แบบจำลองเชิงสาเหตุของความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย

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A CAUSAL MODEL OF FUNCTIONAL PERFORMANCE IN THAI ELDERLY

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เรืออากาศเอกหญิง จิรวรรณ อินคุ้ม: แบบจำลองเชิงสาเหตุของความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย (A CAUSAL MODEL OF FUNCTIONAL PERFORMANCE IN THAI ELDERLY) อ. ที่ปรึกษา: ศ. ดร. วีณา จีระแพทย์, ผศ. ดร. ชนกพร จิตปัญญา, 279 หน้า.

การวิจัยนี้มีวัตถุประสงค์เพื่อพัฒนาแบบจำลองเชิงสาเหตุ และทดสอบความสัมพันธ์เชิงสาเหตุระหว่างปัจจัยความแข็งแรงของกล้ามเนื้อ ความสามารถในการมองเห็น การเจ็บป่วยเรื้อรัง การออกกำลังกาย การสนับสนุนทางสังคมและภาวะซึมเศร้ากับความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย กรอบแนวคิดของแบบจำลองเชิงสาเหตุพัฒนามาจากทฤษฎีส่งเสริมความสามารถในการทำหน้าที่ พัฒนาโดยมิลเลอร์ (Miller, 1995) กลุ่มตัวอย่างคือ ผู้สูงอายุที่มีอายุ 60 ปี หรือมากกว่า จำนวน 320 คน อาศัยอยู่ในชุมชนใน 5 ภาคของประเทศไทย ได้แก่ ภาคเหนือ ภาคใต้ ภาคกลาง ภาคตะวันออกเฉียงเหนือ และภาคตะวันออก คัดเลือกโดยการสุ่มตัวอย่างแบบ 4 ขั้นตอน เก็บรวบรวมข้อมูลโดยแบบสัมภาษณ์ ได้แก่ แบบสัมภาษณ์การออกกำลังกาย (the Yale Physical Activity Survey) แบบสัมภาษณ์การสนับสนุนทางสังคม (the Personal Resource Questionnaire; PRQ 85) แบบประเมินภาวะซึมเศร้าของผู้สูงอายุ (the Geriatric Depression Scale) แบบสัมภาษณ์การเจ็บป่วยเรื้อรัง และแบบประเมินความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุ (the Modified Barthel ADL Index and the Chula ADL Index) และอุปกรณ์การวัด ได้แก่ เครื่องมือวัดความแข็งแรงของกล้ามเนื้อ (Leg dynamometer) และเครื่องมือวัดความสามารถในการมองเห็น (Snellen Chart) วิเคราะห์ข้อมูลโดยใช้โปรแกรม SPSS for Window version 13 และ LISREL version 8.72.

ผลการวิเคราะห์พบว่า แบบจำลองมีความกลมกลืนกับข้อมูลเชิงประจักษ์ และสามารถอธิบายความผันแปรของความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุได้ร้อยละ 66 การออกกำลังกายมีอิทธิพลโดยตรงทางบวกต่อความสามารถในการปฏิบัติกิจกรรม และทำนายความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุได้ดีที่สุด การเจ็บป่วยเรื้อรังมีอิทธิพลโดยตรงทางลบกับความสามารถในการปฏิบัติกิจกรรม และมีอิทธิพลทางอ้อมผ่านภาวะซึมเศร้า ความสามารถในการมองเห็นมีอิทธิพลโดยตรงทางบวกกับความสามารถในการปฏิบัติกิจกรรม การสนับสนุนทางสังคมมีอิทธิพลโดยตรงทางบวกกับความสามารถในการปฏิบัติกิจกรรม และมีอิทธิพลทางอ้อมผ่านภาวะซึมเศร้า

ผลการศึกษาบ่งชี้ว่า การพัฒนาการปฏิบัติการพยาบาลเพื่อส่งเสริมหรือคงไว้ซึ่งความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุ องค์ประกอบหลักที่สำคัญของการพัฒนาการปฏิบัติการพยาบาลดังกล่าว ต้องมุ่งเน้นให้ผู้สูงอายุมีการออกกำลังกายอย่างสม่ำเสมอ ส่งเสริมให้ได้รับการสนับสนุนทางสังคมอย่างเพียงพอ คงไว้ซึ่งความสามารถในการมองเห็น ป้องกันการเกิดการเจ็บป่วยเรื้อรัง และการเกิดภาวะซึมเศร้า

สาขาวิชา....พยาบาลศาสตร์.....
ปีการศึกษา....2549.....

ลายมือชื่อนิสิต.....
ลายมือชื่ออาจารย์ที่ปรึกษา.....
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

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The purposes of this study are 1) to develop a causal model for explaining the functional performance including muscle strength, vision, chronic illness, level of exercise, social support and depression, and 2) to examine the causal relationship between those variables and functional performance in Thai elderly. The hypothesized model was based on functional consequence theory developed by Miller (1995). Stratified four-stage random sampling was employed to obtain a sample of 320 elderly aged 60 years and over who resided in community from five parts of Thailand including Northern, Southern, Central, Northeastern, and Eastern part. The interview questionnaires including the Yale Physical Activity Survey, the Personal Resource Questionnaire (PRQ 85), the Geriatric Depression Scale, the Chronic Illness Questionnaire, the Modified Barthel ADL Index, the Chula ADL Index and equipments including leg dynamometer and the Snellen Chart were employed to collect data. The SPSS for Window version 13 and LISREL version 8.72 were used for data analysis.

The results showed that the model fitted well with the empirical data (chi-square = 133.59; df = 116; p = .126; GFI = .96; AGFI = .93) and explained 66% of the variance of functional performance among Thai elderly. Level of exercise was the most powerful predictor and had a positive direct effect on functional performance. Chronic illness had a negative direct effect on functional performance and an indirect effect through depression. Vision had a positive direct effect on functional performance. Social support had a positive direct effect on functional performance and an indirect effect through depression.

The study findings indicated that nursing intervention focusing on maintaining or enhancing functional performance in Thai elderly should be significantly established. The prominent components of the intervention shall consist of promoting exercise, social support, vision and preventing chronic illness and depression in Thai elderly.

Field of study....Nursing Science.... Student's signature Lt. Lt. Jirawan Inkoom
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CHAPTER I

INTRODUCTION

Background and significance of the study

It has been reported that the ultimate goal of a number of elderly is to have the ability to conduct activities of daily living independently during their older adulthood (Demer et al., 2004; Zimmer et al., 2003; Miller, 1995; Jitapunkul, Kamolratanakul, & Ebrahim, 1994). The basic activities of daily living (BADL) of the elderly normally consists of feeding, grooming, transferring, toilet use, mobility, dressing, climbing stairs, bathing, bowel continence and bladder continence (Bennett, 2002; Jitapunkul, Kamolratanakul, & Ebrahim, 1994). If the elderly can do these activities independently, it means they have ability to survive (Stone, Wyman & Salisburry, 1999). In other words, the elderly who are faced with difficulties in performing the basic activities of daily living would suffer and possibly lead to disability. In addition, some activities such as walking outdoors, cooking, housekeeping, managing money, and accessing transportation, called the instrumental activities of daily living (IADL) as per Bennett (2002) and Jitapunkul, Kamolratanakul, and Ebrahim (1994), are also important to the elderly. These activities usually support the elderly by giving them the independent living that is the ultimate goal of older people. If the ability to perform the instrumental activities of daily living could fulfill the social roles of the person, then the psychosocial health of the person could be realized (Bennett, 2002).

The increasing number of elderly with disabilities trying to conduct activities of daily living independently during older adulthood has become an important aspect in

society and for those people surrounding the elderly. The ability to perform activities of daily living is therefore important and has become a new research trend, especially in gerontological nursing. Term of functional performance has been used and defined as the ability to perform activities of daily living, including basic activities of daily living (BADL) and instrumental activities of daily living (IADL), which the elderly actually do in their normal lives (Bennett, 2002). Maintaining or improving functional performance becomes a significant health outcome from both the elderly person and of the gerontological nurse's perspective (Demer et al., 2004; Zimmer et al., 2003; Miller, 1995).

In Thailand, there is reliable evidence indicating that a number of Thai elderly are faced with a decline in functional performance and this has gradually intensified to become a disability (disability refers to the elderly being unable to perform activities of daily living in at least one category). From the national survey of population health in 1996-1997, it was found that one in every four of Thai elderly could not perform activities of daily living in at least one type. 11.5 % of Thai elderly reported they had difficulty being mobile outdoors and eight percent had difficulty in being mobile even in the room (Jitapunkul et al., 2001). Furthermore, nineteen percent (19%) of Thai elderly were reported to have a long-term disability because they suffered from the problem for longer than 6 months (Jitapunkul et al., 2001).

There is a study which reported that Thai elderly life has been threatened since they had difficulty in performing basic activities of daily living. Jitapunkul et al. (2001) proposed that seven percent of Thai elderly need help from other people to perform basic activities of daily living in at least one type. Similarly, the findings of Buakeaw (2003)

found that five percent of the elderly in Krabi province reported they had difficulty in performing basic activities of daily living in at least one type.

Furthermore, there is consistent evidence indicating that the instrumental activities of daily living (including accessing public transportation, cooking the food and walking outdoors) is a difficult task for the elderly to perform (Buakaew, 2003; Jitapunkyul et al., 2001; Kanjanawong et al., 1997). It means that some Thai elderly with dependent lives could not fulfill their social role and psychological health. Their health might be poor.

Recently, Zimmer et al. (2003) investigated the functional performance of older adults in three Asian societies including Thailand, Taiwan and the Philippines. The results from this study indicated that Thailand had a higher percentage of functional impairment in older adults than in the other countries when using the same measurements for evaluation (functional impairment refers to the elderly having difficulties in performing activities in daily living in at least one type). The results revealed that 17.2% of the elderly sample in Thailand had difficulty in climbing the stairs, 35.1% had difficulty in walking and 63.8% of them had at least one limitation.

As can be seen from the above, it could be concluded that functional performance problems in the Thai elderly has rapidly increased. In addition, a dramatic increase in the number of Thai elderly resulting from the phenomena of aging has been reported by the National Statistics Office (2005). The demographic changes and rapid increase in the number of Thai elderly who have functional performance impairment results in health care providers having to increase the attendant concern for the functional performance problem in the elderly population.

The functional performance of a group of people aging 20 to 30 years old remains unchanged. At about the age of 40 functional performance begins to gradually decline (Al-Abdulwahab, 1999). The more there are people who become older and live longer, the more decline in functional performance there is (Suther & Seeman, 2004; Zimmer et al., 2003; Miller, 1995). A significant decline of functional performance would cause the elderly to be faced with difficulties in conducting the activities of daily living. This phenomenon increases the need for help from other people to assist them in conducting activities of daily living (Buakaew, 2003; Amnatsatsue, 2002; Jitapunkul et al., 2001; Miller, 1995). Moreover, some elderly could not perform activities of daily living and this finally results in a condition of disability. This problem becomes a serious aspect (Gill et al., 2004; Jitapunkul et al., 2001).

The elderly who are unable to conduct their activities of daily living usually suffer from serious effects on both their physical and psychological health. Regarding physical health, the effect reduces the pulse rate, decreases chest expansion and ventilation, reduces muscle strength, tone, increases ease of fractures, slower gastrointestinal motility, slower metabolism, increased risk of complications such as postural hypotension, hypostatic pneumonia, pressure ulcers, poor appetite, and constipation (Eliopoulos, 1997; Staab & Hodges, 1996). For Psychological health, an inability to perform the activities of daily living leads to a loss of independence and feelings of low self-esteem and hopelessness in the elderly (Eliopoulos, 1997; Staab & Hodges, 1996).

Moreover various evidence has indicated that the functional performance of the elderly related significantly to other health outcomes such as health (Herman et al., 2001; Leinonen, Heikkinen, & Jylha, 2001; Hoeymans et al., 1997), the quality of life

(Wilhelmson, 2005; Patrick et al., 2000), the use of health care services (Gill et al., 2004; Laukkanen et al., 2000), the cost of medical expenditure (Gill et al., 2004; Fried, 2003), nursing home admission and premature death in this population group (The Finnish Center for Interdisciplinary Gerontology, 2004).

Herman et al. (2001) found that functional performance has a positive association with self-rating health of the elderly. The researchers examined this association in Guatemalan elderly. The results indicated that the elderly with a high score of functional status particularly in mobility index of 1.15 times are more likely to rate themselves as having good health. Similarly to Hoeymans et al. (1997) it was found that the elderly with disabilities in mobility and basic activities of daily living had an odd ratio on poor health of 4.7 and 8.9 respectively.

The association between functional and quality of life in the elderly is in a positive direction. It means that the elderly with a high functional performance score reported their quality of life was good. In contrast, with the elderly using wheelchairs they reported low level of quality of life (Patrick et al., 2000).

Functional performance associated negatively with the use of health care services. Laukkanen et al. (2000) reported that the decline of functional performance impacts on an increasing need for health care services. This study indicated that the elderly with a low score of functional performance used health care services more often than their counterparts.

Considering the rate of using health care services and expenditure for hospitalization of Thai elderly, it shows an increasing trend. In 1995, Thai elderly use of health care services at outpatient departments was approximately 10.6 million times and

then increased to 15.7 million times in 1999 (Jitapunkul et al., 2001). This signifies an increasing amount of medical expenditure and social costs to be allocated to the elderly population group. In 1995, the Thai government provided 4,273 million Baht for caring for the elderly, then increasing to 7, 728 million Baht in 1999 (The Department of Health Insurance, The Ministry of Public Health, 1999).

From the evidence presented above, functional performance decline in Thai elderly has become a crucial public health concern. Ultimately, it is possible to state that this type of phenomenon would obviously increase the economic burden on society. There is, therefore, an urgent need to understand the factors influencing functional performance and the degree of significance of each factor that could lead to the development of effective intervention programs for promoting functional performance or disability prevention, which has become an important public health concern.

Although, in the present day, gerontologists, researchers and health care providers have established intervention to improve or enhance functional performance in the elderly by offering exercise programs (King et al., 2002), resistance training programs (Kalapotharakos et al., 2004) and home based exercise programs (Nelson et al., 2004) the percent of the elderly who have functional performance decline is still increasing (The Finnish Center for Interdisciplinary Gerontology, 2004). To maintain or improve functional performance in the elderly, it is necessary to understand what factors contribute to the maintenance or improvement of functional performance in the elderly and what the pathway of the relationship between factors and functional performance should be. This knowledge is essential for developing substantial effective nursing intervention for maintaining or enhancing the functional performance in the elderly.

This study is guided by the functional consequence theory developed by Miller (1995). The theory postulated that the functional performance of the elderly will change because of influences in age-related change factors and additional risk factors. Age related change factors cause a reduction in functional capability of the body system influence on functional performance decline of the elderly. Risk factors increase the vulnerability of older people and interfere with the older adult in conducting activities in daily living, directly influencing functional performance.

Based on systematic reviews of Heikkinen (2003) and Stuck et al. (1999) about factors related to functional performance in the elderly, it is found that the significant risk factors affecting functional performance are chronic illness, the level of exercise, the level of social support, and depression. In addition, these systematic reviews indicated that major age related change factors influencing functional performance in the elderly are muscle strength and vision.

Previous research indicated that when growing older, muscle strength starts to decline and leads the elderly to functional performance limitation and possibly to a disabled state (Carmeli et al., 2000; Hurley, Ree & Newham, 1998). Conversely, the elderly who have stronger knee muscle strength will have a higher functional performance score (McNevin et al., 2002; Salem et al., 2000; Topp, Mikesky, & Thompson, 1998).

Vision is one of the most significant senses of people that is utilized to navigate and to perceive what is going on in the surrounding environment and then leads to the process of performing activities. Gradual changes in visual functioning and visual perception according to the ageing process have a certain impact on the daily activities of

the older person (Crews & Campbell, 2004; Rowe & MacLean, 2000; Miller, 1995). Various evidence indicates that elderly people with poor vision often cannot satisfactorily perform activities of daily living. They have difficulty in conducting daily activities when they have a visual impairment (Sloan et al., 2005; Crews & Campbell, 2004; Leiberman, Friger, & Lieberman, 2004; Rowe & MacLean, 2000).

Chronic illness is one of the most significant risk factors and commonly causes functional impairment or a decline in the elderly (Kriegman, Deeg, & Stalman, 2004; Pope et al., 2001; Markides et al., 1996; Haan, & Weldon, 1996). The elderly who have a chronic illness, which causes pathology in the specific organ, usually have a lower functional performance (Kriegman, Deeg, & Stalman, 2004; Pope et al., 2001; Markides et al., 1996; Haan, & Weldon, 1996). Moreover, the elderly who have several types of chronic illness, or have a greater number of chronic illnesses, have lower functional performance levels than the elderly who have less illnesses, or none (Kriegman, Deeg, & Stalman, 2004; Miller et al., 2004; Beland & Zungzunegui, 1999).

Although exercise has been an effective tool for improving fitness and overall health, it was found that more than 40% of the elderly aged over 65 years old did not participate in any leisure-time exercise (Cohen-Mansfield, Marx, & Guralnik, 2003). In a similar occurrence in Thai elderly, the levels of exercise reported in previous studies were relatively low (Chinuntuya, 2001; Inpang, 1999). A decrease in exercise leads to lower functional performance of the elderly (Young, Masaki, & Curb, 1995; Wagner et al., 1992). Conversely, the elderly who engage in regular exercise, improved their functional performance (Brach et al., 2003; Ringsberg et al., 2001).

The level of social support is an important factor which influences functional performance of the elderly. The presence of social support becomes critical when the elderly have difficulty or are unable to perform activities of daily living. Physical support from significant persons (e.g. a partner, family, and health care provider) and emotional support play a major role in maintaining functional performance of the elderly (Braungart, Zarit, & Malmberg, 2000; Seeman et al., 1995).

Depression usually results in negative effects on functional performance of the elderly (Lenze et al., 2005; Mossey et al., 2000; Penninx et al, 1998; Miller, 1995). The depressed elderly have appetite disturbance: anorexia, starvation, flatulence, constipation, sleep disturbance, diminished energy and chronic fatigue. These somatic symptoms have directly affected basic activities of daily living of the elderly (Penninx et al., 1998; Miller, 1995). Additionally, the influence of depression on the psychological health of the elderly leads them to feel sad, diminishes life satisfaction, causes low self-esteem and negative feelings about themselves. Furthermore, they lose interest in conducting their affairs. All of these affect functional performance decline in the elderly (Miller, 1995).

In summary, the factors found to have contributed to functional performance in the elderly are muscle strength, vision, chronic illness, the level of exercise, the level of social support and depression. However, little is known about whether these factors found in Western literature can be used as generalizations for Thai culture and more specifically for Thai elderly. Due to the differences of socioeconomic and cultural between Western and Thailand might influence on the relationship of the factors and functional performance in the elderly. For example, most of Thai elderly live with their family (Chinuntuya, 2001) since Thai people believe that Thai adult children have to gratitude to

their parents when parents are getting older. If Thai adult children inappropriately care their parents, they will be condemned from Thai society (Choowattanapakorn, 1999). Thus, in Thai context the elderly might be easy to get help from their families. In western area, most of the elderly like to live alone in their houses or live in institutional nursing home (Miller, 1995). Then they might be difficulty to get help from their families. Consequently, understanding the relationship between muscle strength, vision, chronic illness, level of exercise, level of social support, depression and functional performance of Thai elderly will enhance the knowledge for developing substantial effective nursing interventions to maximize and maintain functional performance specifically in Thai elderly. To fill this gap of knowledge, the present study is aimed at developing the causal model to explain functional performance of Thai elderly and to examine the causal relationship between factors and functional performance in Thai elderly.

Research questions

1. Does the hypothesized causal model to explain the functional performance of Thai elderly including muscle strength, vision, chronic illness, level of exercise, level of social support, and depression adequately fit the data?
2. Do muscle strength, vision, chronic illness, level of exercise, level of social support, and depression have direct effects on functional performance?
3. Does level of exercise have an indirect effect on functional performance through muscle strength?

4. Does level of social support have an indirect effect on functional performance through depression?

Purpose of the study

1. To develop the causal model for explaining the functional performance of Thai elderly including muscle strength, vision, chronic illness, level of exercise, level of social support, and depression
2. To examine the causal relationship between variables including muscle strength, vision, chronic illness, level of exercise, level of social support, depression and functional performance in Thai elderly.

Conceptual framework

The functional performance of the Thai elderly model is derived from the functional consequence theory developed by Miller (1995), described in more detail in the next chapter, and other related literature. In this study, the theory is employed as an initial conceptual framework for development of a hypothesized causal model of functional performance in Thai elderly. The functional consequent theory postulates that functional performance of the elderly will change because of influences from receiving age-related changed factors and additional risk factors. Functional performance could be maintained or enhanced when the risk factors are reduced. The reduction of risk factors would facilitate the older person having a higher level of functional performance and the least amount of dependency. Conversely, when the risk factors interfere with a person's level of functional performance, functional performance will be reduced while the

potential of dependency will increase. Age-related changes directly affect functional performance by causing a reduction in functional capability of the body system. It is possible that the elderly can compensate for age-related change effects and to intervene in the effects in order to increase their functional performance. However, changes of functional performance typically occur because of a combination of age-related changes and risk factors.

Age-related Changes

Age related changes are defined as the changes occurring during later adulthood and are independent of extrinsic or pathological diseases. It includes musculoskeletal systems such as muscle strength, the cardiopulmonary system, sensory systems such as vision and hearing and others systems (Miller, 1995). The age related change factors causing a reduction of functional capability of the body system have an influence on the functional performance decline of the elderly. Based on a systematic review of Heikkinen (2003) and Stuck et al. (1999) concerning factors related to functional performance in the elderly, it is found that major age related change factors influencing functional performance in the elderly are muscle strength and vision. Therefore, the study will emphasize those two factors in the proposed causal model.

Risk factors

Risk factors proposed by Miller (1995) are defined as conditions that increase the vulnerability of the elderly. Common risk factors are disease, environment, lifestyle, support systems, psychosocial circumstances, and attitudes based on a lack of knowledge. Based on a systematic review of Heikkinen (2003) and Stuck et al. (1999) concerning factors related to functional performance in the elderly, it is found that the significant risk

factors which affected functional performance are chronic illness, the level of exercise, the level of social support, and depression. These risk factors are included in the hypothesized model in this study.

The study derives each empirical indicator by using Hierarchy of Middle-Range Theoretical Deduction proposed by Fawcett (2000). She suggested that a theoretical model provide the structure. Its concepts and proposition cannot be tested directly and cannot be empirically measurable. More concrete and specific concepts and propositions, in particular phenomena, have to be derived from a theoretical model where a middle range theory must be formulated. The concrete concepts must be operationally defined and empirically testable. Hypotheses must be derived from the proposition of the theory. Concepts needed to test the direction and strength of the relationship between concepts. Each concept is linked to empirical indicators which provide a method to measure the variable. An explicit conceptual–theoretical-empirical structure, by using functional consequence theory, is developed to test a hypothesized causal model of functional performance in Thai elderly presented as Figure 1.1.

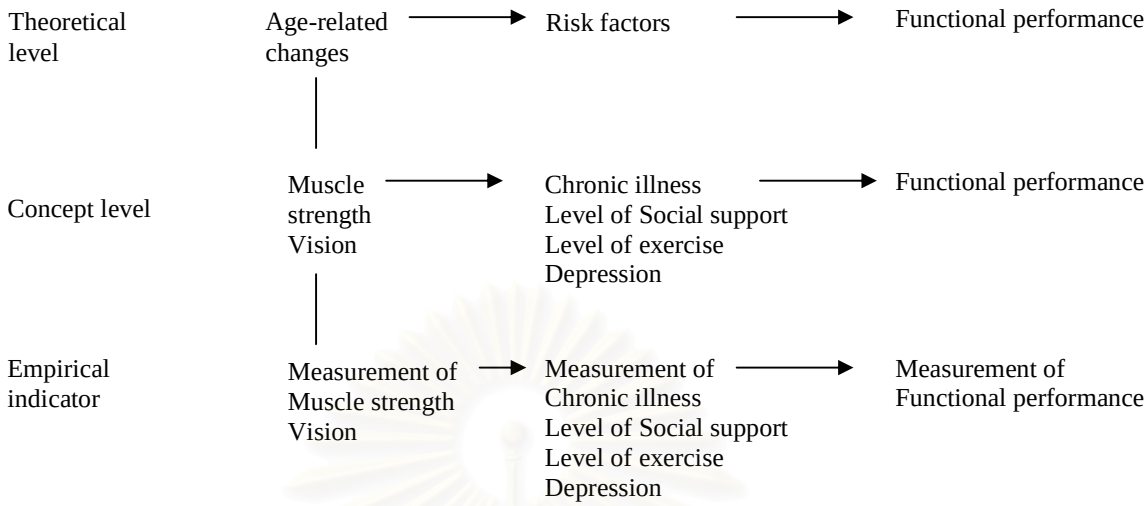

Figure 1.1 Hierarchy of Middle-Range Theoretical Deduction (Fawcett, 2000)

Therefore, a hypothesized causal model of function performance of the Thai elderly could be drawn as shown in Figure 1.2.

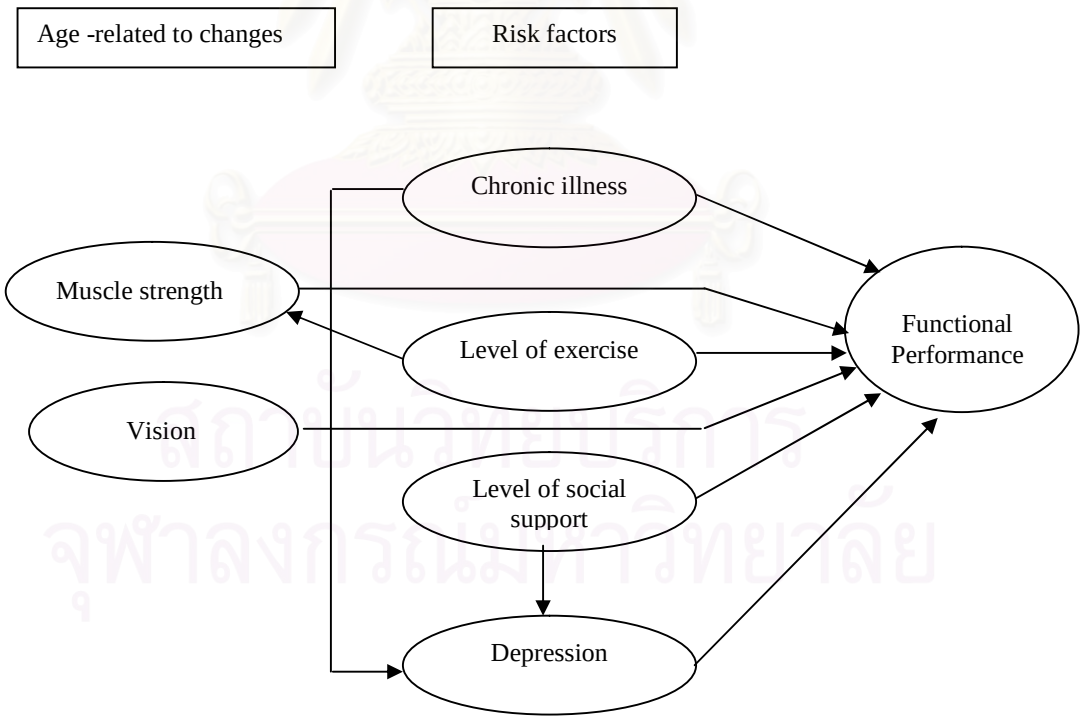

Figure 1.2 A hypothesized causal model of functional performance in Thai elderly

The empirical rationale for the proposal model is presented hereunder.

Muscle strength has been defined as the maximum amount of force that a muscle or muscle group can generate in a specified movement (Knuttgen & Kramer, 1987). It is essential in performing daily living activities such as walking, climbing the stairs, and rising up from sitting to standing (Heikkinen, 2003; McNevin et al., 2002; Suzuki, Bean, & Fielding, 2001; Salem et al., 2000). When growing older, muscle strength starts to decline, especially during the years forty to eighty years old, where muscle strength decreases by 20-40% (Hurley, 1995). It leads the elderly to functional performance limitation and possibly to a state of disability. Various clinical evidence has indicated that age-related changes associated with muscle strength decline usually influence functional performance impairment (Carmeli et al., 2000; Hurley, Ree & Newham, 1998). It means that muscle strength deteriorates as age increases. There is a trend for older people to require more time to perform something or face difficulties in conducting activities of daily living. Conversely, the elderly who have stronger knee muscle strength will have higher functional performance scores (McNevin et al., 2002; Salem et al., 2000; Topp, Mikesky, & Thompson, 1998). Muscle strength has a positive direct effect on functional performance in the elderly. This is inconsistent with the results of some studies found that muscle strength had little effect or no effect on functional performance in the elderly. Buchner et al (1996) found that lower levels of muscle strength had little effect or no effect on the ability to conduct activities of daily living in the group of younger older adults or stronger elderly. Therefore, the relationship between muscle strength and functional performance in Thai elderly requires being tested. The hypothesized model proposes that muscle strength would have a direct affect on functional performance.

