energy, and poor concentration" (WHO, 2007).

#### *Proposition Statements of Theoretical Relationships*

The hypothesized theoretical relationships among these concepts are:

1. Elders' well-being is positively impacted by their activity.
2. Elders' activity is influenced by their use of compensation strategies.
3. Elders' use of compensation strategies is influenced by their sense of control.
4. Elders' compensation strategies are influenced by their self perception.
5. Elders' sense of control and self perception covary; the stronger the sense of control, the better the self perception and vice versa.
6. Depression is a modifying factor for both activity and well-being.

### Theories Related to This Study

Although the concept of SIAL is new and there is little literature that addresses this concept, the phenomenon has been discussed by many theorists from different perspectives. In the following section, three groups of theories will be reviewed: 1) Theories related to SIAL; 2) Theories related to self perception and aging; and 3) Theories related to sense of control. Each theory has its unique function and position in explaining and interpreting the shaping process of SIAL. Their major ideas, uniqueness and usefulness in relation to the concept of SIAL and the conceptual model for SIAL study—the Aging Well model will be presented. By testing the model, this study sought to develop a new theory for community dwelling elders with SIAL.

#### *Theories Related to SIAL*

Baltes' (1997) theory of Selection, Optimization with Compensation describes the internal function of human beings in the process of adaptation in life. This theory helps explain the process of SIAL: When people get older, there is an unfavorable balance between gains and losses that cause elders to be unable to perform some activities to the degree they did at younger age. They tend to reprioritize their goals or limit themselves to certain activities that are important to their life fulfillment and use a compensation strategy to make up for the losses.

#### *Baltes: Selection Optimization with Compensation (SOC Model)*

The model of Selection Optimization with Compensation (SOC) is embedded in, and draws upon ideas from, the life-span perspective of development and aging (Marsiske, Lang, Baltes & Baltes, 1995). Baltes recognized that the essential problem of

human aging is the search for an effective and reality-based mastery of the dynamics between growth and decline, expansion and construction, progress and deficits. Baltes' SOC theory fits with the conceptualization of SIAL as having adaptive elements. Figure 2 illustrates the three major concepts and relationships in the Baltes' SOC model.

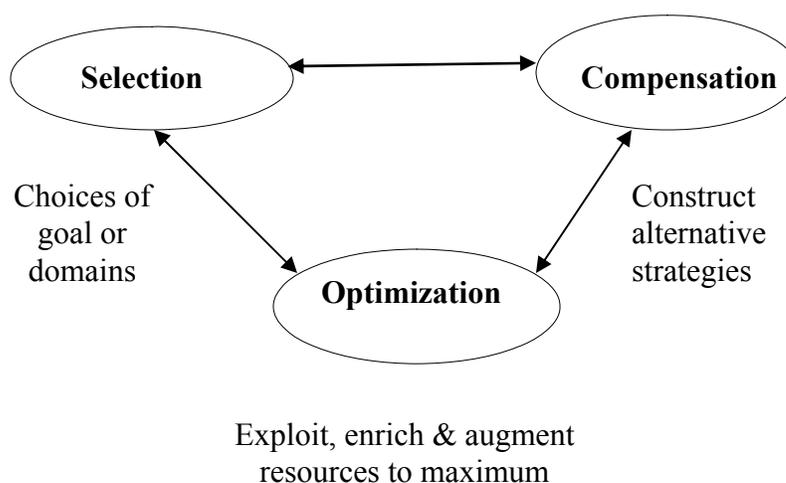


FIGURE 2. Baltes' Selection, Optimization with Compensation (SOC) Model

*Selection.* Selection is a conscious or unconscious choice of particular goal-continued development (growth or maintenance). This definition is consistent with the core characteristic of SIAL. A person's choice is the fundamental component of any behavioral or developmental process. In order to conserve energy, elders actively or passively reset life goals, re-prioritize needs and interests, and reduce the number and diversity of activities so they can focus on those areas that are most important in everyday life. Selection creates and gives direction to development. It manages the fundamental resource limitations inherent in all living systems. It can be directed by origins within an individual's own motivational and cognitive constraints, or be directed

by biological and social forces outside the individual (Freund & Baltes, 2000). In the SIAL process, people make choices based on their cognitive appraisal, and select either approach or avoidance strategies.

*Optimization.* Optimization is an internally and externally regulated search for a higher, efficacious, and desirable level of functioning. People enhance and refine the means to maximize their resources in a selected domain of functioning. It is the fundamental component of developmental progression and maintenance. People exploit organism and environmental opportunities. They engage in behaviors to enrich and augment their general reserves and maximize (within the societal, subculture and personal norms) their chosen life course with regard to quality and quantity. Optimization implies a generalization and transfer of life in the direction of increased adaptive fitness (Freund & Baltes, 2000). People who do not use optimization go in the other direction, which leads to a maladaptive outcome. In the SIAL process SIAL can be either adaptive or maladaptive. Optimization is an adaptive form of SIAL in which people tend to use an approach strategy that leads to well-being.

Following Baltes' thought, we can further extend the idea in the opposite direction of non-optimization. Non-optimization is a maladaptive form of SIAL which leads to sedentary states and finally results in functional declines. Elders who use non-optimization see only limitations and losses. They have no intentions or ideas of searching internal or external resources or of maximizing existing strengths. The result of non-optimization is a negative transfer of life to helplessness and hopelessness, which is a maladaptive form of SIAL and leads to a withdrawal from life activities. The continuum

of optimization to non-optimization is identified as the process of exploring resources or seeking support in the SIAL study.

*Compensation Strategy.* Compensation is an adjustment process or strategy by which the functional impact of internal and external losses and limits are minimized by relying on other internal or external resources. Compensation allows elders to construct alternative approaches to make up for particular limits or losses of competence that are internal and external in terms of plasticity, reserve capacity, and contextual opportunities (Freund & Baltes, 2000). Optimal use of compensation is an adaptive form of SIAL which assists elders in healthy aging. Furthering Baltes' ideas in the opposite direction, Non-Compensation, then, is a maladaptive form of SIAL. People who use Non-Compensation may select an avoidance approach. If they cannot do what they want to do, then they may avoid the activity or give up entirely. Consequences of Non-Compensation are functional decline. The continuum of Compensation to Non-Compensation is indicated by "lowering aspirations" but "persistent with goal striving" in the SIAL study.

*Summary:* The strengths of the SOC model lie in its holistic approach to aging. The model considers the biological, psychological and social aspects of the aging process. It is also in agreement with scientific knowledge about the nature of psychological development and aging. SOC emphasizes a successful or adaptive life-span developmental perspective, but SNONC, a maladaptive developmental perspective and its consequences are not emphasized.

Although the SOC model has been applied to different age groups in recent years, the original propositions were based largely on studies of "young-old" (age 60-75). It

strongly emphasizes psychological development, and it does not focus on the environment as a major factor influencing people's choices and performance (except the condition as a person views it). Because SOC was based on studies of Northern European elders its generalizability to other cultural populations needs to be studied. There is a need to further develop the theory for more empirical operationalization.

Many studies using Baltes' theory have focused on the adaptive behaviors of SOC. Selection, Non-Optimization with Non-Compensation (SNOONC) has not been considered. The study of SIAL will add information about SNOONC.

#### *Theories Related to Self Perception and Perception of Aging*

Markus and Nurius' (1986) Envisioned Possible Selves theory and Kuypers and Bengtson's (1973) Social Breakdown theory identify issues related to self concept which relate to SIAL. Markus and Nurius focus on the personal perspective while Kuypers and Bengtson focus on the social perspective. These theories helped to explain the hypothesized theoretical relationships between self perception and compensation strategies and behaviors among elders (i.e., how self concepts regulate people's selection of choices).

#### *Markus and Nurius: Envisioned Possible Selves*

Markus and Nurius (1986) discussed how self-concept influences people's present and future experiences. Their proposition of self-concept is at the root of behavior change and helps explain why some people change their behavior and others do not.

In the discussion of envisioned possible selves, Markus and Nurius describe self-concept as a cognitive manifestation of anticipated goals, motives, fears and threats.

Possible selves can be symbols of hope or reminders of an undesirable future, because when people perceive themselves, they see their present capacities and states, as well as their potential and worries. Therefore, possible selves can be a positive image of hoped-for self or ideal self or a negative image of feared self or not-me self. Positive selves motivate and guide people to realize a desired future, while negative selves, which are unwanted and feared selves, can block action or prompt avoidance of what one fears. Possible selves are individualized. The nature, importance, degree of cognitive and affective elaboration, and the link to behavior vary depending on the individual's position in the life span. In the SIAL process, envisioned possible selves influence how people construct the situations they encounter which affects their visualized future as a success or failure (Markus & Nurius, 1986).

*Summary:* The concept of envisioned possible self provides a link between self concept and behavior. It influences people's selection of behaviors: to approach the hoped-for self and ideal self or to avoid the feared self and not-me self.

Possible selves theory is based on a future oriented self perception. However, most elders are present oriented, especially the oldest-old elders (Melenhort, Rogers, & Bouwhuis, 2006). Therefore, the implication of studying SIAL among elders is to understand that their perceptions of their present and near future selves are more critical than their far future selves.

#### *Kuypers and Bengtson's Social Breakdown Syndrome (SBS) Model*

The Social Breakdown Syndrome (SBS) model was developed from a social psychology perspective. Kuypers and Bengtson (1973) propose that individuals' sense of

self, their ability to mediate between self and society and their orientation to personal mastery are functions of the kinds of social labeling and values that people experience. People's social positions and social expectations change with advancing age. People, who experience role loss, vague or inappropriate normative information, and lack of reference groups, also experience a feedback vacuum which creates a vulnerability to, and dependency on, external sources of self labeling. Kuypers and Bengtson argue that, generally speaking, aging assumes a pathological quality because of the nature of environmental changes. SBS focuses on expectable psychological consequences of noxious social reorganization in late life (Kuypers & Bengtson, 1973).

SBS offers considerable insight into the dynamic between the person's sense of self, the development of skills for dealing with self and environment, and the feedback given by the outside world. It provides, "a sensitized model that explains the peculiar relationship between the elder person whose social system is contracting and the broader social environment within which he lives" (Kuypers & Bengtson, 1973, p186).

According to Kuypers and Bengtson (1973), the ethic of personal worth through social utility is the fulcrum that creates the negative spiral of breakdown. For elders, the symptoms of being old are related to the negative-toned stereotypes associated with loss of "productive" roles. Gradually, elders accept these negative attitudes in describing themselves. They are informed directly or indirectly of their uselessness, obsolescence, low value, inadequacy, and incompetence. Their self view of incompetence, uselessness, and worthlessness are the result of marginalization from society and may lead to SIAL

which will result in the maladaptive consequences from Selection Non-optimization with De-Compensation (SNODC).

There are seven steps of social breakdown that make up a malignant cycle of SBS: (1) precondition of susceptibility; (2) dependence on external labeling; (3) social labeling as incompetent; (4) induction into a sick, dependent role; (5) learning of “skills” appropriate to the new dependent role; (6) atrophy of precious skills; (7) identification and self-labeling as sick or inadequate. The model of SBS is presented in figure 3.

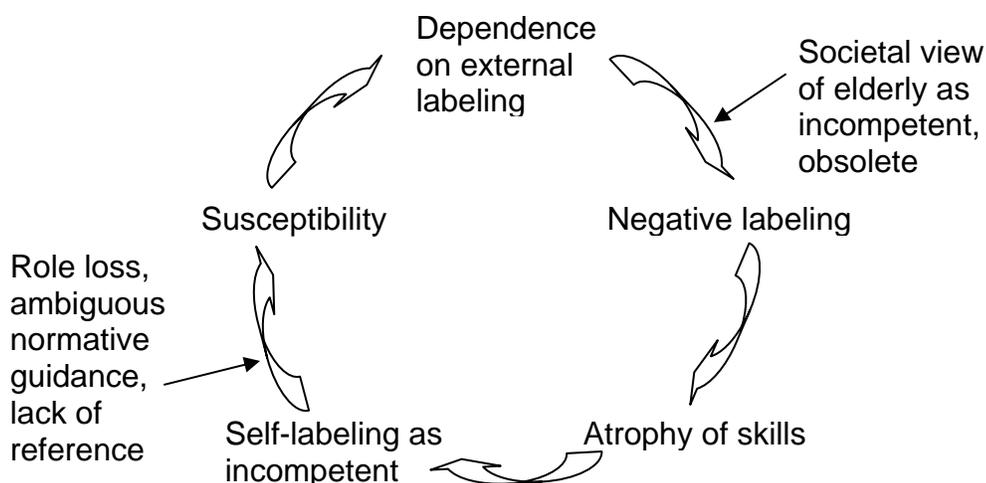


FIGURE 3. Kuypers and Bengtson’s Social Breakdown Syndrome (SBS) Model

*Summary:* SBS theory fits well in the study of SIAL among the aging population as it provides theoretical explanations of the social influence on elders’ perceptions of aging and health which are parts of the Aging Well. It can also help explain the social domain modifier of the Aging Well. It helps us understand that when people advance in age they not only face the challenge of changes in physiological function but also

challenging interactions with the social environment. The psychosocial environment is one of the forces that influence the affective perception of aging and health. SBS describes the noxious social influence on the perceptions of aging and health among elders. SBS, however, only explains part of the SIAL phenomenon. Positive images of social influences on aging are not described. To fully explore the SIAL among elders, a more comprehensive theory is needed.

#### *Theories Related to Sense of Control*

Bandura's theory about Self-Efficacy and Rotter's theory of Locus of Control discuss the relationship between people's personal beliefs in self and their selection of action. These theories explain how people's self beliefs regulate their decision-making and performance. These theories help explain the hypothesized relationship between sense of control and compensation strategies and behaviors of elders in the Aging Well.

#### *Bandura's Self-Efficacy*

Bandura (2000) posits that self-efficacy is the foundation of human agency. Efficacy beliefs regulate human functioning through four processes: cognitive, motivational, affective, and selection. These four processes can help explain how self-efficacy mediates the relationship between elders' sense of control, perception of self and their well-being.

*Cognitive processes.* Efficacy beliefs affect thought patterns that can enhance or undermine performance. Efficacy beliefs influence how people construe situations, types of anticipatory scenarios and visualized futures. The stronger the perceived efficacy, the higher the challenges people set for themselves and the firmer their commitment to

meeting them. People who doubt their efficacy visualize failure scenarios that undermine performance by dwelling on how things might go wrong (Bandura, 2000). This process provides theoretical support to Markus and Nurius' Possible Envisioned Selves theory about hoped-for self and feared self. It also provides a cognitive foundation for approach or avoidance strategies chosen by elders with SIAL.

*Motivational processes.* Efficacy beliefs play a central role in the self-regulation of motivation. Most human motivation is cognitively generated (Bandura, 2000). There are three forms of cognitive motivators: causal attributions, outcome expectancies and recognized goals. Based on expectancy-value theory, outcome expectancy is a judgment of the likely consequence that performance will produce. It addresses how people actually go about appraising and weighing the probable consequences of alternative courses of action. Outcome expectancies can be positive or negative. Positive outcome expectancies lead to incentives, whereas negative outcome expectancies lead to disincentives. Courses of action likely to produce positive outcomes tend to be adopted and used, whereas those that bring unrewarding or punishing outcomes are usually discarded (Bandura, 2000).

*Affective processes.* According to Bandura, there are four major ways in which efficacy beliefs regulate emotional states. They influence how threats are cognitively processed by supporting coping actions that alter the threats, by exercising control over perturbing thought patterns, and by alleviating aversive affective states (Bandura, 2000). Efficacy beliefs do not distress people who believe they can manage threats. People who believe they cannot control threats experience high anxiety, dwell on their coping

deficiencies, view many aspects of their environment as fraught with danger, magnify possible risks, and worry about perils that rarely happen. By such thinking, they distress themselves and compromise their functioning (Bandura, 2000, p20).

*Selection processes.* Efficacy beliefs influence the types of activities and environments people choose (Bandura, 2000). In self development through choice processes, personal destinies are shaped by selecting environments known to cultivate valued potentialities and lifestyles. People who have a strong sense of efficacy approach difficult tasks as challenges that need to be mastered rather than threats to be avoided when they encounter problems. They concentrate on how to perform successfully rather than on disruptive personal concerns. People who have a low sense of efficacy in a given domain of life shy away from difficult tasks which they perceive as personal threats. They turn inward on their self-doubts instead of thinking about how to perform successfully. When faced with difficult tasks they dwell on obstacles, the negative consequences of failure and their personal deficiencies (Bandura, 2000, p22).

*Summary:* Efficacy beliefs, like the theory of Possible Selves, helps to explain people's perception of self and the world in which they live as well as the shaping process of selection. Efficacy beliefs provide a theoretical base for understanding sense of control and constructing subscales in the Aging Well.

Bandura's theory emphasizes the relationship between beliefs and performance outcomes. However, the mediating factor between them is not extensively explored. For example, how an individual's engagement with versus withdrawal from selected

activities regulates the effects of sense of control on performance is not adequately discussed.

### *Locus of Control Theory*

Locus of Control refers to an individual's perception of the main causes of events in life (Rotter, 1966, 1990). Rotter posits that internal control refers to control generated from the individual. Individual behaviors are guided by personal decisions and efforts, whereas external control refers to control generated by forces located outside of the individual. When people expect that outcomes are the results of personal choices and actions, they apply an internal locus of control. When people expect that outcomes result from unpredictable or chance causes such as luck or fate or as a result of the control of powerful other people, they apply an external locus of control.

People experience personal mastery and feeling of internal control when their action results in an expected outcome. On the other hand, if an individual's expected outcomes are not believed to be personally controllable (due to an external locus of control), he will experience hopelessness.

*Summary:* A person's perception of being in control is significant and influences subsequent thoughts, feelings, and behavior. However, older people apply internal and external locus of control in diverse and overlapping domains (Lachman, 1986). People may feel in control and masterful in some domains but out of control and helpless in other domains. Rotter's theory helps understand sense of control and was used to construct subscales in SIAL study, especially the perceived constraints subscale.

### Application and Limitations of Selected Theories in the Study of Elders with SIAL

Among the reviewed theories, Baltes' Selection Optimization with Compensation supports the phenomena of SIAL among elders and illustrates the adaptive outcome of SIAL through optimizing resources and compensating with alternative activities. Rotter's theory of Locus of Control and Bandura's theories of Self-Efficacy all support the concept of sense of control which is one of the major independent variables in the Aging Well. Markus and Nurius's envisioned possible selves, Bandura's concept of visualized future, and Kuypers and Bengtson's Social Breakdown Syndrome (SBS) Model support another major independent variable, self perception, in the SIAL Study.

All the above theories and models suggest that there are relationships among predictive variables such as elders' sense of control, perception of self and aging, activity, and outcome variable such as elders' well-being. The Aging Well Model (Figure 1) suggests that there is a mediator (i.e., SIAL) between the predictive variables and outcome variables.

From the review of selected theories, it has been demonstrated that none of the reviewed theories alone can explain the phenomenon of SIAL. Integrating these theories provides a better understanding of SIAL and informs a new theory to explore SIAL among community dwelling elders.

### Emerging Theory of the Self-Imposed Activity Limitation

SIAL is an incremental process of self-determined, self-initiated, and self-reinforced constraint to one's physical, mental, or social actions by persons who possess

control over a situation. SIAL is a process from elders' self appraisal of confronted situations to their subjective selection of life goals and the way they relate themselves to activities.

Many factors influence the SIAL process such as sense of control and self perception. Elders' sense of control and self perception play an important role in SIAL. They regulate the SIAL shaping process by affecting the capability of cognitive appraisal and selection of goals. Elders with a high sense of control and positive self perception appraise situations more positively. They are more involved in searching and mobilizing all available internal and external resources to achieve developmental maintenance and progress.

Compensation is a key variable in the Aging Well. As age advances, older people use a combination of active assimilative strategies and passive accommodative strategies to reduce physical and psychological demands on their resources. Compensation acts as a mediator between people's intrinsic process of selection and efforts made by elders regarding their goals, activities and the outcome of SIAL. Compensation strategies help elders make a positive transition which implies movement in the direction of increased adaptive fitness (Freund & Baltes, 2000). This leads to well-being. Conversely, non-compensation negatively affects elders' situation appraisals because they see only the limitations and losses of aging. They have no intention or desire to search and mobilize internal or external resources, neither intention nor desire to maximize their existing strengths. By using Non-optimization, elders make a negative transition in life which results in hopelessness and helplessness and ultimately Self-Imposed Activity Limitation.

Compensation strategies include positively confronting situations, seeking support and lowering aspirations. Compensation is influenced by elders' sense of control and self perception which can affect elders' envisioned self and the scenarios they imagine. Elders, who have a high sense of control and positive self perception will apply internal control and make efforts to make up for the losses of aging by using compensation. Such elders will examine possible desired directions in their later life and choose from them. They use alternative strategies in order to optimize their resources and lower their aspirations to compensate for their limitations and losses. Elders who have a low sense of control and negative self perception will apply external control and use less effort to make up the losses by using non-compensation. Elders will list possible undesired directions and try to avoid them. If they cannot do the thing they want to do, they give up. Not using strengths and resources results in sedentary states which finally lead to functional decline, which is the maladaptive outcome of SIAL. The maladaptive outcomes of SIAL are risks to health which includes restrictions and their consequences in the basic domains of physical, mental, and social actions. Proper use of compensation assists elders to live a restricted but effective life (Baltes, 1991). Elders' motivation, cognitive constraints, biological and socio-cultural forces influence this process.

#### Summary

This chapter introduced the background, problem statement, purposes and significant of the study. Theoretical conceptualization of Self-Imposed Activity Limitation was discussed. Proposition statements of theoretical relationships among concepts in SIAL study, and the emerging theory of the Self-Imposed Activity Limitation

were presented. Two research questions were proposed to serve as guidance for the study:

(1) how well does the proposed Aging Well Model fit with the empirical sample data? (2)

are the proposition statements in the Aging Well Model valid?

## CHAPTER II

### LITERATURE REVIEW

This chapter includes a review of literature related to the SIAL study. Empirical research related to major variables in the Aging Well structure model (Figure 1) such as well-being, activity, compensation, sense of control, self perception and depression. The relationships among these variables as well as indicators included in the Aging Well Measurement Models will be reviewed. All the reviews are from MEDLINE(R) 1996 to present, CINAHL 1982 to present, and HealthSTAR 1975 to present.

#### Well-being and Its Relationship to Major Variables

This section will review research related to well-being. The univariate relationships of well-being with variables in the Aging Well Model including: elders' well-being in physical, mental, psychological, and social aspects; and elders' activity, compensation, sense of control, and self perception will be examined. Measurements of well-being will be included in the discussion.

#### *Well-being and Activity*

##### *Well-being and Activity in General*

“Well-being is the central goal of human activity.” (Ormel, Linderberg, Steverink, & Verbrugge, 1999, p.61). Activity contributes to all aspects of well-being: physically, mentally, psychologically and socially. Evidence of the relationship between well-being and activity among elders has been demonstrated in the literature. In an analysis of a subsample (n=679) of older adults age 65 and older in a Midwestern metropolitan area,

Herzog and colleagues (1998) concluded that there was a positive relationship between frequency of activity performance and level of well-being, and engaging in a variety of activities may indicate more successful aging among community dwelling elders.

The relationship between both physical and social activity levels and survival as an indicator of well-being has been reported (Kannel, Belanger, Agostino, & Israel, 1986; Paffenbarger, Hyde, Wing, & Hsieh, 1986; 1993; Kaplan, Strawbridge, Cohen, et al., 1996; Simonsick, et al., 1993; Peppers, 1976). For example, a 13-year longitudinal study conducted by Glass and colleagues (2006) explored the relationship between activities and survival among 2812 community dwelling men and women aged 65 years and older. The results show that survival was significantly associated with three types of activities: *social activity* such as participating in social groups, *productive activity* such as preparing meals, and *fitness activity* such as engaging in physical exercise. There was a clear mortality gradient across levels of reported activity for each type of activity: those in the least active quarter were 34.7% more likely to die than those in the most active quarter in productive activity, 20.3% for social activity and 18.8% for fitness activity. These results indicate that active people enjoy stronger survival advantages than inactive ones, and activities that entail little or no physical exertion may also be beneficial.

Similar results were also reported from Sweden. Lennartsson and Silverstein (2001) explored the relationship between engagement in life and survival of elderly people aged 77 and older (n=463). The results show that involvement in social, leisure, and productive activity produced a survival advantage among older Swedish. Greater participation in activity such as working and engaging in hobbies significantly reduced

the risk of mortality when all other activity domains and health factors were controlled, especially in men.

Warr and colleagues (2004) conducted a study among community-dwelling British adults (50-74 years old,  $n=1167$ ) examining associations between psychological well-being and activity among community dwelling elders. They used life satisfaction and affective well-being to measure psychological well-being, and 17 behaviors to measure six types of activities such as family and social, church and charity, home and garden, reflection and learning, music and drama. Results showed that both psychological well-being measures were significantly positively associated with overall activity level (frequency averaged across the 17 behaviors), with  $r=.21$ ,  $p<.01$ ; and  $r=.28$ ,  $p<.01$ .

#### *Well-being and Physical Activity*

Exercise makes you feel good (Fox, 1999) is one of the best expressions of the relationship between physical activity and well-being. Findings in gerontology and sport sciences suggest that regular physical activity and exercise can help to maintain and enhance functioning and health and psychological well-being among elderly people (Herzog et al., 1998; Woodgate, Ginis, & Sinden, 2003; Dik et al., 2003; Courneya & Fridenreich, 1997, Brown et al., 1995; McMurdo & Burnett, 1992; Morgan, 1994). Recent studies have shown that physical exercise may have broad significance for the overall well-being of elderly people (DiPietro, 2001; Seeman & Chen, 2002). A study regarding risk and protective factors for physical functioning in older adults ( $n=4,030$ ) revealed a consistent protective effect of regular physical activity with respect to patterns of change in physical functioning in community dwelling elder (age from 70-79) with

and without chronic conditions (Seeman & Chen 2002). Ruuskanen and Ruopilla (1995) also studied the associations between physical activity and psychological well-being and their significance among elderly individuals aged 65-84 in central Finland (n=1244). Log-linear and regression models showed that there was a significant association between higher prevalence of depression and no regular physical exercise. Elders' self-rated meaningfulness of life and better subjective health were also significantly related to regular and intensive physical exercise, especially among the young-old cohort (65-74 years). The results suggested that involvement in physical exercise may promote positive perceptions of psychological well-being among the elderly.

A meta-analysis examined data from 36 studies linking physical activity to well-being in older adults without clinical disorders. Physical activity had the strongest effects on self-efficacy and improvements in cardiovascular status; strength and functional capacity were linked to overall improvement of well-being. Social-cognitive theory was used to explain the effect of physical activity on well-being. Five random controlled trials (Brown et al, 1995; McMurdo & Burnett, 1992; Tyni-Lenne et al, 1998; Ruhland & Shields, 1997, Singh et al, 1997) showed that the exercise groups had improved physical function, social function, psychological well-being, mental health, and vitality.