Vision is defined as the ability of the elderly to see. It is one of the most significant senses of people that is utilized to navigate and to perceive what is going on in the surrounding environment and then leads to the process of performing activities. Gradual changes in visual functioning and visual perception according to the aging process has a certain impact on the daily activities of the older person (Crews & Campbell, 2004; Rowe & MacLean, 2000; Miller, 1995). The visual capabilities would provide the primary cues for conducting the activities of daily living and allow people to fully interact or communicate with the surrounding environment in either a positive or negative way. Various evidence has indicated that those elderly with low vision often cannot satisfactorily perform activities of daily living. Thus the older people reported they had difficulties in conducting daily activities when they have visual impairment. An inability to see well affects negatively functional performance and social interactions and could lead to a loss of independence (Sloan et al., 2005; Leiberman, Friger, & Lieberman , 2004; Crews & Campbell, 2004; Rowe & MacLean, 2000). Thus vision has a positive direct effect on functional performance. It is included in the hypothesized model for testing in Thai elderly.

Chronic illness is considered as an important risk factor of functional performance (Miller, 1995). The elderly who have chronic illness, which causes specific organ pathology, usually have a lower functional performance (Kriegsman, Deeg, & Stalman, 2004; Pope et al., 2001; Markides et al., 1996; Haan, & Weldon, 1996). Kriegsman, Deeg, and Stalman (2004) proposed that people aged 70 years and over usually have 2-3 chronic illnesses, as with Thai elderly. Approximately 70% have at least 1-2 chronic illnesses (Amnatsatsue, 2002; Jittapunkul et al., 2001). Therefore, most importantly, the

elderly who have several types of chronic illnesses or have a greater number of chronic illnesses would have a lower functional performance level than the elderly who have a lower number or none (Kriegsman, Deeg, & Stalman, 2004; Miller et al., 2004; Beland & Zungzunegui, 1999). The combined effects from several chronic illnesses would deteriorate or minimize functional performance in the elderly more than with the effect of one chronic illness. It could be explained that the elderly person who has more than one chronic illness has the pathology of several organs leading to the severity of chronic illnesses increasing. Consequently, the number of chronic illnesses occurring in the elderly has a negative effect on functional performance in the elderly. In the proposed model in this study, chronic illness is also included.

The relationship among chronic illness, depression, and functional performance are not yet clear. In functional consequence theory no specific relationship between chronic illness and depression is proposed. However, evidence from functional performance studies indicated that depression is highly prevalent in people with chronic illness (Lyness, 2006; Egede, 2005; Egede, Nietert, & Zheng, 2005). Approximately 30% of people with diabetes have depression and there is a two-fold increase of having depression among people with diabetes (Egede, 2005). In addition, studies have shown that depression co-occurs in a substantial proportion of patients with hypertension (Abas, Hotopf, & Prince, 2002), coronary artery disease (Egede, Nietert, & Zheng, 2005; Barefoot et al.,1996), chronic arthritis (Dicken et al., 2002), and strokes (Provinciali & Coccia, 2002).

Chronic illness influences depression in older adults because older people with several chronic illnesses usually have pathological defects in various organs causing

much more symptoms such as fatigue, restless, tiredness, anorexia, fainting, dyspnea, chest pains etc. The combination of various symptoms influences the older person to suffer more and fall into depression. However, the costs and treatments of a number of chronic illnesses related independently to depression (Egede, 2004). Psychological distress and subsequent neurohormonal and immunological are thought to increase the susceptibility to disease and the persistence of somatic symptoms of depression are thought to worsen functional performance over time (Penninx et al., 1998). A depressed mood is thought to interfere with physical recovery by impeding treatment seeking, and adherence to treatment (Penninx et al., 1998). Chronic illness had a positive relationship with depression (Lyness et al., 2006; Egede, 2004). Therefore, the relationship between chronic illness, depression and functional performance needed to be tested. The hypothesized model proposed that chronic illness may have negatively affected functional performance directly and indirectly through depression.

It has been documented that the level of exercise has an important role for the prevention of functional performance decline resulting from aging related to changes (Tager et al., 2004; Brach et al., 2003; Carlson, 1999; WHO, 1998; Miller, 1995). However, in advancing old age, exercise has also been documented to decline (Conn, 1998a; Bautch, Malone, & Vailas, 1997). The decrease in exercise leads to lower functional performance among the elderly (Young, Masaki, & Curb, 1995; Wagner et al., 1992). Conversely, with those elderly who engage in regular exercise, their functional performance improved (Brach et al., 2003; Ringsberg et al., 2001). Participating in exercise can help the older adults more easily perform many activities of daily living. For example, being more flexible will help the elderly more easily to do things like reach in

to the cupboard and tie one's shoes. Being stronger and having more balance will help the older adults lift and carry items like bags of groceries and will make it easier to get in and out of chairs and the bathtub. Improving their cardio-respiratory endurance will allow the older adults to do things like climbing stairs or playing with grandchildren without being out of breath (USDHHS, 1999). Therefore, the level of exercise has a positive direct effect on functional performance and it is included in the hypothesized model for testing in Thai elderly.

The relationship between the level of exercise, muscle strength and functional performance are also not clear. In the functional consequent theory no specific relationship between the level of exercise and muscle strength is proposed. However, evidence from some studies indicated that participating in exercise would slow the age-related decline in muscle strength and maintain functional performance in older adults (Ringsberg et al., 2001; Rantanen, Era, & Heikkinen, 1997). The elderly who persisted in exercise maintained their muscle strength at a higher level of the sedentary group. In the sedentary group, the rate of decline in muscle strength was greater than in the exercise group. The results of some evidence suggested that undertaking exercise such as household work, walking, and gardening, which are the most common forms of exercise for older adults, may play an important role maintaining strength at an adequate level for independent living (Rantanen, Era, & Heikkinen, 1997). Therefore, the relationships between the level of exercise, muscle strength and functional performance in Thai elderly, needed to be tested. The hypothesized model proposed that exercise has a positive direct effect on functional performance and indirect affects through muscle strength.

The level of social support is an important factor influencing functional performance in the elderly. The presence of social support becomes critical when the elderly have difficulties or are unable to perform activities of daily living. Support from significant others (e.g. a partner, family, and health care provider) assistants and emotional support play a major role for maintenance of functional performance in the elderly (Braungart, Zarit, & Malmberg, 2000; Seeman et al., 1995). The assistance from their family and social network positively associated with functional performance in the elderly (Fiksenbaum et al. 2005; Braungart, Zarit, & Malmberg, 2000). In the absence of support from the family or friends, the elderly may be unable to care for themselves (Mann, 2002; Miller, 1995). Greater risk of functional disability was confined mostly to those elderly reporting lower than average levels of social support (Shaw, 2004). The greater frequency of emotional support from their families had a favorable impact on functional performance because emotional support provides a sense of love, caring, and security for those elderly who feel some difficulties in performing activities in daily life that help them to maintain their functional performance (Seeman et al., 1995). Therefore, the level of social support has a directly positive association with functional performance.

In addition, the relationships between social support, depression, and functional performance in the elderly are not clear. The functional consequent theory noted that stressful life events influenced the occurrence of depression and the functional performance decline in the elderly. To reduce the impact of a stressful life the elderly need support from their resources including from family members and friends or other relatives. Inadequate social support makes people feel more susceptible to developing depression. (Miller, 1995). Several studies have found that higher social support is

associated with lower levels of depression (Greenglass et al., 2006; Fiksenbaum et al., 2005; Jang et al., 2002; Antonucci, Fuhrer, & Dartigue, 1997; Oxman et al., 1992). Social support is associated with a positive affective state such as increased feelings of intimacy, nurturance, social integration, heightened self-worth, and assistance. It can be a source of useful information that enhances the coping of the elderly (Fiksenbaum et al., 2005; Pender, 1996). Moreover, the emotional support from their families and social networks releases stress, allows them to feel relaxed and be in a good mood, which convinces them to maintain their functional performance. Therefore, social support has a positive direct effect on functional performance and an indirect effect on depression. This study will examine this relationship on the Thai elderly.

Depression is also considered as a risk factor impacting on functional performance. In older adulthood, the elderly are often at risk from depression because of the disruption to their social network over time. Moreover, there are several stressful life events which occur such as a loss of a lover, including their wife or husband, friends and particularly the occurrence of chronic illness. The loss of several things in their life in a short time and having to deal with chronic illness causes the elderly to be vulnerable to depressive symptoms (Miller, 1995; Stenback, 1980).

Depression has a negative affect on functional performance in the elderly (Lenze et al., 2005; Mossey et al., 2000; Penninx et al, 1998; Miller, 1995). There are several reasons to explain the relationship between depression and functional performance. First, the depressed elderly has significantly more somatic complaints including appetite disturbance: anorexia, starvation, flatulence, constipation, sleep disturbance, diminished energy and chronic fatigue. These somatic symptoms have a direct effect on basic

activities of daily living in the elderly (Penninx et al., 1998; Miller, 1995). Second, the depressed elderly are likely to experience psychomotor agitation or retardation. Psychomotor retardation is manifested as slowed body movement and slow verbal response. In contrast, psychomotor agitation, older adults may be unable to sit still, may have verbal outbursts: shouting, and may have compulsive behaviors: frequent toileting or hand washing. It influences the elderly having difficulties in conducting their activities meaning functional performance in the elderly is reduced (Miller, 1995). Finally, the influence of depression on the psychological health of the elderly leads them to feel sad, with diminished life satisfaction, low self-esteem and negative feelings about themselves. This leads to them losing interest in conducting their activities. This affects functional performance decline in the elderly (Miller, 1995).

The relationship between depression and functional performance is still unclear because there is inconsistency in the results from evidence that indicates that the level of depression had no significant effect on functional performance decline in depressive patients (Hay et al., 2001; 1997). Based on emerging empirical evidence the hypothesized model proposed that depression has a negative direct effect on functional performance.

The proposed relationships among the variables that will be tested are presented in the research hypotheses.

Research hypothesis

The following hypotheses are formulated to test the causal effects proposed in this study:

1. Muscle strength has a positive direct effect on functional performance.

2. Vision has a positive direct effect on functional performance.
3. Chronic illness has a negative direct effect on functional performance and an indirect effect on functional performance through depression.
4. Level of exercise has a positive direct effect on functional performance and an indirect effect on functional performance through muscle strength.
5. Level of social support has a positive direct effect on functional performance and an indirect effect on functional performance through depression.
6. Depression has a negative direct effect on functional performance.

Scope of the study

The study is a cross-sectional study to develop and test the causal model of functional performance of Thai elderly, who are 60 years old and over and live in Thailand.

Definitions of terms

Functional performance is defined as the ability to perform activities of daily living including basic activities of daily living (BADL) and instrumental activities of daily living (IADL) which the elderly actually do in normal their living. The basic activities of daily living included feeding, grooming, transferring, toilet use, mobility, dressing, climbing stairs, bathing, bowel continence and bladder continence. Instrumental activities of daily living included walking outdoors, cooking, housekeeping, managing money, and accessing transportation (Bennett, 2002). It was measured based on combining two self-reported measures including (1) Modified Barthel ADL Index

(MBAI) and (2) The Chula ADL Index (CAI) (Jitapunkul, Kamolratana, & Ebrahim, 1994).

Muscle strength is defined as the ability of the knee muscles of the elderly to produce resistance force. It is the maximum weight that the elderly could lift or produce in resistant force for one repetition of knee muscle strength (1-RM) (Kalapotharakos et al., 2004). It was measured by leg dynamometer.

Vision is defined as the ability of the elderly to see. It was measured by using the Snellen chart. The score for visual acuity resulting from reading the Snellen chart refers to the ability of the elderly to see.

Chronic illness is defined as the perception of the elderly concerning the number of chronic illnesses that continue over an extended period of time for at least 3 months (Markides et al., 1996). The number of chronic illnesses means the accumulation of diagnosis of medical doctors about an illness that the participants have suffered from for 3 months or over before participating in the present study.

Level of exercise is defined as the perception of the elderly of performing physical activities as determined by the intensity, frequency, and duration of five activities-vigorous activities, leisure walking, moving, standing, and sitting which significantly improve and maintain well-being and health status, evaluated by the Yale Physical Activity Scale (YPAS; Dipietro et al., 1993).

Level of social support is defined as the level perceived with specific supportive behavior when needed, including intimacy, social integration, nurturance, worth and assistance. It was measured by the Personal Resource Questionnaire (PRQ 85 Part 2) developed by Brand and Weinert (1987).

Depression is defined as the perception of the elderly about emotion, negative will, psychomotor, cognition and isolation. The short version of the Geriatric Depression Scale (GDS), a 15 item self-reported depression scale was used to measure depression in Thai older adults (Jitapunkul et al, 1994)

Expected usefulness of the study

The present study is aimed at developing the causal model for explaining the functional performance of Thai elderly based on functional consequence theory proposed by Miller (1995) and reviewing related literature to determine the utility of the causal model in predicting functional performance of Thai elderly and the utility of the causal model in successfully intervening to increase functional performance in Thai elderly.

Moreover, the findings from the study will provide benefits for the elderly themselves and also the broader Thai society because they offer basic knowledge about the pathway of the relationships between factors and functional performance. It will help the health professional and policy maker to develop a best practice model for promoting the Thai elderly as a healthy human resource. Nurses could minimize the influencing factors that interfere with the level of functional performance such as chronic illness, and depression and to facilitate or promote the influencing factors that motivate the elderly to conduct activities such as level of exercise, level of social support, muscle strength, and vision. However, nurses could conduct health assessment basing on the knowledge about factor influencing on functional performance in order to evaluate the risk of functional impairment. Afterward, nurses should establish the specific intervention following those influencing factors for enhancing functional performance of the elderly.

Additionally, the modified instrument of the study will be utilized as a tool for evaluating interventions to promote functional performance for Thai elderly. It is hoped that the study will promote the possibility of disability-free life expectancy or independent life expectancy, which is an important factor for human well- being.

CHAPTER II

LITERATURE REVIEW

This chapter presents an integrated review of theoretical and empirical literatures describing concepts of the interest and interrelationship among them. The following literature was reviewed, evaluated and summarized herein.

1. Functional performance
   1.1 Definition of functional performance
   1.2 Assessment of functional performance
   1.3 Functional performance of Thai elderly
2. Theory related to functional performance
3. Factors related to functional performance
4. Relationships among factors related to functional performance

1. Functional performance

1.1 Definition of functional performance

Having the ability to conduct activities of daily living is the ultimate goal based on older adults' perspectives and health care providers (Demer et al., 2004; Zimmer et al., 2003; Jitapunkul et al., 2001; Miller, 1995). Since functional performance concerns the ability to conduct activities of daily living related to independent living then it is a significant meaningful health outcome for this population group (Suthers & Seeman, 2004; Resnick, 2002; Roach, 2000; Miller, 1995; Bonder & Wagner, 1994). It is worth noting that several terms were used to refer to the ability to perform activities of daily

living including functional performance, functional ability, functional status and physical functioning or physical function (Wang, 2004; Bennett, 2002).

Historically, the development of a functional performance concept focused on basic activities of daily living or personal care since it was developed empirically in 1950 from the observation of a large number of activities performed by patients with fractured hips (Moinpour, McCorkle & Sauner, 1988). Katz et al. (1963) defined functional performance as the ability of the patient to conduct activities of daily living including six basic activities of daily living (ADL), which were bathing, dressing, toileting, transferring, continence, and feeding. These activities referred to basic self-care or personal care and mobility.

The amount of assistance that the patient requires was examined by self-reported measure for determining the level of functional performance. Three levels of independence are used for indicating the level of functional performance in each activity by rating the amount of assistance needed. For example, Bathing is considered as independent level if there is no need for assistance. Bathing is considered as at a dependent level if the bathing is provided by other persons on one part of the body. Bathing is considered as a disability if the bathing is provided by another person for more than one part of the body (or if not bathed) (Katz et al., 1963).

The activities of daily living are hierarchical and represent a natural sequence of functional loss as dependency increases. During recovery, the regaining of activities is reversed. For most people, the last function which signaled a loss of independence was the inability to feed themselves, and this function was usually the first area where independence returned as their condition improved (Center to improve of care, 2007).

Initially, six basic activities of daily living seemed to be suitable for assessing functional performance but do not discriminate concerning people who have a high functional performance and not enough to indicate the independent living of the elderly (Wang, 2004). Lawton and Brody (1965) extended the definition of functional performance to the independent living of the person. They defined functional performance as the ability to perform activities of daily living particularly the instrumental activities of daily living which included housework, shopping, meal preparation, telephone use and financial management. These activities cover the activities that a person needs for independent living and to fulfill the social role of the person such as house keeping and telephone use. Then the psychosocial health of the person could be committed (Bennett, 2002).

Since then, there have been numerous researchers interested in studying functional performance in the elderly and they have identified definitions of functional performance as with the following.

Leidy (1994) defined functional performance as the physical, psychological, social, occupational and spiritual activity that people actually do in the normal course of their lives to meet basic needs.

WHO (1998) defined functional status as a person's ability to perform activities necessary to ensure well-being. Moreover, WHO (2001) suggested that the difference between functional performance and functional capacity should be of concern. It is that functional performance which is commonly defined as "the activities that people actually do" or "What an individual does in real situations" whereas functional capacity is "what an individual can do in standard situations". Thus the assessment of functional capacity

strongly needs a standardized environment such as in the laboratory while functional performance is measured in the “actual context in which an individual lives”

Bennett (2002) proposed the definition of functional performance or functional status as the ability to perform activities of daily living including basic activities of daily living (BADL) and instrumental activities of daily living which the elderly actually do in their normal lives. The basic activities of daily living included feeding, grooming, transferring, toilet using, mobility, dressing, climbing stairs, bathing, bowel continence and bladder continence. Instrumental activities of daily living (IADL) included walking outdoors, cooking, housekeeping, managing money, and assessing transportation. This definition is similar to the components of functional performance proposed by Jitapunkul et al. (2001).

Guralnick and Ferrucci (2003) conceptualized physical function or functional performance as the ability to perform a specific physical movement such as lifting and walking. Several researchers defined functional performance as similar to this definition. It was defined as the ability to perform five chair stands (Hoeymans et al., 1997; Seeman et al., 1995; Guralnick et al., 1994), walking speed (Amnatsatsue, 2002), balance, time tandem, and side by side stands, walking speed and chair stands (Guralnick et al., 1994), gait speed, chair stand time, maximum grip strength and balance score (Cress et al., 1995). However, the ability to perform specific tasks could not reflect the ultimate goal of the elderly people for wanting independent living at all. For example those elderly who have the ability to walk by themselves, might have difficulty in conducting the house keeping or other activities of daily living.

Recently, Wallace (2007) defined functional performance as the ability to perform activities of daily living independently. A decline in functional performance may place the older adults on a spiral iatrogenesis leading to further health problems.

From the literature review, it could be summarized that functional performance in the elderly is historically defined in two ways. Firstly, it is defined as the ability to perform activities of daily living including basic activities of daily living (BADL) and instrumental activities of daily living. Lastly, it is defined as the ability to perform specific tasks. The definition which referred to the ability to perform specific tasks could not provide significant information about whether the elderly have an independent living. This was because the ability to perform specific tasks may not be a good representation of all dimensions of functional performance that include basic activities of daily living and instrumental activities of daily living. Therefore, this definition is not employed in this study. Moreover, functional performance is commonly defined as “the activities that people actually do” or “What an individual does in real situations”. It is measured in the “actual context in which an individual lives”.

Hence, in this study, functional performance is defined as the ability to perform activities of daily living including basic activities of daily living (BADL) and instrumental activities of daily living (IADL) which the elderly actually do in their everyday lives. The basic activities of daily living included feeding, grooming, transferring, toilet use, mobility, dressing, climbing stairs, bathing, bowel continence and bladder continence. Instrumental activities of daily living included walking outdoors, cooking, housekeeping, managing money, and accessing transportation (Bennett, 2002).

1.2 Assessment of functional performance

There are several measurements have been developed to measure the functional performance in the elderly. These measurements could be categorized into two groups including self reported measures and performance based measures. Since each method has advantages and disadvantages the following issues should be considered prior to selecting the type of measurement tool: a) size and characteristic of the target population (e.g. age, gender, patient in hospital, living in community or institutional); b) practicality (e.g. cost, time, convenience); c) acceptability to the study subject; and d) accuracy (reliability and validity) (Sehy & Williams, 1999). A description of the functional performance measurement as well as its advantages and disadvantages are presented next.

Although the performance based measure is more objective than the self-reported measure (Suther & Seeman, 2004; Bennett, 2002) most of them were developed based on the concept that defined the functional performance as the ability to perform just specific tasks. Therefore, these tools do not refer to the definition of functional performance in this study which covers a wider rage. In particular they could not provide important information indicating whether the elderly conduct the activities of daily living independently or dependently. Hence these measurement tools are not suitable for the assessment of the functional performance in this study.

For self-reported measures, they are suitable for assessing the functional performance in this study and several rationales are given. First, most of them were developed based on the concept that defined functional performance as the ability to conduct activities of daily living. Second, self-report measures are simple, convenient and inexpensive. And finally, they can provide significant information indicating the

dependency of the elderly to conduct the activities of daily living. Several self-reported measures were established for measuring functional performance such as Katz ADL (Katz et al., 1963), the Barthel Index (Marhony & Barthel, 1965), OPCS (Martin, Melzer, & Elliot, 1988) the Modified Barthel ADL Index and the Chula ADL Index (Jitapunkul, Kamolratanakul, & Ebrahim, 1994). The descriptions of each self-reported measure is presented hereafter.

Katz ADL was designed to assess the functional performance in chronicly ill patients. A dichotomous rating (dependent/independent) of basic activities of daily living including bathing, going to the toilet, transferring from bed to chair, continence and feeding. Despite the widespread use of scales, there is little evidence of the validity of the measure. Moreover, the measure is most appropriate for patients who are severely sick since it is not suitable for a health survey or in general practice as the items are not sensitive to minor deviations from complete well-being (Center to Improve Care of the Dying, 2007).

The Barthel Index is an ordinal scale that measures functional independence in the domain of personal care and mobility. It was designed to monitor functional performance in chronic patients and long-term hospital patients with a paralytic condition. The ten activities cover personal care and mobility, omitting everyday tasks essential for life in the community (e.g. cooking and shopping). Each item is rated in terms of whether the patient can perform the task independently, with some assistance or is dependent on help. This scale is restricted in that low level of disability reflecting its origins as a measure for severely ill patients. It may require some IADL which is not included in Barthel Index.

The OPCS (Martin, Melzer, & Elliot, 1988) was derived from the World Health Organization classification of impairment, disability and handicaps. This scale was composed of 13 dimensions including locomotion, dexterity, personal care, reaching and stretching, continence, vision, hearing, communication, behavior, interlectual functioning consciousness, eating-drinking-digesting and disfiguraion. Jitapunkul, Kamolratanakul, and Ebrahim (1994) found that the OPCS was not suitable for Thai people because of a high misinterpretation of behavioral and intellectual disability.

The Modified Barthel ADL Index (MBAI) and the Chula ADL Index (CAI) (Jitapunkul, Kamolratanakul, & Ebrahim, 1994). It was developed for measuring the functional performance of Thai elderly living in the community. The MBAI included feeding, grooming, transferring, toilet use, mobility, dressing, climbing stairs, bathing, bowel continence and bladder continence. The participants are interviewed on conducting the 10 item tasks. If they can do the activity without help, it means they are independent. If they can do it with help, it means they are dependent to a certain level. If they can not do it at all, it means they are absolutely dependent.

However, the MBAI alone might be inadequate to assess the functional performance of Thai elderly because the scale consists of only basic activities of daily living and is possibly too simple for comparatively healthy older adults. Therefore a tool for evaluating the ability to perform more complex tasks necessary for independent living (extended activities of daily living or instrumental activities of daily living) was needed to increase discriminated power. Jitapunkul, Kamolratanakul, and Ebrahim (1994) developed the tool in the name of Chula ADL Index which includes five IADL activities such as walking outdoors, cooking, using public transportation, using money, and heavy

housework. Participants were interviewed how they performed their five IADL. The possible score on the CAI ranged from 0 to 9.

The construct validity of the MBAI and CAI was tested in Thai older adults (Jitapunkul, Kamolratanakul, & Ebrahim, 1994). Factors analysis with varimax rotation revealed 2 factors loading of .50 and over: (1) basic ADL; (2) extended (instrumental) ADLs. The test-retest reliability, inter- rater reliability and internal consistency were conducted initially for development. The results showed a high correlation coefficient of 0.96 and 0.84 for test-retest and the inter-rater reliability respectively. In addition, the internal consistency of CAI (Cronbach's alpha = .76) was sufficient (Jitapunkul, Kamolratanakul, & Ebrahim, 1994).

It is found that MBAI and CAI developed in a Thai context could reflect the construct of functional performance in the elderly. Additionally, the validity and reliability of the instrument reported is acceptable therefore this instrument is suitable for the assessment of functional performance in this study.

1.3 Functional performance of Thai elderly

Recently, Thailand has been facing with aging population structure. It means that the proportion of the elderly increasing more and more while younger population is decreasing. National statistic office (2005) reported that the proportion of the elderly population is increasing from 9.5 percent in 2000 to 10.3 percent in 2005 while younger population is largely decline from 27.9 percent in 1995 to 23.0 percent in 2005. Changing of the age structure affected to dependency ratio. It is found that every 100 persons in productive age supported approximately 50 dependents (National statistic office, 2005). The old dependency ratio modestly increased.

The elderly population (60 years and over) was approximately 6.7 millions or 10.3 percent of the total population. The elderly population was characterized into three groups including the younger older adults (60-69 years), middle older adults (70-79 years), and the very old (80 years and over). It was found that 59.2 percent of the old population was the younger older adults, 31.6 percent was middle older adults and 9.2 percent was the very old one (National statistic office, 2005). The percentage of population characterized by age group is presented as Figure 2.1

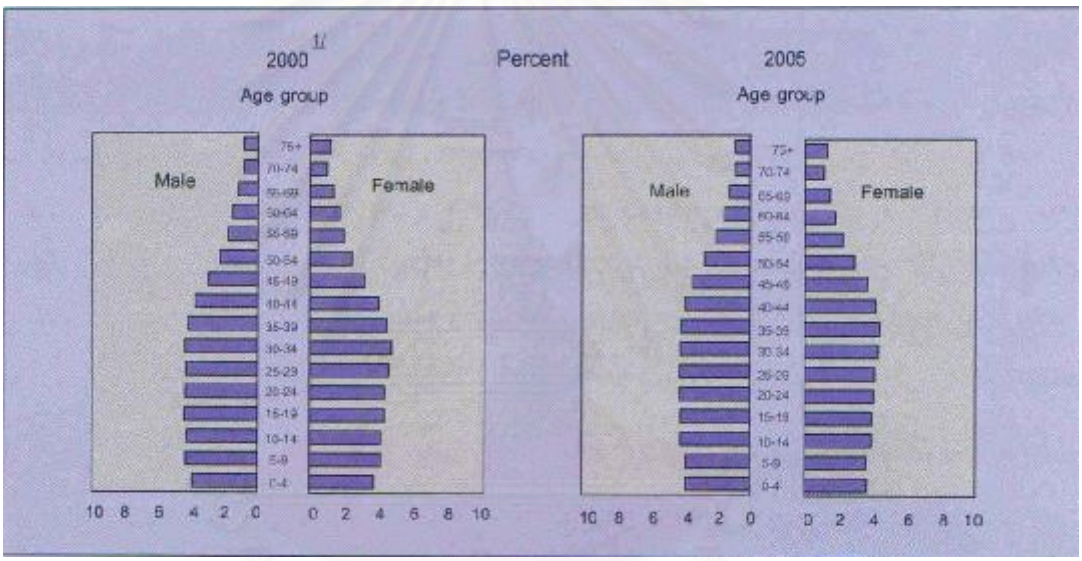

Figure 2.1 Percentage of population characterized by age group (National statistic office, 2005)

Miller (1995) found when people getting older the more functional performance decline and the more dependency living. Therefore, the increase of dependency ratio not only results from demographic changes but also the decline of ability to conduct activities of daily living or the decline of functional performance in this group. To reduce the dependency ratio resulting from the decline of functional performance, it is

importance for health care provider to understand about functional performance in Thai elderly.