Biddle and colleagues (2000) also conducted an intensive literature search on survey and experimental research on well-being and activity and summarized three major conclusions: (1) large scale surveys in several countries using different methods and criteria confirmed a moderate association between physical activity and indices of subjective well-being; (2) experimental studies supported a positive effect on mood for

moderate intensity exercise; and (3) affective benefits were more likely to be experienced by participants who focused on personal improvement goals.

#### *Well-being and Social Activity*

Engaging in social activities has been associated with increased well-being among community dwelling elders (Everard, 1999; Glass, Seeman, Herzog, Kahn & Berkman, 1995; Horgas, Wilms, & Baltes, 1998; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). Social relations with others as a form of social activity was examined by Avlund, Lund, Holstein, and colleagues (2004) among 651 non-disabled elders (age 76 and older) in Finland and Denmark. They found that in men, no weekly telephone contact was related to functional decline and mortality. In women, less than weekly telephone contact, no membership in a retirement club, and not sewing for others were significantly related to functional decline and mortality. In a secondary data analysis of the MIDUS data, Greenfield and Marks (2004) found that older participants with a greater number of major role-identity absences reported more negative affect, less positive affect for poor psychological well-being. However, being a formal volunteer can protect older persons from decreased levels of purpose in life among those with a great number of major absences in role-identity.

#### *Well-being and Compensation Strategies*

Age-adapted compensation strategies are functionally tailored to age-graded constraints and opportunities for development. During older age, people have less control over intended outcomes of behavior and fewer opportunities for goal attainment in many domains. As a result, using compensation strategies such as positive appraisals of

situation is predictive of successful development (Wrosch, Heckhausen, & Lachman, 2000). Wrosch and colleagues (2000) used terms and measures of persistence with goal striving, positive appraisal, and lowering aspiration as strategies. They examined the relationships among persistence in goal striving, positive appraisal, lowering aspiration and subjective well-being across adulthood with 3,490 people aged 25 to 76 from a national survey, the MIDUS database. The results showed that 1) positive appraisals had a stronger positive relation to subjective well-being than persistence with goal striving in middle and older age, 2) persistence had a stronger positive relation to subjective well-being in young adulthood than in older age; and 3) lowering aspiration was negatively related to subjective well-being independent of age.

Compensation is a very important mechanism in adapting to the changes of aging. Its association with well-being has been consistently demonstrated. However, there are not many studies that illustrate its relationship to other variables discussed in this study in the reviewed literature.

#### *Well-being and Sense of Control*

Many studies have demonstrated the relationship between sense of control and well-being (Wolinsky & Stump, 1997; Menec & Chipperfield, 1997, 1999; Menec, Chipperfield, & Perry, 1996; McAvay, Seeman, & Rodin, 1999; Glass, Seeman, Herzog, Kahn, & Berkman, 1995). For example, Lang & Heckhausen (2001) investigated the relationship between perceived control and subjective well-being among 480 people across adulthood (aged 20-90). They reported that perceived control over desirable outcomes was related to three dimensions of subjective well-being: life satisfaction

( $r=.35$ ), negative affect ( $r=-.13$ ), and positive affect ( $r=.58$ ). A meta-analysis of nineteen studies showed an average correlation of  $r=.29$  between perceived control and general subjective well-being of young and middle aged adults (Deneve & Cooper, 1998).

Menec and Chipperfield (1997) explored the relationship between leisure activity participation, health and life satisfaction among 1258 older adults (mean age=70). They found that locus of health control contributed to perceived health (physical well-being) and life satisfaction (psychological well-being) both directly and indirectly through its effect on exercise participation. In another study conducted by Menec and Chipperfield (1999) they found similar results that a greater sense of control was associated with lower rates of hospitalization and mortality for oldest-old individuals with little functional impairment.

In Carmel and Bernstein's (2003) study of 987 Israeli elders aged 70 and older, multivariate analysis indicated that sense of control of one's life was an important explanatory variable of satisfaction with life for men (Beta=.118,  $p<.001$ ) but not for women (Beta=.057,  $p>.05$ ).

Relationships between sense of control and well-being have been shown in the literature. People's sense of control over health as an important component of sense of control in general was also demonstrated in the literature.

#### *Well-being and Self Perception*

Results of studies have suggested that self perception and perception of aging affect elders' well-being. A large body of research documents the effect of self perception and well-being on the older population. In an 18-year longitudinal study from 1977 to

1995, Levy, Slade, and Kasl (2002) showed that people with a more positive self-perception of aging in 1975 reported better functional health across time. Perceived control partially mediated the relationship between self-perception of aging and functioning. Reitzes and Mutran (2006) have reported that better functional health was associated with greater self-esteem in longitudinal study. Carmel and Bernstein (2003) found that elders' self-esteem is one of the best predictors of satisfaction with life in both men and women. Self-esteem explained 28.6% of the variance in satisfaction with life in men and 22.6% in women.

Rothermund and Brandtstadter (2003) explored relationships between age stereotypes, self-views, and well-being in an eight-year longitudinal study among older adults aged 54-77 (n=690). Life satisfaction depended on positive self-rating as well as on the positive stereotype ratings. Age stereotypes correlated negatively with measures of subjective life quality. The negative impact of self-evaluation on subjective life quality was boosted by a negative age stereotype and dampened when the stereotype was more positive.

#### *Well-being Measurement*

Well-being related concepts have been identified as outcome variables in studies of the aging process in recent years (Okun, 1995; Keyes, et al. 2002). Research has revealed that aging has not been as uniformly associated with declines of subjective well-being as people had expected (Charles, & et al, 2001). Literature aimed at describing well-being comes from multiple perspectives such as *positive affect, negative affect, and happiness* (Lawton, 1983); *life satisfaction* as perceived congruence between desired and

attained goals (Campbell et al., 1976); conception of *self-actualization* (Maslow, 1968); view of *the fully functioning person* (Rogers, 1961), formulation of *individuation* (Jung, 1933), and conception of *maturity* (Allport, 1961). Ryff (1989) proposed that the concept of well-being was made up of six domains: (1) *self-acceptance* representing a positive evaluation of oneself and one's past life; (2) *positive relations with others*; (3) a sense of self determination or *autonomy*; (4) *environmental mastery* being the capacity to manage one's life and surroundings; (5) having meaning and *purpose in one's life*; and (6) a sense of continuing development as a *person or personal growth*. These terms are used interchangeably in research regarding well-being; in particular, positive and negative affects and life satisfaction are terms often used where well-being is discussed.

Researchers have developed multidimensional models to describe and measure well-being based on different perspectives. Subjective well-being is described as an individual's appraisal of his or her life situation overall, or the totality of pleasures and pains, or quality of life (Bradburn, 1969; Campbell et al, 1976; Diener, 1984; Omodei & Wearing, 1990; Watson, 1988). Psychological well-being has been formulated as a form of human development and existential challenges in life (Ryff, 1989). Social well-being has been formulated as a form of the appraisal of one's circumstances and function in society in terms of social integration, social acceptance, social contribution, social coherence and social actualization (Keyes, 1998). Physical and mental well-being has been formulated as elders' perception of their physical and mental health and their functions in adjustment and adaptation to older age. These formulations have led to the construction of scales to measure different domains of well-being.

### *Psychological Well-being*

Many researchers have made efforts to measure psychological well-being. For example, researchers guided by sociological theories use overall life satisfaction and domain-specific questions about work, income, social relationships, and neighborhood as key indicators of well-being (Andrew, 1991, Diener, 1984; Neugarten, Havighurst, & Tobin, 1961). Researchers guided by psychological theories use primary conceptions of positive functioning or positive affect and negative affect to measure well-being (Bradburn, 1969).

Ryff (1989) identified twenty items for each of the six domains of well-being in the original measurement and tested the six domain model of psychological well-being (with a 20-item scale for each domain) among 321 men and women with young, middle-age to older adults. This test showed that Ryff's measurement had high internal consistency and test-retest reliability as well as convergent and discriminate validity with other measures. Reliability tests conducted among a sub-sample of respondents (n=117) showed that internal consistency coefficients ( $\alpha$ ) ranged from .87-.93: self-acceptance, .93; positive relation with others, .91; autonomy, .86; environmental mastery, .90; purpose in life, .90, and personal growth, .87. Test-retest reliability coefficients over a 6 week period ranged from .81-.88: self-acceptance, .85; positive relations with other, .83; autonomy, .88; environmental mastery, .81; purpose in life, .82; and personal growth, .81. Validity of the six domain measurement was evidenced by the convergence with prior indexes of well-being such as life satisfaction, affect balance, self-esteem, depression and morale. Most of the coefficients (87%) of correlations

between Ryff's scales with other prior existing well-being measures ranged between .55 and .73. Similar results were also found in her later studies. For the purpose of a national survey study (The National Survey of Midlife Development in the United States, MIDUS); only three items of the original twenty items were selected to measure each domain. The shortened scales correlated from .70 to .89 with the parent scales (Ryff & Keyes, 1995). However, these shortened scales showed lower coefficients (ranging from .37 to .62) across the various sub-samples. In the same national survey study (n=2788), the shortened Ryff's six-domain measurement was used to measure the psychological well-being among American adults age 25-74 (Ryff, Keyes, & Hughes, 2004). The results showed that 1) older respondents had significantly higher scores on environmental mastery and positive relations with others than did young adults or middle-aged respondents; 2) older respondents had significantly lower scores on personal growth and purpose in life scores than young and middle-aged respondents; 3) younger adults had significantly lower scores on autonomy than middle-aged or older adults did; 4) men had significantly higher self-acceptance scores than women.

### *Social Well-being*

Social well-being is defined as the appraisal of one's circumstances and functioning in society; an individual's self-report of the quality of his or her relationships with other people, the neighborhood, and the community (Keyes, 1998; Larson, 1993). Studies regarding social well-being have identified five domains to measure social well-being (Keyes, 1998; Keyes and Shapiro, 2004). These five domains are: 1) *Social coherence*--the perception of the quality, organization, and operation of the social world

as well as meaningfulness of society, 2) *Social integration*--the evaluation of the quality of one's relationship to society and community, 3) *Social acceptance*--acceptance of Others, 4) *Social contribution* --the evaluation of one's social value, and 5) *Social actualization* --the evaluation of the potential and trajectory of the society. Keyes (1998) tested the five-domain model in two studies to investigate the theoretical structure, construct validity, and social structural sources of the dimensions of social well-being. The first study was conducted in 1994 among adults age 18 or older (n=373). The second study used the MIDUS data in an analysis in 1995 of adults age 25 to 74 (n=3032). Confirmatory factor analysis showed that the hypothesized five-factor model of social wellness fits the data in both studies. Therefore, well-being includes social dimensions such as coherence, integration, actualization, contribution, and acceptance. Keyes' five-factor scale correlates with measures such as anomie, generativity, perceived social constraints, community involvement and neighborhood quality. It also correlates discriminately with measures such as dysphoria, global well-being, physical health and optimism. The internal consistencies for each subscale reported by Keyes (1995) ranged from .42 to .73: Social coherence, .65, Social Integration, .73; Social Acceptance, .42, Social Contribution, .67, and Social Actualization, .64.

In The National Survey of Midlife Development in the United States (MIDUS), Keyes' five-domain measure was used to measure social well-being among American adults age 25-74 (Keyes, & Shapiro, 2004). The results show that age was a strong predictor of social well-being. Age was positively associated with social acceptance and social integration, but negatively associated with social coherence and social contribution.

### *Physical Well-being*

Physical well-being, as a domain-specific well-being, is also called *subjective health* (Staudinger, Fleeson & Baltes, 1999), *health-related well-being*, *self assessed or self-rated health* (Carmel & Bernstein, 2003; Morrow-Howell, Hinterlong, Rozario, & Tang, 2003), and *self-perception of health* (Menec, Chipperfield & Perry, 1999) in aging research. Physical well-being is often measured by people's subjective perception of their health. For example, subjective health is measured by 1) subjective physical health such as how one sees his or her physical and mental health in general, 2) subjective physical health in comparison with others of one's age and gender, 3) subjective risk of heart attack in comparison with others of one's age and gender, and 4) subjective risk of cancer in comparison with other of one's age and gender (Staudinger, Fleeson & Baltes, 1999).

Physical well-being significantly contributes to people's overall well-being, especially in older age. Menec and colleagues (1999) reported that older adults who rated their health as "bad/poor" and "fair" were more than twice as likely to die sooner following the initial survey than those who perceived their health as "excellent".

Two national studies regarding predictors of subjective well-being from the United States (n=3032) and Germany (n=1607) reported that subjective physical health explained about 26% of the total variance of subjective well-being (Staudinger, Fleeson & Baltes, 1999). Strain and colleagues (2002) found that 1) better self-assessed health was associated with higher rates of participation and participation in a greater number of activities; 2) self-rated health and functional ability were significantly related to changes

in activities; 3) age alone did not explain why some older adults ceased their participation nor was it significantly associated with other activities studies.

In a study about physical health and psychological well-being among Israeli elders aged 70 and older (n=987), Carmel and Bernstein (2003) measured self-rated health by questions regarding general self-evaluation of health and an evaluation of health compared to others at the same age. They found that self-rated health is one of the best predictors of satisfaction with life for both men and women. Self-rated health explained 22.7% variance of satisfaction with life in men and 26.0% in women.

Steverink, Westerhof, Bode, Dittmann-Kohli (2001) explored the association between people's personal experience of aging and subjective well-being among 4034 Germans aged 40 to 85. They found that adults' subjective health was positively related with their hope, life satisfaction, positive affect and continuous growth; and negatively related to loneliness, negative affect, physical decline and social loss.

#### *Summary of Well-being Review*

In the above section, measurement of well-being, and research related to well-being among the community dwelling elders was reviewed. A large body of research demonstrates a significant relationship between well-being and other variables such as activity, compensation, sense of control, self perception and personality traits. In particular, elders' activity predicts more variance in subjective well-being than socio-structural characteristics. Both physical and social activities have positive effects on elders' overall well-being and domain specified well-being. Few studies have measured the effect of compensation on well-being.

### Activity and Its Relationship to Other Variables

This section will include a review of research related to activity in general as well as in specified domains such as physical and social activities. The univariate relationship of activity with compensation strategies used by elders, the key variable in the Aging Well Model, will also be reviewed. Indicators underlying the activity variable will be included in the discussion.

#### *Activity Research and Measurement*

Engaging in a variety of activities may be indicative of successful aging (Horgas et al., 1998). Risks for declines in health and functioning at older ages are influenced by lifestyle characteristics including differences in levels of physical activities and social engagement (Alber, Jones, Savge, Berkman, & Seeman, 1995; Seeman, Berkman, Charpentier, Blazer, Albert, & Tinetti, 1995). Research regarding activity among elders involves physical activity and social activity. Activity has been defined in different categories: 1) personal care activities such as ADL; 2) leisure activity such as hobbies, sports, and volunteer work; 3) productive activity such as housework, upkeep of home and yard, and help to others that leads to a product or service that has social or economic value, 4) valued activities such as social services, helping others.

In Menec's (2003) longitudinal study of successful aging, the results showed that a greater overall activity level related to greater happiness, better function, and reduced mortality. In particular, social and productive activities were positively related to happiness, function, and lower mortality; whereas, more solitary activities such as handwork hobbies were only related to happiness (Menec, 2003). In Everard, Lach,

Fisher and Baum's (2000) study of the relationship of activity and social support to the functional health among 244 older adults showed interesting findings in the ways that activity related to physical and mental health. Maintenance of instrumental, social, and high-demand leisure activities was associated with higher physical health scores; and maintenance of low-demand leisure activities was associated with lower physical health score. However, maintenance of low-demand leisure activities was associated with higher mental health scores.

#### *Physical Activity Among the Elder Population*

The assessment of physical activity in older adults is difficult because most of the activities they engage in are of light to moderate intensity and their recall of those activities are not necessarily accurate (Bernstein, et al., 1998; Washburn et al, 1990, 1993). Measurements of physical activities varied in studies on aging but mainly in domain specific categories: instrumental /productive activities (i.e. house work or shopping), occupational activity, sports and exercise, and other leisure-time physical activity. Checklists and questionnaires have been used in aging activity studies such as the Short Physical Activity Survey developed by Baecke, Burema, and Frijers (1982), the Zutphen Physical Activity scale by Caspersen and colleagues (1991), the Yale Physical Activity Survey by DiPietro and colleagues (1993), and the Physical Activity scale for the Elderly by Washburn and colleagues (1993). There has been limited information reported on the reliability and validity of activity questionnaires for older adults.

Studies regarding physical activities among elders involved both types and intensity of activities and their relations to other variables. Riddick and Daniel (1984)

found that participation in leisure activity was a strong contributor to life satisfaction among older women when compared with income, health difficulties, and work history. Habitual walking (Wong, Wong, Peng, Azizah, & Dass, 2003), Tai Chi (Yau & Packer, 2002), and volunteer work (Greenfield, & Marks, 2004; Morrow-Howell, Hinterlong, Rozario, & Tang, 2003) were all correlated to better function and psychological well-being among older adults. Sedentary behavior was an important risk factor for chronic disease morbidity and mortality in aging. It was found that moderate levels of regular physical activities such as walking, climbing stairs, biking, gardening or yard work accumulatively increased energy expenditure and maintained muscular strength, and thus, provided protection from certain chronic diseases (DiPietro, 2001).

#### *Social Activity Among the Elder Population*

Activities that have social value can be beneficial for individuals, as can more leisure-type activities (Herzog, Franks, Markus, & Holmberg, 1998). Social activities may involve a broad range based on purposes such as leisure and enjoyment, reinforcement of social status and sense of worth, social engagement, and productivity (Glass, et al., 1999). Rowe and Kahn's (1998) successful aging model is comprised of three components, avoidance of disability, maintenance of physical functioning, and active engagement with life. Engagement with life, which involved participation in social activities that were associated with increased physical function, predicted a slower decline in functional status in community dwelling older adults (Everard, 1999; Unger, Johnson, and Markus, 1997). In the longitudinal Berlin Aging study (Bukov, Maas, & Lampert, 2002), social participation was categorized into three types: collective social

participation—common acting of group members; productive social participation—rendering of services, goods, and benefits for others; and political participation—acts of decision making about social groups and the allocation of resources. Results showed that elders' social participation was cumulative; elders who engaged in political activities also participated in other types activities; elders who engaged in productive activities also participated in collective activities. Glass, Leon, Marottoli, & Berkman (2006) conducted a population based study on social and productive activities as predictors of survival among elderly Americans. They found that all three types of activities, social, productive, and physical, were independently associated with survival after demographic and other social variables were controlled. They suggested that elders could improve their well-being through psychosocial pathways.

#### *Activity and Compensation Strategies*

Older adults sometimes modify their activity to compensate for the losses of physical ability. Petrella and Cress (2004) studied daily ambulation activity and task performance in community dwelling older adults aged 63-71 with preclinical disability. They found that older adults compensated for declines in capacity by altering task performance in order to accomplish daily tasks, especially those with a lower functioning threshold, and those in a preclinical disability phase.

#### *Activity and Sense of Control*

Change in productive activities has been related to change in feelings of mastery and control in elders (Glass, Seeman, Herzg, Kahn, & Berkaman, 1995). Perceived benefits and risks also influence older adults' activity level. The literature suggests that

low-active women perceived that exercise provided them more risks than benefits (Cousins, 1998). In Cousins' (2000) qualitative study, 143 women aged 70 and older were asked to respond to open-end questions about their beliefs about benefits and risks for 6 fitness activities. Perceived risk filled 19 categories, and perceived benefits filled 6 categories. Although those older women generally recognized the broad health benefits of activities, their beliefs about risks were stronger. They reported medical reasons why they shouldn't participate in fitness-promoting exercises. The higher level of perceived risk and medical excuses of avoiding exercises indicated lower sense of control among those women.

#### *Activity and Self Perception*

In recent years, researchers have taken a perspective on the self that emphasizes its active nature which is to express self through activities and behaviors. Activities are ways to actualize, validate and maintain self (Cross & Markus, 1990). McAuley, Elavsky, Motl, Konopack, Hu, and Marquez (2005) examined an exercise and self-esteem model in a longitudinal study among older adults (n=174, age m=66.7). They found that physical activity and self-efficacy were associated with self-esteem in both year 1 and year 5 measures. Self-esteem as an outcome variable was predicted by activity level and self-efficacy in their study.

#### *Summary of Activity Review*

Both physical and social activities among older adults were reviewed. The benefits of both activities were documented in the literature.

### Compensation and Its Relationship to Other Variables

Research related to compensation strategies in general as well as the relationship between compensation strategies and the two important variables of elders' sense of control and self perception in the Aging Well will be reviewed in this section. Indicators underlying the activity variable will be included in the discussion.

#### *Compensation Research and Measurement*

In old age, optimal development over the life span depends on elders' selection of life pursuits and compensation (Bailis & Chipperfield, 2002). Compensation is an adaptive and effective buffering system to life's stressful events and important to maintaining positive health. Research on compensation behaviors and aging has included different domains: 1) maintaining everyday or professional success and competence (Abraham & Hansson, 1995; Dixon, 1995; Freund, & Baltes, 1998), 2) accommodating to personal losses or social decrements (Brandtstadter & Wentura, 1995; Carstensen, Hanson, & Freund, 1995), 3) activating or recruiting new neuro-anatomical regions related to task performance (Dixon & Backman, 1999), 4) overcoming normal sensory or cognitive deficits in late life (Backman, 1989; Salthouse, 1995; Wahl, Oswald, & Zimprich, 1999), and 5) rehabilitating or adjusting behaviorally to neurological diseases or injuries (Glisky & Glisky, 1999; Wilson, 1999).

Many studies on compensation have been guided by Baltes' Selection, Optimization with Compensation (SOC) model. Paul Baltes and Margret Baltes (1990) proposed the SOC model to describe adaptive strategies that help elders respond to everyday demands and functional decline in later life (Lang, Riechmann, & Baltes, 2002).

In everyday life situations, selection is defined as re-organization of goal priorities or of activities in order to focus on those areas that are most important or salient in everyday life; optimization is defined as the enhancement and refinement of the means to maximize resources in a selected domain of functioning; and compensation refers to the use of new and alternative means to reach a goal, or maintain a desired state, once losses have occurred.

Although compensation has been identified as an important mechanism to cope with aging losses, no instruments have been developed to measure compensation. Wrosch and colleagues (2000) developed a three-factor model of persistence in goal striving, lowering aspiration and positive reappraisal to measure primary and secondary control. The definitions of these three factors described characteristics of compensation strategies. This model was tested on a national database (The Midlife in Development in the United States, MIDUS) among 3,490 people aged 25 to 76. An exploratory factor analysis confirmed a three-factor model: for persistence in goal striving, Cronbach's alpha = .77, eigen value = 1.14; for positive reappraisal, Cronbach's alpha = .78, eigen value = 4.13; and for lowering aspiration, Cronbach's alpha = .63, eigen value = 2.04. Results from this study suggested that older adults reported higher levels of positive reappraisal and lowering aspiration than younger adults. Older adults adapted to age related development losses by lowering aspiration and protecting their emotional and motivational resources by positive reappraisals. Congruent with another study (Heckhausen, 1997), elders attempted to compensate for age-related decline by persistent goal striving; however, this effort did not predict subjective well-being in older adults. The authors concluded that

positive reappraisal and lowering aspiration were important for regulating well-being in older age.

Goal pursuit was one area that researchers studied using SOC based on the assumption that people actively shape their own development within their social, cultural and biological limits (Riediger, Freund, & Baltes, 2005; Brandtstadter & Lerner, 1999; Heckhausen, 2000; Salmela-Aro, Nurmi, Saisto & Halmesmaeki, 2000). For example, Riediger, Freund and Baltes (2005) compared younger (n=25 years) and older adults (n=64 years) regarding interrelations among people's goals and intensity of goal pursuit in regular physical exercise in two studies and found older adults did better in goal pursuit than younger ones. Study 1 was a cross-sectional design using a self-report measure of goal pursuit. Study 2 used a prospective design based on study 1 using diary and objective information. In study 1, older participants reported 1) more instrumental inter-goal relations and overlapping goal-attainment strategies, and 2) a higher goal-pursuit intensity than younger participants. In study 2, older participants reported 1) not only more inter-goal facilitation but also less inter-goal interference than young participants, 2) older participants maintained their exercise adherence longer than younger participants, and 3) older adults' higher intensity of goal pursuit during the diary phase could not be attributed to their having more time for leisure activities than younger adults.

In a 4-year longitudinal study, Lang, Riechmann, and Baltes (2002) used everyday functioning to assess community dwelling elders' (aged 70 to 103) adaptation to aging losses (n=206). In their study, selection in everyday functioning was indicated by 1) an increase of contact with family members during the day and 2) a decrease in

diversity of activity within the most salient leisure domain. Compensation was indicated by an increase in the number and duration of sleep phases during the day. Optimization was indicated by an increase in the variability of time investments across all reported activities. Comparing survivors and non-survivors from resource-rich and poor groups, they found a greater use of selection, optimization and compensation strategies in everyday functioning among resource rich elders. Elders from resource-rich groups not only had a higher survivor rate, but also 1) invested more social time with their family members, 2) reduced the diversity of activities within the most salient leisure domain, 3) slept more often and longer during the daytime, and 4) increased the variability of time investments across activities after 4 years.

Gignac, Cott and Badley (2000) examined adaptive behavior among 286 community dwelling elders (aged 55 and older) with diagnosed osteoarthritis. Results showed that 1) non-compensating behavior such as reduced activity, giving up or avoiding activity and restricting or limiting activity comprised about 21% of the behaviors reported by the respondents; 2) compensating behavior such as spending more time, planning activities to avoid problems, using movement to avoid pain/stiffness, using periods of rest, substituting one activity or object for another, modifying or changing the way activities were performed, using furniture/equipment for assistance, using gadgets for assistance and using assistive devices comprised 71% of the behaviors reported by the respondents. Elders compensated mainly in the personal care domain: the majority (66%) of non-compensation behaviors such as giving up or limiting behavior were household activities (25%) and valued activities (hobbies and leisure pursuits). Their study also

revealed that older adults did not simply respond to the current demands of their condition. They also anticipated future problems and initiated behaviors that would overcome or avoid these problems.

#### *Summary of Compensation Review*

A three-factor model of compensation among the general elder population was documented empirically within the Baltes' Selection, Optimization with Compensation model. Reports showed that this compensation model was associated with the well-being of elders. However, there was limited information about the relationships that were reported on other variables discussed in this review.

#### Sense of Control and Its Relationship to Other Variables

This section will review research related to sense of control in older age as well as the relationships between sense of control and perception of self and sense of control and personality. Studies of the measurement of sense of control will also be reviewed.

Sense of control has been studied from different perspectives such as internal and external locus of control (Rotter 1966, 1990), mastery—the extent to which one assumes oneself as having control over one's life chances (Pearlin & Schooler, 1978), and self-efficacy—the beliefs that one can successfully behave as intended (Bandura, 1977).