In Thailand, there is reliable evidence indicating that a number of Thai elderly have been faced with a decline in functional performance and this gradually intensified to become a disability. From the national survey of population health in 1996-1997, it was found that one in four Thai elderly could not perform activities of daily living at at least one type. 11.5 % of Thai elderly reported they found it difficult to be mobile outdoors and eight percent had difficulty being mobile even in a room (Jitapunkul et al., 2001). Furthermore, nineteen percent of Thai elderly were reported to have a long-term disability because they encountered the problem for longer than 6 months (Jitapunkul et al., 2001).

Several reports similarly proposed that most types of activities of daily living which Thai elderly found difficulty performing were the instrumental activities of daily living including accessing public transportation, cooking the food and walking outdoors (Buakaew, 2003; Jitapunkyul et al., 2001; Kanjanawong et al., 1997). The ability to conduct the instrumental activities of daily living usually helps the elderly to have the independent living in the community that corresponds to the important goals of both the older persons and of the gerontological nursing staff (Roach, 2000). Additionally, it fulfills the social role of the person so the psychosocial health of the person could be committed (Bennett, 2002). Those elderly who have a difficulty in conducting instrumental activities in daily living have a more dependent living than the elderly who do not have difficulties.

However, the ability to perform basic activities of daily living (including dressing, eating, bathing, toileting, and transferring from bed or chair) is also an important point of the functional performance problem in Thai elderly. Jitapunkul et al. (2001) reported that seven percent of Thai elderly need help from other people to perform basic activities of daily living in at least one type of these activities. Buakeaw (2003) reported that 5 % of the elderly in Krabi province need assistance from other people to perform basic activities of daily living in at least one type. The basic activities of daily living are the group of activities that people need to conduct in order to survive in their lives (Stone, Wyman & Salisburry, 1999). If they have difficulty to perform basic activities of daily living, their lives will be threatened.

Recently, Zimmer et al. (2003) investigated the functional performance of older adults in three Asian societies including Thailand, Taiwan and Philippines. The results revealed that in Thailand 17.2% of the elderly sample had difficulty with climbing the stairs, 35.1% had difficulty with walking and 63.8% of them had at least one limitation. For Taiwan 25 % of the elderly sample had difficulty with climbing the stairs, 16.4 % had difficulty with walking and 42.2 % of them had at least one limitation. In the Philippines, 20.8% of the elderly sample had difficulty climbing stairs, 28.4% had difficulty walking and 47.5 % of them had at least one limitation. The results from this study indicated that when compared with other countries, Thailand had a higher percentage of functional performance impairment in older adults than other countries when using the same measurement for evaluation. As can be seen from the above, it could be concluded that functional performance problem in Thai elderly has rapidly increased.

2. Theory related to functional performance

Functional consequence theory

Functional consequence theory explains the functional performance in the elderly person and this theory was employed as a guideline guiding in this study. This theory, developed by Miller (1995) based on gerontological nurse's perspectives, is a gerontological nursing theory. A gerontological nursing theory is distinguished from the nursing theory since it can explain the care needs that are unique to older people and provides a basis for addressing those needs from a nursing perspective. The functional consequence theory emphasizes functional ability or functional performance in older adults. The theorists believe that if older adults have a high level of functional performance despite the presence of age-related to change and risk factor, they can achieve their ultimate goal to have independent living and have a good quality of life and well being (Miller, 1995).

This theory postulates that older adults experience changes of functional performance because of the influences of age-related changes, additional risk factors and also implemented intervention. In the absence of interventions, functional performance decline or reduction in the effects of age-related to change (and additional risk factors but with interventions), the functional performance can be enhanced or maintained. The role of the gerontological nurse is to identify the factors that cause functional performance impairment and initiate intervention that will result in enhancing functional performance. The ultimate goal of this theory is to enable older people to have the functional performance at a high level despite the presence of age-related changes and risk factors. The theory is diagrammed in Figure 2.1 and is illustrated by the following example.

One of functional performance impairments resulting from aged-related changes of eyes is that an older adult has some difficulty to walk or move since he/she is less able to see clearly or with blurred vision. In addition to this age-related to change, the older adult has a disease-related risk factor such as hypertension. The combination of both effects could influence the older adult to having more difficulty in walking or moving or to stop walking. These age-related changes and risk factors can interfere with the functional performance of the older adult to the extent that the person stops performing certain activities.

This theory could be drawn in schematic form as shown in figure 2.2.

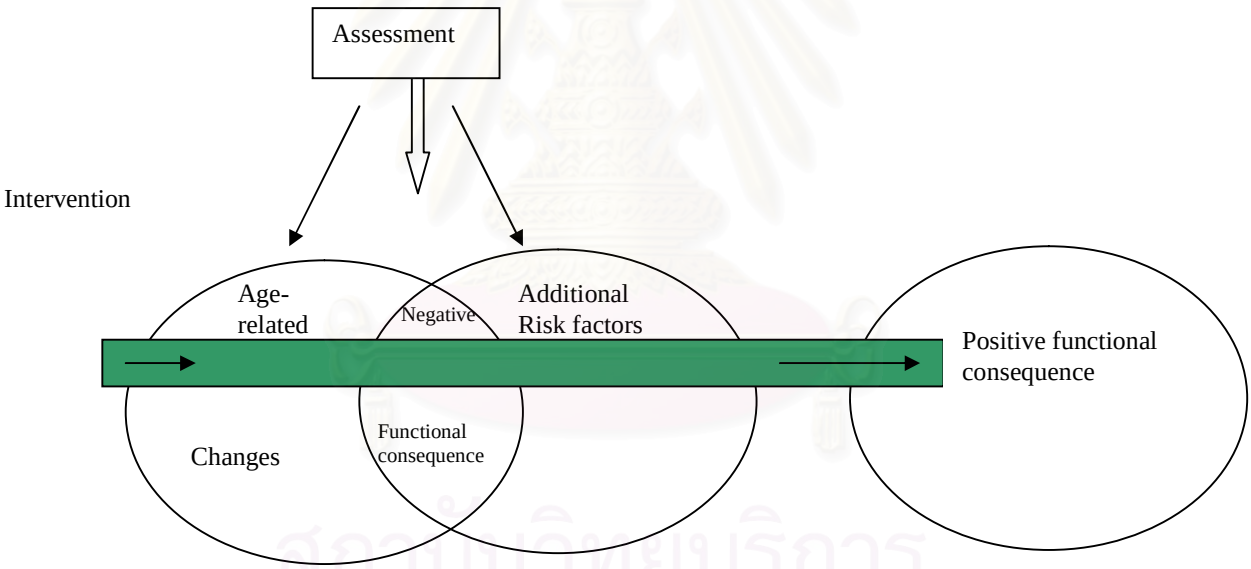

Figure 2.2 Functional consequence model (adopted from Miller, 1995).

There are three major key concepts in functional consequence theory including functional consequence, age-related changes and risk factors. Each concept could be described as in the following.

Functional consequence is defined as the observable effects of actions, risk factors and age-related changes that influence the quality of life or day to day activities of older adults. The observable effects of action, risk factor and related change referred to functional performance or the ability to conduct activities of daily living. Older adults referred to people whose functional performance is affected by the acquisition of age-related changes and risk factors. Functional performance could be positive or maximized when the risk factors are reduced. This condition would facilitate the older person to having the highest level of functional performance and the least amount of dependency. Conversely, functional performance is minimized when the risk factors interfere with a person's level of functional performance that increases the person's dependency. However, minimized or diminished functional performance typically occurs because of the combination of age-related changes and risk factors.

Age-related changes conceptualized as progressive changes that occur during later adulthood and are independent of extrinsic or pathologic conditions. It includes changes in muscle strength, sensory systems such as vision, cardiovascular capacity and other systems. These changes directly effect functional performance or the ability to conduct activities. It is possible that the elderly can compensate for the age-related effects of change and minimalize the effects in order to increase their functional performance.

Risk factors were defined as the conditions that increase the vulnerability of older people and interfere with the older adult to conduct activities in daily living. It directly influences functional performance. Common risk factors are diseases, medications, lifestyle, support system, psychological circumstances, and attributes based on a lack of knowledge. When the risk factors are reduced, functional performance could be

maximized. Conversely, functional performance is minimized when the risk factors interfere with a person's level of functional performance that increases the person's dependency.

3. Factors related to functional performance

Concerning the functional consequence theory, there are two groups of factors related to functional performance including age-related changes and additional risk factors. Stuck et al (1999) performed systematic reviews of several longitudinal studies published between 1985 and 1997 concerning factors related to functional status decline in community-living elderly people, and found that significant factors related to function performance decline are depression, chronic illness, muscle strength, social support, level of exercise, and vision impairment. Additionally, Heikkinen (2003) conducted the literature review of the longitudinal and comparative studies, and had discussions with experts from multicentre networks on burden disease in old age concerning main risk factors for disability in old age. The findings reveled that chronic illness, low levels of exercise or a sedentary life style, depression, lower knee muscle strength, a low level of social contact and vision impairment are among the most important risk factors. It is found that the mentioned factors could be categorized into two groups (including age related to change and risk factors) as per Miller (1995) framework. It is described as follows.

3.1 Age-related change factors related to functional performance

According to Miller (1995), Heikkinen (2003), Stuck et al. (1999), and reviewing literature related to functional performance in the elderly it is found that major age related

change factors influencing functional performance in the elderly are muscle strength and vision impairment. The associations between functional performance and two factors were reviewed and summarized herein

3.1.1 Muscle strength

Muscle strength has been defined as the maximum amount of force that a muscle or muscle group can generate in a specified movement (Knuttgen & Kramer, 1987). Muscle is also an extremely important organ for conscious and unconscious awareness of body position, movement, and force acting on the body. Muscle strength contributes to mobility and confidence, enhancing the performance of common functional ADL (Hurley, Ree, & Newham, 1998). Therfore it is essential for individuals to perform daily living activities such as walking, cooking and transferring.

As people grow older than 40 years old, muscle strength beging to decline (Al-abdulwahab, 1999). It results from reduced muscle mass, muscle fiber, and muscle contraction (Kalapotharakos et al., 2004; Taaffe and Marcus, 2000; Carmeli et al., 2000). From fourty to eighty year old, muscle strength decreases by 20-40% (Hurley, 1995).

In the elderly population, loss of muscle strength is associated with functional performance impairment. Functional impairment means the older adults reported they have difficulty in conducting activities of daily living in at least one type (Al-abdulwahab, 1999). Hurley, Ree and Newham (1998) compared the quadriceps strength between the young, middle aged and elderly. The findings indicated that the quadriceps strength of the elderly was weaker than the young and middle-aged subjects ($p<.001$). Moreover, it meant the elderly took more time to conduct activities such as stair climbing and walking longer than young and middle age people and some of them reported that

they had difficulty in climbing the stairs. Similar to the study of Carmeli et al. (2000) 60% of the most senior older adults had significant lower muscle strength in all muscle groups and they took a longer time to walk and shorter distance than the younger and middle age people. The findings of the study indicated that as muscle strength deteriorated with age there was a trend for older subjects to take longer performing them or have more difficulty in conduct activities in daily living.

Several groups of muscle strength were reported to be associated with functional performance in the elderly including upper extremities muscle strength and lower extremities muscle strength. Whitbourne (1985) found that lower extremities muscle strength, including knee extension and flexion, have a greater decline than upper extremities including arm strength, elbow and hand. The reduction in muscle strength in the lower extremities has a more critical contribution to the change in functional performance in the elderly than upper extremities because it is significantly related to the ability to ambulate (mobility) that is essential for many activities of dependent life (Heikkinen, 2003). Knee muscle strength particularly was reported as an important predictor of functional performance in older people (Salem et al., 2000; Rantanen et al., 1999).

McNevin, et al. (2002) determined the predictors of functional ability in elderly men and women. The selected factors included elbow and knee flexion and extension strength and 6 minute walks. The regression analysis revealed that the functional performance was associated with the distance covered during the 6 minutes of walking and knee flexion and extension. These findings suggested that functional performance in the elderly may be modified via knee strengthening.

Topp, Mikesky, and Thompson (1998) investigated the predictive relationship between muscle strength in the upper and lower extremities of functional performance in four tasks among older adults including (1) getting out of bed, going to a chair and returning to bed (2) crossing a street and getting onto a bus (3) exiting the passenger side of car (4) climbing the stairs. The results revealed that muscle strength in the lower extremity was a significant predictor of all the tasks and accounted for the largest proportion of the variance in each task.

It is consistent with Todd, et al. (2007) who found that knee muscle strength provides the objective marker to identify initially the proper functioning in older adults at high and low risk of the future mobility limitation. The elderly individuals with knee extension strength in the high and moderate risk categories were more likely to have a gait speed of less than 1.22m/s than individuals in the low-risk category. Adjustment for demographic factors, health behavior, and medical conditions did not alter these associations.

Salem et al. (2000) examined the association between the knee muscle strength, work capacity and functional performance in 62 older adults. The results revealed that knee muscle strength and work capacity explained between 41% and 54% of the variance functional performance model. Therefore, the relationship between knee muscle strength and functional performance in the elderly should be a positive direction.

Numerous studies investigated the association between knee muscle strength and functional performance tasks among the elderly including slow and fast walking (Salem et al., 2000; Suzuki, Bean, & Fielding, 2001; McNevin et al., 2002) rising from a chair (Suzuki, Bean, & Fielding, 2001; Salem et al., 2000) climbing stair (McNevin et al.,

2002; Salem et al., 2000; Topp, Mikesky, & Thompson, 1998) and crossing a street and getting onto a bus (Topp, Mikesky, & Thompson, 1998). Most of the results indicated that knee muscle strength positively affected several functional performance tasks. That means the elderly who have stronger knee muscle strength will have higher functional performance scores too. In contrast, lower knee muscle strength was associated with gait and mobility or movement dysfunction (Connelly & Vandervoot, 1997). Therefore, the relationship between knee muscle strength and functional performance in the elderly should be a positive direct effect.

However, Buchner et al (1996) showed interesting converse results. This study examined the relationship between leg strength and functional performance in a population based-sample of older adults aged 60-96 years (n = 409). The researchers found that in younger elderly adults or stronger subjects, a lower level of muscle strength had little effect or no effect on the ability to conduct activities of daily living of the elderly. Due to the threshold at which muscle weakness begins to effect the functional performance depended upon physiological reserve in other determinants such as joint muscular tissue, neuromuscular action, flexibility and endurance. Contrasted with frail older adults or the oldest adults a small change in muscle strength may produce a relatively large effect on functional performance. Therefore, in the younger older adults there was a weak association between muscle strength and functional performance while in the oldest seniors there was a strong association. This is consistent with Salem et al. (2000) suggestions concerning the relationship between muscle strength and functional performance involving the threshold of muscle strength. The people who have muscle strength below a minimum threshold report difficulties performing activities of daily

living or functional impairment, whereas the people who have muscle strength above a minimum threshold report performing activities of daily living as well.

Despite various evidence supporting the positive direct effect of knee muscle strength on functional performance in the elderly, most of them examined the relationship between muscle strength and functional performance in specific activities such as stair climbing, walking, rising from the chair, and etc. The direction of previous results differ some. Additionally, a lack of evidence supports this association in the Thai context. It is therefore critical for this research to examine the relationship between muscle strength and functional performance in Thai elderly.

3.1.2 Vision

Ebersol, Hess, and Luggen (2004) found that visual acuity and accommodation normally decreases with age. These changes, particularly presbyopia, begin making themselves felt in the forties for many years. *Healthy people 2010* (2002) revealed that about 2.7 million American elderly have severe visual impairment, women are more visually impaired than men and 33%of women 85 and older reported visual impairment**.** In Thaialnd**,** Panjamanas (2005) found that 21.9% of Thai elderly had visual impairment.

Visual impairment means that a person's eyesight cannot be corrected to a "normal" level. It is caused by a loss of visual acuity, where the eye does not see objects as clearly as usual. Visual impairment was defined as visual acuity that was worse than 6/12 in the better of the two eyes when the elderly read a Snellen chart. If the subject had a visual acuity worse than 6/12 or 20/40 he or she was considered as having visual impairment (Rubin, 1997; Thaimwong, 2001; Squirrell et al., 2005).

Vision impairment could be detected by the Snellen chart, Fundoscopy, Tonometry and interview questions (Miller, 1995; Patterson, 1994). The Snellen chart is used to assess visual skill or acuity. It could detect visual impairment in a large percentage of older people with a sensitivity of 94% and specificity of 89% when compared to an ophthalmological clinic visit assessment (Canadian Task Force on the Periodic Health Examination, 1995).

Gradual changes of visual functioning and visual perception according to the ageing process has a certain impact on the daily activities of the older person. However, it may interfere with the quality of life and safe performance of many activities (Miller, 1995).Vision, one of the most significant senses of people, is utilized to navigate and to perceive what is going on in the surrounding environment and then leads to the process of decision making to perform the activities. The visual capabilities would provide the primary cues for conducting the activities of daily living and allow people to fully interact or communicate with their surrounding environment, in either a positive or negative way (Miller, 1995).

People with low vision often cannot satisfactorily perform activities of daily living. Then the older people reported their difficulty in conducting daily activities when they have visual impairment. An inability to see well negatively affects functional performance and social interactions and could lead to a loss of independence (Rowe & MacLean, 2000).

Leiberman, Friger, & Lieberman (2004) examined the independent effect of visual impairment and functional performance in 926 elderly patients hospitalized for rehabilitation. The researcher found that the visual impairment had a significant

independent effect on the functional performance in the elderly patient in hospital (β = -0.01, regression coefficient = -4.15, P<.01; β = standardized regression coefficient). The results of the study suggested that while the elderly having visual impairment it has a severe impact on elderly individuals' daily levels of functioning and their ability to adjust to changing conditions.

Crews & Campbell (2004) investigated the effects of vision impairment among community-dwelling older Americans. It was found that the elderly with vision impairment reported disparities in health, activities and social roles. The results of the study indicated that when a person has a visual impairment, they feel unsafe or in difficulty to conduct activities of daily living such as walking, climbing the stairs and using transportation.

A longitudinal study was conducted to examine the effects of changes in self-reported vision on the functional status among the elderly. The participants were 6234 elderly people who participated in the study of Assets and Health Dynamic among the oldest seniors (AHEAD), which was followed up in 1998, 2000 and 2002. The results showed that a decline from excellent/good vision to fair/poor vision had statistically significant effects on the functional status particularly in several IADL and ADL such as driving, managing money, preparing hot meals. The results indicated visual impairment has a major impact on functional performance. Preventing vision loss is likely to appreciably improve the functioning of elderly people (Sloan et al., 2005).

Stevenson et al (2004) studied the relation between visual impairment and the ability to care for oneself or a dependent who is an older person with age related macular generation (AMD). 199 subjects who underwent visual function assessment completed a

package of questionnaires dealing with general health status, and the ability to care for one's self or provide care for others. Three levels of self reported ability to care were identified, (1) inability to care for self, (2) ability to care for one's self but not others, and (3) and ability to care for one's self and others. The results showed that the elderly people who reported good general health status and vision functioning were more likely to state that they were able to care for themselves and others. Similarly elderly people with good vision in the better seeing eyes were more likely to report the ability to care for themselves and others. Whereas people with poor vision with a probability of greater than 50% reported that they had an inability to care for themselves. The study indicated that visual impairment had a negative direct effect on ability to care for one's self or functional performance (The National Eye Institute).

Having reviewed the literature concerning the association between vision and functional performance it could be assumed that vision has a positive direct effect on functional performance in the elderly. A lack of the evidence related to the Thai context means the study needs to examine this association with Thai elderly.

3.2 Risk factors related to functional performance

Risk factors refer to conditions that increase the vulnerability of older people and interfere with the older adults to conduct activities in daily living and directly influences on functional performance. Common risk factors are diseases, lifestyle, support systems, psychological circumstances, environment, and attributes based on a lack of knowledge. Functional performance is minimized when the risk factors interfere (Miller, 1995).

According to Miller (1995), Heikkinen (2003), Stuck et al. (1999), and reviewing literature about functional performance in the elderly it is found that major risk factors

influencing functional performance in the elderly are chronic illnesses, the level of exercise, the level of social support and depression. The associations between these factors and functional performance in the elderly were reviewed and summarized herein.

3.2.1 Chronic illness

Chronic illness was defined as a disease or disorder that continues over an extended period of time and causes continuous or episodic periods of incapacity (Markides et al., 1996, Luft & Koch, 1998). U.S. National Center for Health Statistic defined chronic illness as a disease that persists for a long time. It is one lasting 3 month or more. It tends to become more common with age (Webster's new world medical dictionary, 2003).

According to functional consequence theory, chronic illness is one among the significant risk factors (Miller, 1995) and commonly causes functional impairment or decline in the elderly (Kriegsman, Deeg, & Stalman, 2004; Pope et al., 2001; Markides et al., 1996; Haan, & Weldon, 1996). Kriegsman, Deeg, and Stalman (2004) proposed that people aged 70 years and over usually have 2-3 chronic illnesses, the same as Thai elderly. Approximately 70% have at least 1-2 chronic illnesses (Amnatsatsue, 2002; Jittapunkul et al., 2001). Elderly people with chronic illnesses reported having difficulty in conducting activities of daily living, which means they have low functional performance. This follows that chronic illness is negatively associated with functional performance in Thai elderly (Miller, 1995; Markides et al., 1996; Amnatsatsue, 2002).

There are several types of chronic illnesses influencing functional performance in the elderly. However, types of chronic illness with a significant influence on functional performance were arthritis, cancer (Kriegsman, Deeg, & Stalman, 2004; Pope et al.,

2001; Markides et al, 1996), strokes (Kriegsman, Deeg, & Stalman, 2004; Markides et al, 1996; Haan et al., 1996), diabetes, heart disease (Kriegsman, Deeg, & Stalman, 2004; Pope et al., 2001; Markides et al, 1996), and hypertension (Kriegsman, Deeg, & Stalman, 2004; Pope et al., 2001). In Thailand, types of chronic illness significantly occurring in Thai elderly included stroke, arthritis, hypertension, heart diseases, diabetes, and cancer (Jitapunkul et al., 2001).

The effects of each type of chronic illness on functional performance varied (Pope et al., 2001; Markides et al., 1996). Markides et al. (1996) examined the effect of each illness (arthritis, cancer, diabetes, strokes, heart attack) on nine functional activities while controlling the possible effect of other factors, as well as age and gender. They found that each of all the illnesses had a statistically significant association with two or more functional activities whereas strokes had an influence on all functional activities. In the same way, Pope et al. (2001) reported that diabetes, heart disease, arthritis, and osteoporosis were associated with both moderate and substantial functional performance limitations, but hypertension disease was associated with substantial functional limitation only.

Most importantly the elderly who have several types of chronic illness or have a greater number of chronic illnesses have lower functional performance levels than the elderly who have a lower number or none (Kriegsman, Deeg, & Stalman, 2004; Miller et al., 2004; Beland & Zungzunegui, 1999). Therefore, the number of chronic illnesses occurring in the elderly has a negative relationship on functional performance in the elderly as well as the type of chronic illness. The following present evidence supporting this association.

Beland and Zunzunegui (1999) conducted the longitudinal study between 1993 and 1995 to examine the predictors of functional status in older people living at home. The participants were 1564 elderly people living in Leganes city, Spain. The researcher found that the number of chronic diseases significantly predicted the transition of the functional status of the elderly. Moreover, the results indicated that the elderly who had four chronic illnesses or more were 10 times more likely to suffer impairment in ADL than the elderly without chronic illnesses.

Similarly, Kriegsman, Deeg, and Stalman (2004) employed the longitudinal study to assess the association of the decline in physical functioning with the number of chronic diseases. 2,497 older adults participated in the longitudinal aging study were interviewed in Amsterdam. The results showed that a decline in functional performance was associated with the number of chronic illnesses (Adjust Ors from 1.58 for 1, to 4.05 for ≥ 3 diseases). Comorbidity of lung disease and malignancy had the strongest influence on functional performance decline. An exacerbating effect was also found for arthritis in the elderly with diabetes or malignancy, and for strokes in elderly with lung diseases. A weaker effect than expected was observed for diabetes in subjects with strokes, malignancies and cardiac disease. In addition, the researcher found that women with chronic diseases were 1.5-2.3 times more likely to suffer moderate functional limitations than women without chronic diseases.

The results of the study suggested that the effect of combinations of chronic illnesses caused higher deterioration or minimized functional performance in the elderly than the effect of just one chronic illness. It could explain why the elderly people who have more than one chronic illness have the pathology of several organs leading to an

increase in the severity of chronic illnesses. For example, the elderly with diabetes often have uncontrolled blood sugar and decreased endurance capacity due to the complications of endocrine and the cardiovascular system. At the same time they also have arthritis disease. Arthritis causes the locomotor system to reduce mobility. Therefore the elderly who had both diseases reported that they had more difficulty in conducting activities of daily living than the elderly with one chronic illness. Hence, a number of chronic illnesses have a greater negative direct effect on the functional performance in the elderly.

In Thailand, Malathum (2001) examined the effects of a number of chronic health problems on the functional ability in elderly living in Supanburi province. The path analysis showed that a number of chronic health problems had a negative direct effect on functional ability (γ = -.405, $p<.001$).

In summary, it can be seen that the number of chronic illnesses is an important predictor of functional performance in the elderly. Therefore, chronic illness is included in the proposed model. Although a few Thai studies already examined the association between chronic illness and functional performance, that research was studied in a specific area. It needed the present study to examine this association again in a broader area.

3.2.2 Level of exercise

It has been documented that the level of exercise has an important role in the prevention of functional performance decline resulting from aging related to changes (Tager et al., 2004; Branch et al., 2003; WHO, 1998; Carlson, 1999; Miller, 1995). However, due to advancing old age, exercise has been also documented to decline (Conn,

1998a; Bautch, Malone, & Vailas, 1997). More than 40% of those over 65 do not participate in any leisure-time exercise (Cohen-Mansfield, Marx, & Guralnik, 2003). In a similar occurrence in Thai elderly, only a low number of Thai elderly participated in leisure time exercise (Inpang, 1999; Chinuntuya, 2001). The decrease in exercise leads to lower functional performance among the elderly (Young, Masaki, & Curb, 1995; Wagner et al.,, 1992). Conversely, the elderly who engaged in regular exercise meant their functional performance improved.

Centers for Disease Control and Prevention (CDC) of U.S. Department of Health and Human Service (USDHHS, 1996) recommended the level of exercise, where in order to gain benefits in overall health and well being for the older adult population, the older adults should accumulate at least 30 minutes of moderate-intensity physical activity on five or more days of the week. Physical activity means any bodily movement produced by the skeletal muscles that result in the expenditure of energy. Moderate intensity physical activity refers to the level of effort in which a person should experience some increase in breathing or heart rate while the person performs that activity. In other words the moderate intensity physical activity refers to the activities that burns 3 to 6 MET (1 MET = the energy used by the body as the person sits quietly, perhaps while talking on the phone or reading a book). Examples of activities referring to moderate intensity physical activity for older adults are walking for pleasure, walking to class, work or the store, gardening and yard work, housework, taking care of children, and farming.

Allison and Keller (1997) noted that it becomes more important to engage exercise directed to promote health and functional performance rather than fitness. They suggested an exercise prescription for elderly that consists of four interrelated

components: intensity, frequency, duration, and mode of activity. The intensity of the exercise refers to the degree of effort to perform that activity (e.g. degree of vigor). It is often low because many elderly persons have been sedentary for long time and have musculoskeletal muscle limitation as well. Then it is particularly important to begin with low intensity activities or activities that they are comfortable performing. Adding activities of higher intensity should be done slowly when the individual's self monitoring skill established. The frequency of the exercise refers to the number of times the exercise is performed (e.g. times per week). When exercise intensity levels are low, participants are encouraged to increase the frequency of exercise, perhaps to even three or four times a day. Duration of the exercise period refers to the amount of time involved in the exercise (e.g. minutes, hours). Recent strategies for exercise recommend numerous bouts of exercise throughout the day for an accumulation of energy expenditure. It appears that the duration of a single activity is far less important than the accumulation or volume of activities.

The type, intensity and duration of a physical activity determine the energy expenditure during a bout of activity. The amount of physical activity can be described in metabolic equivalent (MET). USDHHS (1999) classified exercise or physical activity for older adults by the level of intensity. Light-intensity physical activity refers to the activity required at approximately less than 3 METs such as sitting, standing and lawn bowling. Moderate-intensity physical activity refers to the activity requiring approximately 3-6 METs such as walking for pleasure, walking to class, work or store, gardening and yard work, housework, taking care of the children, and farming. Vigorous-intensity physical activity refers to the activities and level of effort in which a person should experience

with exertion and greater increase in breathing or heart rate. These activities require greater than 6 METs such as jogging, running, race walking, bicycling, step aerobic, tennis, and swimming.

Therefore the definition of the level of exercise in this study refers to the perception of the elderly performing physical activities as determined by intensity, frequency, and duration of five activities-vigorous activities, leisure walking, moving, standing, and sitting, which significantly improve and maintain well-being and health status.

Participating in moderate physical activity is sufficient to maintain optimal functional performance in older adults. Young, Masaki, & Curb (1995) examined the association of self-reported physical activity with functional performance measured 3 to 5 years later. The subjects were 3,640 Japanese-American men older than 70 years of age. The results showed that for the healthy subsample, those who were highly active in 1988 were more likely to have an optimal function for basic activities of daily living score (odd ratio 2.3; confidence interval (CI) 1.1 to 4.9), home management score (odd ration 1.5; CI 1.1 to 2.1) than subjects classified as low active. Similar results were found for subjects with chronic disease; however, most of the benefits of physical activity for this sub-sample occurred for subjects who were at least physically active at moderate level.

USDHHS (1999) suggested that participating in moderate physical activities can help the older adults more easily perform many activities of daily living. For example, having more flexibility will help the elderly more easily to do things like reach into the cupboard and tie their shoes. Being stronger and having more balance will help the older adults lift and carry items like sacks of groceries and will make it easier to get in and out

of the chair and bathtub. Improving their cardio-respiratory endurance will allow the older adults to do things like climbing the stairs or playing with grandchildren without being out of breath

Ringsberg et al. (2001) investigated the impact of long term moderate physical activity on functional performance, bone mineral density and fracture incidence in elderly women. One hundred and thirty-five women, 68-89 years old, who had participated regularly in moderated physical activity for at least 1 hour a week over the previous 20 years, were investigated. The results showed that the active group needed significantly less help in performing activities of daily living and also rated their own health as good to a significantly higher extent than the controls. Additionally, for quadriceps muscle strength, grip strength, balance and gait speed, the active groups performed significantly better than control groups. The results suggested that the elderly women who persisted with moderate intensity physical activity over many years, performed functionally better, sustained fewer fractures and experienced greater well-being than women in general.

Similarly to Brach et al. (2003) examined the long-term association of physical activity to functional status in community-dwelling older women. Two hundred and twenty-nine older women (mean age, 74.2 years) who were involved in randomized control walking intervention from 1982 to 1985 were subsequently followed up until December 1999. Physical activity in 1985 independently predicted gait speed in 1999 after controlling for age, chronic condition and activity limitation. The consistency of physical activity participation from 1985 to 1995 was also related to functional status in 1999. Women who were always active had a best functional status and women who were always inactive had the worst functional status. The results demonstrated that a

significant relationship between physical activity during a 14-year period and current functional status in older women, thus suggesting that physical activity played a role in maintaining functional performance later in life.

Over participating in moderate physical activity there is various evidence indicating that participating in resistance training exercise (Kalapotharakos et al., 2004; Seynnes et al., 2004), multidimensional home-based exercise programs (Nelson et al., 2004), center based exercise (King et al., 2002) and exercise programs with enriched food regimes (Chin A Paw et al., 2001) significantly affected the improvement of functional performance in the elderly. However, the resistance training exercise program is reported at most (Kalapotharakos et al., 2004; Seynnes et al., 2004; Taaffe & Galvo, 2004; Sayer et al., 2003).

It can be concluded that the level of exercise positively directly effected functional performance. The elderly who were active could maintain or improve their functional performance whereas the elderly who were always inactive could not maintain their functional performance or functional performance declined rapidly. Moreover, participating in exercise means the elderly not only benefit from functional performance improvement, but also benefit in other body systems such as increased muscle strength (Bastone, & Filho, 2004; Kalapothrakos et al., 2004; Hruda et al., 2003; Puggaard; 2005; Taaffe & Marcus, 2000), improved cardiovascular function (Lyndon-Griffith, 2004), flexibility, endurance, and balance (USDHHS, 1999). Therefore the level of exercise is an important factor for predicting functional performance in the elderly. It is included in the proposed model.

3.2.3 Level of social support

Several studies have found that social support plays a vital task in protecting health (Cobb, 1976), preventing health hazard behavior (Zimmerman & corner, 1989), changing behavior such as reducing smoking and alcohol (Mermelstien et al., 1986) promoting health behavior (Pender, 1996), and increasing functional performance in the elderly (Fiksenbaum et al., 2005; Shaw, 2004; Miller, 1995).

Vaux (1988) portrayed social support as the "wind beneath a bird's wing which is an essential part of our flight". It refers to the perceived availability of psychological and instrumental resources which has been shown to be a cause of psychological and physical well-being (Cohen & Wills, 1985). Social support influences health through the main-effect process and the buffering process. The main effect process directly promotes health by completing fundamental social need and social integration. The buffering process occurs when individuals feel stressed. If the people fail to cope with a situation they may feel helpless and experience low self esteem. Perceived adequate support will reduce stress reactions by increasing one's confidence to cope with the stressful event, by solving the problem, by weakening the importance of the problem, or by reducing physiological response to stress (Cohen & Wills, 1985).

According to the functions of social support, Brandt and Weiner (1987) conceptualized social support as a supportive relationship which included five dimensions: 1) intimacy or attachment refers to the supportive relationship that provides that a person gain a sense of security, love, care and place; 2) social integration refers to the support relationship that provides a person with the way to share concern, thoughts, feelings and to exchange activities of services; 3) nurturance refers to the supportive

relationship that provides the person with an opportunity to aid others in need and consequently develop a sense of being needed, this focus is on giving rather than receiving support; 4) worth refers to the supportive relationship that provides the person with a sense of being valued as an individual and social roles; 5) assistance refers to the supportive relationship that provides that the person can rely on the assistance of others including affection or emotional guidance, and help regardless of reciprocity.

In Thailand, the family serves as the central role of support for older adults. The value of filial piety among Thai adult children for older parents is strong because the Thai culture of “parental repayment” is related to Buddhist-based beliefs (Choowattanapakorn, 1999). This phenomenon suggests that when younger Thai people perceive that their parents’ health could benefit from promote functional performance; their actions may strengthen older parent’s resolve to perform activities of daily living. For example, family members may encourage older parents to engage in activities of daily living if they perceive that this will promote the health of their parents. Positive family action can also reinforce a persons’ participation and encourage them to be independent (Kernich & Robb, 1988).

The presence of social support becomes critical when the elderly are in difficulty or are unable to perform activities of daily living and the assistance from their family and social network are an important part of the social support association for functional performance in the elderly. Braungart, Zarit, and Malmberg (2000) examine patterns of social support and assistance among a sample of the oldest elderly, people aged 86 to 94. The results showed that 33% of the sample needed help from their families and social network with basic and instrumental ADL. Most of them received help from their

families to conduct activities for daily living. 11% received help from formal services for conducting those activities of daily living. In the absence of support from family or friends, the elderly may be unable to care for themselves and may have to be placed in residential care. Therefore social support commonly related to the degree of functional performance and impairment of older adults (Mann, 2002; Miller, 1995).

Emotional support from their families also plays an important role in the association with functional performance in the elderly. Seeman et al., (1995) investigated the effects of behavioral and psychological characteristics and social support on functional performance in 1189 elderly aged 70-79 years. The results suggested that a greater frequency of emotional support from their families had a favorable impact on functional performance. They found that emotional support provide a sense of love, care, and security for those elderly who feel difficulty in performing activities of daily living that help them to maintain their functional performance.

Several previous studies indicated that the level of social support directly effects functional performance in the elderly.

Amnatsatsue (2002) conducted a cross-sectional study to examine factors related to functional performance in Thai older adults, living in Bangkok. Data was obtained from 222 Thai community-dwelling older adults. The results from multiple regression analysis showed that age, social support, education, exercise, depression and number of disease were significantly associated with the level of functional performance.

Fiksenbaum et al. (2005) tested the model of functional disability in two elderly populations (178 senior living in the community and 168 in-patients in rehabilitation in the hospital). Results of the path analysis in both samples; seniors living in the

community and in-patients in rehabilitation in the hospital, showed that social support had a negative direct effect on function disability (B = -.28, p< .001; -.15, p< .05). The results indicated that social support leads to lower functional disability or higher functional performance. The elderly perceived that with greater assistance from performing activities daily livings, their level of social support increased. The results suggested that the amount and satisfaction of social support which the elderly received is important. It directly affected their functional performance.

Shaw (2004) determined the effect of the level of the anticipated support reported by older adults on functional disability. Survey data was collected from nationwide samples of 1,103 older adults aged 60 to 95. Ordinary least square regression analysis was used to test the relationship between social support and functional disability. The findings revealed that the level of social support was inversely associated with functional disability. Greater risk of functional disability was confined mostly to those elderly reporting lower than average levels of social support. This association was particularly strong with respect to instrumental support. The findings suggested that the perception of social support may enhance functional performance in older age.

From literature reviews it is found that social support is a significant factor positively related to functional performance in the elderly. Therefore, the level of social support is included in the proposed model and the present study has hypothesized that social support will have a direct effect on functional performance in Thai elderly

3.2.4 Depression

Depression is one of the psychiatric illnesses appearing most frequently among the aged population. Depression in the aged differs in several ways from that of younger

adults. One of the major differences is the insidious manner in which depression develops and the concurrency with other events, which results in depression, frequently going unrecognized and untreated (Miller, 1995).

There appears to be some divergence of statistical data on its prevalence among the elderly population, though most studies have found a prevalence rate of depression of between 5% to 15% among seniors in the United State as well as various countries throughout the world (Dunlop et al., 2005). In Thailand, Jitapunkul et al. (2001) reported that 20 % of Thai elderly had depression while as Thongtang et al. (2002) studies showed the prevalence and incidence of depression in Thai elderly was 12.78. Much of the divergence in depression statistics seem to be explained by the differences in the assessment tool as well as the specific definition of depression utilized.

Smarr (2003) reviewed the instrument tools for screening depression and found that several assessment tools were developed to measure current levels of depressive symptomatology in a general population including Beck Depression Inventory (BDI) developed by Beck (1961), Center for Epidemiological Studies-Depression Scale (CES-D) developed by Radloff (1977), Geriatric Depression Scale (GDS) developed by (Yesavage, 1982), and Hospital anxiety and depression scale (HADS) developed by Zigmond and Snaith (1983). The target population for them is the general population except for the Geriatric Depression Scale (GDS) that focused on elderly population. However, all of them were developed based on a western context. In Thai, Jitapunkul et al (1994) developed the instrument tool (Geriatric Depression Scale Thai version) for screening depression in order to measure the current level of depressive symptoms in older adults. This instrument is very useful and because it's psychometric is good the

Geriatric Depression Scale Thai version was used to measure the current level of depressive symptom in the study sample.

The variation of depression scores in the elderly is not only related to the differences in instrument tools but is also related to the diversity of cause factors. The difference in factors has an unequal influence on the depression level in the person. In fact, many factors cause depression in the elderly including medical disorder (cancer, cardiovascular disorder, endocrine disorder), alcohol abuse, negative thought patterns, cognitive dysfunction, loss of a spouse or partner, loss of social support, and lower income (Ebersole, Hess, & Luggen, 2004).

At older adulthood, the elderly are often at risk from depression because of the disruption to their social network over time. Due also to their children possibly moving to another city or country for their career and family income, spouses and their friends become ill and die (Zimmer et al., 2003; Jitapunkul et al., 2001) then they live alone. For some elderly becoming retired also reduces their social relationships. Moreover, most of the elderly usually have chronic illnesses which prevent them from participating with others in their usual activities. The loss of several things in their life over a short period and facing chronic illness causes the elderly to become vulnerable to depressive symptoms (Stenback, 1980; Miller, 1995). Therefore, depressive symptoms are more frequent among the oldest elderly because physical dysfunction and low personal control add to personal and status loss (The Finnish Center for Interdisciplinary Gerontology, 2004; Miller, 1995; Mirowsky & Ross, 1992).

Depression has a negative affect on functional performance in the elderly (Mossey et al., 2000; Penninx et al, 1998; Miller, 1995). There are several reasons to

explain the relationship between depression and functional performance. First, the depressed elderly have significantly more somatic complaints than those who are not depressed. Somatic complaints include appetite disturbance: anorexia, starvation, flatulence, constipation, sleep disturbance, diminished energy and chronic fatigue. These somatic symptoms have a direct affect on basic activities of daily living for the elderly (Penninx et al., 1998; Miller, 1995).

Second, depressed elderly, as with seriously depressed people of any age, are likely to experience psychomotor agitation or retardation. Psychomotor retardation is manifested as a slowed body movement and slow verbal responses, sometimes to the point of muteness. In contrast to psychomotor retardation, psychomotor agitation, older adults may be unable to sit still, may have verbal outbursts: shouting, and may have compulsive behavior: frequent toileting or hand washing. If it influences the elderly's difficulty to conduct their activities then functional performance in the elderly is reduced (Miller, 1995).

Finally, the influence of depression on the psychological health of the elderly leads them to feel sad, have diminished life satisfaction, low self-esteem and negative feelings about themselves. This leads to a loss of interest in conducting their activities and has an affect on functional performance decline in the elderly (Miller, 1995).

Various reliable clinical evidence has supported the view that depression has a negative affect on functional performance in the elderly. Penninx et al. (1998) examined whether depressive symptoms in older people increased the risk of subsequent decline in physical functions as measured by objective performance based tests. There were 1286 Iowa and Washington older participants who completed a short battery of functional

performance tests in 1988 and again 4 years later. The results showed that increasing levels of depressive symptoms were predictive of a greater decline in physical performance over the 4 years. Even among the older adults at the high end of the functional performance spectrum who reported no disability, the severity of depressive symptoms predicted a subsequent decline in functional performance.

Kempen et al. (1999) conducted a 2-year longitudinal study to examine the impact of depression on changes in functional performance among 574 low-functioning adults aged 57-91 years. Functional performance was measured by self-reported and performance tests. They found a significantly stronger association between changes in depression symptoms and changes in self-reported functional performance ($r = .26$) than between those and changes in performance based functional performance ($r = .13$).

Horbunlerkit (1993) examined factors associated with functional disability in Thai elderly. The results showed that the elderly who are independent and dependent in IADL have levels of depressive symptoms of a statistical difference ($p < .005$). The results of this study indicted that the elderly who performed instrumental activities in daily living independently had lower depressive symptoms than the counterpart group who performed instrumental activities of daily living dependently.

Amnatsatsue (2002) conducted a cross-sectional study to examine factors related to functional performance in Thai older adults, living in Bangkok. Data obtained from 222 Thai community-dwelling older adults. The results from multiple regression analysis showed that depression was negatively significantly associated with the level of functional performance.

However, this is in contrast with the study of Hay, et al (2001) who examined the interactive effects of depressive symptoms and social support on functional performance of the elderly patients with unipolar major depression. The results showed improved scores on instrumental activity of daily living and stable scores on basic activities for daily living. In adjusted analyses, social support provided marginal protection against the worsening of functional performance scores. The results indicated that large social networks, more frequent social interaction and perceived adequacy of social support play a modest buffering role against a decline in functional performance in the depressed elderly patients. Moreover, the researcher found that the buffering effects of social support against functional performance decline would be strongest among the most severely depressed patients. A stronger compensatory effect for social support among the most depressive patients preserve and improve their ability to perform basic activities of daily living. Therefore the level of depression had no significant effect on functional performance decline in this group. In a longitudinal study of community-dwelling elderly subjects (Hay, et al., 1997) social support was found to buffer the effect of depression on the risk of functional impairment too.

The explanation was given that social support may buffer the neuroendocrine effect of depression. Greater social interaction may encourage depressed people to remain physically active, decreasing the potential severity of functional impairment. An ability to conducting activities of daily living in the elderly may also be greater in the presence of a supportive environment. Therefore depression had a non significant direct effect on functional performance in the ederly.

In summary, according to Miller (1995) and most literature it was indicated that depression has a negative direct effect on functional performance in the elderly but there have been inconsistencies in the results when this association in the present study needed to be examined. Hence, depression is included in the hypothesized model.

4. Relationships among factors related to functional performance

4.1 Chronic illness and depression

Chronic illness and depression most commonly coexist in older adults. There have been various studies that have indicated that depression is highly prevalent in people with chronic illness (Lyness et al., 2006; Egede, 2005; Egede, Nietert, & Zheng, 2005). Approximately 30% of people with diabetes have depression and there is a two-fold increase in the odds of having depression among people with diabetes (Egede, 2005). In addition, studies have shown that depression co-occurs in a substantial proportion of patients with hypertension (Abas, Hotopf, & Prince, 2002), coronary artery disease (Egede, Nietert, & Zheng, 2005; Barefoot et al.,1996), chronic arthritis (Dicken et al., 2002), stroke (Provinciali & Coccia, 2002), chronic obstructive pulmonary disease (Van Ede, Yzermans, & Brouwer, 1999), end-stage renal disease(Lopes et al., 2002) and congestive heart failure (Koenig, 1998). It is consistent with the evidence indicated by Kriegsman, Deeg, and Stalman (2004) that people aged 70 years and over usually have 2-3 chronic illnesses. In Thailand, the previous study showed that approximately 70% of Thai elderly have at least 1-2 chronic illnesses (Jitapunkul et al., 2001).

To understand how the number of chronic illnesses influences the likelihood of having depression in people, Egede (2005) examined the effects of coexisting with a prevalent chronic condition and the odds of depression in adults with diabetes. Data on

1794 adults with diabetes from the 1999 National Health Interview Survey were analyzed. Six chronic conditions were identified including hypertension, coronary artery disease, chronic arthritis, stroke, chronic obstructive pulmonary disease and end-stage renal disease. The findings revealed that the odds of having major depression among people with diabetes increased from 1.31 in those with one additional chronic condition to 4.09 in those with three or more chronic conditions (compared with those with diabetes alone).

These finding clearly showed that a large component in the increased prevalence and odds of having major depression in people with diabetes is accounted for by coexisting chronic comorbid conditions or a number of chronic illnesses. It seems plausible that these chronic illnesses are surrogates for diabetes in duration and severity and so represent an increased psychosocial burden of illness. Alternatively, it is also plausible that these chronic conditions may have biological effects that individually and collectively increased the risk of having depression (Egede, 2005).

Similarity with the study of Lyness et al. (2006) which examined the relationship between several chronic illnesses including diabetes disease, chronic obstructive disease, neurological disease and hypertension and depression in a sample of 546 primary care patients aged 65 years and over. The findings revealed a number of chronic diseases independently associated with depression and functional ability. Older people with several chronic illnesses usually have pathological defects in various organs causing much more symptoms such as fatigue, restlessness, tiredness, anorexia, fainting, dyspnea, chest pains etc. The combination of various symptoms influences the older person to suffer more and go through the depression. However, there are costs and treatments of a

number of chronic illnesses independently related to depression too. This means chronic illness had a positive relationship with depression.

Describing the relationship between chronic illnesses, depression and functional performance in the elderly, Egede (2004) determined the prevalence and odds of functional disability in individuals with diabetes and comorbid major depression compared with individuals with either diabetes or major depression alone. Data on 30,022 adults from the 1999 National Health Interview Survey (NHIS) was analyzed. Four disease categories were created: no diabetes and no major depression, major depression alone, diabetes alone and diabetes and comorbid major depression. Comorbid conditions included chronic arthritis, chronic obstructive disease, coronary artery disease, strokes or heart failure. The author needed to test the hypothesis that the people with diabetes and comorbid major depression would have a higher prevalence of functional ability and that after controlling for relevant covariates, they would have higher odds of functional disability compared with individuals with either diabetes or major depression alone. The results demonstrated that the odds of functional disability are significantly higher in individuals with diabetes and comorbid major depression than individuals with either diabetes or major depression alone.

The plausible explanation for this relationship is that depression is hypothesized to decrease the functional performance by the combination of bilological and psychological mechanisms (Penninx et al., 1998). Psychological distress and subsequent neurohormonal and immunological are thought to increase susceptibility to disease, while a persistence of somatic symptoms of depression is thought to worsen functional performance over time. A depressed mood is thought to interfere with physical recovery

by impeding treatment seeking, and adherence to treatment. Chronic illnesses have an effect on functional performance via the development of multiple complications and the severity of symptoms. Multiple mechanisms are likely to mediate the relationship between chronic illness and depression and functional performance. Therefore it could be indicated that chronic illness had a negative direct effect on functional performance and an indirect effect through depression.

4.2 Social support and depression

In older adulthood there are several stressful life events which occur such as loss of lovers, including their wife or husband, friends and particularly the occurring of chronic illness. These stressful life events influence the occurance of depression and functional performance declines in the elderly. Many studies have indicated the association between chronic illness, depression and functional performance (Lyness et al., 2006; Egede, 2005; Abas, Hotopf & Prince, 2002).

In order to reduce the impact of a stressful life, the elderly need support from their resources including from family members and friends or other relatives (Miller, 1995). Particularly, for the oldest aged, they are at a vulnerable age where they are likely to experience functional limitations that require regular assistance, as well as having weakened social support.

It is consistent with Pender (1996) who conceptualized about the effects of social support. Social support decreases the likelihood of stressful life events and buffes the negative effects of a stressful life even through influencing interpretations of events and emotional responses to them by providing feedback or confirmation that actions are leading to anticipation and socially desirable consequences.

Hay et al. (2001) examined the interactive buffer effects of social support on the association between depression and functional performance of the elderly patient with major depression. The researcher found that buffering the effect of social support against functional performance declined among the most severely depressed patients. A stronger compensatory effect for social support among the most depressive patients preserved and improved their ability to perform basic activities of daily living.

Among the elderly, resilience is an important attribute that is needed for successful adjustment to change. Meaningful social relationships contribute to the resilience needed for a successful adjustment to the difficulties associated with aging (Cartensen, 1992). Inadequate social support is directly or indirectly associated with poor physical and mental health (Schoenbach et al., 1986; House, Robbin, & Metzner, 1982). Social support is associated with a positive affective state such as increased feelings of intimacy, nurturance, social integration, heightened self-worth, and assistance. It can be a source of useful information that enhances coping (Fiksenbaum et al., 2005; Pender, 1996).

Social support is important because the elderly have faced functional limitations that requires available assistance from their resources (Miller, 1995). The absence of social support or social support perceived by the elderly to be of a low quality increases the risk of depression (Mann, 2002). According to this, the elderly with inadequate social support are more susceptible to developing depression. Therefore levels of social support has a negative relationship with depression. It means that those elderly with adequate social support are less susceptible to developing depression.

Several studies have found that higher social support is associated with low levels of depression (Greenglass et al., 2006; Fiksenbaum et al., 2005; Jang et al., 2002; Antonucci, Fuhrer, & Dartigue, 1997; Oxman et al., 1992). A description about the the relationships between them is presented below.

Antonucci, Fuhrer and Dartigues (1997) analyzed data from 3.777 non-institutinalized older adults living in southern France and found that respondents with social integration, and those who were satisfied with the quality of their social relationships reported significantly lower levels of depressive symptomatology. Fiksenbaum, et al. (2005) tested the model of functional disability in two elderly populations (178 seniors living in the community and 168 in-patients in a rehabilitation of the hospital). Results of the path analysis in sample living in the community showed that social support had a negative direct effect on function disability and depression. That is, individuals who were satisfied with social support reported lower levels of depression and functional disability or higher functional performance. Similarly, Jang et al. (2002) found that higher levels of social support had a significant direct effect on depression.

Furthermore, Cumming and Cockerman (2004) examined the effects of social support on depression in the assisted living older adults. They found that residents who view their social networks more negatively and require greater assistance for conducting activities in daily living experienced higher levels of symptoms of depression .

More recently, Greenglass et al. (2006) tested a psychosocial model of functional disability in older adults. Respondents were 224 community-residing older adults. The findings demonstrated that social support had an indirect effect on functional disability through depression ($\beta = 0.07$, $p<.01$). The elderly who reported receiving high levels of

social support had lower depression scores but less functional disability since the social support provided useful supportive resources for them. The emotional support from their families and social networks released their stress, making them feel relaxed. They therefore felt in a good mood, convincing them to maintain their functional performance. Additionally, the assistance from their family and social networks when they had difficulties in conducting activities of daily living directly increased their functional performance.

Taken together, these results suggest that social support should have a positive direct effect on functional performance and indirect effect on depression.

4.3 Exercise and muscle strength

A decline in muscle mass associated with a reduction in muscle strength is a well-known consequence of aging. These changes impinge on the functional performance for independent living and contribute to frailty and fracture risk (Taaffe & Marcus, 2000). The changes in muscle strength reflect the aging process as well as the consequence of reduced levels of exercise. As individuals retire from employment, they may become sedentary and often eventually rely on others to assist them in ADL. The difficulty to perform activities in daily living could lead to disability resulting from underuse, muscle atrophy, loss of flexibility and diminished endurance (Carlson, 1999).

Maintenance of moderate intensity in physical activity would slow the age-related decline in strength and maintain functional performance in older adults. Ringsberg et al. (2001) investigated the impact of long term moderate physical activity on functional performance, muscle strength, bone mineral density and fracture incidence in elderly women. The results showed that the active group needed significantly less help in

performing activities of daily living. Additionally, for quadriceps muscle strength, grip strength, balance and gait speed, the active groups performed significantly better than the control group. The results suggested that the elderly women who persist with moderate intensity physical activity over many years, performed functionally better, sustaining more muscle strength than women in general.

This is a similar case to the study of Rantanen, Era, and Heikkinen (1997) that examined the effects of everyday physical activity on strength alteration over a period 5 years in one hundred and one men and one hundred and eighty six women aged 75 years. The participants were divided into four groups on the basis of the level of everyday physical activity: (a) remained active, (b) remained sedentary, (c) decreased activity, (d) increased activity. The results revealed that the remaining active group maintained their muscle strength at a higher level than the sedentary group. In the decreased activity group, the rate of decline in muscle strength was greater than in the active group. The results of this study suggested that undertaking everyday physical activities such as household work, walking, and gardening which is the most common physical activity or exercise of older adults, may play an important role in maintaining strength at an adequate level for independent living.

However, several experimental studies indicated that resistance training programs prevented the age-related decline in muscle strength and hence improved the functional performance for older adults (Kalapothrakos et al., 2004; Bastone, & Filho, 2004; Hruda et al., 2003; Puggaard, 2003; Taaffe & Marcus, 2000). Most common benefits of the resistance training program is increasing muscle strength and endurance. In addition, resistance exercise improves cardiovascular strength(Vincent et al., 2002), it improves

functionality related to such activities as getting up from the bed to the chair (transferring), walking, mobility, climbing stairs (Penninx et al., 2002), improves balance and flexibility, increases bone mass, strengthens connective tissue, reduces body fat and glucose tolerance (Posner et al, 1992).

In reviewing previous studies concerning how the duration of resistance training programs affected muscle strength decline or improved muscle strength it has been found that the short term training influencing improvements in muscle strength was 12 weeks of training, 3 days per week at 80% percent of their one repetition maximum (1-RM, the maximum amount of weight lifted at one time). Knee strength increased by 69-100% (Frontera et al., 1988; Charette et al., 1991).

Exercise programs will be effective when they meet the needs of older adults. Apart from apprehension exercise itself, several factors affected the ability of older individuals to participate, such as access to exercise facilities or time availability. In the case of resistance exercise, the elderly reported that it is the risk of injury when they engage in this exercise. At the beginning of the engagement the resistance exercise needs special equipment and training in exercise centers which means it is difficult for them to regularly conduct this type of exercise (Resnick, 2003). Therefore participating in moderate physical activity of the elderly should be a useful strategy that elderly people engage in to prevent the loss of muscle strength, and maintain their functional performance. Thus this study needs to examine what level of exercise has a positive direct effect on functional performance through muscle strength.

Summary

After studying previous research, published between 1991 and 2007, concerning functional performance in the elderly, it could be summarized that there are many significant factors (including muscle strength, vision, chronic illness, the level of exercise, the level of social support and depression) related to functional performance in the elderly. Various evidences have indicated that muscle strength, vision, the level of exercise, and the level of social support has a positive direct effect on the functional performance in the elderly. Moreover, chronic illness and social support has an indirect effect on functional performance though depression and the level of exercise has an indirect effect on functional performance through muscle strength. Based on the literature review, gaps of knowledge in this subject could be evaluated and summarized as shown in the following section.

The results from previous research could only partially explain factors related to functional performance of Thai elderly because only a few studies have been conducted in the Thai context. Most of the studies examine the relationship between one or two selected factors and functional performance. Particularly, they emphasized only the direct effects of the factors on the levels of functional performance. There are also few studies providing an understanding of indirect effects of factors on functional performance and also few provided the interrelationship among factors related to the functional performance of Thai elderly. The relationship between many significantly related factors and functional performance and the interrelationship between those factors is still not established. There are problematic conclusions about the relationships and the interrelationship between significant factors and functional performance in the elderly.