There are several approaches that have been used to measure sense of control. For example, Kunzmann, Little, and Smith (2002) proposed a three-factor model to measure perceived control: 1) perceived personal control over desirable outcomes, 2) personal responsibility for undesirable outcomes, and 3) perceived other's control. This model was tested in two studies (one cross-sectional  $n=516$ , one longitudinal  $n=206$ ) with samples

from the Berlin aging Study (age 70-103). Both studies showed good model fit. These two studies showed that beliefs about control were important contributors to both positive and negative affect. However, there was neither consistent support for perceived personal control over desirable outcomes being associated with positive affect nor support for personal responsibility over undesirable outcomes being associated with negative affect. This means that none of the studies could predict the relationship between personal responsibility over desirable or undesirable outcomes and positive or negative affect.

Lachman and Weaver (1998) proposed a two-factor model to measure sense of control. The two factors were Personal Mastery, and Perceived Constraints. The internal consistency reliabilities were  $\alpha = .70$ , and  $.86$ . They found that participants' lower income was associated with lower perceived mastery and higher perceived constraints as well as poorer health. Results of hierarchical multiple regression analyses showed that higher perceived mastery and lower perceived constraints were related to better health, greater life satisfaction, and lower depressive symptoms.

Other studies have indicated that individuals with a lower sense of control take less responsibility for their health, are less likely to engage in health protective behaviors, and have lower or negative biological functioning (Seydel, Taal, & Wiegman, 1990; Wiedenfeld, O'Leary, Bandura, Brown, Levin, & Raska, 1990) Several studies have examined the relationship between sense of control and physical functioning in older people. Mastery appeared to be a significant predictor for stability in mobility in a longitudinal study (Femia, Zarit, & Johansson, 1997). Many researchers have provided evidence of the impact of mastery and general self-efficacy on physical functioning

(Kempen, Ormel, Scaf-Klomp, Sonderan, et al, 2003; Kempen, Steverink, Ormel, & Deeg, 1996; Bandura, 1997; Bosscher, Aa, Dasler, Deeg, & Smith, 1995).

There is an extensive body of research linking sense of control to both physical and psychological health (Rodin, 1986). Believing that one has control over outcomes has been associated with better reported health, fewer and less severe symptoms, faster recovery from illness, and greater longevity (Lachman, 1986; Rodin, Timko, & Harris, 1985). Chipperfield and Greenslade (1999) explored the relationship between perceived control and use of health care services. They found that perceived control served as a buffer. Elders who perceived low levels of control subsequently used more health services than their high control counterparts.

Summary of Sense of Control Review: Links between sense of control and well-being, behavior, and self concept have been documented. Repeatedly, efficacy beliefs, mastery over general and health situations have been associated with outcome behaviors.

#### Self Perception and Its Relationship to Other Variables

Research related to self perception in older age will be reviewed in this section. Studies of the measurement of perception of self will also be reviewed.

A sense of one's self as being competent appears to play an important role in the link between activities and demonstrated benefits (McClelland, 1982). The loss of a sense of self is a factor influencing health status, psychological well-being, and quality of life in old age. Subjective usefulness has been shown to be strongly related to physical and psychological health and is an indicator of overall well-being (Butler, & Gleason, 1985; Ranzijn, Keeves, Luszcz, & Feather, 1998; Ryan & Frederick, 1997; Ryff, 1989). Studies

about self perception have included self-usefulness or self-value (Okamoto & Tanaka, 2004; Ranzijn, Keeves, Luszcz, & Feather, 1998), self-esteem (Rosenberg, 1965; Robins, Trzesniewski, Gosling, & Tracy, 2002), self-view or self-appraisal (Rothermund & Brandtstadter, 2003), self-descriptions (Charles & Pasupsthi, 2003) and aging self-stereotypes (Rothermund and Brandtstadte, 2003; Levy, 2003). These different domains of self perception have provided a framework for constructing scales for self perception.

Sense of Self, Self-esteem and Self-Value: Positive self-perceptions of self and aging are thought to be beneficial to health and life and promote longevity. Levy, Slade, Kunkel and Kasl (2002) examined the relationship between longevity and positive self-perception in a longitudinal study among 660 community survey participants (aged 50 and older). Results showed that older individuals with more positive perception of aging lived 7.5 years longer than those with less positive perception of aging, even after demographic and psychosocial variables were controlled. Analysis from the Berlin aging study shows that old and very old persons (70-103 years) viewed themselves as active and present-oriented (Freund & Smith, 1999). Although most elders generated positive evaluations about themselves, the ratio of positive to negative views of self were less favorable for the oldest old (.85 years). The elders' emotional well-being was associated with their self definition.

Global self-esteem has been shown to vary through out the trajectory of a life span. Robins, Trzesniewski, Gosling, and Tracy (2002) collected data from 326,641 individuals aged 9 to 90 through the internet. They found that self-esteem was high in childhood, lower during adolescence, higher in adulthood, and very low in older age.

Consistent with these findings, low self-esteem in older adults was also reported by several other researchers such as Tiggemann and Lynch (2001) who studied elder women (age 70-85), Ranzijn, Keeves, Luszcz, & Feather (1998) who studied elder people aged 85-103, and Ward (1977) who focused on elders aged 60-92.

Herzog, Franks, Markus and Holmberg (1998) suggested that sense of the self as agency mediated the effects of leisure and productive activities on physical health in a sample of persons aged 65 and older. Okamoto & Tanaka (2004) examined the relationship between subjective usefulness and mortality for 6 years among 784 Japanese elders aged 65 and older. The results showed that a greater sense of self-usefulness was protective against mortality after adjusting for subjective health and other variables.

Perception of Aging and Aging self stereotypes: Historically, three hypotheses have influenced studies regarding age stereotypes and self-esteem in older people: 1) the contamination hypothesis --age stereotypes contaminated the self-view of older people, 2) the comparison hypothesis—age stereotypes served as a reference standard for self-enhancing comparisons, and 3) the externalization hypothesis—individually held age stereotypes were a projection of elderly person's self-views (Rothermund & Brandtstadter, 2003). In an eight-year longitudinal study among 690 older adults (54-77), Rothermund and Brandtstadter (2003) identified that elders with more negative age stereotypes tended to have a more negative view of self ( $r=.12$ ,  $p<.01$ ). Their study was consistent with the contamination and externalization hypotheses: stereotyped expectations about elders predicted later self-appraisals, people gradually incorporated

stereotyped views into their self view; and elders' self-views had an influence on individually held age stereotypes.

Levy, Hausdorff, Hencke, and Wei (2000) found that negative aging stereotypes may contribute to adverse health outcomes in elderly persons without their awareness; that positive aging stereotypes could be used in interventions to reduce cardiovascular stress. They also suggested that negative stereotype could activate negative self-stereotypes, which in turn, lowered expectation of performance.

Summary of Self Perception Review: Self perception has been examined as both a predictor and as an outcome variable in aging studies. There was no reported standardized instrument that measures self perception and its related concepts in older adults. Elders' perception of aging is mediated by self-efficacy.

#### Depression and Its Relationship to Other Variables

The true picture of depression among community dwelling elders is unclear. Some people say that the large majority of older adults are not depressed (Karel, Ogland-Hand, & Gatz, 2002), while others say that depression is the most common mental disorder in later life (Lawrence, Murray, Benerjee, Turner, & et al., 2006; Penninx, Guralnik, Ferrucci, Simonsick, Deeg, & Wallace, 1998, Cole, Bellavance, & Mansour, 1999). A recent review by Zarit and Zarit (2007) of depression studies among community dwelling elders revealed that between 1 and 5 % elders are depressed, and between 10 and 25% elders have depressive symptoms. However, the highest prevalence of both major depressive disorder and depressive symptoms are among people in their young adulthood rather than in older adulthood. The prevalence of depression declines with age

from young adulthood until age 75, and rises again after age 75. Stek and colleagues (2004) found that the rate of depression is high (25%) in the community based oldest old (age 85 and older, n=599). Their study also revealed that elder's perceived health, loneliness, impaired mobility, and cognitive and functional decline are correlated with their level of depression.

The challenges for recognizing late-life depression relate to misattribution of symptoms and the complexity of depression and co-morbidity in older age. Under-diagnosing of depression may relate to misattributing all somatic complaints to medical causes; over-diagnosing depression relates to misattributing all somatic complaints to psychiatric causes (Karel, et al., 2002)..

#### *Depression and Activity*

Depression and elder's activity are negatively associated. Depression may decrease elder's activity level and vice versa (Lampinen & Heikkinen, 2003; van Gool, Kempen, Penninx, Deeg, Beekman & van Eijk, 2003; Strawbridge, Deleger, Roberts, & Kaplan, 2002; Paluska & Schwenk, 2000). Signs of depression among elders include social withdrawal or decreased activity, lack of interest in things they normally enjoy; abandoning hobbies, refusing to attend activities (Twedell, 2007). Yoshiuchi and colleagues (2006) found that daily moderate-intensity physical activity is negatively associated with depressive mood among elders (age 65-85, n=184). A four-year prospective cohort study among community dwelling elders (age 71 and older, n=1286) revealed that depressive symptoms were a predictor of decline in physical performance regardless of differences in baseline performance scores, health status and socio-

demographic factors (Penninx, et al, 1998). Another study among elders (age 65 and older, n=6247) conducted by Penninx and colleagues (1999) found that depressed elders were at risk for activity disability in daily living and mobility. A longitudinal study among community dwelling adults in Japan (age 65-79, n=1151) showed that daily walking predicted fewer depressive symptoms (Fukukawa, Nakashima, Tsuboi, Kozakai, Doyo, Niino, Ando, & Shimokata, 2004).

### *Depression and Well-being*

Depression was associated with reduced global health, reduced overall mental health, psychological health, and social functioning (Fauerbach, Bush, Thombs, McCann, Fogel, & Ziegelstein, 2005). Depressed elders have poorer functioning than those without depression and those with chronic medical conditions (Gurland, Wilkder, & Berkman, 1988; Van Korff, Ormel, Katon & Lin, 1992; Wells & Burman, 1991). Depression is also associated with elder's perceived health (Katon, Von Korff, Lin, Bush, & Ormel, 1992), and quality of life (Jiang, Tang, Futatsuka, & Zhang, 2004). An eight-year follow up study of a cohort of 1828 disabled free elders (age 55 and older, n=1828) showed that depression was associated with physical disability. Wells and colleagues' (1989) study revealed that depressed people tended to have worse physical, social and role functioning, worse perceived current health and greater body pain compared to people without depression.

Summary of depression review: Existing literature demonstrated that depressive symptoms are common among community dwelling elders. Depression and elder's activity were negatively associated with each other. Depression has negative influences

on elder's physical, psychological and social well-being. Studies about the relationship between depression and well-being among the elder population mainly focused on the relationship between depression and disability.

## CHAPTER III

### METHODOLOGY

This chapter includes the research design, description of the original study, and description of the current study which used secondary data analysis. The sample and data analysis plans will be described. Measurements will be discussed in Chapter IV along with detailed information about scale construction and reconstruction using exploratory factor analysis (EFA).

#### Research Design

This study involved a secondary data analysis from a nationally representative sample, The National Survey of Midlife Development in the United States (MIDUS) database. The purposes of the data analysis were to understand patterns of correlation and covariance among variables in the Aging Well Model (Figure 1) and to explain as much of their variance as possible with the model specified by the researcher. The goal was to have the results of analysis make theoretical sense and the statistical correspondence to the MIDUS data reasonable.

A correlational descriptive design with a causal modeling approach was used to explore the relationships among variables in the Aging Well Model and to examine the explanatory power of the SIAL variables in predicting the outcome variable elders' well-being. The Aging Well Model as illustrated in Figure 1 in Chapter I points out that there are multiple predictor and outcome variables. These multiple variables exert various causal influences on each other and are nested in a causal network. For example:

- elders' perceived wellbeing is influenced by their activity, compensation strategies, sense of control and self perception;
- elders' activity is influenced by their use of compensation strategies, sense of control and self perception; and
- elders' use of compensation is influenced by their sense of control, and self perception.

In this situation, multiple regression, or separate causal analysis for each of these dependent variables may not be appropriate. In multiple regression analysis, which deals with only one endogenous variable at a time, variables which have no contribution to the explanation of the dependent variable are dropped from the model, which removes the remaining covariance between the dropped variable and other variables from the model.

Other statistical techniques are Path analysis and structural equation modeling. In path analysis, on which the Structural Equation Modeling (SEM) is based, only the non-significant paths are removed from the model, but not the variables. The variables remain in the model and are available for analysis with other covarying variables. To increase the flexibility of investigating complex relationships among variables, using a causal modeling approach can allow researchers to hypothesize the impact of one latent construct on another, test hypotheses, make causal inferences, and generate a model that is both substantively meaningful and statistically fitting (Byrne, 2001).

Structural Equation Modeling (SEM) was used to analyze data in this study. SEM is a technique used for specifying and estimating models of linear relationships among variables; it includes both measured and latent variables in the model. SEM is based on

multiple regression, but in a more powerful way by taking into account the modeling of interactions, nonlinearities, correlated independent variables, measurement errors, correlated error terms, multiple latent independent variables each measured by multiple indicators. Advantages of SEM compared to multiple regressions include its flexible assumptions, the ability to test models with multiple dependent variables, the ability to model mediating variables, and the ability to model error terms.

According to Kline (2005), a valid measurement model is needed before proceeding to a structural model evaluation. The SEM process has two major steps: validating the measurement model (a model of how theoretical constructs are measured) by using Confirmatory Factor Analysis (CFA) and fitting the structural model (a model of the hypothesized relationships between latent variables) with data by using path analysis with latent variables. Based on the reviewed theories and literature, five latent variables were included in the emerging theory of SIAL: Well-being, activity, compensation, sense of control, and perception of self.

#### Description of the Original Study

The National Survey of Midlife Development in the United States (MIDUS) was funded by the MacArthur Foundation, a private philanthropic organization. The primary objective of the survey was to identify the major biomedical, psychological, and social factors that limit some people from achieving good health, psychological wellbeing, and social responsibility during their adult years (Brim, 2004). The multidisciplinary team who designed the study was led by Dr. Orville Brim and composed of epidemiologists, psychologists, occupational and family sociologists, anthropologists, medical

professionals, and healthcare policy makers. The data and related information have become available for secondary data analysis through public domain files located online.

#### *Sample and Data Collection in the MIDUS*

This interdisciplinary investigation was conducted from 1995 to 1996. The MIDUS survey was administered to a nationally representative sample of 7,189 non-institutionalized, English-speaking adults. The sampling frame was based on a nationally representative sample of household male and female adults aged 25 to 74 obtained by random-digit-dialing. There was an over-sampling of older respondents and men to guarantee a good distribution on the cross-classification of age and gender. For example, men aged 65-74, often the rarest sub-sample group, was over sampled. Every man (100%) from the random household sampling was included in the study.

Two aspects of data collection, telephone interviews and self administered questionnaires (SAQ), were used in the MIDUS study. The response rate for the 30 minute telephone interviews was 70%. Among the 3485 telephone respondents in the main survey, 3032 people (87%) completed self administered questionnaires. The mean age of the participants was 46.9 years, (SD=13.1). Forty-nine percent (49%) of the respondents were male, and 88% of the participants were white.

#### *Information Available from the MIDUS Dataset*

MIDUS used the Midlife Development Inventory (MIDI) as a measure. More than eleven hundred items were included. MIDI was assembled by a multidisciplinary investigative team based on six separate pilot studies. Some of the pilot studies involved national samples. Although there are no validity and reliability reports related to the

overall MIDUS questionnaire, many secondary analyses using the MIDUS database have reported reliabilities of measurements in the MIDUS study; these will be discussed in Chapter IV.

The following data were obtained using Midlife Development Inventory (MIDI). *Personal information* included demographics, living arrangement, childhood, parents and family background, occupational history, finances, spouse/partner relationship, and sexuality. *Psychological assessment* included personality traits, locus of control, goal orientations, life satisfaction, perceived discrimination and inequalities. *Social assessment* included social network and support, and social participation. *Mental and emotional health assessment* included depression, anxiety, and psychological well-being. *Physical health assessment* included subjective health, chronic conditions, symptoms and body measures, disease histories, and health behaviors. Beliefs about health, spirituality and religion were also assessed. Respondents were asked for information about their physical and mental health throughout their adult lives including: sense of control over their health and lives; awareness of changes in their medical conditions; commitment to regular exercise and a healthy diet; experience with menopause (women); decision-making processes used to deal with health concerns; experiences with nontraditional remedies or therapies; history of attending support groups; and personal feelings of accomplishment; desire to learn; interests, and hopes for the future. Respondents were also asked to compare their overall well-being with that of their peers and to describe social, physical, and emotional characteristics typical of adults in their life transitions.

### Current Self-Imposed Activity Limitation (SIAL) Study

The current study is a secondary data analysis using MIDUS data. The data are in the public domain and no special permission is required for their use. However, acknowledgement of the original investigators was required.

A complete Project Review Form with information about the database and how the database would be accessed were submitted to the University of Arizona Institutional Review Board office. An exemption was approved.

In the following sections, research issues to be addressed include: sample of the SIAL study, and analysis plan for measurement model and structural model.

#### *Sample of the SIAL Study*

##### *Sample Criteria*

Data selection from the MIDUS main dataset was based on following criteria.

1. Subjects who completed both the telephone interview and self administered questionnaires (SAQ) were chosen. Since most measures of this study were based on the respondents' answers to the SAQ, people who didn't complete the SAQ were not included. The investigation acknowledges that this may have introduced bias into the study because people who were unable to complete written questionnaires may have had a lower literacy compared to those who completed the questionnaires. However, the positive aspects of this sample selection were thought to outweigh unknown negative effects.
2. Subjects were chosen who answered "no" to both questions of "do you ever get chest pain or discomfort when you walk at an ordinary pace on a level surface, not

hill” (telephone interview question A24) and “do you ever get chest pain or discomfort when you walk uphill or hurry” (telephone interview question A23).

These two questions helped exclude people who had a physical illness that limited their activity level.

3. Subjects between ages 65-74 were chosen according to the tradition of the United States that people who are 65 years old and older are considered to be the elder population. Age 65 was used as a lower cut-off age for elders in this study. The maximum age was 74 in the original study.

*Sample Size and Sample Description:*

Four hundred and thirty-five cases met the sampling criteria and were included in the study. Sixty cases were deleted due to missing over one-fourth of the variables. Therefore, the final sample size for testing the model was  $n=375$ . There were 194 (51.7%) men and 181 (48.3%) women in the SIAL study sample with a mean age of 69.4 (SD=2.74), and an average education level of some college. Description of SIAL study sample is presented in Table 1.

TABLE 1: Description of SIAL Study Sample

Variable		Current Study Dataset (n=375)		Valid/M issing
Age	Mean age (SD)	69.4	(2.74)	347/28
	Median age	69.6		
Gender	Male	194	(51.7%)	375/0
	Female	181	(48.3%)	375/0
Education	Mean rating	Some College		375/0
Employment	Retired	251	(66.9%)	371/4
	Still Working	72	(19.2%)	371/4
	Work for pay	22	( 5.9%)	256/119
Marital Status	Married	243	(64.8%)	243/0
	Divorced	38	(10.1%)	38/0
	Separated	0	0	0/0
	Widowed	81	(21.6%)	81/0
	Never married	13	( 3.5%)	13/0
Family	No Biological Children	37	( 9.9%)	375/0
	No non-biological children	309	(82.4%)	375/0
Living Situations	Living with someone	3	( 0.8%)	131/244
	Ever lived in institution	8	( 2.1%)	375/0
	Ever without telephone	6	( 1.6%)	375/0

### *Analysis Plan in the SIAL Study*

The major focus of the analysis was to assess the fit of the proposed Aging Well model (structural model) to the empirically-based findings: that was, whether or not the hypothesized Aging Well Model provided a good fit to the MIDUS data compared with other competing models (saturated model, independent model and alternative models). The analyses were conducted using the SEM technique with Analysis of Moment Structures (AMOS, 5.0.1) software, which can test the measurement models and several structural models simultaneously. There were two steps in the analysis: (1) scale construction using Exploratory Factor Analysis (EFA) (Chapter IV); and (2) measurement model testing using Confirmatory Factor Analysis (CFA) and structural model testing using Structural Equation Modeling (SEM) (Chapter V). Issues of relevance to the analysis discussed below including: (1) assumptions of SEM, (2) assessment of the measurement model, and (3) assessment of the structural model.

#### *Assumptions of Structural Equation Modeling (SEM)*

SEM is based on regression techniques. To produce trustworthy results in the study, all assumptions of regression should be met or at least approximated. Assumptions related sample issues include: a relatively large sample size, completeness of data, continuously and normally distributed endogenous variables; univariate normality, multivariate normality, normally distributed error, linearity, and multicollinearity.

#### *Sample Size*

A relatively larger sample size is required when using SEM. Consequences of using smaller samples include more convergence failures, improper solutions, lowered

accuracy of parameter estimates and standard errors in particular because the SEM program computes standard errors under the assumption of large sample sizes. When data are not normally distributed or flawed, larger samples are required. However, using larger samples may result in a highly significant Chi-square, which may lead to the rejection of hypothesized models even when they have a good fit with the data. This can happen because minor discrepancies between the data and the model can be exaggerated with larger sample sizes (McDonald, & Ring Ho, 2002). SEM specialists have recommended reasonable numbers for estimation such as five cases per parameter (Bentler & Chou, 1987), or 15 cases per measured variable (Bentler & Chou, 1987; Stevens, 1996). Most experts recommend that 200 to 400 cases are needed for an optimal test of the hypothesized model. The sample for the SIAL study contained 375 cases, which met the assumption of sample size.

#### *Complete Data and Appropriate Handling of Incomplete Data*

A database without complete data is a concern when using SEM. The problem of missing data can seriously bias the conclusions drawn from data. Many factors may contribute to incomplete data and most of them are beyond the control of researchers (Byrne, 2001). The completeness of the SIAL study dataset was examined prior to data analysis to determine the pattern and magnitude of missing information. As recommended (Little & Rubin, 1987), the Maximum Likelihood (ML) Estimation method for analysis was used. ML is a method that makes use of all available data points and makes estimates based on maximizing the probability (likelihood) that the observed covariances are drawn from a population assumed to be the same as that reflected in the

coefficient estimates. That is, ML computes estimates which have the greatest chance of reproducing the observed data. ML estimations will reduce bias even when the missing at random condition is not completely satisfied; ML estimates exhibit the least bias as compared to all other procedures (Byrne, 2001). ML is a default in AMOS software.

#### *Continuously and Normally Distributed Endogenous Variables*

SEM programs assume that dependent and mediating variables are continuously distributed, with normally distributed residuals. However, this assumption is difficult to meet in practice. In the SIAL study, all measurements were Likert scales (ordinal level data), which is a violation of an interval scaling assumption. SEM specialists have developed methods designed for variables that are measured by Likert scales and assume these scales have an underlying continuous distribution. The scale points tap into points along a continuum and even though the item data are not interval level data, the underlying scale distribution is considered continuous. The assumption was met. The distribution of the MIDUS data was examined. When non-normal distribution occurred, outliers were identified and deleted. *Univariate normality* was examined by checking a histogram of frequencies, skewness and kurtosis. According to Kline (2005), extreme non-normality was determined if the absolute values of the skew statistics were greater than 3.0 and absolute values of the kurtosis statistics were greater than 10.

Multicollinearity occurs when intercorrelations among variables are too high (i.e.,  $r > .85$ ), which indicate the highly correlated variables are not distinguished from each other (Kline, 2005). Correlations among all indicators were examined to detect

multicollinearity. If a squared multiple correlation between each variable and all others was larger than .90 ( $R^2 > .90$ ), multicollinearity is suggested (Kline, 2005).

#### *Assessment of Measurement Models (CFA)*

The measurement model is a form of SEM with empirically observed variables. Measurement model tests were based on confirmatory factor analysis (CFA) of internal structure to obtain estimates of the parameters of the measurement models such as factor loading, variances and covariance of factors, and residual error variances of the observed variables. Two matrices were examined for each scale: factor loading matrix, and factor variance/covariance matrix.

For measurement instruments, each item should have a nonzero loading on the targeted indicator and zero loading on other indicators. Items having a lower loading on targeted indicators ( $r < .40$ ) were discarded. Items which had double indicator loadings were allowed. If the two factor loading difference was larger than .15, the item belonged to the factor with the higher loading (Carmines & Zeller, 1979); otherwise it was dropped from the scale. Measurement errors were assumed to be unrelated.

For latent variables, each indicator was expected to have a nonzero loading on the targeted latent variable and zero loading on other latent variables. In SEM, the program requiring that one indicator to be fixed for each latent factor as reference, and then estimates other indicator variances from the data. Indicators of the targeted latent variable should be correlated. Unrelated indicator of a factor were discarded from the measurement models.

### *Assessment of the Structural Model in SIAL Study*

Model assessment relates to the extent a hypothesized model adequately describes the sample data (Byrne, 2001). In this study, it was about the fit between the hypothesized Aging Well model and the MIDUS data. The structural model involved relationships among latent factors and variables. The primary methodological concern was to assess the extent to which these relationships were valid. The structural model analysis was based on the first step analysis of the validity of the measurement models.

Multiple working hypotheses were examined. Specifically, to examine to what extent the hypothesized Aging Well Model statistically fit with the dataset compared with the null model with all variables independent, the saturated model with all variables correlated, and the alternative model without the construct of SIAL.

The Structural Equation Modeling (SEM) technique with AMOS software was used to assess the structural models in this study because of its powerful analysis features. SEM programs provided overall simultaneous tests of model fit and individual parameter estimates as well as simultaneous comparison of regression coefficients, means, and variances. Measurement errors were considered in the level of measurement models assessment so it produced estimated relationships among latent variables that were more accurate.

*Model identification* and *theoretical specification* are two major issues related to model testing. The SEM program requires that equations to be properly identified.

*Identification:* focuses on whether or not there is a unique set of parameters consistent with the data. That is, a unique set of values can be inferred for the unknown parameters

from a given covariance matrix of analyzed variables that is reported by the model (Byrne, 2001). In SEM, researchers favor an over-identified model, or one in which the number of estimable parameters is less than the number of indicators. This over-identification gives the model a positive degree of freedom that allows for rejection of the model. Structural models may also be just-identified or under-identified. A just-identified model means there is a one-to-one correspondence between the data and the structural parameters. This kind of model has no scientific interest for researchers because there is no degree of freedom and therefore the model can never be rejected. An under-identified model means the number of parameters to be estimated exceeds the number of variances and covariance. This kind of model has insufficient information from the data to determine solution of parameter estimation (Byrne, 2001). Identification of the Aging Well Model was examined based on following calculations:

The data points  $p$  (number of observed variables):  $p(p+1)/2$ ;

The estimated parameters  $t$  = number of error variances + number of regression coefficients + number of covariance;

The degree of freedom:  $p(p+1)/2-t$

According to the t-rule, the estimated parameter should be less than data points:  $t \leq \frac{1}{2} p(p+1)$ .

*Specification:* SEM software programs require researchers to be very explicit in specifying models. Fixed and free parameters in the path diagram of the Aging Well Model, which showed the causal relationships among all variables, were based on the

theories reviewed in the Chapter I and literature in the Chapter II. All measurement models were assessed for their factorial validity.

Saturated, null and alternative models were also assessed using likelihood estimations to compare the differences. Model parsimony was examined. A simplest and meaningful model was selected from model comparison. While models that fit the data well were only provisionally accepted, models that did not fit the data well were absolutely rejected.

#### *Descriptive Criteria for Model Evaluation*

Several estimations were involved in the determination of model fit and acceptance or rejection of the hypothesized model based on the considerations of both the goodness of fit and parsimony. These estimation parameters included: Chi-square, covariance coefficient, and fit indexes. Different software has different terms of parameters for estimation. In this study, AMOS software and its terms were used.

*The Chi-square ( $\chi^2$ ):* “a  $\chi^2$  test provides a useful basis for making decisions about the fit of a model, or the relative fits of different models” and “a  $\chi^2$  roughly equal to its degree of freedom is an instant definition of satisfactory fit” (Loehlin, 2004, p67). The  $\chi^2$  tests are normally used to compare the hypothesized model with the null model, the saturated model and the alternative model. The purpose is to find a model that has a good fit with the data by explaining as much of the covariance as possible with great parsimony.

Theoretically, if the Aging Well Model were a good fit to the MIDUS data, the Chi-square value would not be significant. If the Chi-square value were significant, then

the covariance structure in the Aging Well Model was significantly different from the observed covariance matrix in MIDUS data and the Aging Well Model would be rejected. The same logic applies to both the saturated model and alternative model to examine if these two models also fit with the MIDUS data. The results from these two Chi-square tests would determine whether the Aging Well Model needed to be compared with either the saturated model or the alternative model. If the difference between the Chi-square were non-significant when comparing the Aging Well Model to the saturated model, then the Aging Well Model would not be significantly different from the saturated model. Both models explained covariance and represented the data equally well; however, the Aging Well Model was a more parsimonious fit to the data than the saturated model. If the difference between the Chi-square were non-significant when comparing the Aging Well Model with the alternative model, then the Aging Well Model would not be significantly different from the alternative model. Both models represented the data equally well; however, the alternative model was a more parsimonious fit to the data than the Aging Well Model.

According to Hox and Bechger (1998), the Chi-square test in SEM is sensitive to the sample size. There is a tendency that the model will be rejected in a larger sample even in the situation that the model represents the data well (type II error), or the model will be accepted in a small sample even when the model doesn't represent the data. For models with about 75 to 200 cases Chi-square is a reasonable measure of fit. But for models with more cases, the chi square is almost always statistically significant. Chi square is also affected by the size of the correlations in the model: the larger the

correlations, the poorer the fit. For these reasons alternative measures of fit have been developed. These are because the significance of Chi-square will increase or decrease with sample size changes. So, other parameters need to be used to make judgments.

### *Fit Indexes*

Many fit indexes have been described in the SEM literature. However, there is no single gold standard index for model testing. Using multiple fit indexes is recommended to reflect diverse criteria because a single index can only reflect a particular aspect of model fit (Kline, 2005). Different SEM computer programs report different fit indexes. Four commonly reported fit indexes in the Amos program were used in this study and are reported below.

*Goodness-of-Fit Index (GFI)* is a measure of the relative amount of variance and covariance in the sample covariance matrix that is jointly explained by the population covariance matrix. GFI can be used to assess simultaneously both the fit and the simplicity of a model. In Amos, a similar term for this fit index is *Normed Fit Index (NFI)* or *Bentler Bonett Index*. In the Normed Fit Index (NFI) estimate, the null model is defined as all of the correlations or covariances are zero. The null model is also referred to as the "Independence Model" in the literature. Let AWM as a simple term representing Aging Well Model:

$$\text{NFI} = \frac{\chi^2 (\text{Null Model}) - \chi^2 (\text{Proposed Model})}{\chi^2 (\text{Null Model})} = 1 - (\chi^2_{\text{AWM}} / \chi^2_{\text{null}})$$

A value between .90 and .95 is acceptable and above .95 is good. A disadvantage of this measure is that the NFI value cannot be smaller if more parameters are added to

the model. Thus, the more parameters are added to the model, the larger the index. It is for this reason that other criteria are used together to determine the fit of a model.

*Comparative Fit Index* (CFI) is used to assess the relative improvement in the fit of the researcher proposed model compared with the null model. The Comparative Fit Index equals:

$$CFI = \frac{\chi^2 - df_{(Null\ Model)} - \chi^2 - df_{(Proposed\ Model)}}{\chi^2 - df_{(Null\ Model)}} = 1 - \{(\chi^2_{AWM} - df_{AWM}) / (\chi^2_{null} - df_{null})\}$$

where  $df$  are the degrees of freedom of the models. AWM is a simple term for the Aging Well Model. A value between .90 and .95 is acceptable and above .95 is considered as good fit.

*Root Mean Square Error of Approximation* (RMSEA): This index is based on the non-centrality parameter. The formula for determining the RMSEA is as follows:

$$RMSEA = \sqrt{[(\chi^2/df - 1) / (N - 1)]}$$

where  $N$  is the sample size and  $df$  is the degrees of freedom of the model. (If  $\chi^2$  is less than  $df$ , then RMSEA is set to zero.) Good models have an RMSEA of .05 or less.

Models whose RMSEA is .10 or more have poor fit and the models are rejected (Loehlin, 2004).

A confidence interval can be computed for this index. First, the value of the non-centrality parameter is determined by  $\chi^2 - df$ . The confidence interval for the non-centrality parameter can be determined for  $\chi^2$ ,  $df$ , and the width of the confidence interval. Then these values are substituted for  $\chi^2 - df$  into the formula for the RMSEA. Ideally the

lower value of the 90% confidence interval includes or is very near zero and the upper value is not very large, i.e., less than .08.

*Akaike Information Criterion (AIC)*: This index indicates a better fit when the value is smaller. The measure is not standardized and is not interpreted for a given model. For two models estimated from the same dataset, the model with the smaller AIC is to be preferred. The formula for determining the AIC is as follows:

$$AIC = \chi^2 + k(k - 1) - 2df$$

where  $k$  is the number of variables in the model and  $df$  is the degrees of freedom of the model. Note that  $k(k - 1) - 2df$  equals the number of free parameters in the model. The AIC makes the researcher pay a penalty of two for every parameter that is estimated. The absolute value of AIC has relatively little meaning; rather the focus is on the relative size of the values. The model with the smaller AIC is preferred.

#### Summary

In this chapter, the research design, description of the original study, and description of the current study using secondary data analysis were presented. Issues related to assumptions and assessments of both measurement models and structural models were reported. A basic explanation of SEM and the criteria for use of SEM data analysis were also introduced.

## CHAPTER IV

### MEASURES IN THE SIAL STUDY

The measures used in the SIAL study are described in this chapter. The major focus of this chapter is on the use of exploratory factor analysis (EFA) to evaluate measures. The measures include scales constructed by the original MIDUS investigators and new scales constructed by the author of this study. Reliability of each scale will be reported. Validity of measures was determined through use of confirmatory factor analysis (CFA) and will be reported in Chapter V.

#### General Information of Measures for the SIAL Study

Measurement instruments used for this study were scales constructed and revised from the items in the original MIDUS questionnaires and telephone interviews. Explorative Factor Analyses (EFA) was used in scale construction and revision. Internal consistency reliability was estimated to evaluate the degree to which the instrument's items measured the same thing and the degree to which the various parts of an instrument (item, subscale, total scale) were related to each other. Coefficient alpha was used for estimating the reliability based on internal consistency (Nunnally, 1978). When subscales were found to have a lower Cronbach's alpha ( $<.70$ ), a correlation matrix and item loadings on targeted indicators and constructs were examined to reassess factor assignments and their contribution to the total score of measurement of constructs.

The rules and criteria for scale construction and revision were:

1. An independent subset of data ( $n=774$ ) was used for exploratory factor analysis and scale construction. The same sampling criteria as used for the SIAL study

were used for creating a sub-dataset for scale construction except that age ranged from 60-64 years instead of 65-74. The purpose of this technique was to preserve the sample size for model testing. Although the age differences may have been related to other differences in characteristics in the sample, it is the closest dataset that could be found.

2. If Cronbach's alpha was  $\geq .70$ , items were considered unidimensional and were combined in a scale.
3. The acceptable cutoff value for factor loading was  $\geq .40$ , eigenvalue  $\geq 1.00$ .
4. Items with cross loadings (i.e., loading on two or more factors) and a difference of  $\geq .15$  were assigned to the factor with the highest loading. If the difference was  $< .15$ , the item was deleted from all factors. (Carmines & Zeller 1979).

Theoretical constructs in the Aging Well Model were as follows: sense of control, perception of self, compensation strategy, activity, and well-being. Depression as a modifier in the model was dropped due to a high percentage of missing data. In the following section, measures used in the SIAL study are introduced with their definitions, methods of scale construction, psychometric features, items (sample items for existing scales, and all items for newly constructed scales), and reliability.

Eleven scales were constructed by the original MIDUS researchers and are identified in Table 2 along with item descriptions and internal consistency reliabilities. Seven scales were constructed by this investigator from the original items in the MIDUS questionnaires, reflective of the constructs in the theoretical framework. These seven scales are also identified in Table 2. Reversed items (negatively stated items) were

recoded so that higher scores reflected the most desirable outcomes. Factor analysis was conducted using an independent sub-dataset to check if these scales were indeed independent indicators for the measured variables. Internal consistencies of the scales were calculated using Cronbach's alpha and are listed in Table 2. Items for each scale are listed in Appendix B.

TABLE 2: Scales and Internal Consistency Reliability ( $\alpha$ ) for the Self-Imposed Activity Limitation (SIAL) Study

Construct	Scale		# of Items	Items	$\alpha$ Current Study	$\alpha$ Reported
Sense of Control	Perceived Constraints		8	RSF1 s, t, v, w, y, aa, bb, cc	.78	.86 Lachman & Weaver, 1998a
	Personal Mastery		4	RSF1 u, x, z, dd	.66	.70 Lachman & Weaver, 1998a
	<i>Health Efficacy</i>		4	RSA7 a, b, c, d	.82	
Aging Perception	<i>Elder personal attributes (Aging 1)</i>		6	SG1 c, f, I, l, o, r	.82	
	<i>Elder Social Integrity and Capacity (Aging 2)</i>		7	SG 2 c, f, i, l, o, r, u	.84	
Compensation	Positive Confrontation	Positive Appraisal	5	RSF3 e, h, m, n	.74	.78 Wrosch, Heckhausen, & Lachman, 2000
		Goal Striving	5	RSF3 a, b, g, j, k	.73	.77 Wrosch, Heckhausen, & Lachman, 2000
	<i>Seeking social support</i>		3	RSF3 gg, ii, jj	.65	
	Lower Aspiration		5	RSF3 c, d, f, i, l	.64	.63 Wrosch, Heckhausen, & Lachman 2000
Activity	<i>Physical Activity</i>		4	RSA 18, 19, 20, 21	.81	
	Social Responsibility	Civic Obligation	4	SK7 I, j, k, l	.73	.78 Rossi, 2001
		Work Obligation	3	SK7 m, n, o	.75	.68 Rossi, 2001
		Altruism	4	SK 7 p, q, r, s	.80	.80 Rossi, 2001
Well-being	<i>Psychological Well-being</i>		4	RSF1 a, b, c, i	.65	
	Social Well-being		6	RSK6 a-f	.87	.84 McAdams, & de St. Aubin, (1992); Rossi (2001).
	<i>Perceived Health</i>		3	QA4, QA5 RQA6	.73	
Depression	Depressed affect		7	QA 60-66	93% missing data	Wang, Berglund, & Kessler (2000)
	Anhedonia		6	QA 72-77	93% missing data	No report. Wang, Berglund, & Kessler (2000)

\* Scales in italics are those constructed by this investigator for use in this study. All other scales were developed by the researchers for the original MIDUS study.

### *Measures for Sense of Control*

Sense of Control is defined as beliefs about how much control people have over their lives or situations. Sense of control is an internal state that explains why certain people actively and willingly try to deal with difficult circumstances whereas others do not (Moore, 2003). The Sense of Control measure was based on theories of Locus of Control and Self-Efficacy. The researchers of MIDUS study developed two scales, Perceived Constraints and Personal Mastery, to measure the theoretical construction of Sense of Control. The researcher of this current study added an indicator of Health Self-Efficacy, a specified domain within the construct of Sense of Control.

#### *Perceived Constraints Scale*

Perceived constraints refer to the extent one believes there are obstacles or factors beyond one's control that interfere with reaching goals. The Perceived Constraints Scale was constructed by the MIDUS original researchers using eight items from the Self Administered Questionnaires (SAQ) Section F, Question 1. A sample item is: "there is really no way I can solve the problem I have." Respondents were asked to what extent each statement described them using a 7-point scale (1=strongly agree, 7=strongly disagree). All items were reverse coded. This scale was scored by calculating the sum and the higher the score the higher were the elder's perceived constraints. The acceptable internal consistency reliability was found in both the earlier study ( $\alpha = .86$ ) as reported by Lachman & Weaver (1998) and the current study ( $\alpha = .85$ ).

### *Personal Mastery Scale*

Personal Mastery refers to one's sense of efficacy or effectiveness in carrying out goals. The Personal Mastery Scale was constructed by the MIDUS original researchers from the Self Adminstrated Questionnaires section F, Question 1. There were 4 items (SAQ F1 u, x, z, and dd) in this scale. A sample item is: "Whether or not I am able to get what I want is in my own hands." Respondents were asked to what extent each statement described them using a 7-point scale (1=strongly agree, 7=strongly disagree). Negatively stated items were recoded so higher scores reflected greater personal mastery. This scale was scored by calculating the sum. The reported internal consistency (coefficient alpha=.70) was acceptable (Lachman & Weaver, 1998), but lower than acceptable ( $\alpha$  =.66) in the current study dataset.

Examining the questions in the Personal Mastery scale, some items were found as not appropriate for the elderly population. For example, "What happens to me in the future mostly depends on me" and "I can do just about anything I really set my mind to".

Factor analysis was conducted and the results showed that the four items loaded well on one factor when they were entered alone, but they would load on two factors when items for the Perceived Constraints Scale were added into the analysis. Considering both the construct inappropriateness of this scale and statistical analysis, this scale was determined to not be a good measure of elders' sense of control and was not included in the current study.

### *Health Self Efficacy Scale*

Health Self Efficacy refers to one's sense of control over health issues. Elders' beliefs in control over health issues influence their health practices. For the purposes of this study a Health Self Efficacy Scale was constructed from items in the MIDUS Self Administrated Questionnaire by this investigator using six items from the original questionnaire (SA7 a-e). Respondents were asked to what extent each statement described them using a 7-point scale (1=strongly agree, 7=strongly disagree) for the following five items : (1) *Keeping healthy depends on things that I can do*; (2) *There are certain things I can do for myself to reduce the risk of a heart attack*; (3) *There are certain things I can do for myself to reduce the risk of cancer*; (4) *I work hard at trying to stay healthy*; (5) *When I am sick, getting better is in the doctor's hands*. Negatively stated items were recoded in analysis so higher scores reflect greater health self efficacy. For the sixth item, respondents were asked: How they would rate the amount of control they have over your health these days on an 11-point scale (0 = none, 10 = very much).

The internal consistency reliability was estimated using an independent subset data. The first result showed a low alpha of .528 with all items included. An exploratory factor analysis was conducted to check item loadings on the measured factor. The result showed that the six-item scale had two factors with the first four items loading on one factor and the other two items loading on another. Since items number 5 (getting better is in doctor's hands) and number 6 (control over health) were not related to the measured factor, and two items were too few for a separate scale, the two items were deleted. Another factor analysis showed that all four items loaded on only one factor indicating

Health Efficacy and it was independent from the other two scales. Finally, the reconstructed Health Efficacy Scale had four items with an acceptable internal consistency ( $\alpha = .82$ ). The four items were: (1) Keeping healthy depends on things that I can do; (2) There are certain things I can do for myself to reduce the risk of a heart attack; (3) There are certain things I can do for myself to reduce the risk of cancer; and (4) I work hard at trying to stay healthy. This scale was scored by calculating the sum. The higher the score the higher were the elder's health efficacy.

#### *Summary of Measures of Sense of Control*

Due to the inappropriateness of the construct, low internal consistency and a two factor loading, the Personal Mastery Scale was deleted from the study. After modifying the Health Efficacy Scale, two indicators remained for Sense of Control. They were: Perceived Constraints ( $\alpha = .85$ ), and Health Efficacy ( $\alpha = .82$ ).

#### *Measures for Self Perception*

Self perception is an awareness of the characteristics that constitute one's self or self-knowledge (Bem, 1972). The construction of scales is based on the Envisioned Possible Self theory and the Social Breakdown theory which provide a link between people's self concept and their behavior. In this study, Self Perception was designed to be indicated by elders' perception of aging, and perceived self. However, there were no appropriate items to construct perceived self scale, only perception of aging measures was constructed.

### *Measures for Perception of Aging*

Perception of aging refers to how elders view life related to aging. This scale was constructed by the researcher of the current study from the MIDUS Self Administered Questionnaires regarding images of life changes (SAQ G 1-2). There were two parts in the original questionnaire with the first part identifying perceived characteristics of people in various age groups and the second part identifying how individuals rate themselves in various age groups.

The first part asked about what people in general are like in their late twenties (25-30 years old), late forties (45-50 years old), compared with those in their late sixties (65-70 years old). There were six items indicating six characteristics of people: (1) Calm and even-tempered, (2) Willing to learn, (3) Energetic, (4) Caring, (5) Wise, and (6) Knowledgeable. Respondents were asked to rate how much they thought each of the characteristics describes most people in their late twenties, forties and sixties, using a scale from 0 to 10 (0= not at all, 10 = very much). The second part asked about how people would rate themselves in some specified situations in different age groups. There were seven items in the scale. Respondents were asked to rate people in their later twenties, forties; and late sixties using an 11-point scale (0 = the worst possible you can imagine, 10 = the best possible you can imagine) in the following domains: (1) their physical health, (2) their contribution to the welfare and well-being of others, (3) their marriage or close relationship, (4) their relationship with their children, (5) their financial situation, (6) their paid or unpaid work situations, and (7) their overall lives.

MIDUS respondents' ratings on their perception of people in their late sixties were selected for this study. Factor analysis was conducted with all items from part one and two together. The results showed that there were two factors extracted. All six SG1 items loaded on one factor with two items having double loadings on another factor, but the loadings were much lower (differences were larger than .39) than the loadings on the first factor. So these six items were constructed as a scale, named "Elder Personal Attributes" (due to lack of space, it was labeled as Aging 1 in the model). Items in this scale were: Characteristics of people in their late 60's are calm and even tempered, like to learn, energetic, caring, wise and knowledgeable. All seven SG2 items loaded on a second factor. The scale was constructed and named "Elder Social Integrity and Capacity" (due to lack of space, it was labeled as Aging 2 in the model). Items in this scale included ratings from six domains of people in their 60's: physical health, contribution to others, marriage or close relations, relation with children, financial, and overall of life. Each scale was scored by calculating the sum of all items. The higher the score the higher were the elder's perception of aging. Reliability testing using the dataset for the current study showed that the Perception of Aging Scales had acceptable internal consistency ( $\alpha = .82$ , &  $.84$ ).

#### *Summary of the Measures of Self Perception*

Self perception was measured by elder's perception of aging. Two indicators in the measurement model for Perception aging were: Elder Personal Attributes (Aging 1),  $\alpha = .82$ , and Elder Social integrity and Capacity (Aging 2),  $\alpha = .84$ .

### *Measures for Compensation Strategy*

Compensation strategy is a psychological mechanism by which feelings of inferiority, frustration, or failure in one field are counterbalanced by achievement in another (Merriam-Webster Online Dictionary). Based on Baltes' (1995) model of Selection, Optimization with Compensation (SOC), compensation strategy was operationalized by an index which assessed elders' efforts in attaining personal goals and overcoming obstacles. The Compensation Strategy Index was constructed for the purposes of the current study using a four-indicator index: persistence with goal striving, positive reappraisal, lowering aspirations and seeking support.

The first three scales, Persistence with Goal Striving, Positive Reappraisal, and Lowering Aspirations, were constructed by the original MIDUS researchers. Items were selected from the Self-Administered Questionnaire, Section F, and were scored using a 4-point scale (1=a lot, 4=not at all). Alpha internal consistency coefficients were obtained in the MIDUS data base for each scale. Each scale was scored separately by calculating the sum. There was no total score for the Compensation Strategy Index.

#### *Persistence with Goal Striving Scale*

The Persistence with Goal striving Scale assessed elders' perceived attainment of goals using five items. "When I encounter problems, I don't give up until I solve them" is a sample item. Negatively stated items were recoded so higher scores reflected greater goal striving. This scale was scored by calculating the sum. Internal consistency reliability was acceptable in the reported MIDUS study ( $\alpha=.77$ ) (Wrosch, Heckhausen, & Lachman, 2000) and in the current study ( $\alpha=.73$ ).

### *Positive Reappraisals Scale*

The Positive Reappraisal Scale was used to assess the extent to which an elder saw a positive side of a bad situation using four items. A sample item was “I find I usually learn something meaningful from a difficult situation.” The scale was renamed as Positive Appraisal Scale in this study. Negatively stated items were recoded so higher scores reflected greater use of positive appraisals. This scale was scored by calculating the sum. Internal consistency reliability was acceptable in the reported study ( $\alpha = .78$ ) (Wrosch, Heckhausen, & Lachman, 2000) and in the current study ( $\alpha = .78$ ).

### *Lowering Aspirations Scale*

The Lowering Aspiration Scale focused on elders’ efforts which related to goal disengagement and reprioritizing of goals using five items. A sample item was “When my expectations are not being met, I lower my expectation.” Negatively stated items were recoded in analysis so higher scores reflected greater use of lowering aspirations. This scale was scored by calculating the sum. Internal consistency reliability was lower than the acceptable level in the reported study ( $\alpha = .63$ ) (Wrosch, Heckhausen, & Lachman, 2000) and in the current study ( $\alpha = .67$ ). This scale was scored by calculating the sum. The higher the score the higher were the elder’s use of lowering aspiration.

### *Seeking Support Scale*

A Seeking Support scale was developed by the researcher of current study from the MIDUS SAQ Section F, Question 3. The items in the original MIDUS questionnaire were: (1) *I would rather deal with my problems by myself (SF3 ff)*; (2) *Asking others for help comes naturally to me (SF3 gg)*; (3) *I like to get advice from others before making a*

*decision (SF3 ii); (4) When I'm upset about something I feel better after talk it over with others (SF3 jj); and (5) I prefer to make decisions without input from others (SF3 kk).*

Factor analysis showed three of five items (SF3 gg, ii and jj) loaded on one factor, while the other two items (SF3 ff and kk) loaded on another. Therefore, two items (SF 3 ff and SF3 kk) were dropped. The new scale was named Seeking Support. The items in the newly constructed scale included: (1) *asking others for help comes naturally for me;* (2) *I like to get advice from others before making a decision;* and (3) *When I am upset about something, I feel better after I talk it over with others.* Negatively stated items were recoded so higher scores reflected greater use of seeking support. This scale was scored by calculating the sum. Internal consistency reliability of this three-item scale had a Cronbach's alpha of .65, somewhat lower than the criterion alpha of  $\geq .70$ .

#### *Summary of the Measures of Compensation*

The three scales constructed by the original MIDUS study remained in the current study. A new Seeking Support Scale was constructed. In summary, compensation strategy was measured using four indicators: Persistence with Goal Striving ( $\alpha=.73$ ), Positive Appraisal ( $\alpha=.74$ ), Lowering Aspiration ( $\alpha=.64$ ) and Seeking Support ( $\alpha=.65$ ).

#### *Measures for Activity*

Simply stated, activity is the quality or state of being active (Merriam-Webster Online Dictionary). Conventional knowledge suggests that people need to make use of their physical and social capacities in order to enjoy well-being; this involves engagement in both physical and social activities. There were two forms of activity measured in this study: elders' physical activity and social responsibility.

### *Physical Activity Scale*

Physical activity refers to an elder's level of daily physical functioning. The Physical Activity Scale was constructed for the current study from the MIDUS Self-Administered Questionnaire (SA, 18-21). There were 4 items in the scale. Items included: (1) *During the summer, how often do you engage in vigorous physical activity (for example, running or lifting heavy objects) long enough to work up a sweat?* (2) *What about during the winter -- how often do you engage in vigorous physical activity long enough to work up a sweat?* (3) *During the summer, how often do you engage in moderate physical activity (for example, bowling or using a vacuum cleaner)?* (4) *What about during the winter -- how often do you engage in moderate physical activity?* Respondents were asked to what extent each of the statements described themselves by using a 6-point scale (1= Several times a week or more to 6= Never). Negatively stated items were reverse coded in analysis so higher scores reflected greater physical activity. The scale was scored by calculating the sum. The internal consistency reliability were acceptable ( $\alpha=.81$ ).

### *Social Responsibility Scales*

Social activity referred to elders' level of daily social functioning which was measured by elders' social actions and their commitment to community / work social responsibilities. There were three scales constructed by the original researchers of the MIDUS study: Elders' willingness to participate in Civic Obligation, Work Obligation, and Altruism. Factor analysis with all 11 items in the three scales extracted three factors as expected. There was no change for the items in the scales. As showed in Table 2, the

internal consistency reliability was acceptable in the reported study for civic Obligation ( $\alpha = .78$ ) and Altruism ( $\alpha = .80$ ), but lower than acceptable for Work Obligation ( $\alpha = .68$ ) (Rossi, 2001). All three scales showed acceptable internal consistency in the current study ( $\alpha = .73$ ,  $.80$ , and  $.75$ ).

*Civic Obligation:* There were four items in the *Civic Obligation scale* from MIDUS SAQ (SK7 i-1). A sample item was: “How much obligation would you feel to serve on a jury if called?” Respondents were asked to rate how much obligation they would feel if the situation described in the item happened to them, using a 0 to 10 scale where 0 means “no obligation at all” to 10 means “a very great obligation”. The scale was scored by calculating the sum. Reported internal consistency reliability was acceptable from both the reported study ( $\alpha = .78$ ) (Rossi, 2001) and the current study ( $\alpha = .76$ ).

*Work Obligation:* There were three items in the *Work Obligation scale* from MIDUS SAQ (SK7 m, n, & o). A sample item was related to: “Doing more than most people would do on your kind of job.” Respondents were asked to rate how much obligation they would feel if this particular situation would happen to them, using a 0 to 10 scale where 0 meant “no obligation at all” to 10 meant “a very great obligation.” The scale was scored by calculating the sum. Reported internal consistency reliability was lower than acceptable from the reported study ( $\alpha = .68$ ) (Rossi, 2001), but acceptable in the current study ( $\alpha = .75$ ).