There are inconsistencies in the results because of using different research methodology, conducted in different settings and populations. It might be inappropriate to generalize about existing knowledge in a Thai context. Furthermore, a basic knowledge relevant to functional performance in Thai elderly is still not clear. This information is essentially needed to develop the effective nursing intervention for maintaining or improving functional performance in Thai elderly. The basic knowledge to establish useful nursing intervention and nursing care in order to promote or enhance the functional performance in Thai elderly is still required. Thus, the study of a causal model of functional performance is important and necessary.

To resolve this problem, the study on the development of a causal model of functional performance of Thai elderly is organized to study and to examine the direct effects of significant factors including muscle strength, vision, chronic illness, levels of exercise, levels of social support and depression on functional performance, to examine the indirect effect of chronic illness, and social support on functional performance through depression and the indirect effects of levels of exercise on functional performance through muscle strength in Thai elderly randomly sampled from various regions in Thailand. The study has been conducted to obtain the information in order to gain a better understanding of the relationships and interrelationships between factors and functional performance of the elderly. The findings would lead to acquiring a greater understanding of the nursing implications. The findings would play a major role in the development of intervention to promote functional performance and a healthier lifestyle for the Thai elderly.

CHAPTER III

RESEARCH METHODOLOGY

This chapter describes the research design and methods that were used to conduct the present study. The research design, population, sampling technique and sample selection, instrumentation, protection of human subjects, data collection and data analysis procedure are included.

Research design

A descriptive correlational, cross-sectional research design was used to test a proposed model of factors contributing to functional performance, in Thai older person, and to explore relationships among variables including muscle strength, vision, chronic illness, level of exercise, level of social support, depression and functional performance. According to Polit and Hungler (1995), the correlational, cross-sectional design has the many advantages. It is appropriate when budget is limited or less time available. A correlational design allows the investigator to explore the relationships among variables as they naturally occur without any artificial manipulation. A cross-sectional design allows the researcher to collect a large amount of data in an economic way.

However, this design is limited in its ability to explain the causal relationship between variables due to a lack of manipulation or control of the independent variables (Polit & Hungler, 1995). Several independent variables in this study are not amenable to manipulation (i.e., chronic illness, vision, and depression). Therefore, a descriptive, correlational design is appropriate.

Population and sample

The population for this study was Thai elderly persons aged 60 years of age and over who reside in communities from each part of Thailand including Northern, Southern, Central, Northeastern, and Eastern parts. These older people were studied because (1) most of Thai elderly are living in the communities (2) Thai older people in these area live an agricultural lifestyle, which is the predominant lifestyle of people in Thailand.

Sample size

For structural equation modeling (SEM), no definite formula for calculating sample size is mentioned by Joreskog & Sorbom (1996-2001). However, Hair et al. (1998) suggested that a minimum ratio is of at least 5 respondents for each estimated parameter. The most appropriate ratio is 10:1 (Hair et al., 1998). The parameter refers to the relationship between two variables (Hoyle, 1995). A free parameter is a parameter with unknown value, which is to be estimated from data and assumed to be non-zero, while a fixed parameter is not estimated from data and has a value fixed at zero (Hoyle, 1995; MacCallum, 1995). In this study, the hypothesized model contained 29 free parameters; thus a sample size of 290 was the minimum requirement. The addition of 10% of minimum requirement was employed to cover the attrition of the sample selected. Therefore, a sample of 320 Thai elderly was recruited for this study.

Sampling technique

In order to meet the general statistical assumption of SEM which is a normal distribution of the sample (Munro, 2001), a stratified four-stage random sampling was used to yield a probability sample of Thai elderly as illustrated in Figure 3.1

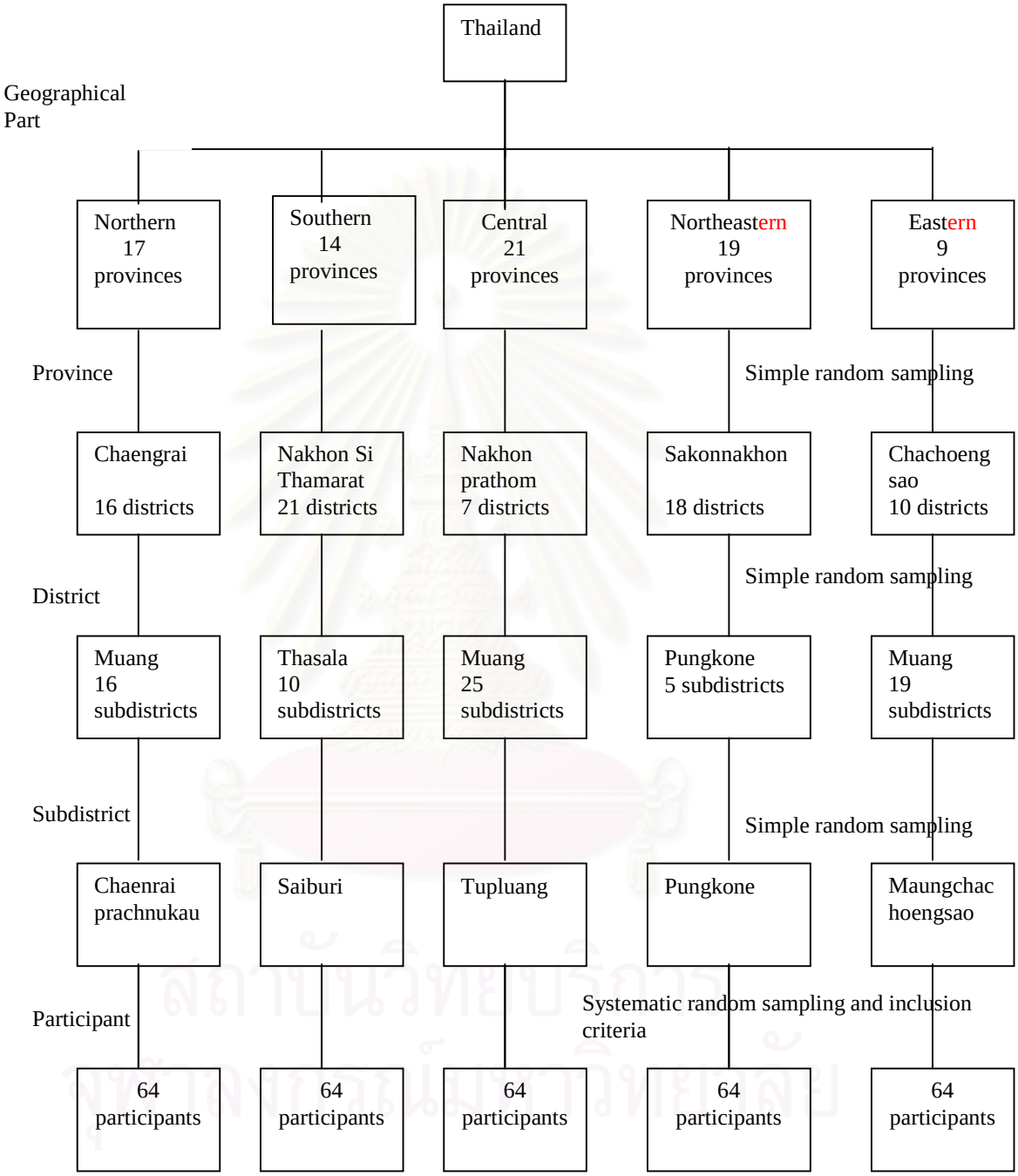

Figure 3.1 Stratified four - stage random sampling

Thailand is divided into five parts according to the geographical area including Northern, Southern, Central, Northeastern, and Eastern parts. Each part consists of 9-21 provinces which have similar population characteristics. Each province is comprised of several districts or amphoe. Each district consists of several sub-districts or tumbol including inside and outside of the municipal areas.

Stage 1. One province was randomly selected from each part

Stage 2. One district was randomly selected from each province

Stage 3. One subdistrict was randomly selected from each district

Stage 4. In each subdistrict, 64 participants were selected by a systematic sampling technique from a name list (family folder) of each primary care unit in each sub-district together with inclusion criteria. To contract each participant, the community nurses who are working in each PCU were asked by the researcher or investigators to make an appointment with each potential participant. After that the researcher or investigators contacted potential participants to invite them to participate in the study.

Sample selection

A participant was recruited into the study based on eligible criteria as follows: (1) aged 60 years or over, (2) having no cognitive impairment and achieving the CMT (Chula Mental test) score of at least 15 point, (3) does not have any severe illnesses such as severe hypertension and blood pressure uncontrolled, acute stroke, chest pain, hyperglycemia, hypoglycemia, post-operation, and severe weakness, (4) no hearing loss and (5) willing to participate in this study. Severe illnesses were determined by reviewing medical diagnosis from family folder and assessment general appearance of the participant such as severe headache, dizziness, fainting, palpitation, and chest pain

Instrumentation

Several types of instruments were employed to collect the data addressing the research proposes, including the interviewing form, the data collection form and the special equipment required for physical testing. The interviewing forms included the personal information sheet, the Chula Mental Test, the Yale Physical Activity Survey, the Personal Resource Questionnaire (PRQ 85), the Geriatric Depression Scale (GDS), the Chronic Illness questionnaire and the Modified Barthel ADL Index and the Chula ADL Index. The data collection forms consisted of the muscle strength recording form and visual acuity recording form. The equipment used included the leg dynamometer and the Snellen vision chart. The variables and its indicators or instruments are present in Table 3.1

Table 3.1 Variable and their indicators or instruments in the study

Variable name	Indicators or instruments
• Muscle strength	Score assessed by Leg dynamometer and recorded on the Muscle strength recording form
• Vision	Visual acuity score assessed by Snellen chart and recorded on the visual acuity form
• Chronic illness	Number of chronic illnesses or diseases assessed by chronic illness questionnaire
• Level of exercise	Score assessed by Yale Physical Activity Survey
• Level of social support	Score assessed by PRQ 85

• Depression	Score assessed by Geriatric Depression Scale (GDS)
• Functional performance	Composite score of the Modified Barthel ADL Index and the Chula ADL Index

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Testing the psychometric properties of the instruments

All of instruments were examined for reliability and content validity by 5 geriatric experts including one expert in geriatric medicine, one expert in geriatric community nursing, one expert in instrument development and two experts in geriatric nursing (Appendix C). Details of each instrument are presented below.

1. Chula Mental Test (CMT)

The Chula mental test for the elderly, an interviewing form, was developed by Jitapunkul, Lailert, and Worakul (1996) to assess the cognitive function of the elder who has difficulties in reading and writing. There are 13 items listing cognitive function. The responses to the item are coded on a dichotomous scale of 0 (incorrect) and 1 (correct) in which item 5 and item 12 have two sub-scales, and item 3 and item 13 have three sub-scales. Therefore, the possible summation of all items to represent the cognitive function ranges from 0-19. The sum score represents the cognitive function of the elderly. The interpretation of the categorical cognitive function including scores 0-4 referring to severe cognitive impairment, scores 5-9 referring to moderate cognitive impairment, score 10-14 referring to mild cognitive impairment, and scores 15-19 referring to normal cognitive function

Validity: In the previous study the expert panel, including two neurologists, two psychiatrists and two psychologists determined the content validity of the CMT. To conduct the concurrent validity and criterion validity, the CMT was applied to 212 residents at a home for the elderly in Bangkok. The results showed that concurrent validity was indicated by the strong correlation between the Mini-Mental State Examination (MMSE) (r = 0.78) and the Abbreviated Mental Test (AMT) (r = 0.78). Criterion validity was demonstrated by the ability of the CMT to detect clinical diagnosed dementia with a sensitivity of 100 percent and a specificity of 90 percent (Jitapunkul, Lailert, & Worakul, 1996).

Reliability: The results of the CMT reliability using test-retest kappa coefficient and an internal consistency coefficient (Cronbach's Alpha) were 0.65 and 0.81 respectively (Jitapunkul, Lailert, & Worakul, 1996). Chinuntuya (2001) demonstrated the reliability testing of CMT in the elderly residing in the community, the KR 20 reliability coefficient was .84. In the present study, the reliability testing was calculated from the trial data of 30 elderly who resided in a home within the Thai community. The KR 20 reliability coefficient obtained was .82

2. Personal information sheet

The purpose of the Personal information sheet was to collect information regarding personal and social background. This form comprised of items concerning age, gender, religion, marital status, educational level, working status, income, source of income, caregiver, and perceived health status.

3. The Personal Resource Questionnaire

Level of social support in this study was assessed by the Personal Resource Questionnaire (PRQ 85 Part 2). It was developed by Brand and Weinert (1987). The authors modified this version from the older model, the PRQ 82. The PRQ85 was a self-report tool consisting of two parts. Part I consisted of ten life situations in which a person needed some help and information. It focused on descriptive information about the individual' s social network, such as the number and type of resources, all of which strongly reflect the western culture and context and were out of the scope for this study. Therefore this part was not applied to this study. The PRQ 85 Part 2 assessed the adequacy of the individual's perceived level of social support. The instrument, based on the Weiss (1974) model of relational function, included five dimensional subscales: intimacy, social integration, nurturance, worth and assistance. The PRQ 85 Part 2 consisted of 25 items, five items for each subscale on the Likert scale ranging from strongly agree (5), agree (4), neutral or uncertain (3), disagree (2) and strongly disagree (1). The total score was calculated by the summation for the scores of the 25 items, ranging from 25 to 125. The higher the score means a higher level of social support.

To produce simple cut-off points that facilitates interpretation and use for description of level of social support variable in this study sample. The researcher set up the total score into a five interval width. The rational was based on the equal weighting of the question items produced among the five social support dimensions. It was presented as the followings.

Range of total scores	Level of social support
25.0 - 45.0	Low
45.1 - 65.0	Slightly low
65.1 - 85.0	Moderate
85.1 - 105.0	Slightly high
105.1 - 125.0	High

Similarly, to understand the data interpretation of each dimension of social support the cutting point of the score was set up into five interval width as followings

Range of total scores of each dimension	Level of each dimension
5.0 - 9.0	Low
9.1 - 13.0	Slightly low
13.1 - 17.0	Moderate
17.1 - 21.0	Slightly high
21.1 - 25.0	High

This instrument was widely applied to numerous research studies examining social support and has demonstrated sound psychometric properties (Weinert & Tilden, 1990; Johnson, 1996; Zone, 1997; Han, Kim & Weinert, 2002; Logsdon; 2006). The PRQ 85 was translated into several languages such as Chinese, Japanese, Spanish, Korean, and Thai (Han, Kim & Weinert, 2002). Puttapitukpol (2001) back translated this instrument into a Thai version and then the Thai version was applied to this study.

Validity

The convergent validity of the Personal Resource Questionnaire was conducted in cross sectional design in which 100 men and women through church groups, clubs and

personal contacts (Brand & Weinert 1987). The study compared the PRQ 85 with five other prominent measures of social support and with one measure of individual affective state to examine convergence across support measures and to discriminate between social support measures and individual affective states. These measures were a) the Interpersonal Support Evaluation List, (Cohen, Mermelstein, Kamarck, & Hoberman, 1985); b) the Social Support Scales, (Lin, Dean, & Ensel, 1981); c) the Norbeck Social Support Questionnaire, (Norbeck, Lindsey, & Carrieri, 1981); d) the Cost and Reciprocity Index, (Tilden, personal communication, March 11,1986); e) the Inventory of Socially Supportive Behaviors, (Barrera, 1985); g) the Profile of Mood States, (McNair, Lorr, & Doppleman, 1971). The PRQ 85 Part 2 was found to be significantly related to all measures. Since the PRQ 85 is viewed as a construct composed of five underlying dimensions: intimacy, social integration, nurturance, worth, and assistance. There were moderate intercorrelations among the five subscales across the studies. The correlation among subscales ranged from .52 to .73 (Weinert, 1987).

In this study, the construct validity was tested by confirmatory factor analysis in 320 Thai elderly. The results indicated the measurement model of level of social support fitted data very well (Appendix H). The results revealed that five factors were observed. It means that the instrument had the construct validity. The results were presented in the Table 3.2.

Table 3.2 Confirmatory factor analysis of measurement model of level of social support

Construct (number of indicators)	Loading and reliability of indicators			
	Loading	**Standard error**	**T value**	**R^2**
1. Intimacy (5)	0.49-1.00	0.06-0.11	4.52-14.65	0.07-0.58
2. Social integration (5)	0.76-1.00	0.08-0.08	9.53-11.86	0.31-0.51
3. Nurturance (5)	0.36-1.00	0.07-0.09	4.05-11.53	0.05-0.54
4. Worth (5)	0.40-1.00	0.07-0.10	4.29-11.18	0.06-0.54
5. Assistance (5)	0.29-1.02	0.09-0.12	2.49-10.81	0.02-0.44
$\chi 2$ = 253.87; df = 230; p = 0.13; GFI = 0.94; AGFI = 0.92; RMR = 0.02				

Reliability

Initially, a cross sectional design in which 100 adults obtained from a university was employed for test-retest reliability and internal consistency of the scale. The test-retest reliability coefficient for PRQ 85 Part 2 was r = .72, p < .001. The results suggested that there was stability in perceived support as measured by PRQ 85 over a 4 to 6 week period. The internal consistency of total perceived support scale (PRQ part 2) was estimated using Cronbach's alpha. The reliability coefficient for total scale was α = .93 at time 1. Subscale reliability coefficient ranged from .79 -.88. At time 2 the reliability coefficient for total scale was α = .91. The subscale reliability coefficients ranged from .70 to .88. These results suggested that good internal consistency for total scale and average internal consistency for individual subscale; intimacy, social integration, nurturance, worth, and assistance (Brand & Weinert, 1987),

Concerning Thai elderly, the results of the studies indicated that the PRQ Part 2 had strong internal consistency. Suwanaroop (1999) and Vannarit (1999) proposed that the alpha coefficients were .86 and .79 respectively.

From the trial data in this study, internal consistency was established by using cronbach's alpha coefficient in 30 elderly who reside in a home within the Thai community. The alpha coefficient for total scale was .92. After obtaining the data in 320 Thai elderly, the reliability coefficient of this instrument was analyzed. The cronbach's alpha coefficient for total scale was 0.91.

4. Level of exercise

The level of exercise in this study was assessed by the Yale Physical Activity Survey (YPAS). The YPAS was developed by DiPietro et al (1993). It is an interviewer-administered questionnaire which was specifically developed to assess the range of exercise by the elderly person's exercise because most physical activity surveys have been developed for a younger population and may not be sensitive enough to accurately represent the true range of activity engaged in by an older population. Typically the assessment of exercise should be concerned with the type of exercise, the time spent on exercise, including frequency and duration during a typical week in the past month and expressed in hours per week. Time in each exercise is multiplied by the intensity code to be energy expended (DePietro et al., 1993).

The Yale Physical Activity survey is composed of 2 parts. Part I of the YPAS consisted of an energy expenditure assessment which calculated the form of a specific type of activity, the duration of time for conducting each activity (hours per week) multiplied by the intensity code and then summed up for all activities to create the energy

expenditure index. Since these specific activities relatively reflect a western context and it may not be suitable for a Thai context; therefore part I of YPAS was not used in the present study.

The second part comprising seven questions was designed to assess five activity indices including vigorous physical activity, leisure walking, moving, standing, and sitting, which the elderly perform in a typical day during the last month. All activity indices were believed to reflect the level of exercise. Each activity index was created based on a frequency score, multiplied by the duration of time to conduct each activity (hours per day) and multiplied again by its weighting factor. The weights were based on the intensity of the activity index. The vigorous physical activity index was assigned a weight of 5; the leisure walking index was assigned a weight of 4; the moving index was assigned a weight of 3; the standing index was assigned a weight of 2; and the sitting index was assigned a weight of 1. The summation of these five activity indices referred to the level of exercise or physical activity in the elderly. A higher score means a higher level of exercise. The possible range of the score was from 0 to 137. Only the second part of YPAS was used in this study.

Validity:

At the beginning, the validity of YPAS was tested in 25 senior people living in communities in Connecticut, U.S. (Depietro et al., 1993). The results showed that the YPAS was found to be positively significantly associated with VO2 max and inversely significantly associated with body fat. This revealed that the YPAS demonstrated adequate validity by correlating with significant physiological variables thought to reflect habitual exercise. Afterwards, Bonnefoy et al. (2001) tested the validity of YPAS in

healthy elderly men. The results demonstrated that the YPAS significant correlated with Seven Day Recall moderate activity and Questionnaire d' Activite Physique Saint-Etienne sports activity (r = 0.54 and 0.52, respectively). For part 2 activity index of YPAS, a significant correlation was obtained with VO2 max (0.62). It could be concluded that the YPAS had a reasonable degree of validity and adequately assessed the exercise level in the elderly (Bonnefoy et al., 2001).

Chinutuya (2001) tested construct validity by using factor analysis. The results suggested that loading of five activity indices posited a relationship to the exercise construct and 43% of the variance was explained. In this study the construct validity was tested by confirmatory factor analysis in 320 Thai elderly. The results indicated the measurement model of level of exercise fitted data very well (Appendix H). The results revealed that 5 activity indices were observed. It means that the instrument had the construct validity. The results were presented in the Table 3.3.

Table 3.3 Confirmatory factor analysis of measurement model of level of exercise

Construct	**Loading and reliability of indicators**			
(number of indicators)	**Loading**	**Standard error**	**T value**	**R^2**
1. Vigorous physical activity	0.50	-	-	0.25
2. Leisurely walking	0.45	-	-	0.16
3. Moving	0.90	0.16	5.75	0.70
4. Standing	0.74	0.13	5.52	0.67
5. Sitting	-0.09	0.05	-1.75	0.01
$\chi 2$ = 6.63; df = 3; p = 0.08; GFI = 0.99; AGFI = 0.96; RMR = 0.03				

Reliability

The YPAS was administered to the 76 participants for testing the test-retest reliability within 2 weeks. The test-retest reliability coefficient for the YPAS was r = .65, p<.05 (Depietro et al., 1993). Additionally, Pennathur et al (2004) reported the test-retest reliability coefficient of the YPAS in 49 older Mexican American Adults was .78, p < .01. The results suggested that there was stability in the level of exercise as measured by YPAS over a 2 week period.

In Thai elderly, Vannarit (1999) translated the YPAS Part 2 into the Thai language and validated it by using the back-translation method. This version was then employed in this study. The test-retest reliability of the Thai version was also tested such as Vannarit (1999) and Chinuntuya (2001). The test-retest reliability coefficient were .89 and .87 respectively.

From trial data in this study, the test-retest reliability over 2 week was established in 30 elderly who reside at home in a Thai community. The correlation coefficient was .89.

5. Chronic illness

Chronic illness was assessed by the chronic illness questionnaire developed by Markides et al (1996) and adapted by the researcher for this study. The chronic illness questionnaire consisted of type, the number of chronic illnesses, duration of the chronic illness and caring behaviors after having chronic illness. The types of chronic illnesses included in the questionnaire are those commonly found in Thai elderly such as arthritis, cancer, diabetes, strokes, heart disease, hypertension, asthma, renal disease, liver disease, and incontinence (Jittapunkul et al., 2001). Additionally, an open-ended option was

provided so participants could identify problems not included on the list. Any acute health problems that could be resolved in a short period (e.g. acute diarrhea, colds) were not accounted for in the number of chronic illnesses. Chronic illness was measured based on the participants self-reports of their chronic illnesses; participants report that these illnesses were diagnosed by a medical doctor prior to their participation in the present study.

To ask for type of chronic illness, the following question was asked: “Have you ever been told by a doctor that you have a chronic illness such as arthritis or rheumatism?” Another question was “How many chronic illnesses do you have that have been diagnosed by a medical doctor?” For duration of the chronic illnesses, the proposed question was “How long have you had this arthritis disease?”

Validity

The chronic illness questionnaire in this study was validated by five experts in geriatric. The content validity index was .83.

6. Depression

Depression was measured by the Thai-short version of the Geriatric Depression Scale (GDS) developed by Jitapunkul et al (1994) based on the original GDS concept of Yesavage et al. (1983). The Geriatric Depression Scale has been tested and used extensively with the older population. It has been extensively used in community acute and long-term care settings (Kurlowicz, 1999; Chan, 1996; Smarr, 2003). The short version of the GDS is a 15 items self-reported depression scale with a ‘yes’ or ‘no’ response format. The participants were asked how they felt during the past week, for example, “Do you feel that your life is empty?” “Do you often get bored?” or “Do you

often feel downhearted?" A yes/no response format with a cut off score of 6 were used to simplify the scale (Jitapunkul et al., 1994).

The scores of 1-5 were defined as a normal level. The scores of 6-10 were defined as a mild depression and scores of 11-15 were defined as severe depression. The GDS included five dimensions including emotion, negative will, psychomotor, cognition and isolation. The instrument was previously translated in to Thai by a group of specialists comprised of a psychiatrist, two psychologists, and geriatrician (Jitapunkul et al., 1994) thus this version was employed in this study

Validity

Since the Thai-short version of the Geriatric Depression Scale (GDS) was developed based on the original GDS concept of Yesavage et al., (1983), validity testing was conducted on a group 197 Thai elderly people. Using factor analysis with varimax rotation, sixty percent of total variance was attributable to five factors with Eigenvalues were greater than 1. These extracted factors represent (a) emotion, (b) negative will, (c) psychomotor, (d) cognition and (e) isolation. These findings are consistent with the western study. Constructed and concurrent validity of the GDS was also demonstrated by the correlation of the GDS score with a perceived health status and a self rating of the "happy-sad" rating score. The concurrent validity was supported by the negative correlation between GDS with self-rating of happy-sad rating scores and perceived health status ($r = -.31$, $p<.001$, and $r = -.23$, $p<.001$ respectively). The results showed that the GDS is valid for depression screening among the Thai elderly (Jitapunkul et al., 1994). In this study the construct validity was tested by confirmatory factor analysis in 320 Thai elderly. The results indicated the measurement model of depression fitted data very well

(Appendix H). The results revealed that 5 factors were observed. It means that the instrument had the construct validity. The results were presented in the Table 3.4.

Table 3.4 Confirmatory factor analysis of measurement model of depression

Construct (number of indicators)	Loading and reliability of indicators			
	Loading	Standard error	T value	R^2
1. Emotion (4)	0.67-1.00	0.08-0.10	7.10-8.89	0.26-0.50
2. Negative will (6)	0.20-1.00	0.10-0.13	6.72-7.67	0.01-0.34
3. Psychomotor (2)	0.66-1.00	0.09-0.09	7.53-7.53	0.26-0.39
4. Cognitive (2)	0.67-1.00	0.09-0.09	7.49-7.49	0.24-0.45
5. Isolation (1)	1.00	-	-	0.06
$\chi 2$ = 87.22; df = 69; p = 0.07; GFI = 0.96; AGFI = 0.94; RMR = 0.01				

Reliability

In Thai elderly, Amnatsatsue (2002) conducted test-retest reliability and internal consistency. The results suggested that the GDS had a stability and reliability to measure depression in Thai community-dwelling older adults. The correlation coefficient was reported at 0.81 and Cronbach's alpha was 0.7 (Amnatsatsue, 2002). Similarly, Smarr (2003) reported the test-retest reliability and internal consistency for GDS, correlation (r = 0.85) at one week suggesting the GDS scores reflected stable individual differences. Cronbach's alpha was high (0.94) and split-half reliability was 0.94. From trial data in this study, the internal consistency was established in 30 elderly who reside at home in a Thai community. The cronbach's alpha was .78. After obtaining the data in 320 Thai

elderly, the reliability coefficient of this instrument was analyzed. The cronbach's alpha coefficient for total scale was 0.78

7. Muscle strength

Muscle strength was defined as the ability of the knee muscles of the elder to produce resistance force. It is the maximum weight that the elderly could lift or produce resistant force for one repetition of knee muscle strength (1-RM) for knee extension and flexion (Kalapotharakos, et al., 2004). Muscle strength was measured by the leg dynamometer, a standard tool for measuring knee or leg muscle strength (Visser et al., 2005; Kongsgaard et al., 2004). Several previous studies used this instrument to measure muscle strength in the elderly (Friedman et al., 2002; Ozcan et al., 2005). There are no reports indicating that this instrument is not safe.

Concerning the validity and reliability of the assessment, the same leg dynamometer (as figure 3.2) was used throughout the study.

Figure 3.2: Leg dynamometer

To prevent the error from reading the digital number then the inter-rater reliability was tested throughout the study. Additionally, to prevent using different steps of measuring causing error of measurement and to prevent a possible risk to participants the investigators practiced training with a sports medicine trainer before collecting the data. To make sure the investigator used the same steps for measuring knee muscle strength and prevent possible risk to the elderly, a test protocol was established and was employed throughout the study. Knee muscle strength was measured following the test protocol for measuring knee muscle strength and recording data on the recording form.