*Altruism:* This scale was composed of four items from the MIDUS SAQ (SK7 p-s). A sample item was willingness: “to collect contributions for heart or cancer research if asked to do so”. Respondents were asked to rate how much obligation they would feel if

the hypothetical situations happened to them, using a 0 to 10 scale where 0 meant "no obligation at all" to 10 meant "a very great obligation." The scale was scored by calculating the sum. Reported internal consistency was acceptable from both the reported study ( $\alpha = .80$ ) (Rossi, 2001) and the current study ( $\alpha = .80$ ).

#### *Summary of the Measures of Activity*

Four scales were used to measure the two components of activity—Physical activity and social responsibility. The scales included: Physical Activity Scale ( $\alpha = .81$ ), Civic Obligations ( $\alpha = .76$ ), Work Obligations ( $\alpha = .75$ ), and Altruism ( $\alpha = .80$ ).

#### *Measures for Well-being*

Well-being is the state of being happy, healthy, or prosperous (Merriam-Webster Online Dictionary). Well-being is also defined as “a perceived state of harmony in all aspects of one’s life. It is a state that characterized by experiences of contentment and pleasure, by spiritual experiences, and a sense of happiness” (Orem, 1995, p83). In this study well-being included the aspects of psychological, social and physical health.

#### *Psychological Well-being*

There were two psychological well-being measures in the original MIDUS study: the shortened six-subscale measure of Psychological Well-being based on the work of Ryff (1989) and the Life Satisfaction Scale (Prenda, & Lachman, 2001). Both of these measures could not used in the current study due to the lower internal consistency reliability in both reported studies and in the current study. The shortened six-subscale measure for psychological well-being had low alpha coefficients, ranging from .35 to .62 in the MIDUS data (Ryff & Keyes, 1995) and low internal consistency reliability,

ranging from .31 to .55 in the current study dataset. The life satisfaction scale had low internal consistency reliability ( $\alpha = .67$ ) in the MIDUS study (Prenda, & Lachman, 2001) and even lower internal consistency reliability in the current study dataset ( $\alpha = .59$ ). None of the scales were selected for the current study.

Items in the MIDUS questionnaire were reexamined to identify items related to psychological well-being. Four items (SF1 a, b, c, i) were identified as indicators of life satisfaction: (1) *I like most parts of my personality*, (2) *When I look at the story of my life, I am pleased with how things have turned out so far*, (3) *Some people wander aimlessly through life, but I am not one of them*, and (4) *I am good at managing the responsibilities of daily life*. Factor analysis was conducted and one factor was extracted. The scale was scored by calculating the sum. Negatively stated items were reverse coded so the higher score reflect higher psychological well-being. This scale was named as Psychological well-being in the current study. Internal consistency reliability was ( $\alpha = .65$ ), somewhat lower than the criterion alpha of  $\geq .70$ .

### *Social Well-being*

*Social well-being scales* measure an elder's appraisal of his/her circumstances and functioning in society (Keyes, 1998). According to Keyes, "As adults age they purportedly encounter tasks that force them to choose to adapt through private resignation or public involvement, i.e. generativity" (p121). Keyes's measures of social well-being were comprised of five subscales. Only one subscale had an acceptable internal consistency reliability ( $\alpha = .73$ ), others were low in the MIDUS study (alpha ranging

form .42 to .65) and in the current study (alpha ranging from .29 to .61). This measure could not be used in the current study due to the low internal consistency reliability.

Social contribution was one of the aspects in Keyes' (1995) measurement of social well-being. It is about "the belief that one is a vital member of society, with something of value to give the world" and it reflects whether or not, and to what degree, people feel that what they do in the world is valued by society and contributes to the commonwealth (Keyes, 1998, p122). Based on Keyes's definition of social contribution, a Generativity Scale was selected as a measure of social contribution. The Generativity scale was constructed by the researchers of the original MIDUS study. There were six items (SAQ SK 6 a-f): (1) Other would say that you have made a unique contribution to society, (2) You have an important skill you can pass along to others, (3) Many people come to you for advice, (4) You feel that other people need you, (5) You have had a good influence on the life of many people, and (6) You like to teach things to people. This scale was renamed as Social Well-being Scale and scored by calculating the sum. All negatively stated items were reverse coded so the higher score reflects higher social well-being. Reliability of this scale was acceptable for both reported studies ( $\alpha=.87$ ) (McAdams & de St. Aubin, 1992; & Rossi, 2001), and current study ( $\alpha = .84$ ).

### *Perceived Health*

*The Perceived Health Scale* indicated the elders' perception of both their physical and mental health. The scale was constructed for the current study from the MIDUS Self-Administered Questionnaire by this investigator. The respondents were asked about (1) *how they saw their physical in general* (1= poor, 5=excellent); (2) *how they saw their*

*mental health in general* (1= poor, 5=excellent); and (3) *how they saw their health compared to other people in the same age group* (1= much better, 5 = much worse); in addition, (4) data were also collected regarding the number of days elders were totally unable to carry out their normal household work activities because of their physical and mental health problems (this item was modified by subtracting the raw scores from 30 to get the good days in a month). The scale was scored by calculating the sum. Factor analysis with the four items extracted only one factor. However, the internal consistency was low with this four item scale ( $\alpha=.62$ ). The item of number of sick days had very low correlation with other items ( $r=.04\sim.18$ ) and was deleted. After deleting the item, the scale with three items had an acceptable internal consistency ( $\alpha=.73$ ).

#### *Summary of the Measures of Well-being*

Three scales were selected for measuring elder's well-being in the current study. These scales included: Psychological Well-being Scale ( $\alpha=.65$ ), Social Well-being Scale ( $\alpha=.87$ ), and Perceive Health Scale ( $\alpha=.73$ ).

#### *Measurement Related to Control Variables*

Inactivity among the elder population has been related to many factors in the literature such as their mental status and environmental factors. To distinguish self-imposed activity limitations from activity limitations imposed by other conditions, mental condition was selected as control variable in this study. Mental condition is indicated by depression, general anxiety disorder and worry. Unfortunately, the missing data rate were high in all measures of these three indicators: 93% missing data for Depression scale,

86% missing data for the Generalized Anxiety Disorder scale, and 80% missing data for items related to worry. These three indicators had to be dropped

### Summary

Exploratory factor analysis was conducted by using an independent dataset. Nineteen scales were examined and fifteen were selected as indicators for SIAL study. The construct of Sense of Control was measured by two scales: Perceived Constraints Scale ( $\alpha = .78$ ) and Health Efficacy Scale ( $\alpha = .82$ ). The construct of Self Perception was measured by two Scales related to elders' Perception of Aging: Elder Personal Attributes (Aging 1,  $\alpha = .82$ ) and Elder Social Integrity and Capacity Scale (Aging 2,  $\alpha = .84$ ). The construct of Compensation Strategy was reflected by three indicators: Positive Confront (measured by two scales: Positive Appraisal Scale,  $\alpha = .74$ , and Goal Striving Scale,  $\alpha = .73$ ), Lowering Aspiration Scale ( $\alpha = .64$ ) and Seeking Support Scale ( $\alpha = .65$ ). The construct of Activity was reflected by two indicators: Physical Activity Scale ( $\alpha = .81$ ) and Social Responsibility (measured by three scales: Civil Obligations,  $\alpha = .73$ ; Work Obligations,  $\alpha = .75$ ; and Altruism,  $\alpha = .80$ ). The construct of well-being was indicated by three scales: Psychological Well-being Scale ( $\alpha = .65$ ), Social Well-being Scale ( $\alpha = .87$ ), and Perceived Health Scale ( $\alpha = .73$ ). The measurement model and structural model based on the EFA will be illustrated and tested in next chapter.

## CHAPTER V

### MODEL ASSESSMENTS

The focus of this chapter is on assessing the Aging Well Model using a subset of the MIDUS dataset. There are two sections to the chapter. The first section describes preparation of data and descriptions of samples and variables. The second section describes model assessment. According to Kline (2005), valid measurement models are necessary prior to structural model evaluation, the second section is further divided into: (a) assessment and modification of the measurement model, and (b) assessment and comparison of the structural models, and (c) assessment and comparison of the alternative models to examine the mediating effects of SIAL.

This study focused on understanding elders' use of SIAL. Based on the exploratory factor analysis and examination of scales, a revised Aging Well structural model for testing the hypotheses is presented in Figure 5. This model was a structural regression model (also called hybrid model) which was a synthesis of path and measurement models.

The SIAL factor (the larger circle with dotted line in Figure 4) is a two-dimensional concept with cognitive (compensation) and performance (physical and social activities) aspects. The cognitive aspect was represented by compensation strategy (the small circle with dotted line in Figure 4) which was indicated by a composite factor included variables of: Lowering Aspiration, Seeking Support, and Positive Confrontation which was a latent variable with two indicators, Positive Appraisal of the situation and persistence with Goal Striving. The performance aspect was represented by another

composite factor which was indicated by physical activity and social responsibility. The solid ovals are latent variables, the solid rectangles are empirical indicators.

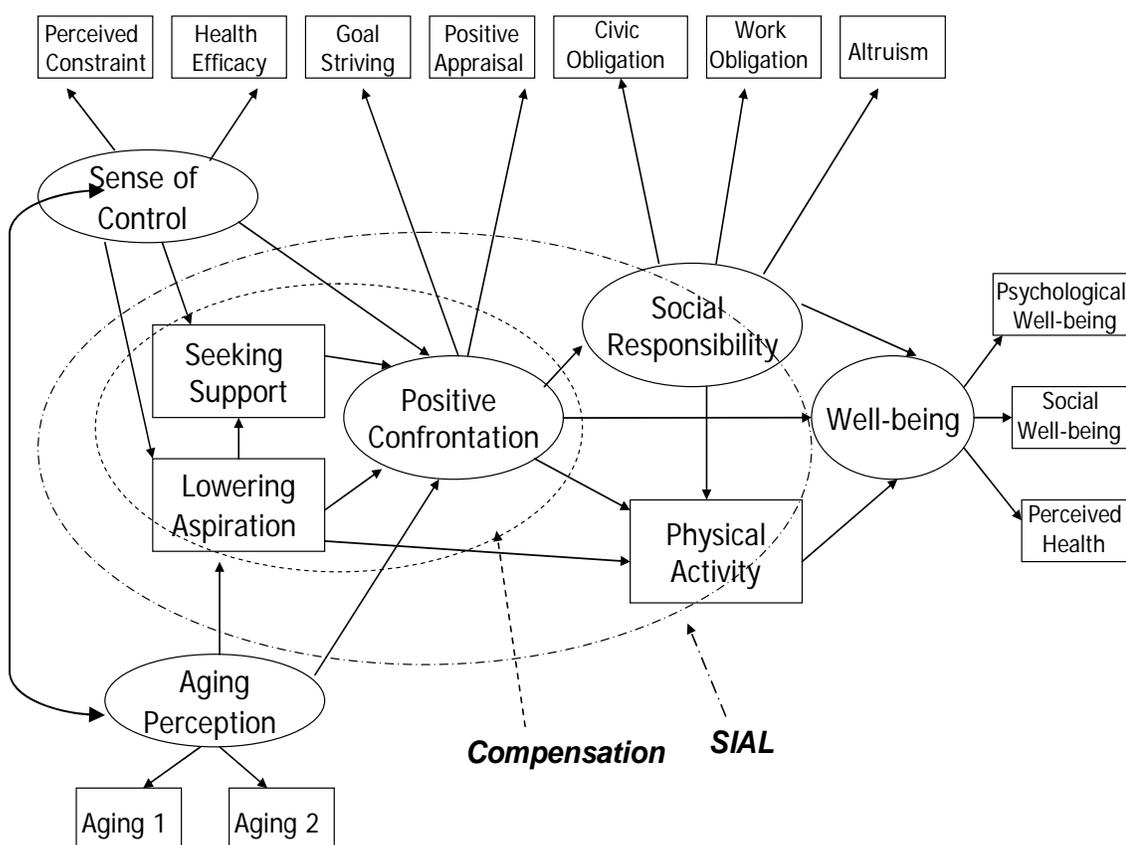


FIGURE 4: Aging Well Model Prior to Measurement Model Testing

\* The small dotted oval circle represents the construct of Compensation Strategy which is a composite factor include variables of: Lowering Aspiration, Seeking Support, and a latent variable of Positive Confrontation.

\* The larger dotted oval circle represents the construct of Self-Imposed Activity Limitation (SIAL), another composite factor included variables of: the composite factor of Compensation, Physical Activity and a latent variable of Social Responsibility.

\* The rectangles are empirical indicators

\* The solid ovals are latent variables

### Preparation of Data and Descriptions of Samples and Variables

This section addresses data preparation, comparison of datasets, missing data protocol, and assumptions associated with SEM analysis. An independent subset (n=435) was created from the MIDUS dataset for model testing according to these sampling criteria: (1) both the telephone interview and the self administered questionnaires (SAQ) were completed; (2) both questions addressing chest pain and discomfort were answered “no” (telephone interview question QA24: “do you ever get chest pain or discomfort when you walk at an ordinary pace on a level surface, not uphill”; and telephone interview question QA23: “do you ever get chest pain or discomfort when you walk uphill or hurry”), and (3) respondent’s age was 65-74.

Further examination of the MIDUS dataset revealed that some of the variables were missing. In some cases, missing variables had been assigned the values of 98, 99, or 999. In other cases, missing variables were blank. For ease of data analysis, all of these missing variables were assigned as missing regardless of the original coding.

Among the 435 cases that met the sampling criteria, 60 cases were missing about one-fourth of the variables. These cases were deleted from the dataset. Therefore, the final sample size for testing the model was n=375. Since some missing variables still existed, Maximum Likelihood Estimation (MLE) was used in data analysis, the default for AMOS software.

The dataset for the current study is similar to the original MIDUS study. The 2-tailed t-test was used to test for differences between the two groups. In the same age group of 65-74 years old, no significant differences were found between the dataset for

the SIAL study and the original MIDUS study in terms of demographic information (Table 3) and selected variables (Table 4). Comparisons of major sample characteristics and variables are listed in Table 3 and 4.

Univariate normality was examined by checking a histogram of frequencies, skewness and kurtosis. According to Kline (2005), variables with absolute values of the skew index greater than 3.0 are described as “extremely” skewed, and absolute values of the kurtosis index greater than 10.0 suggests a problem and values greater than 20.0 indicate serious problem. In the SIAL dataset, all the skew statistics were within one standard deviation with most values ranging from .02 to 1.72; only one value was at 2.67. Most kurtosis statistics were within one standard deviation with values ranging from .05 to 3.92. Only one of the kurtosis values (9.4) exceeded one standard deviation. No extreme non-normality values were identified among the current study variables.

Correlations, variances and covariance were examined among all indicators to detect multicollinearity (Table 5). Most correlation coefficients were moderate ( $r \leq 0.57$ ); only one correlation coefficient was relatively high ( $r = 0.74$ ) but within acceptable range. None of the  $R^2$  values exceeded 0.55. Residual plots of dependent variable were examined and linearity was acceptable.

TABLE 3: Comparison of Demographic Information Between MIDUS Data and Current Study Data

Variable		MIDUS Study Dataset (n=503)	Valid/ Missing (n)	Current Study Dataset (n=375)	Valid/ Missing (n)
Age	Mean age (SD)	69.5 (2.78)	465/38	69.4 (2.74)	347/28
	Median age	69.7		69.6	
Gender	Male	247 (49.1%)	247/0	194 (51.7%)	375/0
	Female	256 (50.9%)	256/0	181 (48.3%)	375/0
Education	Mean rating (SD)	6.15 (2.62)	503/0	6.4 (2.67)	375/0
Employment	Retired	337 (67.9%)	496/7	251 (66.9%)	371/4
	Still Working	93 (18.5%)	496/7	72 (19.2%)	371/4
	Work for pay	25 (5.0%)	348/155	22 (5.9%)	256/119
Marital Status	Married	299 (59.4%)	299/0	243 (64.8%)	243/0
	Divorced	49 (9.7%)	49/0	38 (10.1%)	38/0
	Separated	6 (1.2%)	6/0	0	0/0
	Widowed	127 (25.2%)	127/0	81 (21.6%)	81/0
	Never married	22 (4.4%)	22/0	13 (3.5%)	13/0
Family	No biological children	60 (11.9%)	503/0	37 (9.9%)	375/0
	No non-biological children	410 (81.5%)	503/0	309 (82.4%)	375/0
Living Situations	Living with someone	4 (0.8%)	204/299	3 (0.8%)	131/244
	Ever lived in institution	8 (1.6%)	503/0	8 (2.1%)	375/0
	Ever without telephone	9 (1.8%)	503/0	6 (1.6%)	375/0

\* no significant differences were found between variables in two groups

TABLE 4: Comparison of Variables Between MIDUS Data and Current Study Data

Variables	MIDUS Study Data Set (n=503)				Current Study Data Set (n=375)			
	Mean	SD	Range	Valid/ Missing	Mean	SD	Range	Valid/ Missing
Psychological Well-being	<b>40.6</b>	6.52	8~40	439 /64	<b>40.9</b>	6.00	10~50	369 /6
Social Well-being	<b>32.4</b>	10.76	0~50	429 /74	<b>32.5</b>	10.37	0~50	362 /13
Perceived Health	<b>37.0</b>	6.90	7~.05	440 /63	<b>37.7</b>	6.40	10~50	368 /7
Civic Obligations	<b>33.2</b>	7.32	1~40	450 /53	<b>33.4</b>	6.91	10~40	375 /0
Work Obligations	<b>23.5</b>	5.87	0~30	440 /63	<b>23.7</b>	5.80	0~30	370 /5
Altruism	<b>24.8</b>	9.47	0~40	448 /55	<b>24.8</b>	9.53	0~40	374 /1
Physical Activity	<b>12.3</b>	5.64	0~20	448 /55	<b>12.8</b>	5.53	0~20	369 /6
Goal Striving	<b>16.7</b>	2.54	7~20	441/65	<b>16.8</b>	2.49	10~20	366/9
Positive Appraisal	<b>9.5</b>	2.28	6~16	441 /62	<b>9.5</b>	2.25	7~16	366 /9
Lowering Aspiration	<b>12.3</b>	2.97	5~20	436 /67	<b>12.3</b>	2.91	5~20	366 /9
Seeking Support	<b>7.1</b>	2.12	3~12	446/57	<b>7.1</b>	2.10	3~12	370/5
Perceived Constraints	<b>41.1</b>	10.79	8~56	426 /77	<b>41.7</b>	10.48	8~56	358 /17
Personal Mastery	<b>23.2</b>	4.31	4~28	438/65	<b>23.5</b>	4.01	4~28	367/8
Health Efficacy	<b>24.3</b>	3.95	4~28	442/61	<b>24.6</b>	3.65	4~28	365/10
Aging 1	<b>33.8</b>	6.20	17~50	419 /84	<b>33.9</b>	6.19	17~50	357 /18
Aging 2	<b>61.2</b>	9.52	25~80	419 /84	<b>61.1</b>	9.51	25~80	357 /18

\* no significant difference were found between variables in two groups

TABLE 5: Correlations (lower triangle), Variances (diagonal) and Covariance (upper triangle) Matrix for Indicators

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Constraints 1	<b>109.81</b>	12.68	6.79	.94	-.84	5.53	6.03	-10.69	-.67	15.65	8.38	13.59	7.74	7.12	7.89	6.81
Mastery 2	.30**	<b>16.05</b>	2.13	3.84	5.28	4.03	3.14	-.12	.23	-.00	.83	4.47	.58	3.41	2.95	1.49
Efficacy 3	.18**	.14**	<b>14.18</b>	.80	.87	.36	.85	-1.03	.06	-1.77	1.70	-.37	1.66	.23	.89	1.97
Aging 1 4	.02	.15**	.03	<b>38.36</b>	43.61	4.07	2.14	2.44	.07	3.76	5.81	16.02	-4.18	2.50	2.80	.74
Aging 2 5	-.01	.14**	.03	.74**	<b>90.49</b>	6.40	3.02	2.75	.44	9.79	10.34	19.53	-5.71	2.20	4.79	1.05
Goal strive 6	.22**	.40**	.04	.26**	.27**	<b>6.19</b>	3.183	.19	.25	1.21	3.38	3.95	-.56	2.15	3.59	.89
Appraisal 7	.26**	.35**	.10	.15**	.14**	.57**	<b>5.04</b>	.71	.59	1.93	3.23	4.73	.13	1.81	3.30	.88
Aspiration 8	-.35**	-.01	-.09	.13*	.10	.03	.11*	<b>8.47</b>	.70	-1.5	-.39	-.71	-3.57	-.13	-.43	-1.10
Seek help 9	-.03	.03	.01	.01	.02	.05	.13*	.12*	<b>4.43</b>	.72	1.53	2.87	.64	.18	1.45	.26
Civic 10	.22**	.00	-.07	.09	.15**	.07	.12*	-.08	.05	<b>47.80</b>	17.91	28.13	5.93	3.46	4.29	2.85
Work 11	.14**	.04	.08	.17**	.20**	.23**	.25**	-.02	.12*	.45**	<b>33.68</b>	25.96	3.84	1.61	5.41	1.43
Altruism 12	.14**	.12*	-.01	.27**	.22**	.17**	.22**	-.03	.14**	.43**	.47**	<b>90.80</b>	2.39	6.25	7.64	2.48
Physical act 13	.13*	.03	.08	-.12*	-.11*	-.04	.01	-.22*	.05	.16**	.12*	.05	<b>30.62</b>	.55	3.37	3.60
Psycho WB 14	.22**	.27**	.02	.13*	.07	.27**	.26**	-.01	.03	.16**	.09	.21**	.03	<b>9.81</b>	3.11	.97
Social WB 15	.19**	.19**	.06	.12*	.13*	.36**	.38**	-.04	.17**	.16**	.24**	.20**	.15**	.25**	<b>15.75</b>	1.45
Phys WB 16	.29**	.17**	.24**	.06	.05	.16**	.18**	-.17**	.06	.18**	.11*	.12*	.29**	.14**	.16**	<b>4.98</b>

Notes: \*\* Correlation is significant at the 0.01 level (2-tailed t-test).

\* Correlation is significant at the 0.05 level (2-tailed t-test).

Sample correlations are in lower triangle;

Variances are in diagonal; and

Covariances are in upper triangle.

### Model Assessments

The second section of this chapter includes both measurement and structural model assessments. The models presented below resulted from the Confirmative Factor Analysis (CFA) using SEM. Issues related to identification, specification and estimation of CFA models are reported. Model selection was based on three criteria: acceptable model fit index values, parsimony, and reasonable proportion of explained variance. The basic Aging Well structure and measurement model prepared for analysis is illustrated in Figure 4.

#### *Fit Indexes for Model Assessment*

Following fit indices were used in model assessment: Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA) with 90% Confidence Interval, and Akaike Information Criterion (AIC). Detail of each indexes are listed in Table 6.

TABLE 6: Fit Indices for Model Assessment

Indices	Formula	Acceptable Value	Good Value
NFI	$1 - (\chi^2_{AWM} / \chi^2_{null})$	$\geq .90$	$\geq .95$
CFI	$1 - \{(\chi^2_{AWM} - df_{AWM}) / (\chi^2_{null} - df_{null})\}$	$\geq .90$	$\geq .95$
RMSEA	$\sqrt{[(\chi^2/df - 1) / (N - 1)]}$	$\leq .08$ with 90% CI: LO $\leq .05$ , HI $\leq .10$	$\leq .05$ with 90% CI: LO $\leq .05$ , HI $\leq .10$
AIC	$\chi^2 + k(k - 1) - 2df$  k(k - 1) - 2df equals the number of free parameters in the model	No recommended cut off value, Small value is preferred	

\* AWM= Aging Well=Model

### *Assessment and Modification of Measurement Model*

The measurement model is a model of how theoretical constructs (latent variables) are measured. Five latent variables were included in the SIAL study: well-being, social responsibility, positive confrontation, perception of aging and perceived constraints. The results of the measurement model assessment and modification are presented below.

#### *Initial Measurement Model Test*

As noted in Figure 4, three of the latent variables (sense of control, perception of aging, and positive Confrontation) had only two indicators rather than the required minimum of three indicators making them underidentified. To address this issue, a multifactor CFA model (Figure 5) was used for the measurement model analysis. Issues related to identification, specification, model fit and validity of measures are reported.

*Identification:* The five-factor model (Fig 5) was over identified with 44 degrees of freedom: 90 distinct sample moments, and 46 distinct parameters to be estimated. Assumption of an over identified model was met to conduct model assessment.

*Specification and estimation of models:* Results for the five-factor measurement model had an admissible solution for specification. Except for a significant Chi square statistic ( $\chi^2 = 83.925$ ,  $p = .000$ ,  $df = 44$ ), other selected fit indexes of the CFA model achieved acceptable results: CFI = .956, NFI = .914, RMSEA = .049 with a 90% confidence interval of .033~.065, and AIC=175.925.

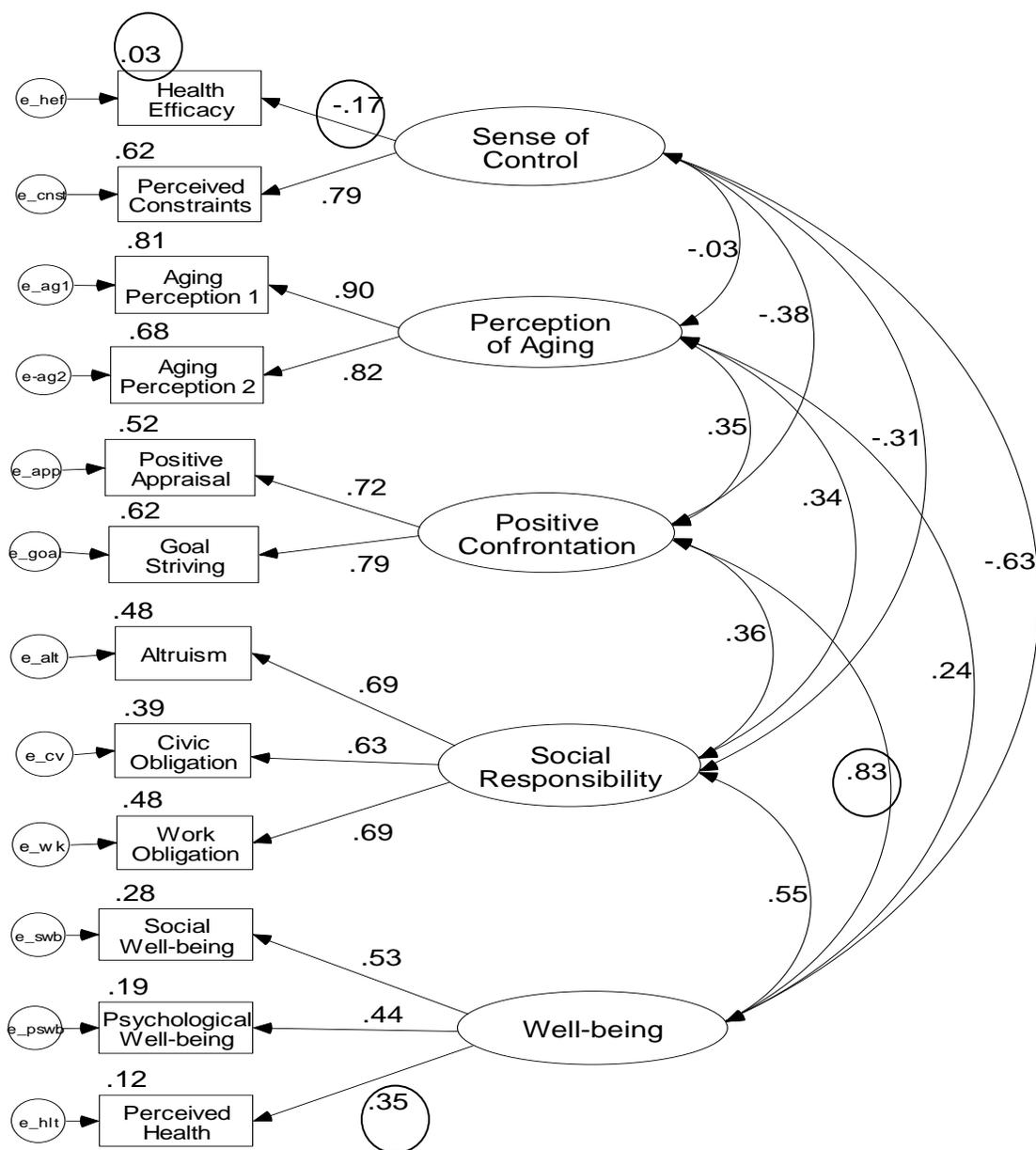


FIGURE 5: Initial Measurement Model Test with All Latent Variables

- \* *Aging Perception 1 = Elder Personal Attributes (Aging 1)*
- \* *Aging Perception 2 = Elder Social Integrity and Capacity (Aging 2)*
- \* *The circled numbers are values need consideration*

### *Assessment of Validity*

#### *Convergent Validity*

Convergent validity was examined by standard factor loadings between indicators and their associated factors (Figure 5). The standardized factor loadings for each set of indicators were relatively high for three of the five factors including Positive Confrontation, Perception of Aging, and Social Responsibility. In addition, for each of these three factors the observed correlations (Table 5) clustered tightly together with the difference between the highest and lowest observed correlation no greater than  $r = 0.08$ . For these three factors, convergent validity was demonstrated.

Problems occurred with the two remaining factors although these problems were different. Standardized factor loadings for the factor Sense of Control varied from a low of  $r = 0.17$  to a high of 0.79 which does not support convergent validity. Well-being factor loadings for the indicators were relatively low  $r \leq 0.53$ , which suggested low validity of these indicators.

#### *Discriminate Validity*

Discriminate validity was examined by estimated correlations among factors (Figure 5). The high estimated factor correlation ( $r=.83$ ) between the Well-being factor and Positive Confrontation factor (Figure 5) suggests an unclear distinction between these two factors. Since this relatively high factor correlation was revealed, all correlations among factors and indicators were examined to identify the cause of these high correlations (Table 7).

These tabled results showed that most indicators had higher correlations with their associated factors than with the other factors. Two problems were identified with Positive Confrontation factor and Well-being factor. First, the two indicators of Positive Confrontation, Appraisal and Goal Striving, had the higher correlations with their associated factor ( $r = .719$ , &  $.793$ ) while they also had relatively high correlations ( $r = .585$ , &  $.645$ ) with the Well-being factor. Second, the highest correlations for Well-being factor were not with its associated indicators but rather with indicators associated with Positive Confrontation factor. In other words, indicators associated with the Positive Confrontation factor had a better correlation with Well-being factor ( $r \geq 0.60$ ) compared to indicators associated with Well-being ( $r \leq 0.53$ ). These findings suggested poor discrimination validity. Due to lack of indicators from the database, these indicators remained in the study, but the results need to be interpreted with caution.

TABLE 7: Correlation Among Factors and Indicators

	Positive Confrontat ion	Perception of Aging	Social Responsib ility	Sense of Control	Well- being
Positive Appraisal	<b>.72</b>	.25	.26	.28	<b>.60</b>
Goal Striving	<b>.79</b>	.27	.28	.30	<b>.65</b>
Aging 1	.31	<b>.90</b>	.30	.03	.22
Aging2	.29	<b>.82</b>	.28	.03	.20
Altruism	.25	.23	<b>.69</b>	.21	.38
Civic Obligation	.22	.21	<b>.63</b>	.19	.35
Work Obligation	.25	.23	<b>.69</b>	.21	.38
Health Efficacy	.07	.01	.05	<b>.17</b>	.11
Perceived Constraints	.30	.03	.24	<b>.79</b>	.50
Social Well-being	.44	.13	.29	.33	<b>.53</b>
Psychological Well-being	.36	.11	.24	.28	<b>.44</b>

*Modification and Respecification of Measurement Model*

As showed in Figure 5, all path coefficients were significant except the one between Health Efficacy indicator and its associated Sense of Control factor ( $\beta = .17$ ,  $p = .17$ ). The proportion of explained variance for Health Efficacy was low ( $R^2 = .03$ ) which means that about 97% of the variance was from unexplained sources. For these reasons, Health Efficacy was considered for deletion from the Aging Well Model.

Another reason for deleting the Health Efficacy indicator was based upon validity considerations. The original MIDUS researchers had two indicators for the Sense of Control factor. For this study, an additional indicator (health efficacy) was constructed. Evidence of validity of health efficacy as an indicator of Sense of Control was lacking. Empirical analysis results revealed that this indicator was not valid. This too contributed to the decision to delete Health Efficacy indicator.

*First modification of the measurement model:* A respecified four-factor model was tested (Fig 6) and favorable results were achieved after modification. Values of selected fit indexes were:  $\chi^2 = 40.313$ ,  $p = .079$ ,  $df = 29$ ,  $CFI = .986$ ,  $NFI = .954$ ,  $RMSEA = .032$  with the 90% confidence interval of .000~.054, and  $AIC = 112.31$ .

After respecification, all path coefficients were significant. However, both factor loading and explained variance for the Health (perceived health) indicator were reduced: factor loading dropped from .35 to .29, and the  $R^2$  dropped from .12 to .08, which means that about 92% of variance was unexplained. Since the perceived health indicator was constructed for this study, evidence of validity was lacking. This indicator was removed

from the model due to the poor validity of measurement and large proportion of unexplained variance.

*Second modification of the measurement model:* Another test was conducted after removing the perceived health indicator (Figure 7). Except for a significant Chi square statistic ( $\chi^2=34.36$ ,  $p=.033$ ,  $df=21$ ), other fit indexes remained good: CFI = .983, NFI = .960, RMSEA = .041 with the 90% confidence interval of .012~.065, and AIC= 100.37. This second modified model was used in further analysis. Comparison of fit estimates of measurement models is reported in Table 8. Since perceived health is a very important theoretical concept of Well-being, ideally it should be included in future studies with valid measurement.

*Summary:* Three measurement models were tested. Two latent variables were deleted after two modifications. The last model, model after the second modification, was selected as best fit with the MIDUS data and used in the further analysis.

TABLE 8: Comparison of Estimates of Measurement Model Testing

	$\chi^2$	p	df	CFI	NFI	RMSEA	90% CI	AIC
Initial Model	83.93	.000	44	.956	.914	.049	.033~.065	175.93
1 <sup>st</sup> Modification	40.31	.079	29	.986	.954	.032	.000~.054	112.31
2 <sup>nd</sup> Modification	34.36	.033	21	.983	.960	.041	.012~.065	100.37

Legend:

CFI = Comparative Fit Index, acceptable value  $\geq .90$

NFI = Normed Fit Index, acceptable value  $\geq .90$

RMSEA = Root Mean Square Error of Approximation, acceptable value  $\leq .05$

AIC = Akaike Information Criterion, no acceptable value, generally, a smaller value is preferred.

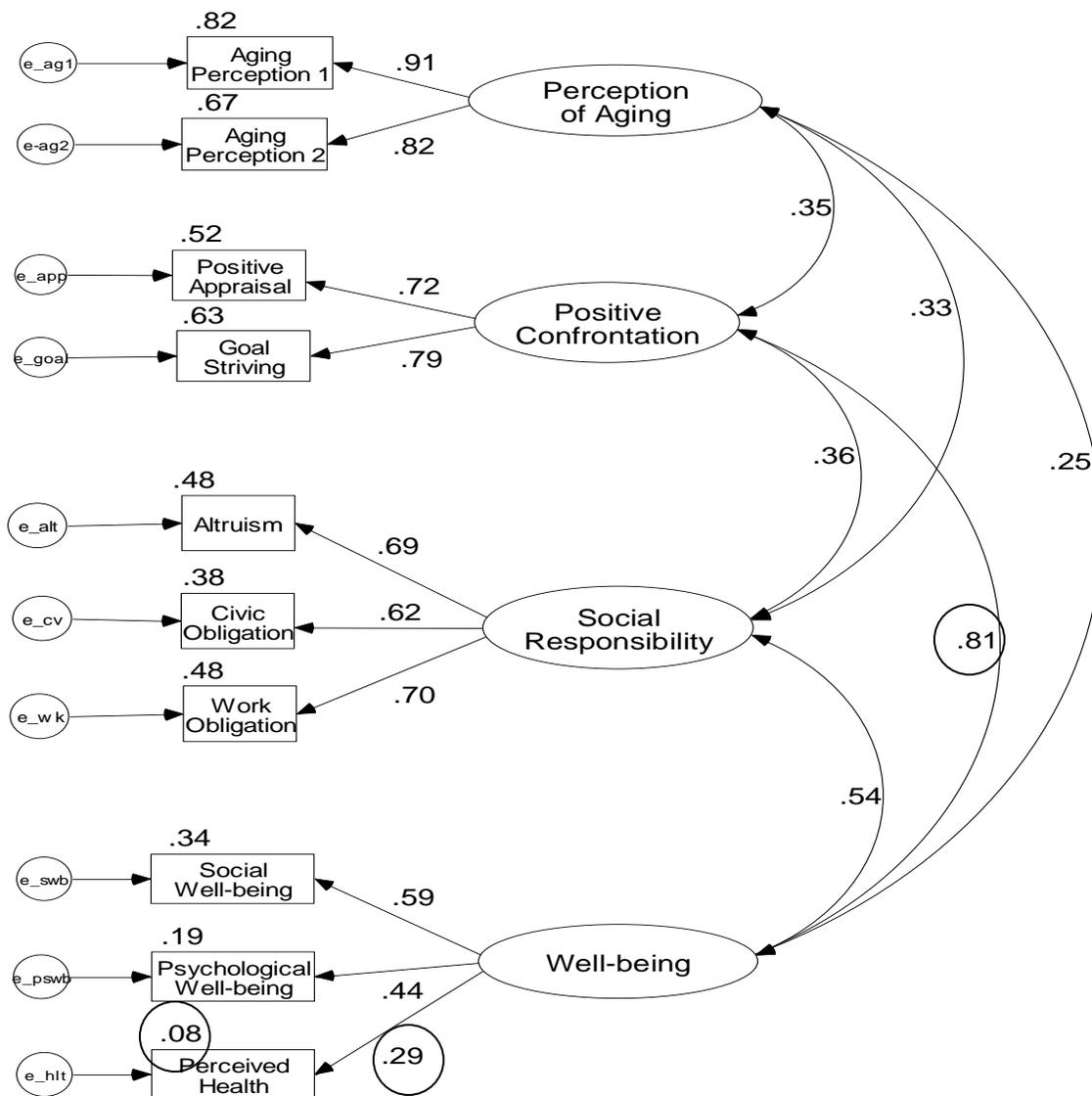


FIGURE 6: First Modification of Measurement Model

\* *Aging perception 1 = Elder Personal Attributes (Aging 1)*

\* *Aging Perception 2 = Elder Social Integrity and Capacity (Aging 2)*

\* *The circled numbers are unfavorability values*

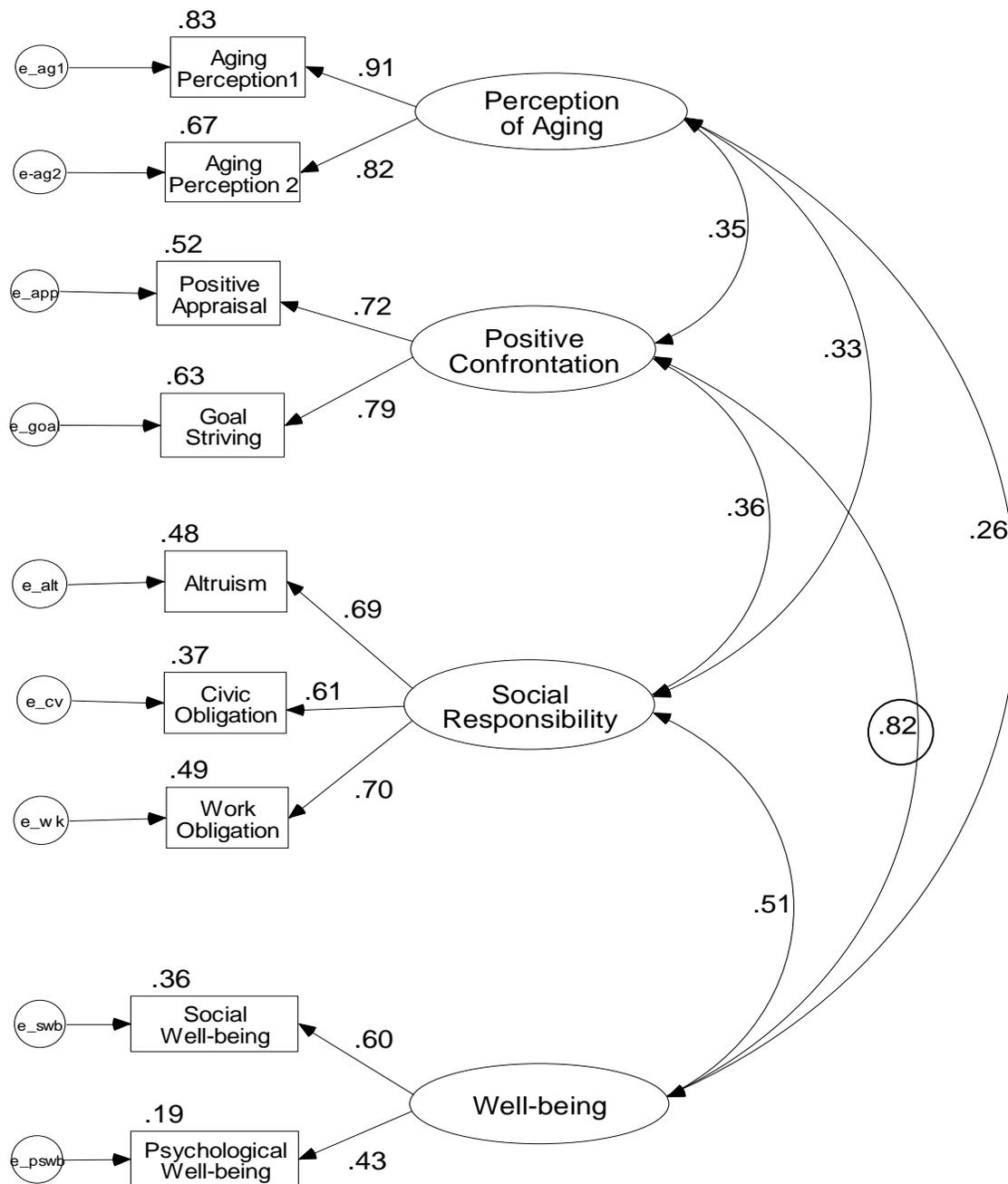


FIGURE 7: Second Modification of Measurement Model

\* *Aging Perception 1 = Elder Personal Attributes (Aging 1)*

\* *Aging Perception 2 = Elder Social Integrity and Capacity (Aging 2)*

*Assessment and Comparison of Aging Well Structural Models*

The structural model is a model of the hypothesized relationships between latent variables. The Aging Well Model was a hybrid model which was a synthesis of both path and measurement model. The purpose of these assessments was to determine how well the proposed Aging Well Model fit with the MIDUS data. Results of Aging Well Model assessment and comparison are reported below. The basic Aging Well Model (Figure 8) was tested based on the respecified measurement model (Figure 7). Estimation of fit indexes, parsimony, and explained variance were compared across model testing. According to Kline (2005, p 122), effect size magnitudes are indicated by the absolute values of path coefficients: if the expected magnitude were “small”, “medium” or “large”, then, respectively, the absolute values of path coefficient would be  $\leq .10$ , around  $.30$ , or  $\geq .50$ .

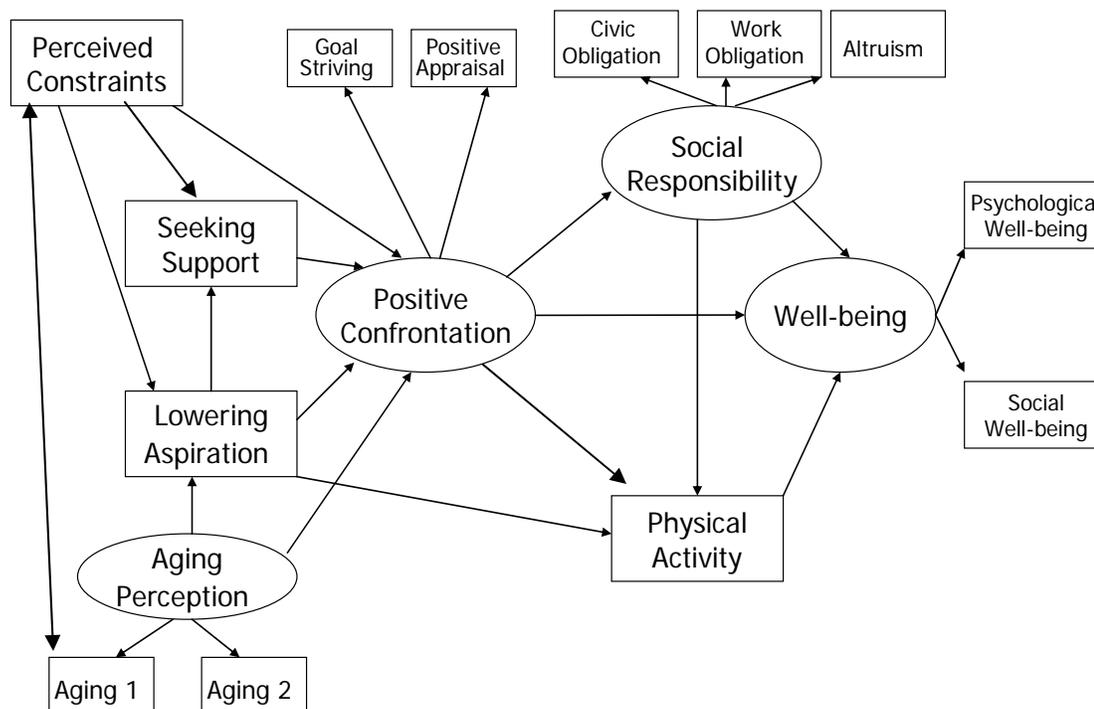


FIGURE 8: Basic Aging Well Model After Measurement Model Respecification

The Aging Well Model is over-identified model with 54 degree of freedom: 104 distinct sample moments, and 50 distinct parameters to be estimated. Based on this Aging Well Model, the following hypotheses were adjusted and tested in analysis:

*Hypotheses associated with research question 1:*

*Research question 1: How well the Aging Well Model fit with the MIDUS data?*

H 1. Aging Well Model is consistent with the MIDUS dataset compared to the null model.

--A Null model = all variables are independent.

H 2. Aging Well Model is more consistent with MIDUS dataset than a saturated model

--A Saturated Model = all variables are correlated.

H 3. Aging Well Model is more consistent with MIDUS dataset than an alternative model.

--Alternative Model = model without the construct of SIAL (fix all paths to and from the constructs to zero).

H 4. SIAL mediates the effects of Perception of Aging and Sense of Control on elder's Well-being.

*Hypotheses associated with research question 2:*

*Research question 2: Are the proposition statements valid?*

H 5. there is a positive association between elders' Well-being and their Physical Activity.

H 6. there is a positive association between elders' Well-being and their Social Responsibility.

H 7. there is a positive association between elders' Well-being and their Positive Confrontation.

H 8. there is an association between elders' Social Responsibility and Positive Confrontation.

H 9. there is an association between elders' Physical Activity and their Social Responsibility.

H 10. there is an association between elders' Physical Activity and their Positive Confrontation.

H 11. there is an association between elders' Physical Activity and their use of Lowering Aspiration.

H 12. there is an association between elders' Positive Confrontation and their Perceived Constraints.

- H 13. there is an association between elders' Positive Confrontation and their use of Seeking Support.
- H 14. there is an association between elders' Positive Confrontation and their use of Lowering Aspirations.
- H 15. there is an association between elders' Positive Confrontation and their Perception of Aging.
- H 16. there is an association between elders' use of Seeking Support and their Perceived Constraints.
- H 17. there is an association between elders' use of Seeking Support and their use of Lowering Aspirations.
- H 18. there is an association between elders' use of Lowering Aspirations and their Perception of Aging.
- H 19. there is an association between elders' use of Lowering Aspiration and their Perceived Constraints.
- H. 20 there is an association between elders' perceived constraints and their perception of aging.

*Initial Assessment: Aging Well Model I*

Aging Well Model I (Figure 9) was a basic Aging Well Model. This model achieved a favorable result of model fit with the MIDUS dataset and explained 75% variance of the dependent variable which was elder's subjective Well-being. Except for a significant Chi square statistic ( $\chi^2 = 102.67$ ,  $p = .000$ ,  $df = 54$ ), other fit indexes were good:

CFI = .95, NFI = .90, RMSEA = .05 with the 90% confidence interval of .03~.06, and AIC=202.67.

Perceived Constraints was not correlated with Perceptions of Aging ( $r=.009$ ,  $p=.869$ ). Three non-significant paths and small effects were revealed: path between Positive Confrontation and Physical Activity ( $\beta=-.08$ ,  $p=.245$ ), path between Social Responsibility and Well-being ( $\beta=.14$ ,  $p=.172$ ), and path between Perceived Constraints and Seeking Support ( $\beta=.01$ ,  $p=.857$ ). To explore the competing model, these paths were deleted in the exploratory model test of Aging Model II.

*Second Assessment: Exploratory Assessment of Aging Well Model II*

Aging Well Model II (Figure 10) was an equivalent model in which three non-significant paths identified in the Aging Well Model I were deleted. This model also achieved a favorable result of model fit with the MIDUS dataset, but with more parsimony by adding four more degree of freedom. Seventy-six percent of the variance was explained by Aging Well Model II. Except for a significant Chi square statistic ( $\chi^2=106.19$ ,  $p=.000$ ,  $df=57$ ), other fit indexes were good: CFI = .95, NFI = .90, RMSEA = .05 with the 90% confidence interval .03~.05, and AIC=200.19. All paths were significant at the .05 level (all critical ratio were  $> 1.96$  for regression weight).

*Summary of Aging Well Model Assessment*

Two Aging Well Models were assessed. Both Aging Well Models I and II had good fit with the MIDUS dataset. However, Aging Well Model II had better parsimony and was selected as a model for further comparison with other alternative models.

Accepted Aging Well Model and effective size of impacts is presented in Figure 11.

Comparison of estimates of the Aging Well Model testing is presented in Table 9.

TABLE 9: Comparison of Estimates of Aging Well Model Testing

Model	$\chi^2$	p	df	CFI	NFI	RMSEA	90% CI	AIC	R <sup>2</sup>
AW Model I	102.67	.000	53	.95	.90	.05	.03~.06	202.67	.76
AW Model II	<b>106.19</b>	<b>.000</b>	<b>57</b>	<b>.95</b>	<b>.90</b>	<b>.05</b>	<b>.03~.05</b>	<b>200.19</b>	<b>.77</b>

Legend:

AW Model I = Aging Well Model I

AW Model II = Aging Well Model II

CFI = Comparative Fit Index, acceptable value  $\geq .90$

NFI = Normed Fit Index, acceptable value  $\geq .90$

RMSEA = Root Mean Square Error of Approximation, acceptable value  $\leq .05$

AIC = Akaike Information Criterion, no acceptable value, generally, a smaller value is preferred.