Details of the test protocol are presented as follows:

1. Instruct the subject on the purpose of the test and demonstrate “how to measure muscle strength by using the leg dynamometer” as well as to open opportunities for participants to ask questions when he or she needs clarification.

2. Before conducting the muscle strength testing, the investigators must assess the participants’ health status and ability to participate by asking “How is your health today?” and asking “Do you have any immediate health concerns or problems?” If the participant has any immediate health problems or his or her health is not good, the testing should be postponed or canceled. If the participant‘s health status is good, the next step for testing will be conducted.

3. The subject stands on the platform with the feet at a comfortable distance apart for balance, usually at shoulder length.

4. Place the hip belt around the subject above the hips, with the end looped over each end of the bar of the dynamometer and push toward the center. The hands grasp each the end of the bars.

5. Instruct the subject to flex the knees to approximately 135 degrees. Ensure the back is kept straight and hips positioned directly over the ankle joints. The chest should be forward and head erect. To prevent a possible risk in measuring, the researcher or assistant researchers stands next to the participant to provide support if he/ she loses her balance.

6. The pointer should be zeroed and a spotter stands behind the subject.

7. The subject takes in a large breath and slowly exhales as he/she attempts to extend the knees smoothly and as forcefully as possible. It is important to ensure that the hip rises vertically.

8. To encourage the subject, the tester should call out encouragement.

9. Stop the test when the pointer ceases to advance or if the subject's knees straighten.

10. Read the peak force as kilogram. Then record the results onto the data form.

11. At all times during testing the investigators must notice any abnormal symptoms including dizziness, fainting, hyper and hypoventilation, palpation, chest pains and dypnea. If the participant has any symptoms, the data collection will stop immediately and a basic examination made such as taking blood pressure and heart rate. After resting and closer observation for a while, if the participant is not better the researcher or investigator will arrange for the participant to be taken immediately to the nearest hospital.

12. After finishing testing, the researcher or investigators should ask the participants about their health at the present time to assess any acute illnesses, abnormal symptoms and to prevent possible risks to the participants.

Reliability

From trial data in this study, the inter-rater reliability was established in 30 elderly subjects who reside at home in a Thai community. The Cronbach's alpha was 1.00.

8. Vision

Vision was defined as the ability to see and read more than half of the letters in 6/12 line of a Snellen chart (Rubin, 1997; Thaimwong, 2001; Squirrell et al., 2005). The Snellen chart used to measure the vision of the elderly in this study is a simple eye examination which public health nurses commonly use to assess visual acuity. The tool can detect visual impairment in a large percentage of older people with a sensitivity of 94% and specificity of 89% when compared to an opthalmalogical clinic visit assessment (Patterson, 1994; Canadian Task Force on the Periodic Health Examination , 1995).

The Snellen chart was printed with eleven lines of numerical block letters. The first line consisted of one very large letter. Subsequent rows had increasing number of letter that decreased in size. For testing, the Snellen chart was placed at a standard distance, twenty feet or six meters. The light in the room must be turned on when assessing visual acuity (VA). If the participant wears glasses, he or she was tested with glasses. In some cases if the subject had better visual acuity with glasses than without glasses, he or she was allowed to be tested with glasses. The participants taking the test covers their left eye and begins to read aloud the letters from the first line (6/60 or 20/200) to the next lines with his or her right eye until he or she cannot read any further. The visual acuity was recoded when he or she read more than half of the letters in the line. Two minutes rest then testing was repeated again in the left eye.

The score of the vision in the better eye was used for analysis. The score was characterized in two categories such as normal acuity score 1 and visual impairment score 0. Visual impairment (visual impairment score = 0) was defined as visual acuity that was worse than 6/12 in the better of the two eyes. If the subject had a visual acuity worse than 6/12 or 20/40 he or she was considered as having visual impairment (Rubin, 1997; Thaimwong, 2001; Squirrell et al., 2005). The optimal visual acuity is equal to 6/6 (meter) or 20/20 and reduced visual acuity is indicated by a higher denominator (Lieberman, Friger, & Lieberman, 2004).

Reliability

To prevent the error from recording the visual acuity then the inter-rater reliability was performed throughout the study. From trial data in this study, the inter-rater reliability was established in 30 elderly who reside at home in a Thai community. The Cronbach's alpha was 1.00.

9. Functional performance

The Functional performance was measured by two instruments including the Modified Barthel ADL Index (MBAI) and the Chula ADL Index (CAI) to cover the basic activities of daily living and instrumental activities of daily living. Both instruments were developed by Jitapunkul, Kamolratanakul, and Ebrahim (1994) for Thai elders. Historically, the Barthel Activity of Daily Living Index was developed for health personnel to evaluate patients' activities of daily living (ADLs; e.g. feeding, moving, personal toilet, bathing, walking, dressing, continence of bowels and bladder) before admission and after discharge from a hospital in Maryland (Mahony & Barthel, 1965). It

has been widely used to measure basic activities of daily living in older people and is based on the amount of physical assistance required from others.

In Thailand, the MBAI was tested in 703 Thai older adults in the community settings (Jitapunkul, Kamolratanakul, & Ebrahim, 1994). The MBAI (Thai version) included feeding, grooming, transferring, toilet use, mobility, dressing, climbing stairs, bathing, bowel continence and bladder continence. The participants were asked whether they could conduct the 10 item tasks. If they can perform the activity without help the score will be 2 or 3 (up to specific task), if they can do it with help the score will be 1 or 2; and if they cannot do it the score will be 0. The possible scores on the BMI range from 0 to 20 with higher scores indicating greater functional ability. The findings showed that the mean of MBAI slightly declined with advancing age. However, the MBAI alone might be inadequate to assess the functional performance of Thai elderly because the scale consists of only basic ADLs and might be too simple for comparatively healthy older adults. Therefore a tool for evaluating the ability to perform more complex task is necessary. To identify independent living extended ADLs or instrumental ADLs assessment were needed to increase discriminated power.

The Chula ADL index was also developed by Jitapunkul, Kamolratanakul, and Ebrahim (1994) to measure extended ADLs in a Thai context. Initially, the researchers used the Office of Population Censuses and Survey (OPCS) disability scale from England to test the functional performance among Thai elderly. They found that the OPCS was inappropriate to assess extended ADLs in Thai elderly because it rated 99% of the elderly in the study as disabled although the mean of their score on the Barthel ADL index was high (19.5 to 20). Thus, the Chula ADL index was developed and is more appropriate for

Thai older adults. It includes five IADL activities such as walking outdoor, cooking, using public transportation, using money, and heavy housework. Participants were asked to rate how they performed their five IADL. The response scales for each item of the CAI were not identical. For example, the ability to walk outdoors is scored on a 0-3 rating scale (0 indicating unable to walk, 1 indicating requiring more assistance, 2 indicating requiring less assistance, and 3 indicating independence). The possible scores on the CAI ranged from 0 to 9. In this study, the self-reported method on the MBAI and the CAI was used to evaluate the participant's functional performance in performing basic activities of daily living and instrumental activities of daily living, respectively.

Functional performance was calculated by a composite score of the Modified Barthel ADL Index and the Chula ADL Index. It refers to the total score of functional performance.

Validity

The construct validity of the MBAI and CAI was tested in Thai older adults (Jitapunkul, Kamolratanakul, & Ebrahim, 1994). Factors analysis with varimax rotation revealed factor loading of .50 and over: (1) basic ADL; (2) extended (instrumental) ADLs. Five of extended ADL items named the Chula ADL index (CAI), including walking outdoors, using public transportation, cooking, handling money and doing heavy house work. In this study construct validity was tested by confirmatory factor analysis in 320 Thai elderly. The results indicated the measurement model of functional performance fitted data very well (Appendix H). The results revealed that 2 factors were observed. It means that the instrument had the construct validity. The results were presented in the Table 3.5.

Table 3.5 Confirmatory factor analysis of measurement model of functional performance

Construct (number of indicators)	Loading and reliability of indicators			
	Loading	**Standard error**	**T value**	**R^2**
1. BADL	0.27-1.00	0.03-0.07	6.28-16.61	0.12-0.75
2. IADL	0.11-1.00	0.03-0.07	3.93-13.59	0.05-0.73
$\chi 2$ = 54.66; df = 42; p = 0.09; GFI = 0.98; AGFI = 0.94; RMR = 0.01				

Reliability

The test-retest reliability, inter- rater reliability and internal consistency were conducted initially. The results showed high correlation coefficients for test-retest and inter-rater reliability of .96 and .84 respectively. In addition, the internal consistency of CAI (Cronbach's alpha = .76) was sufficient (Jitapunkul, Kamolratanakul, & Ebrahim, 1994).

From trial data in this study, the internal consistency was established in 30 elderly people who reside at home in a Thai community. The cronbach's alpha for MBAI and CAI were .94 and .87 respectively. After obtaining the data in 320 Thai elderly, the reliability coefficient of this instrument was analyzed. The cronbach's alpha coefficient for MBAI and CAI were 0.85 and 0.81

Protection of Human Subjects

The study was conducted with the approval of the IRB of Chulalongkorn University and other related concerns to assure the protection of human subjects. Both

written and verbal informed consents were obtained in Thai on the same date as the data collection. The informed consent form explained the purpose of the study, benefits, risks, the types of questionnaires and tasks to be completed, and the length of time needed to complete the test. In particular, it explained about risk prevention and treatment when the risk occurs during the interviewing or the collecting of data.

For example, (1) before conducting the muscle strength testing, the investigators must assess the participants' health status and ability to participate by asking "How is your health today?" and asking "Do you have any immediate health concerns or problems?" If the participant has immediate health problems or his or her health is not good, the testing should be postponed or canceled. If the participant‘s health status is good, the next step for testing continues. (2) To prevent possible risk during muscle strength measurement, the researcher or assistant researchers stand next to the participant to provide support if he/ she loses her balance. (3) As with testing at all times the investigators must pay attention to abnormal symptoms including dizziness, fainting, hyper and hypoventilation, palpation, chest pain and dypnea all the time while collecting data. If the participants feel some discomfort such as tiredness and fatigue they would be asked to take a rest and stop the interview. The researcher should conduct a physical exam such as taking blood pressure and pulse rate while closely observing these symptoms. If the participants are not better, they should be taken to the nearest health care service center. (4) After finishing testing, the researcher or investigators should ask the participants about their health at the present time in order to assess acute illness, abnormal symptom and to prevent possible risks to the participants.

Data collection

Data collection interviews were conducted in the participants' home by the researcher, using structure instruments. Polit & Hungler (1995) describe the advantages of a face-to- face interview in terms of response rates, audience, clarity, depth of questioning, missing information, order of questions, sample controls and supplementary data. The face-to-face interview was used in this study because this method (1) is appropriate for Thai older adults who are illiterate and/or visually impaired; (2) may reduce ambiguity and confusion; (3) has high response rates; and (4) potentially allows the researcher to obtain additional useful data.

The structured interview included the personal information sheet, the Personal Resource Questionnaire, the Yale Physical Activity Survey, the Chronic Illness questionnaire, Geriatric Depression Scale, Modified Barthel ADL Index (MBAI) and the Chula ADL Index (CAI). The interview took between 30 to 45 minutes to complete.

The following section describes procedures of the interview data collection for this study.

1. The interview guides were developed taking into consideration clarity and attractiveness. Clear instruction and example were provided. The cover letter including the participant's information sheet, established rapport and provided information including the purpose of the study, confidentiality, an estimate of time required for completion, and the name, address, and telephone number of the researcher.

2. After approval of the study by the Chulalongkorn University IRB committee, the letter of permission was issued to collect the data and was sent to responsible and

related officers of primary heath care units, in all five sub district target settings, to ask for their permission.

3. After the letter of approval was received from the responsible and related officer, the researcher made personal contact with the public health nurses who worked with older adults at five primary health care units to clarify the study.

4. The researcher and public health nurses in each area identified potential older adults from family folders to establish the list of potential participants.

5. Once the potential participants were identified, the researcher contacted the selected individual. If a person did not wish to participate or did not meet the criteria for inclusion, the next number on the recruitment list for that community was selected. Potential participants who were not at home or not available for contact on that day were contacted on the following day. To avoid confounding of measures, only one member was included in the study if more than one person in a family was randomly selected.

6. The potential participants were invited to be interviewed for the study at a community location (e.g. his or her home, temple, or primary health care unit). The researcher, then, introduced herself, established rapport, explained the purpose of the study, what contributions the subject would make, how the participants were selected and emphasized the confidentiality or anonymity of information given. After the prospective participants agreed to participate in the study, they are asked to sign a consent form.

7. After receiving the written consent form, the data collection interview guide followed the order of each variable such as (1) vision (2) muscle strength (3) personal data (4) chronic illness (5) depression (6) exercise (7) social support (8) functional performance. The interview was started by the researchers. The researcher read each item

carefully to make sure the questionnaire was completed and asked subjects to check again if the answer was not clear. After completing the questionnaire, each subject received a bottle of oil balm in appreciation for participation.

Data analysis

Data analysis included the application of descriptive and inferential statistics. Descriptive statistics (i.e. frequency, percentage, range, mean, and standard deviation) were used to delineate characteristics of the sample and examine the distribution of demographic variable and the variables of interest in this study using the Statistical Package of the Social Science for Window (SPSS/Window) version 13. Inferential statistics were used to determine the reliability of the instrument and subscale and to answer research questions using a maximum likelihood method run by a structural equation modeling program, LISREL 8.72. An alpha level of .05 was the accepted level of significance for this study. The processes of data analysis to answer the research questions are described in the following section.

1. Preparation of data for analysis: Missing data were checked to prevent compromised analytic power and non-response bias (Patrician, 2002). The data were cleaned to prevent random and systematic errors (e.g. typing or coding the wrong value) by using descriptive statistics (Roberts et al., 1997).

2. The sample characteristics of the sample were analyzed by descriptive statistics.

3. The assumptions underlying multivariate analysis for the structural equation modeling were tested, including normality, homocedasticity, the linearity of relationship and multicollinearity.

4. The measurement model was evaluated to verify that the theoretical constructs were accurately represented by observed variables using confirmatory factor analysis. Separate measurement models were tested for each latent variable. According to Joreskog and Sorbom (1996), there are two methods to assess the measurement model, over all fit and measurement model fit. The over all model fit is indicated by chi-square value (χ^2), relative or normed χ^2 (χ^2/df) and goodness of fit indices. The nonsignificant χ^2 means that there is no difference between the observed matrix and that predicted by the proposed model. If the goodness of fit index (GFI) and adjusted goodness of fit index (AGFI) are greater than 0.9, root mean square residual (RMR) are close to zero (Hair et al., 1998) and normed χ^2 is less than 2 (Pedhazur & Schmelkin, 1991) indicating a good fit. For measurement model fit, the observed variable loading related to the construct and the relationship among indicators and the construct were examined. The square multiple correlation (R^2), which is the proportion of variance in the observed variable that is accounted for by the latent variables for which it is an indicator, were examined.

5. Once it was determined that the measurement model fit the data, then the hypothesized model was analyzed. In the proposed model there were four exogenous variables (chronic illness, level of exercise, level of social support, and vision) and three endogenous variables (functional performance, depression and muscle strength). Functional performance was the outcome variable. In this step, path coefficient and R^2 were estimated and the effects of the independent variable on dependent variables were

determined to answer the research questions and test the hypotheses. The goodness-fit-indices were used to determine whether the model adequately fit the data.

Summary

A descriptive correlational, cross-sectional research design was used to test a proposed model of factors contributing to functional performance in Thai and explore relationships among variables including muscle strength, vision, chronic illness, level of exercise, level of social support, depression and functional performance. The population of this study included Thai older persons aged 60 years and over who reside in communities in each part of Thailand including Northern, Southern, Central, Northeastern, and Eastern parts. Stratified four-stage random sampling was employed to obtain a sample of 320 subjects. Six self-report instruments and two pieces of equipment were used to collect the data (Snellen chart and leg dynamometer). Results from trial data indicated that the instruments were culturally appropriate for Thai elderly, no problems were found during data collection, and psychometric properties of the instrument were acceptable. The data was analyzed by using the maximum likelihood method run by the LISREL program. Results of this investigation are reported in the following chapter.

CHAPTER IV

RESULTS

This chapter presents the findings of the study. The descriptive statistics for the demographic characteristics of the study sample and for characteristics of the major study variables are presented. The structural equation modeling analysis explaining the relationships between muscle strength, vision, chronic illness, level of exercise, level of social support, depression and functional performance in Thai community-dwelling older persons is reported. The results of the preliminary analyses including the tests of the assumption underlying the statistical analysis and the findings for each hypothesis are presented.

Characteristics of study sample

Description of study sample

The subject for the study were 320 Thai elderly persons aged 60 years of age and over who reside in community settings in each part of Thailand including Northern, Southern, Central, Northeastern, and Eastern parts. The data analysis showed no missing data for the variables. The following discussion presents characteristics of the sample including demographic information, subjects' perception of happiness for living, and health status.

Demographic characteristics of study sample

The characteristics of the sample are shown in Table 4.1. The age range of the participants was 60 to 94 years old with a mean of 69.6 (SD = 7.8). Most of the participants (57.2%) were female older adults. 66.3 % of the participants were married and 24.0% were widowed. Most of participants were Buddhist (90%). 63.8 % of the participants completed primary school and 21.3% had no formal education. Concerning working status, most of the subjects were still working (60.3%). Most of participants reported their sources of income came from occupations or pensions (53.4%) and children or grandchildren (36.6%) respectively. In 84.7 % of the participants reported income was believed to be sufficient for living and 15.4 % perceived their income to be too low to meet their needs. In the majority of participants, hearing was normal (87.2%) but none of the participants, showed significant hearing loss when the investigator whispered closely to their ears. Most of the participants (89.1%) lived with their spouse and / or children /grandchildren, while7.5% lived alone. 80.9 % of the participants had a caregiver. Most of the caregivers were related (88.4%) with the majority being their children or grandchildren. For the majority of participants, the period of caregiving was unlimited (79.9%). Most of the participants (96.2%) reported that they had happiness for living. 45% of the participants reported that their health status was good, while for 6.3 % of the participants believed their health to be not good.

Table 4.1 Demographic characteristics of the samples (n = 320)

Variables	n	%
Age (years)		
60-74	237	74.1
75-84	66	20.6
≥85	17	5.3
Gender		
Male	137	42.8
Female	183	57.2
Marital status		
Married	212	66.3
Single	19	5.9
Widowed	77	24.0
Divorced	12	3.8
Religion		
Buddhist	288	90.0
Muslim	30	9.4
Christian	2	0.6
Education		
No formal education	68	21.3
Elementary education	204	63.8
Secondary education	35	10.9
Vocational education	4	1.2
Bachelor degree	8	2.5

Variables	n	%
Higher than bachelor degree	1	0.3
Working status		
Working	193	60.3
Not working	127	39.7
Source of income		
Occupation/pension	171	53.4
Spouse	11	3.4
Children/grand children	117	36.6
Social welfare	21	6.6
Income sufficiency		
Sufficiency and having savings	95	29.7
Sufficiency but no savings	176	55.0
Insufficiency but no debt	28	8.7
Insufficiency and having debt	21	6.6
Hearing		
Normal hearing	279	87.2
Hearing when whispered to near to ear	41	12.8
No hearing when whispered to near to ear	-	-
Living status		
Living alone	24	7.5
Living with spouse	101	31.6
Living with children or grand children	184	57.5
Living with cousin	11	3.4

Variables	n	%
Caregiver		
Don’t have	61	19.1
Have	259	80.9
Caregiver relevance **(n = 259)**		
Children/grandchildren	229	88.4
Cousin	19	7.3
Servant	8	3.1
Health officer	3	1.2
Period of caring **(n = 259)**		
Unlimited	207	79.9
Short period	36	13.9
Case by case	16	6.2
Happiness for living		
Unhappiness	12	3.8
Happiness	308	96.2
Health status		
Not good	20	6.3
Fair	137	42.8
Good	144	45.0
Very good	19	5.9

Characteristics of study variables

Functional performance

The functional performance of the study sample characterized by activities of daily living including basic activities of daily living and instrumental activities of daily living and being dependent or independent are shown in Table 4.2. Ability to perform each activities of daily living was reported as being dependent or independent. The results showed that majority of the elderly sample depended on other persons to assist them to perform the following activities. Basic activities of daily living, most of the study sample reported that they difficult to perform bladder continence (24.1%), they depend on other persons to assisting them to perform transferring (18.8%), climbing the stair (17.5%) respectively. For instrumental activities daily living, the results showed that majority of the study sample depended on other person to assist them to perform accessing transportation (27.2%), cooking (21.6%) and walking outdoor (20%) respectively. Regardless dimensions of activities of daily living, majority of the elderly sample depended on other persons to assist them to perform assessing transportation (27.2%), cooking (21.6%), walking outdoor (20.0%) and transferring (18.8%) except bladder continence (24.1%) they reported they difficulty to perform.

Table 4.2 Percent of functional performance of the sample characterized by activities of daily living and being dependent/ independent (n = 320)

Functional performance	Dependent (%)	Independent (%)
Basic activities of daily living		
1. Feeding	7.8	92.2
2. Grooming	3.4	96.6
3. Transferring	18.8	81.2
4. Toilet use	10.9	89.1
5. Mobility	15.0	85.0
6. Dressing	11.6	88.4
7. Climbing stairs	17.5	82.5
8. Bathing	4.4	95.6
9. Bowel continence	16.2	83.8
10. Bladder continence	24.1	75.9
Instrumental activities of daily living		
1. Walking outdoor	20.0	80.0
2. Cooking	21.6	78.4
3. Heavy housework	16.2	83.8
4. Using money	3.1	96.9
5. Accessing transportation	27.2	72.8

Vision

Characteristics of the vision variable of the study sample are shown in Table 4.3. Rubin (1997), Thaimwong (2001) and Squirrell et al. (2005) indicated the cutting point of vision score that visual acuity was worse than 6/12 in the better two eye referring to visual impairment. In this study, 63.4% of the study sample had a normal vision and 36.6% had the visual impairment.

Table 4.3 Frequency and percent of characteristics of vision of the sample (n = 320)

Vision	n	%
Normal	203	63.4
Impairment	117	36.6

Depression

Levels of depression of the study sample are shown in Table 4.4 Jitapunkul et al. (1994) proposed the criterion for cutting point the depression score that if the depression score is between of 0-5 referring normal level. That means the person do not have depression. If the score is between of 6- 10 referring to mild depression level that means the person would have mild depression. And if the score is between of 11-15 referring to severe depression level that means the person would have severe depression. In this study the results showed that most of the study sample did not have depression (67.8%). However, 29.7% of the study sample had mild depression and 2.5% had severe depression.

Table 4.4 Percent of level of depression of the sample (n = 320)

Level of depression	Depression score	%
Normal	0-5	67.80
Mild depression	6-10	29.70
Severe depression	11-15	2.50

Chronic illnesses

Characteristics of the chronic illnesses of the study sample are shown in Table 4.5. 68.1% of the study sample had the chronic illnesses and 35.9% reported that they had two and more than two types of chronic illnesses. Due to the participants reported more than one type of chronic illness, diabetes mellitus, hypertension, arthritis, heart disease, urinary incontinence, asthma, stroke, cataract, renal failure, cancer, and liver disease were reported as the chronic illnesses of the study sample. Majority of the chronic illnesses found in this study sample was diabetes mellitus (31.9%), hypertension (31.9%), arthritis and heart disease (21.9% and 11.9%, respectively).

Table 4.5 Frequency and percent of characteristics of chronic illnesses of the sample (n = 320)

Characteristics	n	%
No chronic illnesses	102	31.9
Have chronic illness	218	68.1
Number of chronic illnesses		

Characteristics	n	%
One	103	32.2
Two	72	22.5
More than two	43	13.4
Type of chronic illness †		
Diabetes mellitus	102	31.9
Hypertension	102	31.9
Arthritis	70	21.9
Heart disease	38	11.9
Urinary incontinence	21	6.6
Asthma	11	3.4
Renal failure	10	3.1
Cancer	8	2.5
Stroke	6	1.9
Cataract	4	1.3
Liver disease	3	0.9

† Participants could report more than one type

Level of exercise

Characteristics of level of exercise of the sample are shown in Table 4.6. It is found that most of the Thai elderly (52.2%) did not participate in the vigorous activities.

For the person who participated, participation rate of 1-2 times per week is the most favorable frequency. In addition, duration of participation usually less than 30 minutes.

For leisurely walking, walking in frequency of 1-2 times per week is the most common (35.9%). It is worth to noting that 20.9% of the elderly walked in rate of more than 5 times per week. Typical duration of the walking is in range of 10-30 minute.

In addition, the sample reported that 37.8% and 27.5% of them made themselves moving in rate of 1-3 hours per day and 3-5 hours per day, respectively. While, 39.7% and 30.9% of them stood up in rate of 1-3 hours per day and less than 1 hour per day, respectively. Most of the Thai elderly (51.9%) spent 3-6 hours per day on sitting in a day and 34.1% of them took a seat in rate of less than 3 hours per day.

Table 4.6 Characteristics of level of exercise of the study sample (n = 320)

Characteristics	n	%
Vigorous activity		
Frequency		
Not at all	167	52.2
1-3 time per month	33	10.3
1-2 times per week	64	20.0
3-4 time per week	23	7.2
5+ time per week	33	10.3
Duration		
Less than 10 minute or not applicable	184	57.5
10-30 minutes	102	31.9

Characteristics	n	%
31-60 minutes	24	7.5
60+ minutes	10	3.1
Leisurely walking		
Frequency		
Not at all	52	16.3
1-3 time per month	47	14.7
1-2 times per week	115	35.9
3-4 time per week	39	12.2
5+ time per week	67	20.9
Duration		
Less than 10 minute or not applicable	81	25.3
10-30 minutes	181	56.6
31-60 minutes	45	14.1
60+ minutes	13	4.0
Moving		
Frequency and duration		
Not al all	9	2.8
less than 1 hr per day	58	18.1
1 to less than 3 hrs per day	121	37.8
3 to less than 5 hrs per day	88	27.5
5 to less than 7 hrs per day	38	11.9
7+ hrs per day	6	1.9

Characteristics	n	%
Standing		
Frequency and duration		
Not al all	13	4.1
less than 1 hr per day	99	30.9
1 to less than 3 hrs per day	127	39.7
3 to less than 5 hrs per day	70	21.9
5 to less than 7 hrs per day	9	2.8
7+ hrs per day	2	0.6
Sitting		
Frequency and duration		
Not al all	3	0.9
less than 3 hours	109	34.1
3 hours to less than 6 hours	166	51.9
6 hours to less than 8 hours	36	11.2
8+hours	6	1.9

Description of the major study variables

Major variables in this study included muscle strength, vision, chronic illness, level of exercise, level of social support, depression and functional performance. Descriptive statistics are presented in this section. Mean, standard deviation, range, skewness, and kurtosis are shown in table 4.7 to describe the distribution of the major study variables.

The muscle strength range of the participants was 5 to 121.50 kg/m with a mean of 37.21 (SD = 20.83). The skewness coefficient of muscle strength appeared to be 1.30 indicting that most of participants had low muscle strength. According to Jacobsen (1997) a skewness value above 0.2 or below -0.2 indicate severe skewness. Additionally, if the skewness was negative this indicated most of the participants had a high score. If the skewness was positive this indicated that most of the participants had a low score. Regarding kurtosis, Jacobsen (1997) noted that if the value is not beyond ± 1.96, the distribution has a normal curve. If the value is lower than -1.96, it indicates platykurtic. If the value is higher than 1.96, it is leptokurtic. In this study, the kurtosis value of the muscle strength was 2.23.

The vision score of the participants ranged from 0 to 1 with a mean of 0.63 (SD = 0.48). The skewness coefficient of the vision score was negative (-0.56) indicating that most of the participants had a high acuity of vision. The kurtosis value of the vision score was close to normal (-1.69).

The number of chronic illnesses ranged from 0 to 7 with a mean of 1.18 (SD = 1.13). The skewness value of the number of chronic illnesses was positive (1.11) indicating that most of the participants had a low number of chronic illnesses. The kurtosis value of this variable was close to normal (1.90).

The total sum score for the level of exercise ranged from 0 to 127 with a mean of 30.22 (SD = 18.63). The distribution of the score for the level of exercise was positively skewed (1.73) indicating that most of the participants had a low level of exercise. The kurtosis of this variable was leptokurtic (5.46).

The scores for vigorous activity ranged from 0 to 60 with a mean of 7.37 (SD = 12.25). The distribution of the score for the level of exercise was positively skewed (2.33) indicating that most of the participants had a low score for vigorous activity. The kurtosis of this variable was leptokurtic (6.00).

The scores for leisurely walking ranged from 0 to 48 with a mean of 10.26 (SD = 10.92). The distribution of score for leisurely walking was positively skewed (1.56) indicating that most of participants had a low score for leisurely walking. The kurtosis value of this variable was leptokurtic (2.32).

The scores for moving ranged from 0 to 15 with a mean of 7.00 (SD = 3.19). The distribution of the score for moving was normal (0.18). The kurtosis of this variable was normal (-0.226).

The scores for standing ranged from 0 to 10 with a mean of 3.79 (SD = 1.87). The distribution of the score for standing was close to normal (skewness = 0.26). The kurtosis value of this variable was close to normal (-0.44).

The scores for sitting ranged from 0 to 4 with a mean of 1.79 (SD = 0.72). The distribution of the score for sitting was positively skewed (0.49) indicating that most of the participants had a low score for sitting. The kurtosis of this variable was close to normal (0.39).

The total sum score for the level of social support ranged from 56 to 121 with a mean of 89.35 (SD = 12.93). The distribution of the score for the level of social support

was close to normal since the skewness value of this variable was -0.16 and the kurtosis value was -0.44.

The score for intimacy ranged from 9 to 25 with a mean of 18.07 (SD = 3.27). The distribution of scores for intimacy was negatively skewed (-0.34) indicating that most of the participants had a high degree of intimacy. The kurtosis of this variable was close to normal (-0.44).

The scores for social integration ranged from 7 to 25 with a mean of 18.17 (SD = 2.97). The distribution of the score for social integration was negatively skewed (-0.46) indicating that most of the participants had a high level of social integration. The kurtosis of this variable was close to normal (0.50).

The scores for nurturance ranged from 8 to 25 with a mean of 18.06 (SD = 2.82). The distribution of the score for nurturance was normal (skewness = -0.12). The kurtosis value of this variable was normal as well (0.50).

The scores for worth ranged from 10 to 25 with a mean of 17.45 (SD = 2.90). The distribution of the score for worth was normal (skewness = 0.12) and the kurtosis of this variable was also normal (-0.51).

The scores for assistance ranged from 10 to 25 with a mean of 17.57 (SD = 2.90). The distribution of the score for assistance was normal (skewness = -0.17). The kurtosis of this variable was normal (-0.07).

The total sum score for depression ranged from 0 to 12 with a mean of 4.05 (SD = 0.17). The distribution of the score for depression was positively skewed (0.62)

indicating that the most of the participants had a low level of depression. The kurtosis of this variable was normal (-0.74).

The scores for emotion ranged from 0 to 4 with a mean of 0.75 (SD = 1.08). The distribution of the score for emotion was positively skewed (1.27) indicating that most participants had a low score for emotion. The kurtosis of this variable was normal (0.50).

The scores for negative will variables ranged from 0 to 6 with a mean of 2.10 (SD = 1.52). The distribution of the score for negative will was positively skewed (0.32) indicating that the most participants had a low degree for negative will. The kurtosis of this variable was normal (-0.80).

The scores for psychomotor depression ranged from 0 to 2 with a mean of 0.41 (SD = 0.65). The distribution of scores for psychomotor was positively skewed (1.30) indicating that most of the participants had a low degree of psychomotor depression. The kurtosis of this variable was normal (0.46).

The scores for cognitive depression ranged from 0 to 2 with a mean of 0.38 (SD = 0.63). The distribution of scores for cognitive was positively skewed (1.41) indicating that most of the participants had a low score for cognitive depression. The kurtosis of this variable was normal (0.77).

The scores for isolation variables ranged from 0 to 1 with a mean of 0.39 (SD = 0.48). The distribution of scores for isolation was positively skewed (0.43) indicating that the most participants had a low score of isolation variables. The kurtosis of this variable was normal (-1.82).

The total sum score for functional performance, ranged from 3 to 29 with a mean of 26.63 (SD = 4.01). The distribution of the score for functional performance was negatively skewed (-2.15) indicating that most of the participants had high levels of functional performance. The kurtosis of functional performance score was leptokurtic (5.30).

The scores for basic activities of daily living (BADL) ranged from 3 to 20 with a mean of 18.57 (SD = 2.57). The distribution of the scores for basic activities of daily living was negatively skewed (-2.37) indicating that most of the participants had a high level of basic activities of daily living. The kurtosis of this variable was leptokurtic (6.55).

Lastly, the scores for instrumental activities of daily living (IADL) ranged from 0 to 9 with a mean of 8.05 (SD = 1.64). The distribution of the scores for instrumental activities of daily living was negatively skewed (-1.68) indicating that most of the participants had a high level of instrumental activities of daily living. The kurtosis of this variable was leptokurtic (2.27).

An assessment of the skewness and kurtosis value are important for further analyses because when the measured variables are “highly non-normal” (e.g., skewness = 3; kurtosis = 21), the standard error of parameter estimates are underestimated, resulting in the untrustworthy output (West, Finch, & Curran, 1995). Overall, the skewness and kurtosis value of the major study variables in table 2 were not “highly non-normal”.

Table 4.7 Descriptive statistics for major study variables (n = 320)

Variable	Mean	SD	Actual range	Possible range	Skewness	Kurtosis
Muscle strength	37.21	20.83	5-121.50	0-highest possible	1.30	2.23
Vision	0.63	0.48	0-1	0-1	-0.56	-1.69
Chronic illness	1.18	1.13	0-7	0-highest possible	1.11	1.90
Level of exercise	30.22	18.63	0-127	0-137	1.73	5.46
Vigorous activity	7.37	12.25	0-60	0-60	2.33	6.00
Leisurely walking	10.26	10.92	0-48	0-48	1.56	2.32
Moving	7.00	3.19	0-15	0-15	0.18	-0.22
Standing	3.79	1.87	0-10	0-10	0.26	-0.04
Sitting	1.79	0.72	0-4	0-4	0.49	0.39
Level of social support	89.35	12.93	56-121	25-125	-0.16	-0.44
Intimacy	18.07	3.27	9-25	5-25	-0.34	-0.44
Social integration	18.17	2.97	7-25	5-25	-0.46	0.50
Nurturance	18.06	2.82	8-25	5-25	-0.12	0.50
Worth	17.45	2.90	10-25	5-25	0.12	-0.51
Assistance	17.57	2.90	10-25	5-25	-0.17	-0.07

Variable	Mean	SD	Actual range	Possible range	Skewness	Kurtosis
Depression	4.05	0.17	0-12	0-15	0.62	-0.74
Emotion	0.75	1.08	0-4	0-4	1.27	0.50
Negative will	2.10	1.52	0-6	0-6	0.32	-0.80
Psychomotor	0.41	0.65	0-2	0-2	1.30	0.46
Cognitive	0.38	0.63	0-2	0-2	1.41	0.77
Isolation	0.39	0.48	0-1	0-1	0.43	-1.82
Functional performance	26.63	4.01	3-29	0-29	-2.15	5.30
ADL	18.57	2.57	3-20	0-20	-2.37	6.55
IADL	8.05	1.64	0-9	0-9	-1.68	2.27

Preliminary analysis

According to Tabachnick & Fidell (1996), the assumptions underlying multivariate analysis included normality, homoscedasticity, linearity and multicollinearity. This section presents the assessment of statistical assumptions prior to SEM analysis.

Normality The assumption of normality was assessed using means, standard deviation, skewness and kurtosis. Skewness values of the variable in the study ranged from -2.37 to 2.33 and the kurtosis value of the variable in the study ranged from -1.82 to 6.55 (Table 4.7). Although some skewness values were higher than ± 0.2 and some

kurtosis value were higher than ± 1.96, however, the standard error of the parameter estimates are underestimated, resulting in the untrustworthy output when the measured variables are “highly non-normal” (e.g., skewness = 3; kurtosis = 21), In this study overall the skewness and kurtosis value of the major study variables in table 4.7 were not “highly non-normal”. Therefore, it is acceptable for the calculation in SEM.

Homoscedasticity Residual scatter plots were examined to assess homoscedasticity. The spread of residual variables around the zero axis within a ± 2 standard deviation indicated this assumption was not violated.

Linearity Linearity was also assessed by residual scatter plots of the independent variables against the dependent variables and residual plots. No problem of nonlinearity was found. The results of these assumptions tested are presented in Appendix G

Multicollinearity Three measures were used for detecting multicollinearity: the simple correlation among the predictors, the tolerance value and the variance inflation factors (VIF). According to Munro (1997), the tolerance value is the “proportion of the variance in a variable that is not accounted for by the other independent variables” ($1-R^2$) and its value range is from 0 to 1. If the tolerance value is too low, it will have a problem in analysis (Tabachnick & Fidell, 1996). It should be above 0.10 (Hair et al., 1998). Inversely, the variance inflation factor is equal to $1/(1-R^2)$ (Steven, 1996). Variables with high tolerance value have small variance inflation factors (Munro, 1997).

As shown on Table 4.8 the correlation coefficients among the observed variables ranged from .10 to .78 which was less than 0.80 indicating that the observed variables were not redundant (Hair et al., 1998). Most of the correlation coefficients among those

observed variables were significant. As shown on Table 4.9 Tolerance values ranged from .24 to .88 which were above 0.1 and variance inflation factors ranged from 1.14 to 4.16 which were below 5.3 indicating no problem of multicollinearity (Hair et al., 1998).

Table 4.8 Correlation matrix of observed variables

Variable	MS	VI	NU	VIG	LW	MO	ST	SIT	IN	SI	NT	WO	AS	EM	NE	PSY	CO	IS	ADL	IADL
MS	1																			
VI	.135	1																		
NU	-.208**	-.140	1																	
VIG	.414**	.102	-.119	1																
LW	.300**	-.166**	-.195**	.100	1															
MO	.237**	.101	-.251**	-.164	.324**	1														
ST	.169	-.179	-.169**	-.197	.334**	.420**	1													
SIT	-.172**	-.176	.166**	-.176	.157	-.166	.101	1												
IN	.320**	-.125*	-.229**	.104	.216**	.306**	-.165	-.198**	1											
SI	.302**	-.115	-.233**	.104	.147**	.192**	-.103	-.169**	.740**	1										
NT	.316**	-.189	-.153**	.190**	.140*	.154**	-.138*	-.169**	.724**	.719**	1									
WO	.221**	.135	-.135*	.192	-.108	.187**	-.179	-.145**	.697**	.656**	.667**	1								
AS	.286**	-.142*	-.241**	.184	.163**	.194**	-.172	-.205**	.729**	.731**	.639**	.611**	1							
EM	-.307**	.192**	.284**	-.189	-.241**	-.323**	-.177	.206**	-.654**	-.545**	-.511**	-.496**	-.487**	1						
NE	-.353**	.114*	.384**	-.220**	-.246**	-.171**	-.182	.192	-.423**	-.456**	-.367**	-.318**	-.382**	.444**	1					

Table 4.8 Correlation matrix of observed variables

Variable	MS	VI	NU	VIG	LW	MO	ST	SIT	IN	SI	NT	WO	AS	EM	NE	PSY	CO	IS	ADL	IADL
PSY	-.241**	.206**	.228**	-181	-.245**	-.308**	-.100	.178**	-.588**	-.493**	-.467**	-.455**	-.444**	.637**	.493**	1				
CO	-.247**	.165**	.305**	-.146	.221**	-.292**	-.123	.176**	-.586**	-.492**	-.461**	-.463**	-.437**	.632**	.330**	.463**	1			
IS	-.110**	-.132*	.165**	-.131	.121*	-.102	.125*	.110	-.211**	-.206**	-.152**	-.218**	-.180**	.199*	.156**	.095	.112*	1		
ADL	.422**	.286*	-.370**	.175**	.238**	.294**	.182	-.208**	.321**	.409**	.258**	269**	.347**	.300**	-.372**	-.260**	-.175**	-.231**	1	
IADL	.427**	.241*	-.387**	.222**	.282**	.344**	.196	-.260**	.264**	.315**	.212**	.199**	.267**	-.275**	-.369**	-.227**	-.160**	-.229**	.782**	1

* p<.05, **p<.01

MS = Muscle strength VI = Vision NU = Number of chronic illnesses VIG = Vigorous physical activity

LW = Leisurely walking MO = Moving ST = Standing SIT = Sitting

IN= Intimacy SI = Social integration NT = Nurturance WO = Worth

AS = Assistance EM = Emotion NE = Negative will PSY = Psychomotor

CO = Cognitive IS = Isolation ADL = Activities of daily living IADL = Instrumental ADL

Table 4.9 Multicollinearity among independent variables (n = 320)

Variable	Tolerance Value	Variance Inflation Factor
1. Muscle strength	.65	1.55
2. Vision	.82	1.22
3. Number of chronic illnesses	.73	1.37
4. Vigorous physical activity	.76	1.32
5. Leisurely walking	.68	1.47
6. Moving	.64	1.57
7. Standing	.67	1.49
8. Sitting	.88	1.14
9. Intimacy	.24	4.16
10. Social integration	.31	3.24
11. Nurturance	.36	2.77
12. Worth	.39	2.60
13. Assistance	.37	2.73
14. Emotion	.39	2.54
15. Negative will	.58	1.73
16. Psychomotor	.48	2.08
17. Cognitive	.52	1.94
18. Isolation	.86	1.16

Principal analyses

LISREL 8.72 was employed in order to answer the research questions and test research hypotheses. The hypotheses testing are described below.

Model testing

According to Joreskog & Sorbom (1996-2001), analysis with LISREL consists of two models, a measurement model and a structure equation model. The measurement model is a model of how latent variables or constructs are indicated by the observed variables or indicators, while the structure equation model is a model of hypothesized relationships among the latent variables which is based on causal relationships.

Measurement model

In this study, 4 theory constructs were evaluated including: the level of exercise, the level of social support, depression and functional performance in order to specify reliability and construct validity by using confirmatory factor analysis (CFA). The equation model is

$$\mathbf{X} = Lx+d$$

Where $x = (x1, x2,\ldots..,xq)$ are the measure variables

Λ= matrix Λx of the general model

$\xi = (\xi 1, \xi 2,\ldots., \xi n)$ are latent variables and

$\delta = (\delta 1, \delta 2\ldots.,\delta n)$ are error variables (Joreskog & Sorbom, 1996-2001)

The maximum likelihood (ML) method of parameter estimation was used because the estimator is consistently efficient and has large-sample standard error computed by

LISREL under normal theory. The results of measurement model analyses are presented next.

Assessment of overall fit

All measurement models had a good overall model fit (Table 4.10 and Appendix H). The CFA that statistically significant level were greater than .05, indicating that the predicted matrices fit the actual matrices. The GFI and AGFI are above 0.9 and RMR are close to zero indicating a high level of goodness of fit (Hair et al., 1998).

Table 4.10 Goodness of fit measures for measurement models (n = 320)

Construct	Chisquare (c^2)	Degree of freedom (df)	P value	Goodness of fit index (GFI)	Adjusted Goodness of fit index (AGFI)	Root mean square residual (RMR)
Level of exercise	6.63	3	0.08	0.99	0.96	0.03
Social support	253.87	230	0.13	0.94	0.92	0.02
Depression	87.22	69	0.07	0.96	0.94	0.01
Functional performance	54.66	42	0.09	0.98	0.94	0.01

After the overall measurement model had been accepted, the indicator loading and construct reliability were examined. Table 4.11 shows that all indicators were significantly related to the constructs except sitting. Some indicators had low factor loading (the correlation between an indicator on a factor) and R^2 (the proportion of

variance between an indicator on a factor) less than 0.4 (Munro, 2001). In sum; however, the measurement model fit the data.

Table 4.11 Unstandardized factor loading and reliability of indicators

Construct (number of indicators)	Loading and reliability of indicators			
	Loading	**Standard error**	**T value**	**R^2**
1. Vigorous physical activity	0.50	-	-	0.25
2. Leisurely walking	0.45	-	-	0.16
3. Moving	0.90	0.16	5.75	0.70
4. Standing	0.74	0.13	5.52	0.67
5. Sitting	-0.09	0.05	-1.75	0.01
6. Intimacy (5)	0.49-1.00	0.06-0.11	4.52-14.65	0.07-0.58
7. Social integration (5)	0.76-1.00	0.08-0.08	9.53-11.86	0.31-0.51
8. Nurturance (5)	0.36-1.00	0.07-0.09	4.05-11.53	0.05-0.54
9. Worth (5)	0.40-1.00	0.07-0.10	4.29-11.18	0.06-0.54
10. Assistance (5)	0.29-1.02	0.09-0.12	2.49-10.81	0.02-0.44
11. Emotion (4)	0.67-1.00	0.08-0.10	7.10-8.89	0.26-0.50
12. Negative will (6)	0.20-1.00	0.10-0.13	6.72-7.67	0.01-0.34
13. Psychomotor (2)	0.66-1.00	0.09-0.09	7.53-7.53	0.26-0.39
14. Cognitive (2)	0.67-1.00	0.09-0.09	7.49-7.49	0.24-0.45
15. Isolation (1)	1.00	-	-	0.06
16. BADL	0.27-1.00	0.03-0.07	6.28-16.61	0.12-0.75
17. IADL	0.11-1.00	0.03-0.07	3.93-13.59	0.05-0.73

Structural equation model

The hypothesized model was tested. The model had 4 exogenous variables (chronic illness, level of exercise, level of social support, and vision) with 12 observed variables (a number of chronic illnesses, vigorous activity, leisure walking, moving, standing, sitting, intimacy, social integration, nurturance, worth, assistance, and a visual acuity score) and 3 endogenous (functional performance, depression and muscle strength) with 8 observed variables (basic activities of daily living, instrumental activities of daily living, emotion, negative will, psychomotor variables, cognitive variables, isolation and muscle strength score). The equation of the SEM is

$$h = bh + gx + z$$

Where η = an m x 1 random vector of endogenous variables

β = an m x m matrix of coefficient of endogenous variables

γ = an m x m matrix of coefficient of exogenous variable

ξ = an n x 1 vector of exogenous variable and

ζ = an m x vector of equation errors in the structure relationship between η and ξ (Joreskog & Sorbom, 1996-2001).

Model identification Since only an over-identified model can be tested, identification assessment of theoretical models had to be performed. According to Tabachnick & Fidell (1996), the over-identified model is a model with more data points (Variance & covariance) than free parameters. The number of data points is {p(p+1)}/2,

where p equals the number of observed variables. That is the hypothesized model had a large number of data points 210 {20(20+1)}/2 and 29 free parameters. Therefore the model is over-identified, and could be tested.

Hypothesized model testing

The hypothesized model tested is shown in figure 4.1. Path coefficients were standardized because it is easier to compare the model coefficients (Hair et al., 1998). The findings revealed that the hypothesized model fit the data with $\chi 2 = 133.59$, df = 116, p =0.126, GFI = 0.96, AGFI = 0.93, and RMSEA=0.022 (Appendix I). The hypothesized model accounted for 66.3% of variance in functional performance among the study sample.

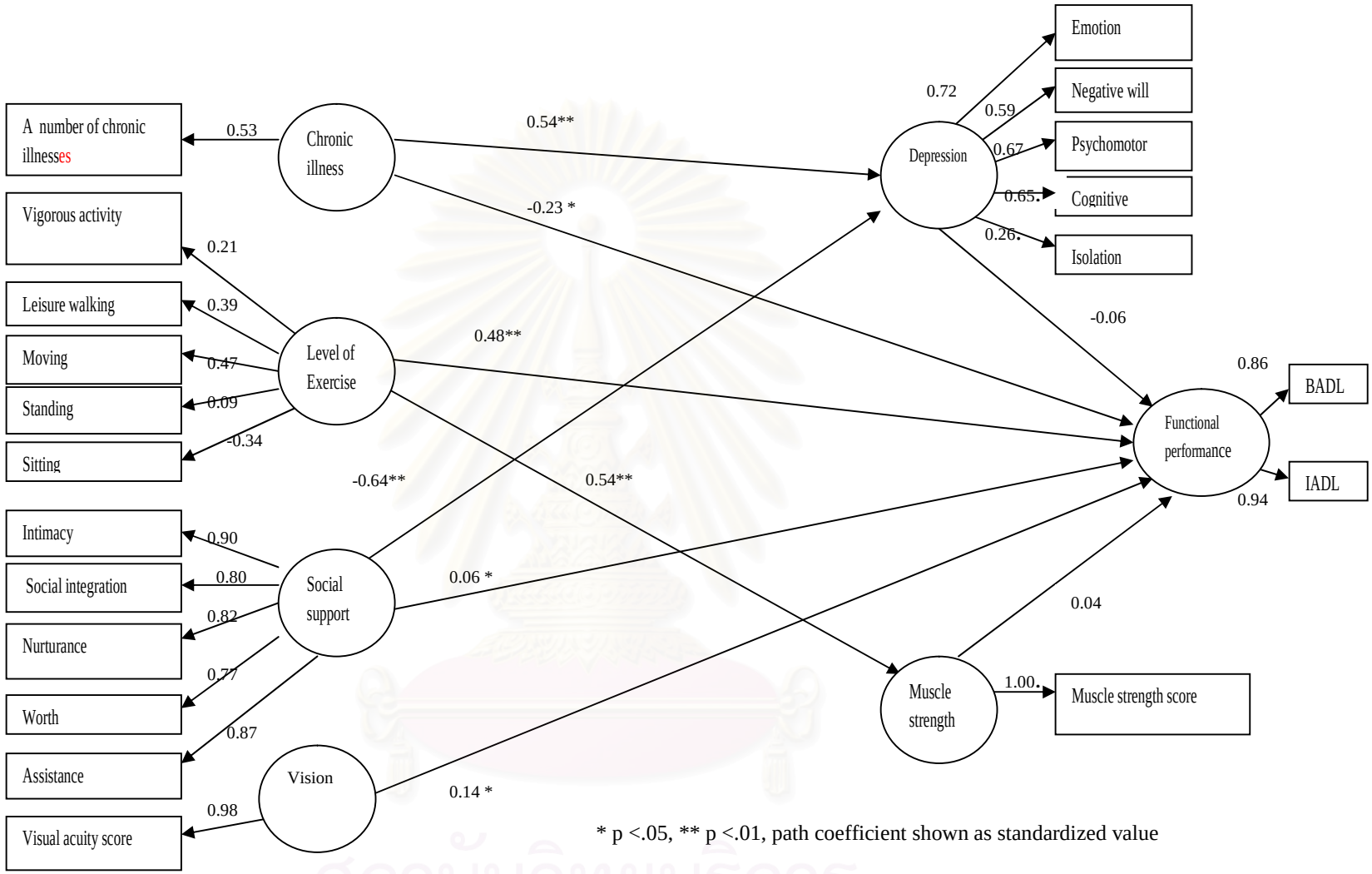

Figure 4.1 Hypothesized model of functional performance in Thai elderly

Evaluation of goodness of fit criteria

In the following discussion, the evaluation of goodness of fit criteria (Hair et al., 1998) is presented.

1. Overall fit index.

The absolute fit measures showed that elements of the covariance matrix reproduced by the parameter estimates of the hypothesized model were not significantly different from the covariance of empirical data (p value = 0.126). The RMSEA was small (0.022) indicating that the data fit the hypothesized model well. The GFI and AGFI were above 0.90 or close to 1. The chi square value was not greater than 2 times the degree of freedom indicating that the model was parsimonious.

2. Measurement model.

Most indicator loadings were statistically significant at level .01. The reliability of indicators ranged from 0.09 to 1.00 indicating almost all indicators were sufficient in their representation of the constructs.

3. Structural model fit. All path coefficients were statistically significant except the path from muscle strength to functional performance (β =0.041, p>.05) and depression to functional performance (β = -0.056, p>.05). In addition, the correlations between the constructs were not high. The R^2 for the structural equation was 0.663. This findings means that the hypothesized model accounted for 66.3 % of the variance in functional performance among Thai elderly. For other predictors, the model accounted

for 28.7 % of the variance in muscle strength, and 95.7 % of the variance in depression (Figure 4.1).

Hypothesis Testing

In order to test the six hypotheses, the direct and indirect effects were examined Table 4.12 summarized the effect of the causal variables on the affected variables as below.

Effect of depression on functional performance

Depression had a non – significant, negative, direct effect on functional performance (β = -0.056, p>.05).

Effect of muscle strength on functional performance

Muscle strength had a non – significant, positive, direct effect on functional performance (β =0.041, p>.05).

Effect of chronic illness on functional performance

Chronic illness had a significant, negative, direct effect on functional performance (γ = -0.233, p<.01) and a significant, negative, indirect effect through depression (γ = -0.030, p<.01) was found. The total effect of chronic illness on functional performance was -0.263, p<.01.

Effect of the level of exercise on functional performance

The level of exercise had a significant positive direct effect on functional performance ($\gamma = 0.481$, $p<.01$) and a non – significant, positive, indirect effect through muscle strength ($\gamma = 0.022$, $p>.05$) was found. The total effect of the level of exercise on functional performance was 0.503, $p<.05$.

Effect of the level of social support on functional performance

The level of social support had a significant positive direct effect on functional performance ($\gamma = 0.063$, $p<.01$) and a significant indirect effect through depression ($\gamma = 0.036$, $p<.01$) was found. The total effect of the level of social support on functional performance was 0.099, $p<.01$.

Effect of vision on functional performance

Vision had a significant positive direct effect on functional performance ($\gamma = 0.144$, $p<.05$).

Effect of the level of exercise on muscle strength

The level of exercise had a significant positive direct effect on muscle strength ($\beta = 0.535$, $p<.01$).

Effect of the level of social support on depression

The level of social support had a significant negative direct effect on depression ($\beta = -0.643$, $p< .01$).

Effect of chronic illness on depression

Chronic illness had a significant positive direct effect on depression ($\beta = 0.538$, $p<.01$).

Table 4.12 Effects of causal variable on affected variables

Caused variable	Affected variables								
	Muscle strength			**Depression**			**Functional performance**		
	DE	IE	TE	DE	IE	TE	DE	IE	TE
Muscle strength	-	-	-	-	-	-	0.041	-	0.041
Vision	-	-	-	-	-	-	0.144*	-	0.144*
Chronic illness	-	-	-	0.538**	-	0.538**	-0.233**	-0.030**	-0.263**
Level of exercise	0.535**	-	0.535**	-	-	-	0.481**	0.022	0.503**
Level of social support	_	-	-	-0.643**	-	-0.643**	0.063**	0.036**	0.099**
Depression	-	-	-	-	-	-	-0.056	-	-0.056

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

Note: DE = Direct effect

IE = Indirect effect

TE = Total effect

Following are the results of hypotheses testing.

Hypothesis one: *Muscle strength has a positive direct effect on functional performance.*

The findings indicated that muscle strength had a non-significant positive direct effect on functional performance ($\beta = 0.041$, $p>.05$). Therefore the hypothesis was not supported.

Hypothesis two: *Vision has a positive direct effect on functional performance.*

The findings supported that vision had a significant positive direct effect on functional performance ($\gamma = 0.144$, $p<.05$).

Hypothesis three: *Chronic illness has a negative direct effect on functional performance and an indirect effect on functional performance through depression.*

The findings supported that chronic illness had a significant negative direct effect on functional performance ($\gamma = -0.233$, $p<.01$) and a significant indirect effect on functional performance through depression ($\gamma = -0.030$, $p<.01$).

Hypothesis four: *The level of exercise has a positive direct effect on functional performance and an indirect effect on functional performance through muscle strength.*

The findings supported the fact that the level of exercise had a positive direct effect on functional performance ($\gamma = 0.481$, $p<.01$) but had a non-significant indirect effect on functional performance through muscle strength ($\gamma = 0.022$, $p>.05$). Therefore the hypothesis was partially supported.

Hypothesis five: *The level of social support has a positive direct effect on functional performance and an indirect effect on functional performance through depression.*

The findings supported that the level of social support had a significant positive direct effect on functional performance ($\gamma = 0.063$, $p<.01$) and a significant indirect effect on functional performance through depression ($\gamma = 0.036$, $p<.01$).

Hypothesis six: *Depression has a negative direct effect on functional performance.*

The findings indicated that depression had a non-significant negative direct effect on functional performance ($\beta = -0.056$, $p>.05$). Therefore the hypothesis was not supported.

Summary

Data was analyzed by using SPSS and LISREL programs. The results from the SEM analyses showed that an overall fit between the functional performance in the Thai elderly model (hypothesized model) and the empirical data. The model explained 66.3% of the variance of the functional performance in Thai elderly. The research hypotheses are partially supported by the data. The findings revealed that chronic illness had a negative direct effect on functional performance and an indirect effect on functional performance through depression. The level of exercise had a positive direct effect on functional performance. Social support had a positive direct effect on functional performance and had an indirect effect on functional performance through depression and

vision had a positive direct effect on functional performance in the Thai elderly. The level of exercise accounted for the largest proportion of the variance in the functional performance in the Thai elderly.