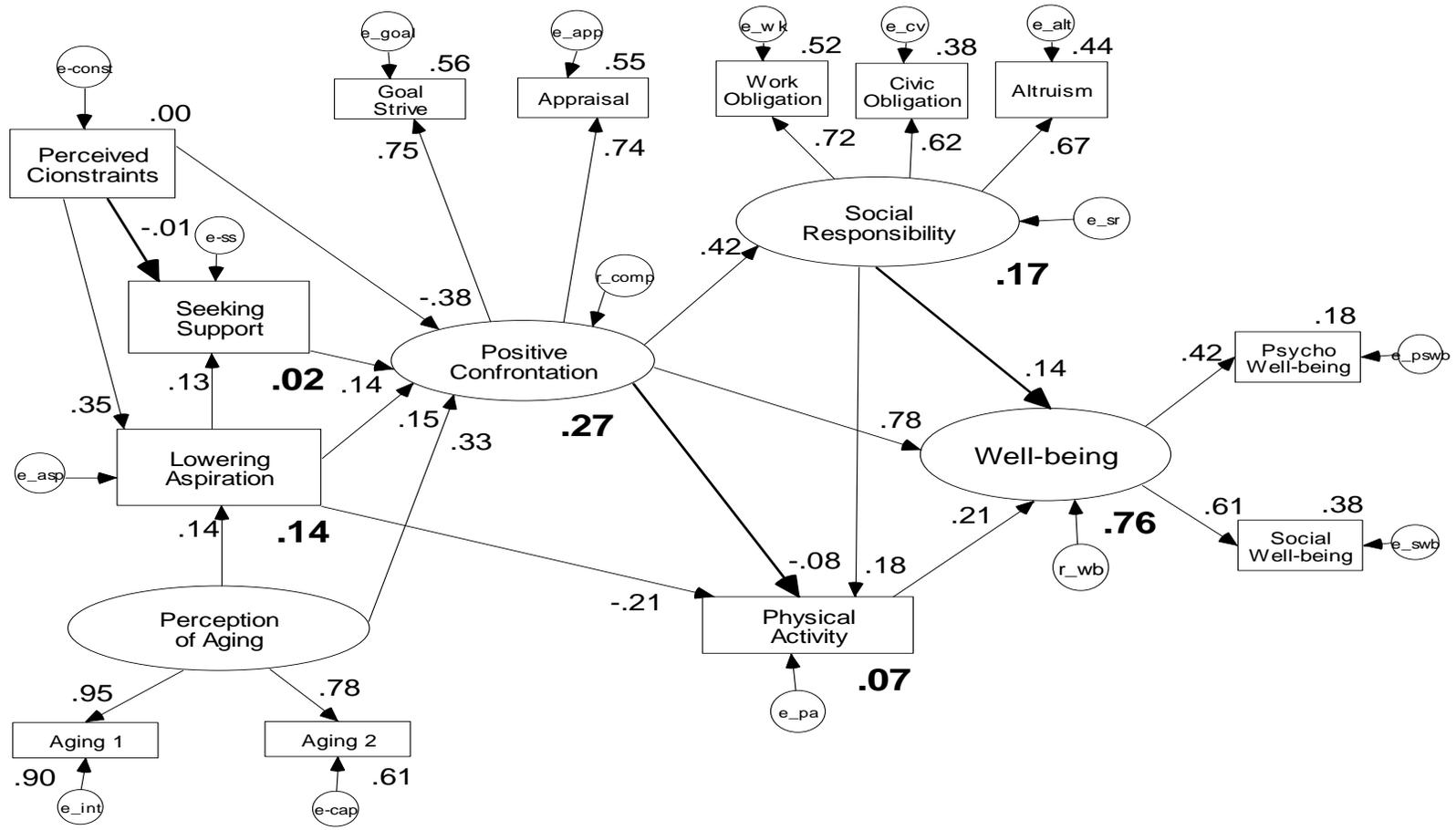


FIGURE 9: Assessment of Aging Well Model I: Basic Hybrid Model

Fit estimations:  $\chi^2 = 102.67$ ;  $p = .000$ ;  $df = 53$ ;  
 CFI = .950; NFI = .90; RMSEA = .049 with 90% CI .03~.06; AIC=202.67

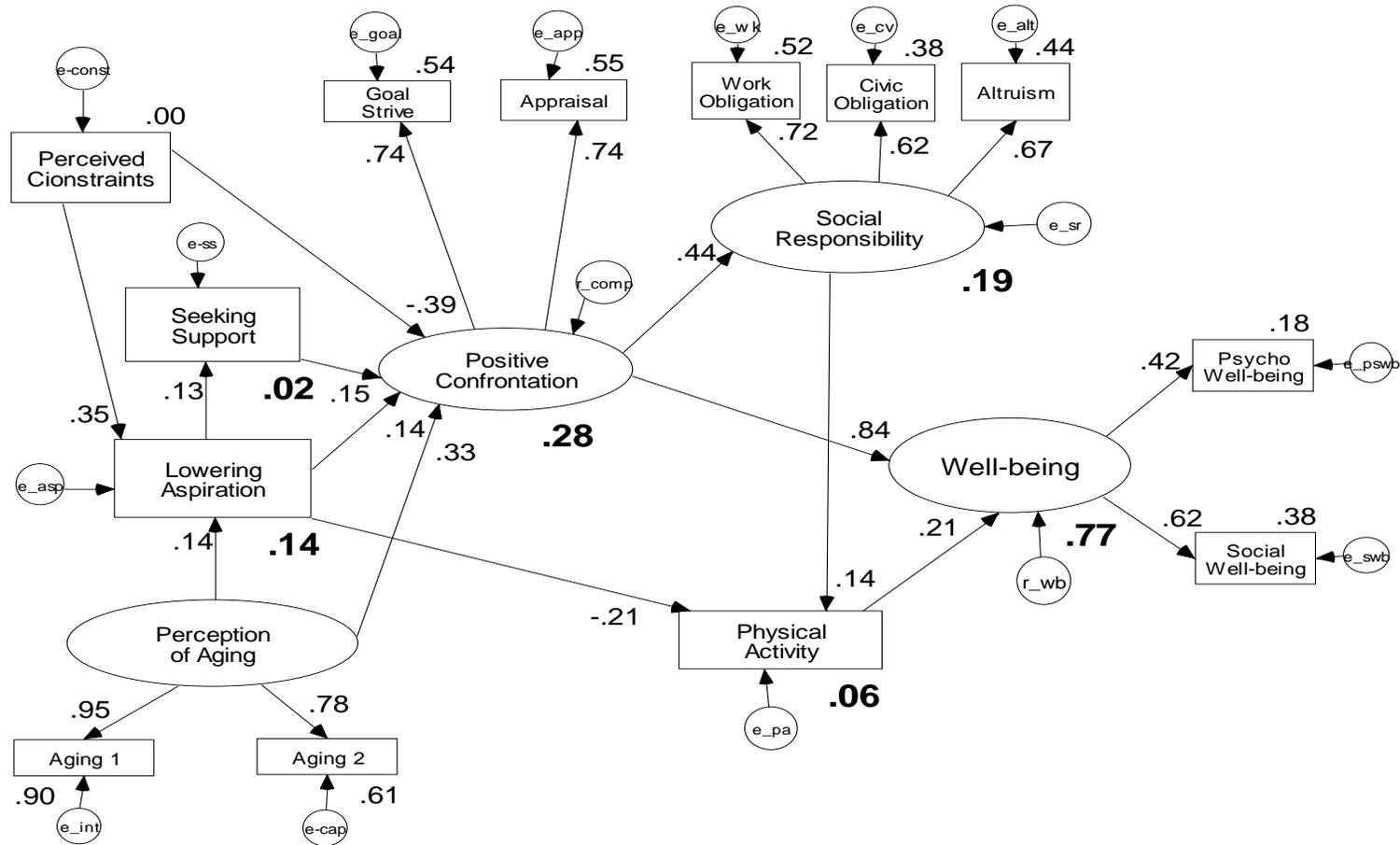


FIGURE 10: Exploratory Assessment of Aging Well Model II: Equivalent Model with Deletion of Four Paths

Fit estimates:  $\chi^2 = 106.19$ ;  $p = .000$ ;  $df = 57$

CFI = .95; NFI = .90; RMSEA = .05 with 90% CI .03~.05; AIC = 200.19

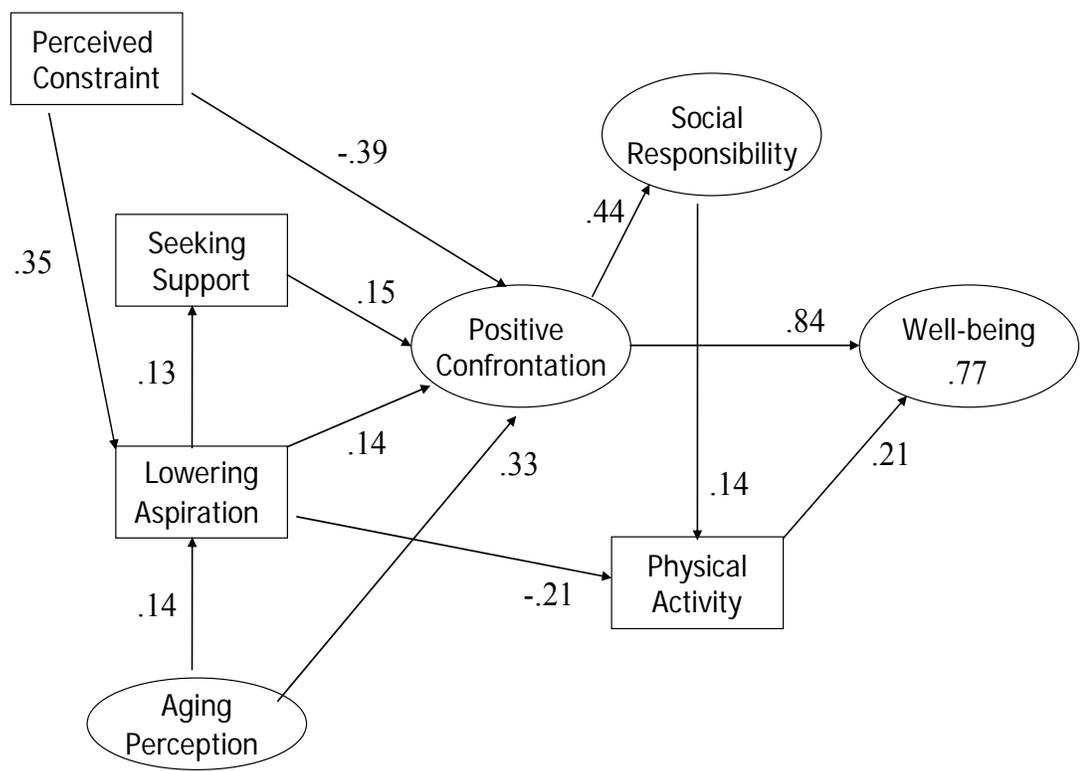


FIGURE 11: Accepted Aging Well Model with Effective Size of Impacts  
*Assessment and Comparison of Aging Well Model with Alternative Models*

Two alternative models were assessed and compared with Aging Well Model.

The purpose of these assessments was to find patterns of result that strongly demonstrate the mediator effects of SIAL —statistically significant indirect effects but not direct effects. These patterns of result also assume correct directionality specification (Kline, 2005).

*Comparing the Aging Well Model with Alternative Model --Testing the Mediating Effects of SIAL*

*Alternative model I* (Figure 12) was a modified model based on Aging Well Model II: SIAL variables were taken out of the Aging Well Model II, and two paths were added to the model--a path between Well-being and Perceived Constraints and a path between Well-being and Perception of Aging. This model had a good fit with the MIDUS dataset, but only explained 23% of variance compared to the Aging Well Model II which explained 76% of variance. Fit estimates were good:  $\chi^2 = 1.88$ ;  $p = .758$   $df = 4$ , CFI = 1.00, NFI = .99, RMSEA = .00 with the 90% confidence interval of .00~.05, and AIC=33.88. Two paths between Well-being and Perceived Constraints, and between Well-being and Perception of Aging remained significant ( $\beta = .40$ ,  $p = .000$ , and  $\beta = .25$ ,  $p = .005$ ).

*Alternative model II* (Figure 13) was another modified model based on the Alternative Model I. In Alternative Model II, SIAL variables were nested in the Alternative model I. This model had a good fit with the MIDUS dataset. Except for a significant Chi square statistic ( $\chi^2 = 105.29$ ,  $p = .000$ ;  $df = 55$ ), other fit indexes were good: CFI = .95, NFI = .90, RMSEA = .05 with the 90% confidence interval of .04~.06, and AIC = 187.06. Compared with the Alternative Model I which had only 23% of explained variance of well-being, Alternative Model II had 78% of explained variance of the well-being. Two paths between Well-being and Perceived Constraints ( $\beta = .06$ ,  $p = .441$ ) and between Well-being and Perceptions of Aging ( $\beta = .03$ ,  $p = .714$ ) became non-significant when SIAL variables were nested in the Alternative model I in which the two paths were significant.

*Summary of Alternative Model Assessment*

Both Alternative Model I and II had a good fit with the MIDUS dataset. Two paths were significant in Alternative Model I, but were non-significant when SIAL variable was nested in the Alternative Model II. Although Alternative model I had well fit indices, it only explained 23% of variance. Aging Well Model II explained 78% of variance when SIAL variables were nested in the model. These results explained the mediating effect of SIAL on the relationship between elder's perception of aging and their well-being, and relationship between elder's perceived constraints and well-being. Estimates of Alternative model testing are presented in Table 10.

TABLE 10: Estimates of Aging Well Model II and Alternative Model Testing

<b>Model</b>	$\chi^2$	<b>p</b>	<b>df</b>	<b>CFI</b>	<b>NFI</b>	<b>RMSEA</b>	<b>90% CI</b>	<b>AIC</b>	<b>R<sup>2</sup></b>
AW Model II	<b><i>106.19</i></b>	<b><i>.000</i></b>	<b><i>57</i></b>	<b><i>.95</i></b>	<b><i>.90</i></b>	<b><i>.05</i></b>	<b><i>.03~.05</i></b>	<b><i>200.19</i></b>	<b><i>.77</i></b>
Alternative I	1.88	.758	4	1.00	.99	.00	.00~.05	33.88	.23
Alternative II	105.29	.000	55	.95	.90	.05	.04~.06	203.29	.78

- AW Model II=Aging Well Model II

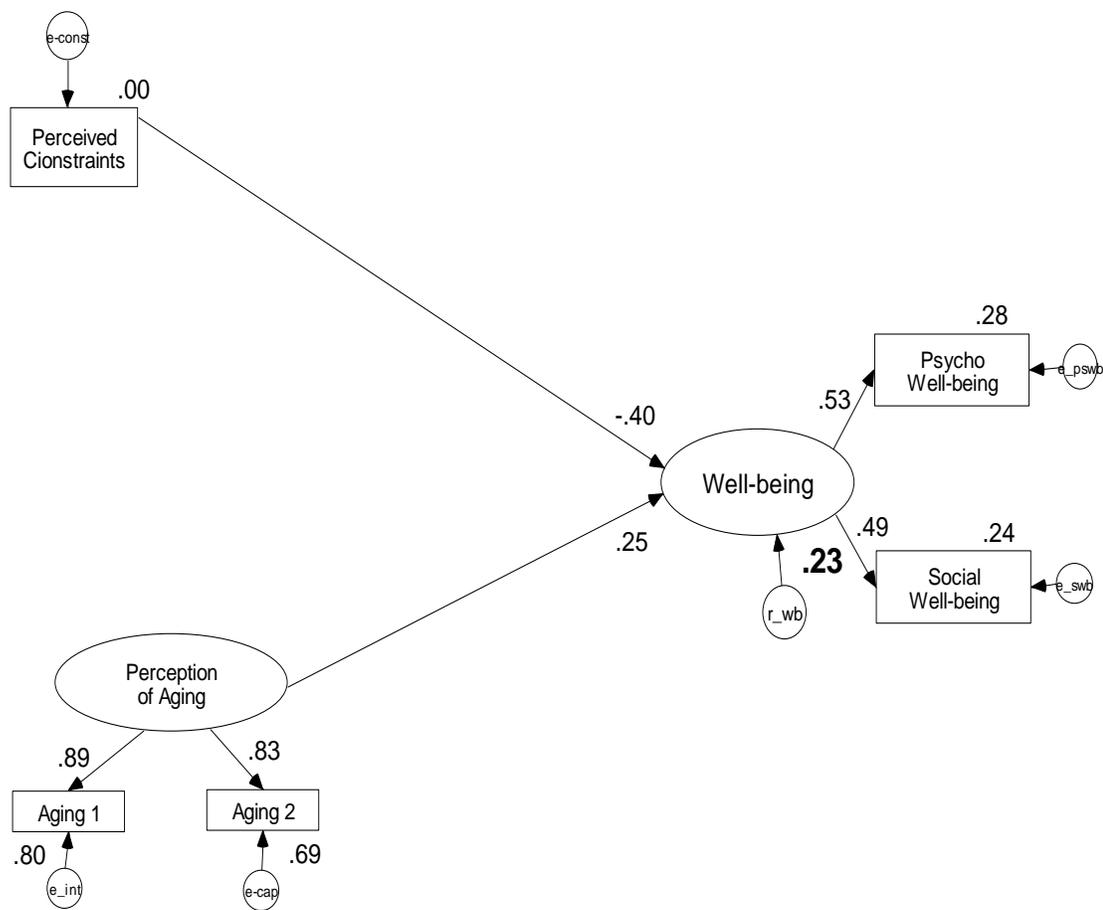


FIGURE 12: Assessment of Alternative Model I—Absence of SIAL Variables

Fit estimations:  $\chi^2 = 1.877$ ;  $p = .758$   $df = 4$

CFI = 1.000, NFI = .994; RMSEA = .000 with 90% CI .000~.054; AIC=33.877.

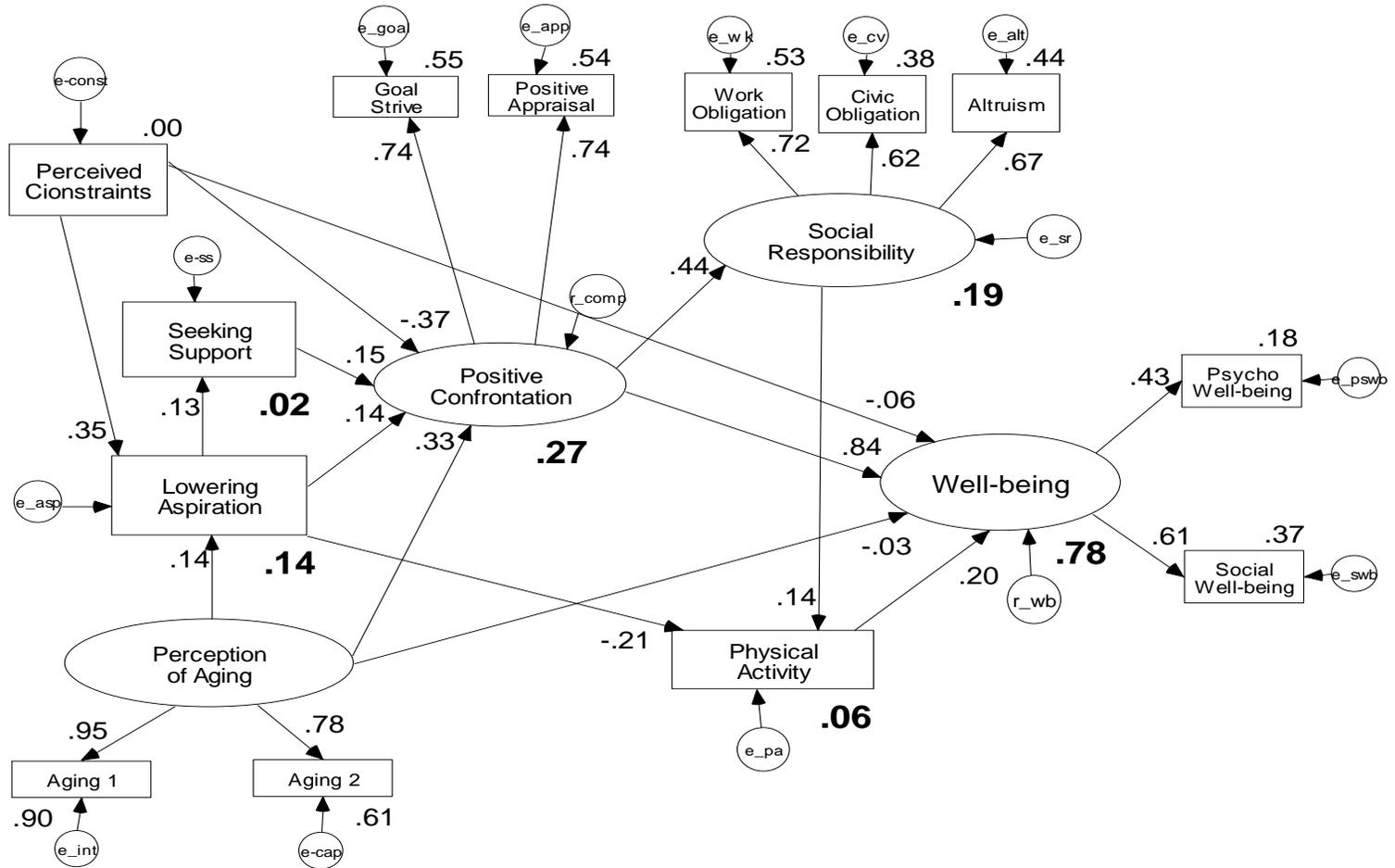


FIGURE 13: Assessment of Alternative II—SIAL was Nested in Alternative Model I

Fit estimations:  $\chi^2 = 105.29$ ;  $p = .000$ ;  $df = 55$

CFI = .95; NFI = .90; RMSEA = .05 with 90% CI .04~.06; AIC=187.06.

### Summary of Model Assessments

Two Aging Well Models and two Alternative Models were assessed. A comparison of models is summarized in Table 9 and 10. Aging Well Model II was selected as having the best fit with the MIDUS dataset. The selected Aging Well Model II explained 76% of the variance of elder's well-being. A summary of direct effects, indirect effects and total effects of independent variables on elder's well-being is listed in Table 11.

#### *Four Supported Hypotheses--- Research Question One Related Hypotheses*

Hypothesis 1 was supported, the Aging Well Model was consistent with the MIDUS dataset compared to a null model. Both Aging Well Model I and II were consistent with MIDUS data, however, Aging Well Model II had better parsimony.

Hypothesis 2 was supported. The Aging Well Model was consistent with the MIDUS dataset, but with more parsimony than a saturated model.

Hypothesis 3 was supported. The Aging Well Model was more consistent with the MIDUS data comparing to an alternative model in which SIAL variables were absent.

Hypothesis 4 was supported. SIAL mediated the effects of Perceptions of Aging and Sense of Control on elder's Well-Being. When SIAL variables were nested in the model, paths between these variables became non-significant.

#### *Twelve Supported Hypotheses—Research Question Two Related Hypotheses*

Hypotheses associated with research question two, are the proposition statements in the Aging Well Model valid, were demonstrated by expected patterns of correlation

and covariance among variables in the Aging Well Model, except for four non-supported hypotheses (Figure 11).

Hypothesis 5 was supported. There was a positive association between elders' Well-being and their Physical Activity. A 1-point increase in the Physical Activity variable predicted a .21-point increase in the well-being variable.

Hypothesis 7 was supported. There was a positive association between elders' Well-being and their Positive Confrontation with situations. A 1-point increase in Positive Confrontation with situation predicted a .84-point increase in well-being.

Hypothesis 8 was supported. There was a positive association between elders' Social Responsibility and their Positive Confrontation with situation. A 1-point increase in elder's Positive Confrontation with situation predicted a .44-point increase in elder's Social Responsibility.

Hypothesis 9 was supported. There was a positive association between elders' Physical Activity and their Social Responsibility. A 1-point increase in Social Responsibility predicted a .14-point increase in elder's Physical Activity.

Hypothesis 11 was supported. There was a negative association between elders' Physical Activity and their use of Lowering Aspiration. A 1-point increase in elder's use of Lowering Aspiration predicted a .21 decreases in their Physical Activity.

Hypothesis 12 was supported. There was a negative association between elders' Positive Confrontation with situations and their Perceived Constraints. A 1-point increase in elder's Perceived Constraints predicted a .39 decreases in their Positive Confrontation with situations.

Hypothesis 13 was supported. There was a positive association between elders' Positive Confrontation and their use of Seeking Support. A 1-point increase in elder's use of Seeking Support predicted a .15 increases in their Positive Confrontation with situations.

Hypothesis 14 was supported. There was a positive association between elders' Positive Confrontation and their use of Lowering Aspiration. A 1-point increase in elder's use of Lowering Aspiration predicted a .14 increase in their Positive Confrontation with situations.

Hypothesis 15 was supported. There was a positive association between elders' Positive Confrontation with situations and their Perception of Aging, a 1-point increase in elder's Perception of Aging predicted a .33 increases in their Positive Confrontation with situations.

Hypothesis 17 was supported. There was a positive association between elders' use of Seeking Support and their use of Lowering Aspiration. A 1-point increase in elder's use of Lowering Aspiration predicted a .13-point increase in their use of Seeking Support.

Hypothesis 18 was supported. There was a positive association between elders' use of Lowering Aspiration and their Perception of Aging. A 1-point increase in elder's perception of aging predicted a .14-point increase in their use of Lowering Aspiration.

Hypothesis 19 was supported. There was a positive association between elders' use of Lowering Aspiration and their Perceived Constraints. A 1-point increase in elder's Perceived Constraints predicted a .35-point increase on their use of Lowering Aspiration.

*Four Non-Supported Hypotheses—Research Question Two Related Hypotheses:*

Hypothesis 6 was not supported. There was no direct association between elders' Well-being and their Social Responsibility. Elder's social responsibility was indirectly positive associated with their well-being through physical activity. A 1-point increase in social responsibility predicted a .03-point increase in well-being (.14\*.21),

Hypothesis 10 was not supported. There was no association between elders' Physical Activity and their Positive Confrontation with situations.

Hypothesis 16 was not supported. There was no association between elders' use of Seeking Support and their Perceived Constraints.

Hypothesis 20 was not supported. There was no association between elders' perceived constraints and their perception of aging.

TABLE 11: Direct, Indirect and Total Effects of Independent Variables on Well-being

	Direct Effect		Indirect Effect	Total Effect
Physical Activity	.21	0		.21
Social Responsibility	0	.14*.21	(= .029)	.03
Positive Confrontation	.84	.44*.14*.21	(= .013)	.85
Seeking Support	0	.15*.84 +.15*.44*.14*.21	(= .126 ) (= .002)	.13
Lowering Aspiration	0	-.21*.21 +.14*.84 +.14*.44*.14*.21 +.13*.15*.84 +.13*.15*.44*.14*.21	(= -.044) (= .118) (= .002) (= .016) (= .000)	.09
Perceived Constraints	0	-.39 * .44 * .14 * .21 -.39 * .84 -.35*(-.21) *.21 +.35 * .13 *.15 +.35 *.15*.84	(=-.005) (=-.328) (=-.015) (= .006) (= .004)	-.34
Perception of Aging	0	.14* (-.21) *.21 +.33*.84 +.33*.44 * .14* .21 +.14*.14*.44*.14*.21 +.14*.14*.84 +.14*.13*.15*.84 +.14*.13*.15*.44*.14*.21	(=-.006) (= .277) (= .004) (= .000) (= .016) (= .002) (= .000)	.29
Compensation				1.07
SIAL				1.31

## CHAPTER VI

### DISCUSSION

This chapter discusses the Self-Imposed Activity Limitation (SIAL) study. Issues related to the validity of measurements, findings from model testing, limitations, future plans of study, and implications will be addressed after a brief review of the study and findings.

#### Brief Review of the Study and Findings

This study explored Self-Imposed Activity Limitation (SIAL) in community dwelling elders. The proposed Aging Well conceptual model was guided by Baltes' theory of Selection, Optimization with Compensation (SOC), Markus and Nurius's theory of Envisioned Possible Selves, Kuypers and Bengtson's theory of Social Breakdown, Bandura's theory about Self-Efficacy, and Rotter's theory of Locus of Control. The Aging Well Model was tested with a national representative sample, The National Survey of Midlife Development in the United States (MIDUS) database using Structural Equation Modeling. Fifteen scales were included in testing the Aging Well Model. Among them, eight were constructed by the original MIDUS researchers, and seven scales were constructed from items from the MIDUS database by the researcher.

Research question one, how well does the proposed Aging Well Model fit with the empirical sample data, was explored. The Aging Well Model statistically approximated the MIDUS data after theoretical and statistical justifications. Explained variance of elder's well-being by the proposed Aging Well Model was 76%. The mediating effects of SIAL variables were determined by nested alternative model testing.

Research question two, are the proposition statements in the Aging Well Model valid, was demonstrated by expected patterns of correlation and covariance among variables in the Aging Well Model, except for four non-supported hypotheses.

Discussions regarding issues of validity of measurements, model testing and related issues are presented in the following sections.

#### Validity of Measurements in the Aging Well Model

In general, the validity of latent variables in the Aging Well measurement model was acceptable after model modification. Acceptable convergent validity was determined by moderate to high standard factor loadings (.63 to .90) for three of five latent variables in the first measurement model test: Positive Confrontation, Perception of Aging and Social Responsibility. Two scales showed poor convergent validity. They were new scales, Health Efficacy and Perceived Health, constructed from the MIDUS database by the researcher of this study. The confirmatory factor analysis revealed low standard factor loading between these two scales to their indicated factors ( $\beta = .17$ , &  $.35$ ), and small explained variances ( $R^2 = .03$  &  $.08$ ). There were no other appropriate items found in the MIDUS database to measure these two concepts. These two scales were deleted from this study. The researcher of this study strongly believed that health efficacy and perceived health were very important concepts in the Aging Well Model. However, invalid indicators would not help explain the phenomena. Ideally the indicators of these two concepts should be included in future studies with improved measurements. Validity for the other three manifest variables, Seeking Support, Lowering Aspiration, and Physical

Activity were not examined in this study. Continuing work in developing measurements for these concepts is needed in future studies.

Acceptable discriminate validity was evidenced by low to moderate correlations among variables. Nine of ten correlations were low to moderate ( $r$  ranged from .03 to .63). Only the correlation between Positive Confrontation and Well-being was relatively high ( $r=.83$ ). Although it did not exceed the recommended limit of .85 (Kline, 2005), it was close enough to suggest a weak distinction between the two factors. The larger effect of Positive Confrontation on Well-being ( $\beta = .84$ ) in the Aging Well Model II (Figure 12) might be spurious. Despite this identified weakness, these two factors were kept in the study because there were no other measures available and it was the first test of the Aging Well Model using a secondary data analysis. Measurement instruments for these important constructs need to be further explored to develop indicators with better convergent and discrimination validity.

#### The Aging Well Model and Its Explanatory Power

Research question one focused on how well the Aging Well Model fit the MIDUS data. Beside the theoretical considerations, the Aging Well Model was also evaluated based on (1) the significance and strength of estimated parameters, all non-significant paths with small effect ( $\leq .10$ ) were deleted from the model; (2) how well the Aging Well Model fit the MIDUS data. Since there was no gold standard fit index, four fit indexes were used to reflect diverse criteria of model fit.

Chi square statistic was used in the model assessment; however, the determination of model fit was not based on it. As discussed in Chapter III, the Chi square Statistic has

its limitations. First, the Chi square statistic tests whether a model is an exact fit to the data. “Exact versus close fit” has been a controversial issue discussed among researchers using SEM. The researcher of this study took a “model approximating the observed data” position, and made decisions based on various fit criteria. Second, the Chi square statistic is sensitive to sample size. As statistical power increases with an increase of sample size, small discrepancies may be exaggerated. With a sample size of 375, the Chi square may be significant even when the model fits data well.

Generally, the findings revealed that the Aging Well Model II had a good fit with the MIDUS database; all the fit indexes achieved an acceptable level, except the Chi squares. The Aging Well Model explained 76% of variance of the dependent variable, elder’s well-being. However, this explained variance needs to be interpreted with caution due to the weak discriminant validity between two factors.

The mediator effects of SIAL were evidenced by statistically significant indirect effects but there was no direct effect from the two exogenous variables, Perceived Constraints and Perception of Aging, on the endogenous variable, Well-being (Figure 14, 15 and 16). Elder’s perceived constraints and perception of aging had no direct effect on their well-being. The influences of these two factors on well-being were mediated by a common factor, SIAL. SIAL as a composite factor had a large positive effect on elder’s well-being. As illustrated in Table 10, the difference of explained variances between the Aging Well Model II and the Alternative Model II (the model absence SIAL variables) was 56%.

These findings supported the emerging theory of SIAL, which suggested that SIAL mediated the effects of elder's sense of control and perception of aging on their well-being. These findings were also supported by Baltes' theory of Selection, Optimization with Compensation (SOC). As described in Chapter I, elders' optimal use of SIAL with Selection, Optimization with Compensation will promote elder's well-being, excessive use of SIAL with Selection, Non-Optimization with Non-Compensation (SNONC) will decrease it. Unfortunately, these data did not allow the researcher to explore her proposed extension of Baltes' theory, which is the Selection, Non-Optimization with Non-Compensation (SNONC). Possible explanations are as follows, (1) The population was too young (65-74 years old) which may have prevented the data from showing the full range of SIAL phenomena; (2) The limitation of using a secondary data analysis and the data collection method used in the MIDUS study prevented the data from providing needed direct information about elder's selection and compensation strategies. These two variables were measured by composite variables with no established validity; and (3) The database consisted of cross-sectional survey data. As described in the definition, SIAL is an incremental process. To explore the SIAL process and its effects on elders' well-being, a longitudinal study would be preferred to monitor the relationship changes between elder's use of SIAL and their well-being. The MIDUS study used a single-point-time assessment which was unable to trace this change.

#### Acceptance of Proposition Statements

The second research question focused on relationships among variables. The proposition statements were:

1. Elders' well-being is positively impacted by their activity.
2. Elders' activity is influenced by their use of compensation strategies.
3. Elders' use of compensation strategies is influenced by their sense of control.
4. Elders' compensation strategies are influenced by their self perception.
5. Elders' sense of control and self perception covary; the stronger the sense of control, the better the self perception and vice versa.
6. Depression is a modifying factor for both activity and well-being.

*Elders' Well-being and Their Activity*

As expected, elder's activity level had positive medium effects on well-being.

This is consistent with existing studies reviewed in Chapter II. For example, Everard and colleagues (2000) reported that maintenance of instrumental, social and high-demand leisure activities was associated with better health. Elder's physical activity had a medium positive direct effect on well-being. Promoting physical activity among community dwelling elders has positive effects on their well-being. This finding was consistent with previous studies which demonstrated a positive association between physical activity and well-being among elders (Marr, et al., 2004; Herzog, et al., 1998; Woodgate, et al., 2003; Dik, et al., 2003; Courneya & Fridenreich, 1997, Brown, et al., 1995; McMurdo & Burnett, 1992; Morgan, et al., 1991; DiPietro, 20001; Seeman & Chen, 2002).

Elders' social responsibility had a small positive indirect effect on well-being through physical activity. This finding was inconsistent with previous studies which demonstrated that actively engaging in social activity such as volunteer work had a

positive effects on elder's well-being (Greenfield & Marks, 2004). One possible explanation for this inconsistency is related to the questions asked about elder's willingness to take social responsibility. More than half (67%) of the subjects in the current study sample were retired. Some questions such as work obligations were irrelevant to their life situations.

#### *Elder's Activity, Well-being and Their Use of Compensation*

Compensation as a composite variable had a large positive effect on well-being, and medium effects on activity. The more the elders lowered their aspiration and sought support, the more they were able to positively confront a situation, which led to increased activity and improved well-being. This is consistent with Baltes' (1995) theory; elders who selected to lower their aspiration of expected outcomes, optimized their resources and achieved their goal with compensation.

Positive confrontation was a major latent construct in compensation. Positive confrontation included positive appraisal of situations and persistent goal striving. This construct reflected the idea of "positive frame of mind" by Steverink, Lindenberg and Slaets (2005). Findings of this study support their theoretical notion that with positive confrontation, elders maintain a positive frame of mind or positive expectations even when things do not seem to turn out well.

Compensation had small negative effects on elder's physical activity and medium positive effects on elder's social responsibility. The physical activity scale measured elder's real participation in physical activity, while the social responsibility scale measured their willingness to take social responsibility. Their willingness was realized

through their physical activity. Elder's use of lowering aspiration had a direct, negative, moderate effect on physical activity as expected, and indirect positive effects on well-being which was inconsistent with existing research. Wrosch and colleagues' (2000) study indicated a negative relation between lowering aspiration and people's subjective well-being independent of age. The indirect positive effects, instead of having a direct negative effect, of lowering aspiration on well-being in the current study could be interpreted as elders' being more realistic and able to positively confront situations after they lowered their aspiration. Elders have limited reservoirs of energy. To reserve this energy, they have to lower their aspiration when challenges exceed their capacity. This notion is supported by the work of Ryan and Frederick (1997). They used subjective vitality as a reflection of the positive feeling of having personal energy. They found that people's subjective vitality (positive feeling of having energy) related to both psychological and physical well-being. Elder's use of seeking support had a small, positive, indirect effect on well-being through use of positive confrontation with situations, their willingness to take social responsibility, and physical activity. This result was consistent with Baltes' assumption that using SOC is associated with better functioning but required the use of resources. It was also consistent with existing literature reporting that social support was associated with elder's physical and mental health (Everard, et al., 2000). Lang, Rieckmann and Baltes' (2002) study revealed that resource-rich elder adults were more active and more likely to have survived compared with resource-poor elders.

### *Elder's Use of Compensation and Their Sense of Control*

Sense of control was indicated by elder's perceived constraints in this study based on Rotter's theory of locus on control. Elder's perceived constraints had medium, negative effects on their use of compensation, especially on elder's positive confrontation. When elders perceived constraints were high, they believed their lives were controlled by external factors; this belief biased their positive confrontation with difficult situations and discouraged them in goal striving. This result supported Lachman (2006) viewpoint that adults with low sense of control over age related decline are unlikely to use compensatory strategy, or to adapt preventive behavior.

### *Elder's Use of Compensation and Their Self Perception*

Self perception was indicated by elder's perception of aging in this study. Elder's perception of aging had positive effects on their use of lowering aspiration, positive confrontation with situations, and willingness to take social responsibility. This finding was supported by research such as Levy, Slade and Kasl's (2002) study on the influence of positive perception of aging on functional health. However, a small, positive, indirect effect was found between perception of aging and physical activity level. This was consistent with existing literature where perception of aging was positively related to physical activity. Promoting elder's perception of aging will increase their activity level and well-being.

### *Elder's Sense of Control and Their Self Perception*

Self perception was indicated by elder's perception of aging in this study. No relationship was found between elder's sense of control and their perception of aging.

Studies have demonstrated that there is an association between elder's self perception and their sense of control (i.e. Lau, 1995). In a longitudinal study on the benefit of positive self-perceptions of aging on functional health, Levy, Slade and Kasl (2002) found that perceived control partially mediated the relationship between aging self-perceptions and functional health. Further study is needed to examine the relationship

#### *Elder's Depression and Their Well-being and Activity*

Depression among elders and its relationship to elder's activity and well-being were not examined in this study due to the amount of unacceptable missing data. The missing data on the depression variables introduced bias in this study. According to Zarit and Zarit (2007), the prevalence of depressive symptoms declines with age, highest in young adulthood, decreasing until about age 75, and increasing again among the oldest old. There was no evidence that suggested the prevalence of depression in the study sample. Although subjects' ages ranged from 65-74, cohort differences may still exist. Further exploration is needed to identify the influence of depression on elder's activity and well-being.

#### Limitations of the Study

Limitations of this study are: limitations of using a single quantitative approach versus a triangulation of both qualitative and quantitative methods, limitations of using secondary data analysis versus primary data analysis, and limitations of using a cross-sectional assessment versus a longitudinal assessment.

*Limitations of Single Quantitative Approach vs. Triangulation with Both Qualitative and Quantitative Approaches*

The development of the SIAL concept and Aging Well Model was based on theories and empirical experience. Foundational research is needed to confirm the existence of SIAL, to specify the definition and the relationships among the theoretical constructs in the Aging Well Model. Qualitative approaches need to be taken to provide a theoretical foundation for SIAL study; for example, an Ethnographical approach would provide a broad picture of SIAL phenomena, the emic and etic perspectives of the existence and rationale of SIAL among community dwelling elders, the antecedence, consequences and influence of cultural background on SIAL. A Phenomenological approach would provide a rich description of the experience of elders with SIAL. A Grounded Theory approach would enable the identification of the basic social processes involved in SIAL. Quantitative research is also needed to validate the usefulness of the model.

*Limitations of Secondary Data Analysis*

Using secondary data analysis had limitations. Issues such as the different purposes of the original and current study, data collection methods, quality and usefulness of the information in the database were a concern. The purpose of the MIDUS study focused on midlife experiences among community dwelling adults. Although 65 to 74 years old adults were included in the study, this population may have been too young to fully test the SIAL theory. The negative part of the SIAL phenomena is expected to occur among people at stages when they are facing the challenges of losses in advanced

age, re-prioritizing their life goals and compensating for the losses of aging. This limitation prevented the researcher to explore the full range of SIAL.

Available information provided by the database was another issue that limited the study. Although there was extensive information in the database, it was still very difficult to find appropriate measures for some constructs in the Aging Well Model such as compensation, physical activity and well-being. This limitation related to the validity of measures in the study.

#### *Limitations of Cross-sectional Assessment vs. Longitudinal and Interventional Studies*

As described in Chapter I, Self-Imposed Activity Limitation is an incremental process. A longitudinal design would be a better to study the phenomena than was a cross-sectional design. To test the mediating effect of SIAL, an interventional design would be better than a survey study.

#### Plan for Future Study

The researcher developed the SIAL concept, Aging Well Model and the emerging theory. Its validity, usefulness and significance to the aging population are still unknown. Future research should include both qualitative and quantitative methods to further develop the theory of Self-Imposed Activity Limitation in community dwelling elders.

**Qualitative Work:** the researcher plans to conduct grounded theory studies to investigate the existence of SIAL phenomena; to confirm the definition of SIAL; and to establish construct validity of measures for SIAL.

**Quantitative Work:** the researcher will continue to specify and assess the Aging Well Model and test it empirically.

### Implications

This study explored the explanatory power of SIAL and the relationships among the constructs in the Aging Well Model. It contributes to the gerontology literature by presenting a new perspective of successful aging. Much current research has focused on elders' well-being; however, little is known about the internal processes of successful aging and its relationship with external influences. This study focused both on the cognitive and performance aspects of the aging process. SIAL is an internal process, but it is also a socially embedded phenomenon. Elders live in a real world. Many social and environmental factors can modify the internal process of SIAL. This influence needs further exploration.

The goal of the researcher is to promote healthy aging. Hopefully, this pursuit will benefit elders in their efforts to achieve their goals and fully enjoy their lives despite the limitation of changes with aging. Contemporary technology has the ability to add years to life; it is elders themselves and society's responsibility to add life to years.

APPENDIX A  
EXEMPTION LETTER

Human Subjects Protection Program



1350 N. Vine Avenue  
P.O. Box 245137  
Tucson, AZ 85724-5137  
(520) 626-6721  
<http://www.irb.arizona.edu>

24 May 2006

Guifang Guo, Ph.D. Student  
Advisor: Linda Phillips, Ph.D.  
College of Nursing  
PO Box 210203

**RE: SELF-IMPOSED ACTIVITY LIMITATION AMONG COMMUNITY DWELLING  
ELDERS**

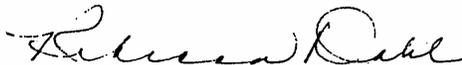
Dear Mr. Guo:

We received documents concerning your above cited project. Regulations published by the U.S. Department of Health and Human Services [45 CFR Part 46.101(b) (4)] exempt this type of research from review by our Institutional Review Board.

Exempt status is granted with the understanding that no further changes or additions will be made to the procedures followed (a copy of which we have on file) without the review and approval of the Human Subjects Committee and your College or Departmental Review Committee. Any research related physical or psychological harm to any subject must also be reported to each committee.

Thank you for informing us of your work. If you have any questions concerning the above, please contact this office.

Sincerely,



Rebecca Dahl, R.N., Ph.D.  
Director  
Human Subjects Protection Program

cc: Departmental/College Review Committee

APPENDIX B  
INSTRUMENTS

## SCALES

1. Sense of Control Scales (3)
2. Self Perception Scales (2)
3. Compensation Strategies Scales (4)
4. Activity Scales (4)
5. Well-being Scales (3)
6. Depression Scales (2)

## 1. SENSE OF CONTROL

The Sense of Control measures includes three scales. Two scales were constructed by the original researchers: Personal Mastery and Perceived Constraints. Items were from MIDUS SAQ Section F Question 1. Instructions are: Please indicate how much you agree or disagree with the following statements. Health Efficacy scale were constructed by the researcher of this study fro MIDUS SAQ Section A, question 7

1). Personal Mastery:  $\alpha=.66$ 

Item #	Items	Agree			Don't Know	Disagree		
		Strong 1	Some What 2	A little 3		A little 5	Some what 6	Strong 7
RSF 1 u	I can do just about anything I really set my mind to							
RSF 1 x	When I really want to do something, I usually find a way to succeed at it							
RSF 1 z	Whether or not I am able to get what I want is in my own hands							
RSF 1 dd	What happens to me in the future mostly depends on me							

2). Perceived Constraints:  $\alpha=.78$ 

Item #	Items	Agree			Don't Know 4	Disagree		
		Strong 1	Some What 2	A little 3		A little 5	Some what 6	Strong 7
SF1 s.	There is little I can do to change the important things in my life							
SF1 t	I often feel helpless in dealing with the problems of life.							
SF1 v	Other people determine most of what I can and cannot do							
SF1 w	What happens in my life is often beyond my control							
SF1 y	There are many things that interfere with what I want to do							
SF1 aa	I have little control over the things that happen to me							
SF1 bb	There is really no way I can solve the problems I have							
SF1 cc	I sometimes feel I am being pushed around in my life.							

3). Health Self Efficacy:  $\alpha=.82$

SFA7. Please indicate how much you agree or disagree with the following statements.

Item #	Item	Agree			Don't Know 4	Disagree		
		Strong 1	Some what 2	A little 3		A little 5	Some what 6	Strong 7
SF7a	Keeping healthy depends on things that I can do							
SF7 b	There are certain things I can do for myself to reduce the risk of a heart attack							
SF7c	There are certain things I can do for myself to reduce the risk of getting cancer							
Sf7d	I work hard at trying to stay healthy							

## 2. AGING PERCEPTION

Aging Perception measures include two scales constructed by the researcher of current study: Elder Personal Attributes and Elder Social Integrity and Capacity. Items were selected from MIDUS SAQ Section G, Question 1 & 2.

### 1). Elder Personal Attributes: $\alpha = .84$

Instructions of the questions are: Please think about what people in general are like in their late sixties (65-70 years old). By people in general, we mean most people in the United States as you see them. Please rate how much you think each of the following characteristics describes most people in their late sixties, 0 means it describes them not at all and 10 means it describes them very much.

Item #	Items	Not at all <b>much</b> <span style="float: right;">Very</span>										
		0	1	2	3	4	5	6	7	8	9	10
G1c	Calm and even-tempered	0	1	2	3	4	5	6	7	8	9	10
G1f	Willing to learn	0	1	2	3	4	5	6	7	8	9	10
G1i	Energetic	0	1	2	3	4	5	6	7	8	9	10
G1l	Caring	0	1	2	3	4	5	6	7	8	9	10
G1o	Wise	0	1	2	3	4	5	6	7	8	9	10
G1r	Knowledgeable	0	1	2	3	4	5	6	7	8	9	10

### 2). Elder Social Integrity and Capacity $\alpha = .74$

Instructions of the questions are: How would you rate most people in their late sixties? 0 means "the worst possible you can imagine" and 10 means "the best possible you can imagine," (Please circle a number on every line.)

Item #	Items	Worst <span style="float: right;">Best</span>										
		0	1	2	3	4	5	6	7	8	9	10
G2c	Physical Health	0	1	2	3	4	5	6	7	8	9	10
G2f	Contribution to the welfare and well- wellbeing of others being	0	1	2	3	4	5	6	7	8	9	10
SG2i	Marriage or close relationship	0	1	2	3	4	5	6	7	8	9	10
SG2l	Relationship with their children	0	1	2	3	4	5	6	7	8	9	10
SG2o	Work situation (Paid or unpaid)	0	1	2	3	4	5	6	7	8	9	10
SG2r	Financial situation	0	1	2	3	4	5	6	7	8	9	10
SG2u	Overall lives	0	1	2	3	4	5	6	7	8	9	10

### 3. COMPENSATION STRATEGIES

Compensation strategy measures include two scales constructed by the original researchers of the MIDUS study: Positive Goal Striving and Reappraisal of Situation. Items are from MIDUS SAQ Section F, Question 3.

#### 1). Goal striving: $\alpha = .73$

Item #	Items	A lot 1	Some 2	A little 3	Not at all 4
RSF3a	When things don't go according to my plans, my motto is, "where there's a will there's a way"				
RSF3b	When faced with a bad situation, I do what I can do to change it for the better				
RSF3g	Even when I feel I have too much to do, I find a way to get it all				
RSF3j	When I encounter problems, I don't give up until I solve them				
RSF3k	I rarely give up on something I am doing, even when things get tough				

#### 2). Positive Appraisal: $\alpha = .74$

Item #	Items	A lot 1	Some 2	A little 3	Not at all 4
RSF3e	I find I usually learn something meaningful from a difficult situation				
RSF3h	When I am faced with a bad situation, it helps to find a different way of looking at things				
RSF3m	Even when everything seems to be going wrong, I can usually find a bright side to the situation				
RSF3n	I can find something positive, even in the worst situations				

3). Lowering Aspirations:  $\alpha=.64$ 

Item #	Items	A lot 1	Some 2	A little 3	Not at all 4
RSF3c	When my expectations are not being met, I lower my expectations				
RSF3d	To avoid disappointments, I don't set my goals too high				
RSF3f	I feel relieved when I let go of some of my responsibilities				
RSF3i	I often remind myself that I can't do everything				
RSF3l	When I can't get what I want, I assume my goals must be unrealistic				

4). Seeking Support:  $\alpha=.65$ 

Item #	Items	A lot 1	Some 2	A little 3	Not at all 4
RSF3gg	Asking others for help comes naturally to me				
RSF3ii	I like to get advice form others before making a decision				
RSF3jj	When I'm upset about something, I feel better after I talk it over with others				

## 4. ACTIVITY

Activity measures include two scales: Physical Activity scale constructed by the researcher of the current study, and Social Responsibility scale constructed by the MIDUS researcher.

1) Physical Activity:  $\alpha = .81$

Item #	Item	Several times a week or more 1	About once a week 2	Several times a month 3	About once a month 4	Less than once a month 5	Never 6
RSA 18	During the summer, how often do you engage in vigorous physical activity (for example, running or lifting heavy objects) long enough to work up a sweat?						
RSA 19	What about during the winter -- how often do you engage in vigorous physical activity long enough to work up a sweat?						
RSA 20	During the summer, how often do you engage in moderate physical activity (for example, bowling or using a vacuum cleaner)?						
RSA 21	What about during the winter -- how often do you engage in moderate physical activity?						

## 2). Social Responsibility Scales

Social Responsibility measures include three scales constructed by the original researchers: Civic Obligation, work Obligation and Altruism. Items were from MIDUS SAQ section L. Instructions are: Please rate how much obligation you would feel if the following hypothetical situations happened to you. Each item was coded on a 10-point scale ranging from 0 (no obligation at all) to 10 (a very great obligation).

Item #	Items	None										Very Great											
		0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
(1) Civic Obligation $\alpha=.73$																							
SK7i	To serve on a jury if called	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
SK7j	To keep fully informed about national news and public issues	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
SK7k	To testify in court about an accident you witnessed	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
SK7l	To vote in local and national elections	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
(2) Work Obligation: $\alpha=.75$																							
SK7m	To do more than most people would do on your kind of job	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
SK7n	To work hard even if you didn't like or respect your employer or supervisor	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
SK7o	To cancel plans to visit friends if you were asked, but not required to work overtime	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
(3) Altruism: $\alpha=.80$																							
SK7p	To pay more for your health care so that everyone had access to health care	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
Sk7q	To volunteer time or money to social causes you support	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
Sk7r	To collect contributions for heart or cancer research if asked to do so"	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10
Sk7s	To vote for a law that would help others worse off than you but would increase your taxes	0	1	2	3	4	5	6	7	8	9	10	0	1	2	3	4	5	6	7	8	9	10

## 5. WELL-BEING

Three Well-being measures were constructed by the researcher of current study from MIDUS Database.

1). PSYCHOLOGICAL WELL-BEING  $\alpha = .65$ 

Psychological well-being measure includes one scale constructed by the researcher of the current study. Items were from MIDUS SAQ Section F, Question 1, a, b, c, i. All items were reverse coded.

Item #	Item	Agree			Don't Know	Disagree		
		Strong 1	Some What 2	A little 3		A little 5	Some what 6	Strong 7
RSF 1 a	I like most parts of my personality							
RSF 1 b	When I look at the story of my life, I am please with how things have turned out so far							
RSF 1 c	Some people wander aimlessly through life, but I am not one of them							
RSF 1 i	I am good at managing the responsibilities of daily life							

2). SOCIAL WELL-BEING  $\alpha=.87$  (current study)

Social Well-being measure includes one scale constructed by the researcher of current study. Items were from MIDUS SAQ Section K, Question 6. All items were reverse coded.

Item #	Item	A lot 1	Some 2	A little 3	Not at all 4
RSK6 a	Other would say that you have made unique contributions to society				
RSK6 b	You have important skill you can pass along to others				
RSK6 c	Many people come to you for advice				
RSK6 d	You feel that other people need you				
RSK6 e	You have had a good influence on the live of many people				
RSK6 f	You like to teach things to people				

3). Perceived Health  $\alpha=.73$ 

Perceived Health scale was constructed by the researcher of the current study. Items were from Telephone Interview question Section A, question 4-6. QA6 was reverse coded.

Item #	Item	1	2	3	4	5
QA4	In general, would you say your PHYSICAL HEALTH is	Poor	Fair	Good	Very Good	Excellent
QA5	What about your MENTAL OR EMOTIONAL HEALTH? (Would you say it is	Poor	Fair	Good	Very Good	Excellent
RQA 6	In general, compared to most (men/women) your age, would you say your health is	Much better	Some what better	About the same	Some what worse	Much worse

## 6. DEPRESSION

Two depression scales were constructed by the MIDUS researchers from the telephone interview questionnaire, Section A. No reported reliability about these two scales.

## 1) Depressed Affect

Instructions: During two weeks in past 12 months, when you felt sad, blue, or depressed, did you:

Item #	Item	Yes	No
QA60	lose interest in most things?		
QA61	feel more tired out or low on energy than is usual?		
QA62	lose your appetite?		
QA63	have more trouble falling asleep than usual?		
QA64	have a lot more trouble concentrating than usual?		
QA65	feel down on yourself, no good, or worthless?		
QA66	think a lot about death?		

## 2). Anhedonia

Instruction: During two weeks in past 12 months, when you lost interest in most things, did you:

Item #	Item	Yes	No
QA72	feel more tired out or low on energy than is usual?		
QA73	lose your appetite?		
QA74	have more trouble falling asleep than usual?		
Q A75	have a lot more trouble concentrating than usual?		
Q A76	feel down on yourself, no good, or worthless?		
Q A77	think a lot about death?		

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