CHAPTER V

DISCUSSION, IMPLICATIONS AND RECOMMENDATIONS

The results of the statistical analysis of data collected from Thai elderly in various locations in Thailand have been presented in the previous chapter. This chapter focuses on discussion of the findings including characteristics of the study sample, characteristics of the study variables, and the model and hypotheses testing results. Consequently, the obtained results are interpreted and evaluated in terms of nursing implications. The latter section in this chapter provides a conclusion of the study and recommendations for future research.

Characteristics of the study sample

The results of the previous chapter showed that the age of the study sample is in the range of 60 to 94 years old. The mean value of the age is 69.6 years old with a Standard Deviation of 7.8. Miller (1995) and recent trends in gerontology classified chronological age classify the elderly into three groups: the elderly aged 60-74 years old are considered as younger older adults, 75-84 years old are considered as middle older adults and those greater than 85 years old are considered as old older adults. Therefore, most of the samples (74.1%) are considered as younger older adults.

The statistical analyses presented in the previous chapter demonstrated that characteristics of the study sample were similar to previous studies. The majority of the obtained study samples were female (57.2%). The sample group consists of the married elderly 66.3% and 27.8% who were widowed and divorced. This is similar to the report

of the Thai National Statistic Office (2002): most Thai elderly were female (54.27%), 62.4% were married and 35% widowed and divorced. A plausible explanation for this phenomenon is that, in adulthood, the mortality rate of Thai male adults was higher than that of females. Since Thai males had greater health risk behavior than females such as smoking, heavy drinking while driving, and unsafe sexual behavior (Bureau of Policy and Strategy, Ministry of Public Health, 2005) meant the percentage of female Thai elderly survivors was higher than males. In addition, most of the study samples were already married and a few were already divorced. It can be explained that Thai people consider divorce as being an extreme solution to family problems. They tend to avoid it if they can reach a compromise. This phenomenon varies according to cohorts and locations (urban or rural). In general, the culture of the Thai elderly in rural areas is intact (Malathum, 2001).

With regard to education in the study sample, the findings indicated that approximately, 63.8 % completed primary school and 21.3% had no formal education. Few participants completed higher than secondary school. A possible reason for this finding is that compulsory formal education did not apply to those Thai elderly aged greater than 75 years old for when they were young. This is because the first compulsory primary education act in Thailand was put into effect in 1921, as well as less availability of schooling and poor transportation systems at that time. The first national educational scheme was thus devised whereby individual educational ability regardless of sex, social background or physical condition would be formally recognized (Education Management Information System Centre, Ministry of Education, Thailand, 1998). Therefore, most of the Thai elderly completed primary school level and some had no formal education what

so ever. This finding is consistent with the report from the Thai National Statistic Office (2002), and previous studies (Malathum, 2001; Jitapunkul et al., 2001; Kanjanawong et al., 1997; Chayovan & Knodel, 1996).

Considering the income and working status in the study sample, 84.7 % of the study sample reported their income was enough to live on and most sources of income came from an occupation or pension (53.4%) and from children or grand children (36.6%) respectively. Additionally, most of them were still working (60.3%). This finding is consistent with the report of the Thai National Statistic Office in 2002 and previous studies (Jitapunkul et al., 2001; Kanjanawong et al., 1997). They reported that most Thai elderly had enough income to live on. Their incomes mostly came from their work or pension and some came from their children. A possible reason used as an explanation to understand this phenomenon is that incomes and expected expenditure of the elderly are commonly lower in old age. Moreover, for the essential expenditure for living of some elderly was supported by their children (Jitapunkul et al., 2001). Therefore, most of the Thai elderly estimated that their incomes were enough to live on. While the phenomenon of working during the aging period may result from the responsibility of several possible burdens such as taking care of their living, health, and family, not wanting to disturb their children's money and needing to spend time to be useful by doing some work (Malathum, 2001, Jitapunkul et al., 2001; Kanjanawong et al., 1997).

Regarding to whom the study sample lived with, most of them reported that they lived with their spouse and/or children /grand children (89.1%), while 7.5% lived alone. Additionally, it is found that their spouse and/ or children /grand children were a majority

group of the caregivers. This finding is consistent with the Thai National Statistic Office (2002), Jitapunkul et al. (2001), Malathum (2001), Kanjanawong et al. (1997), and Chayovan and Knodel (1996). In Thai society, there are beliefs, values, customs, and culture relating to the association between the elderly and their family which Thai people have believed and follow as a social norm for a long time. Traditionally, children have to take care of their parents when the parents grow old in order to express their gratitude towards them. If anyone takes care of their parents inappropriately or do not take care of them at all, they will be condemned from society as a bad person (Jitapunkul et al., 2001; Mutigo et al., 1999; Yodphet et al., 1998). As a reflection of this the results showed that most of the study samples lived with their spouse, their children and/or their grandchildren who become their caregiver.

Most of the participants (96.2%) reported they had happiness for living. Approximately, 45% of the participants reported their health status was good, while 6.3 % of the participants were not good. An estimation of the happiness of living is normally related to an individual's perceived health status. The elderly who perceive their health status as good, usually report that they have happiness for living (Jitapunkul et al., 2001).

Characteristics of study variable

Functional performance

It is found that the statistical means of the functional performance score in the study sample was 26.63 (SD = 4.01) while the collected functional performance level ranged from 3 to 29. This result indicated that most of the sample had a high level of

functional performance. In another way, it means that most of study sample had the ability to conduct activities of daily living by themselves. A small number were dependent on other people to conduct activities of daily living. The reason may possibly be due to most of the samples (74.1%) being young older adult who had the ability to perform activities of daily living independently. The obtained mean of functional performance score of the study samples was therefore high. Puggaard (2005) found that conducting routine activities of daily living of young adults only induces a minimal challenge on maximum capacity. With increasing, age less physically demanding tasks require an increase in maximum physical capacity. Therefore in performing the same activities of daily living, older adults need to make more effort than younger ones. Additionally, this idea was confirmed by the results from pieces of clinical evidence (Toraman, 2005; Leinonen, Heikkinen & Jylha, 2002) showing that younger older adults had functional performance scores higher than the old older adults.

When considering difficulties of conducting activities of daily living in both dimensions of functional performance (BADL and IADL) accessing transportation (27.2%) was most commonly reported, followed by bladder incontinence (24.1%), cooking (21.6%), walking outdoors (20.0%) and transferring (18.8%). Regarding basic activities of daily living (BADL), bladder incontinence was most commonly found (24.1%), then transferring (18.18%) and climbing stairs (17.5%). For instrumental activities of daily living (IADL), accessing transportation was most commonly reported (27.2%), followed by cooking (21.6%) and walking outdoors (20.0%).

The results of the present study are similar to the findings of previous studies of Thai elderly (Jitapunkul et al., 2001). Accessing transportation (45.6%) was found to

cause the most difficulties in Thai elderly, who needed help from other people, followed by cooking (45.4%), heavy housework (37.9%) and climbing stairs (22.7%). Difficulty in accessing transportation was the most dependent activity for Thai elderly, which could result from poor public transportation systems in rural areas. This includes stations of public transportation located too far from their house and the condition of the public transportation, which was inconvenient for the elderly to use. Examples of these are bus entrances having steps too high, unsuitable hand rails, less seats available or even poor road conditions. Thus, the Thai elderly usually depend upon their children to help with accessing transportation.

It is no surprise that walking outdoors, transferring, and climbing were reported by the study samples as activities which are difficult to perform. It is the same as with Katz et al. (1963) who suggested that activities related to mobility including walking, climbing, transferring are in the first order of which older people usually have difficulty in performing.

Depression

The findings of the present study demonstrated that 67.8% of the study sample did not have depression, 29.7% of the study sample had mild depression levels and 2.5% had severe depression. The findings are close to the results of previous studies performed on Thai elderly. Jitapunkul et al. (2001) found that approximately 20% of Thai elderly had depression. However, it differed from the study of Thongtang et al. (2002) that found the prevalence of depression was 12.78 %. The difference in the prevalence rate of depression seems to be explained by the differences in the assessment methodologies used, the specific definition of the depression utilized (Smarr, 2003) as well as other

factors. In fact, many factors including medical disorders (cancer, cardiovascular disorder, endocrine disorder), alcohol abuse, negative thought patterns, cognitive dysfunction, loss of a spouse or partner, loss of social supports, and lower income (Beer & Berkow, 2000) cause depression in the elderly. The differences in factors causing depression in the elderly in any area might have an influence on the divergence of the prevalence rate of depression in the elderly (Oliveira, Gomes, & Oliveira, 2006).

In addition, the depression level is also associated with the level of social support. Miller (1995), Koyano et al. (1994), and Dean, Kolody, and Wood (1990) reported clinical evidence showing that the best supportive resource for the elderly is their families and friends. The wide social support for the elderly would lead to less risk of depression (Jang et al., 2002; Chi & Chou, 2001; Miller, 1995). In this study, it is found that the study samples had a high score of social support as well as most of the samples staying with their family, particularly spouses and their children. Thus, this would be a major reason why the study sample reported less depression.

Muscle strength

The findings of the study revealed that muscle strength in the study sample was low (mean = 37.21, SD = 20.83). It is an expected finding since muscle strength endurance and coordination are affected by age-related changes even in the absence of risk factors such as chronic diseases. After 40 years of age, muscle strength starts to decline gradually, resulting in an overall decrease of 30% to 50 % by the age of 80 years (Kalapotharakos et al., 2004; Al-abdulwahab, 1999; Miller, 1995; Hurley, 1995). Diminished muscle strength is attributed primarily to the age-related loss of muscle mass (Kalapotharakos et al., 2004; Taaffe & Marcus, 2000; Carmeli et al., 2000). In addition,

a person‘s current level of activity and life-long patterns of exercise can influence muscle strength at any age. The muscle strength of an elderly person who regularly engages in doing exercise is higher than that of their counterparts who do not (Tager et al., 2004; Bastone, & Filho, 2004; Miller, 1995).

Considering the level of exercise in this study, the findings showed that the level of exercise was low. Additionally, a low number in the study sample conducted leisure-time exercise or vigorous physical activity. This finding supports the notion above that the current level of exercise of the elderly positively influences muscle strength. Thus, low muscle strength in this study sample possibly resulted from a low level of exercise and the effects of age-related change.

Chronic illness

The finding of the study revealed that 68.1% of the study sample had chronic illnesses. Thirty five point nine percent (35.9%) of the samples reported that they had two or more types of chronic illnesses. The results of the present study are consistent with prior studies. Kriegsman, Deek, and Stalman (2004) reported that approximately 70% of the elderly had at least 1-2 chronic illnesses and for people aged 70 years and over usually had 2-3 chronic illnesses. The findings are similar to previous studies in Thailand, Ministry of public health (2003), Porapukham and Atipho (2000), and Jitapunkul et al. (2001) found that around 70% of Thai elderly had chronic illnesses and one person had several types of chronic illnesses.

Diabetes mellitus, hypertension, arthritis, heart disease, urinary incontinence, asthma, stroke, cataracts, renal failure, cancer, and liver disease were reported as the chronic illnesses in the study sample. A majority of the chronic illnesses found in this

study sample were diabetes mellitus (31.9%), hypertension (31.9%), arthritis and heart disease respectively (21.9% and 11.9%). This is consistent with previous studies which reported that chronic illnesses that mostly occur in Thai elderly were stroke, arthritis, hypertension, heart diseases, diabetes, and cancer (Ministry of Public Health, 2003; Jitapunkul et al., 2001; Porapukham & Atipho, 2000).

Concerning how the study sample take care of their chronic illnesses, approximately 80% of the study sample reported that they regularly followed a physician's appointment and visited the physician when they noticed any abnormal symptoms and never refused medicine usage. However, around 20% of the study sample, particularly in the cases of arthritis disease and urinary incontinence, reported that they never visited physicians again after the physician had diagnosed these illnesses, even when abnormal symptoms occurred. They usually bought medicine similar to the physician's prescriptions from earlier visits at the drug stores to relieve those symptoms. This is similar to the study of Jitapunkul et al. (2001). It is found that 50% of the elderly buy some medicines from the drug store to help with their chronic illness. If they have taken the medicines, and the abnormal symptoms are not relieved, they will visit the physician.

Level of Exercise

The results of the study showed that the study sample had lower levels of exercise with a mean of 30.22 (SD = 18.63). It is found that 52.2% of the samples did not participate in vigorous activities. Regarding the dimensions of the level of exercise scores, it was found that the elderly had a low score on the dimensions of vigorous physical activity, leisure walking, and sitting but they had moderate scores on standing

and moving. The findings of this study coincide with a previous study by Chinuntuya (2001) reporting that the elderly had a low score of exercise behavior with a mean of 30.73 (SD = 19.54). It was also found that 59% of the elderly samples did not perform leisure-time exercise.

The plausible rationale for discussing the findings of the study is that the common work of rural elderly are agricultural chores such as gardening and farming, household chores, and care-giving activities. These activities refer to moderate and low physical activities. Therefore the dimension of vigorous activities and leisure walking was reported at a low level whereas moving and standing was reported at a moderate level. Additionally, only a few of them engaged in leisure-time exercise. This is consistent with the report of the National Statistics Office (2002) which found that 77.4% of Thai elderly lack exercise. Common reasons for preventing the elderly engaging in leisure-time exercise is that it requires some effort in terms of intensity, duration, regularity, specific schedule and location and needed continuity. This indicated that the exercise program could not be accommodated properly into the elderly's daily living (Conn, 1998a; Laitakari et al., 1996). Additionally, health problems such as joint degradation and/or fatigue were reported as the major reasons for the elderly not conducting vigorous activities (Chinuntuya, 2001; Conn, 1998a). For these reasons, it was of the utmost importance for the participants to engage in a level of exercise with low and moderate activities.

Level of social support

The findings of the study demonstrated that the actual level of social support of the study sample ranged from 56 to 121. The mean value is 89.35 with a standard

deviation of 12.93. It indicates that the level of social support of the samples is considerably at a slightly high level. Considering dimensions of social support, the study sample reported that they received intimacy (X= 18.07 from range of 9 to 25, SD = 3.27) social integration (X = 18.17 from range of 7 to 25, SD = 2.97), nurturance (X= 18.06 from range of 8 to 25, SD = 2.82) self worth (X= 17.45 from range of 10 to 25, SD = 2.90), and assistance (X = 17.57 from range of 10 to 25, SD = 2.90) at a slightly high level too.

This is possibly resulting from the fact that the samples stayed with their families including their spouse and children. Family has been identified as the significant resource of social support for Thai elderly (Malathum, 2001; Chinutuya, 2001; Choowattanapakorn, 1999). Significant social support provided by the families including intimacy, self worth, nurturance, social integration and assistance led to the study sample reporting their receiving social support at slightly high level. The findings of the present study coincide with the results of a previous study by Chinuntuya (2001). Here it was reported that the elderly who lived with their families were given a high level of a social support because their families were the most important resource of social support providing tangible, emotional support and assistance for the elderly. Moreover, positive family action can also reinforce elderly people's participation and encourage them to have independent living (Braungart, Zarit, & Malmberg, 2000). For example, a family encourages the older parents to engage in activities of daily living when they have difficulties in conducting activities of daily living. This leads to their perceiving social support at a slightly high level.

Vision

The results of the study showed that 63.4% of the study sample had normal vision and 36.6% had a visual impairment. Visual impairment is commonly found in the elderly population. Ebersol, Hess, and Luggen (2004) found that visual acuity and accommodation normally decrease with age. These changes, particularly presbyopia, begin making themselves felt in the forties and for many years after that. *Healthy people 2010* (2002) revealed that about 2.7 million American elderly have severe visual impairment, women are more visually impaired than men and 33%of women of 85 and older reported visual impairment**.** The results of the study are consistent with the previous study of Panjamanas (2005) which found that 21.9% of Thai elderly had a visual impairment.

Model and hypotheses testing results

The results of the Structural Equation Model (SEM) analyses indicated that the proposed model constructed from the functional consequence theory developed by Miller (1995) fit the empirical data well (χ^2 = 133.59, df =116, p = 0.126, GFI = 0.96 and AGFI = 0.93) and accounted for 66.3% of variance in functional performance in Thai elderly. The findings depicted that the strong predictors are included in the model and the model is parsimonious (χ^2 < 2.df). Moreover, the results of this study supported the causal relationship among these predictors. The obtained causal model of functional performance in Thai elderly could explain the higher proportion of variance of functional performance compared to prior studies developed by Patrick et al. (2004) which model

could explain 45% of functional ability (BADL and IADL) of rural American older adults.

Hypotheses testing

Hypothesis one: *Muscle strength has a positive direct effect on functional performance.*

The results of the study demonstrated that muscle strength had a non-significant positive direct effect on functional performance (β =0.041, p>.05). It means that this hypothesis was not supported by the results of this study. Rationale for these findings could be explained as in the following.

The muscle strength of younger older adults should normally be stronger than in the oldest old adults as well as be better at conducting functional performance. In other words, the muscle strength score and functional performance score of younger older adults should be tentatively higher than that of the older adults. In this study, it is found that most of the samples were younger older adults. But, the average score of muscle strength in the study sample was still low (mean = 37.21, in range of 5 to 121.5, SD = 20.83). However, the average score of functional performance was high (mean = 26.63 from range of 3-29, SD = 4.01). This result is similar to the study of Buchner et al (1996). The researchers found that a lower level of muscle strength had little effect or no effect on the ability to conduct activities in daily living of the younger elderly. This results from the threshold at which muscle weakness begins to have an effect on functional performance depending upon physiological reserves in other determinants such as joint muscular tissue, neuromuscular action, flexibility and endurance. Therefore, the younger older adults who have lower levels of muscle strength but have good

physiological reserves of other determinants are still able to perform activities in daily living as well. Contrasted with frail older adults or the oldest adults, a small change in muscle strength may produce relatively large effects on functional performance. Therefore, there was weak association between muscle strength and functional performance in the younger older adults while a strong association was found in the oldest older adults.

Another reason for discussion of this finding is that conducting activities of daily living, particularly with feeding, dressing and grooming, is that the upper extremity muscle strength (hand grip muscle) directly affects the ability to conduct those activities more than with lower extremity muscle strength or knee muscle strength (Ratanen et al., 1999). In this study, the muscle strength was measured by a leg dynamometer which measures the knee muscle strength. Therefore, it is reasonable that the study result shows the effect of knee muscle strength on functional performance in over all activities of daily living might be less significant. However, several previous studies (McNevin et al., 2002; Topp, Mikesky, & Thompson, 1998) indicated that knee muscle strength provides the highest proportion of variance of functional performance over all and it is the marker of identifying initial good functioning in older adults at high and low risk of future mobility limitation (Todd et al., 2007). It is possible that knee muscle strength might have a direct effect on functional performance in some specific activities, but not all activities. It needs further study to clarify the association between knee muscle strength and functional performance in specific activities of daily living and to examine the association between muscle strength and functional performance in younger Thai older adults in comparison with old older adults.

Hypothesis two: *Vision has a positive direct effect on functional performance.*

The study results support this hypothesis. The findings of the study revealed that vision had a significant positive direct effect on functional performance ($\gamma = 0.144$, $p<.05$). The results of the study are consistent with the study of Lieberman, Friger, and Lieberman (2004) which found that visual impairment had a significant independent effect on the functional performance in the elderly patients in hospital ($\beta = -0.01$, regression coefficient = -4.15, $P<.01$; β = standardized regression coefficient). Additionally, the results confirm the proposition of functional consequence theory developed by Miller (1995) stating that vision has a positive direct effect on functional performance in the elderly. It means that people with no visual impairment can conduct activities of daily living independently. According to the Center for disease Control and Prevention (Desai et al., 2001), 1.8 million community –dwelling elders reported having difficulty with activities of daily living because of visual impairment. Thus, it is reasonable to state that visual impairment is the main factor influencing the difficulty to conduct activities of daily living.

A possible explanation for this finding is that vision capability is one of the most significant senses of people that is utilized to navigate and to perceive what is going on in the surrounding environment and then leading to the process of performing activities. When a person has visual impairment, he/she feels unsafe or has difficulties in conducting activities of daily living such as walking, climbing the stairs and transportation (Crews & Campbell, 2004), reading the newspaper, preparing meals or

recognizing faces of friends (Healthy 2010, 2002). The inability to see well affects functional performance and social interaction and possibly leads to a loss of independence.

Hypothesis three: *Chronic illness has a negative direct effect on functional performance and an indirect effect on functional performance through depression.*

The results of the study indicated that chronic illness had a significant negative direct effect on functional performance ($\gamma = -0.233$, $p<.01$) and had a significant indirect effect through depression ($\gamma = -0.030$, $p<.01$). Therefore the hypothesis of the study was supported. Additionally, the results revealed that chronic illness had a significant positive direct effect on depression ($\beta = 0.538$, $p<.01$).

The findings are consistent with prior studies. Miller et al. (2004), Beland and Zungzunegui (1999), and Kriegsman, Deeg, and Stalman (2004) reported that the elderly who have several types of chronic illness or have a greater number of chronic illnesses would anticipate lower functional performance levels than the elderly who have less in number or none. A combination of chronic illnesses would reduce functional capacity in several organs. Furthermore, various types of chronic illness are more detrimental to functional performance than one type of chronic illness. For example, with the elderly person who has diabetes mellitus together with heart disease, the pathology of both diseases causes more deterioration in the cardiovascular, endocrine and others system, then leading to an increased severity of chronic illness. As the severity of chronic illnesses increase it will result in a higher influence on functional performance reduction or impairment in the elderly. Therefore, the number of chronic illnesses occurring in the

elderly has a negative relationship with functional performance in the elderly (Kriegsman, Deeg, & Stalman, 2004).

Normally, as chronic illness indirectly affects functional performance through depression, this finding is congruent with previous studies. Egede (2004) found that people with diabetes and comorbid major depression would have a higher prevalence of functional disability and higher odds of functional disability compared with individuals with either diabetes or major depression alone.

The rationale for discussing these findings is given herein. Older people with several chronic illnesses usually have pathological defects in various organs causing much more symptoms such as fatigue, restlessness, tiredness, anorexia, fainting, dyspnea, chest pains etc. The combination of various symptoms influences the older person to suffer more and go through the depression. However, there are costs and treatments of a number of chronic illnesses independently related to depression too. This means chronic illness had a positive direct effect on depression (Lyness et al., 2006). Depression decreases functional performance by the combination of biological and psychological mechanisms (Penninx et al., 1998). Psychological distress and subsequent neurohormonal and immunological increases the susceptibility to disease, while a persistence of somatic symptom of depression is worse for functional performance over time. Depressed moods interfere with the recovery of chronic illness by impeding treatment seeking, and adherence to treatment. Also, the development of multiple complications and a severity of symptoms of chronic illnesses increase the depression in the elderly. Therefore, chronic illness had a negative direct effect on functional performance and an indirect effect through depression (Egede, 2004).

Hypothesis four: *The level of exercise has a positive direct effect on functional performance and an indirect effect on functional performance through muscle strength.*

The findings of the study confirm the hypothesis that the level of exercise in the study sample had a significant positive direct effect on functional performance ($\gamma = 0.481$, $p<.01$) but a non significant indirect effect on muscle strength ($\gamma = 0.022$, $p>.05$) was found. The total effect on the level of exercise on functional performance was 0.503, $p<.05$.

A significant direct effect of exercise on functional performance is the expected result in this study. The results are in accordance with previous studies which indicated that the level of exercise had a positive direct effect on the functional performance in the elderly. The elderly who were active had a higher functional performance score and the elderly who were always inactive had a lower functional performance score (Brach et al., 2003; Amnatsatsue, 2002; Ringberg et al., 2001; Young, Masaki & Curb, 1995).

It could be explained that the elderly who participate in moderate physical activity could maintain optimal functional performance as older adults (Young, Masaki, & Curb, 1995). Participating in moderate physical activity can help the older adults to more easily perform many activities of daily living. For example, gaining more flexibility will help the elderly to do things more easily, like reaching in to your cupboard and tying your shoes. Being stronger and having more balance will allow the older adults to be able to lift and carry items like bags of groceries and will make it easier for them to get in and out of chairs and the bathtub. Improving their cardio-respiratory endurance will allow the older adults to do things like climbing stairs or playing with grandchildren without becoming out of breath (USDHHS, 1999).

The indirect effect of the level of exercise through muscle strength which is found to be non significant could be explained based on the concepts proposed by Buchner et al (1996) which stated that the association between muscle strength and functional performance has to concerned with the threshold of muscle strength. This means that the person who has muscle strength higher than threshold level could be to perform functional performance well. While the person who has a muscle strength lower than the threshold level will face difficulty in performing functional performance. It is possible that the elderly sample in this study have a low muscle strength score but is still higher than the threshold level. Thus, they reported that they are still able to perform activities of daily living well. Additionally, to prevent muscle strength reduction in the elderly resulting from age related changes, regularly participating in a leisure-exercise program, particularly in resistance training exercise programs, would be required as clinical evidence has shown (Puggaard, 2005; Bastone, & Filho, 2004; Kalapothrakos et al., 2004; Hruda, Hick, & McCartney, 2003; Taaffe & Marcus, 2000).

Regarding the engagement in exercise of the study sample has been found that a low number of the study sample engaged in vigorous physical activity or leisure-time exercise. Most of them engaged in moderate and low activities. Therefore, it is difficult for the study sample to maintain or prevent muscle strength reduction when growing older. Considering what has been mentioned above, it is reasonable to note that the indirect effect of exercise through muscle strength is non-significant. Thus, to maintain muscle strength when becoming older the resistance training exercise program for the elderly should be promoted. .

Hypothesis five: *The level of social support has a positive direct effect on functional performance and an indirect effect on functional performance through depression.*

The findings of the study support the hypothesis that the level of social support had a significant positive direct effect on functional performance (β= 0.063, p<.01) and had a significant indirect effect through depression (γ = 0.036, p<.01).

As expected those elderly people who have greater social support lead to higher functional performance. This coincides with previous findings of the study of Fiksenbaum et al (2005) that is that the satisfaction of having the social support has a negative direct effect on functional disability in the community dwelling elderly (β = -.15, p<.05). When elderly people have difficulty in performing activities of daily living, such as walking, support from their families by holding their hands, finding assistive devices, or encouraging them while walking, these influences increase their abilities to walk. That means functional performance is enhanced. In cases of low levels or an absence of social support, the elderly person may still be in difficulty to walk and this leads to a situation where they hesitate or stop walking. That means functional performance is limited. Therefore social support had a direct effect on functional performance as proposed in functional consequence theory by Miller (1995).

In addition, the findings of the studies indicated that social support had an indirect effect on functional performance through depression. These findings are similar to previously reported results of Greenglass, Fiksenbaum and Eaton (2006) which is that the social support had an indirect effect on functional disability through depression (β = -0.07, p<.01). Several studies have found that greater social support is associated with a

lower level of depression (Fiksenbaum et al., 2005; Cumming & Cockerham, 2004; Jang et al., 2002). Social support is associated with a positive affective state such as increasing belonging, intimacy, heightened self-worth, and an increased sense of control. It can be a source of useful information that enhances the coping influence on lower levels depression. Therefore older adults who are embedded in active social support tend to enjoy or be comfortable conducting activities of daily living, including a lower incidence of depression, than those who do not maintain strong social support (Fiksenbaum et al., 2005).

Hypothesis six: *Depression has a negative direct effect on functional performance.*

The findings of the study showed that depression had a non-significant negative direct effect on functional performance (β = -0.056, p>.05). It means that the results of present study did not support this hypothesis. It could be explained that it might result from the effect of the level of social support which mitigates the harmful effects of depressive symptoms and functional performance in the study sample. Hay et al (2001) examined the interactive effects of depressive symptoms and social support on functional performance of the elderly patient with uni-polar major depression. The results showed an improved score on instrumental activity of daily living and a stable score on basic activities in daily living. In the adjusted analyses, social support provided marginal protection against the worsening on functional performance score. The results indicated that a large social network, more frequent social interaction and perceived adequacy of social support play a modest buffering role against decline in functional performance in the depressed elderly patient. In a longitudinal study of community-dwelling elderly

subjects, Hay et al. (1997) found that social support buffers the effect of depression on the risk of functional impairment.

Several possible mechanisms could account for the interactive effect of social support and depression on functional performance. Social support may buffer the neuroendocrine effect of depression. Greater social interaction may encourage a depressed person to remain physically active, decreasing the potential severity of functional impairment. An ability to conduct activities in daily living in the elderly may also be greater in the presence of a supportive environment.

In accordance with Cohen and Wills (1985) it has been stated that social support influences health through the main-effect process and the buffering process. The buffering process occurs when an individual feels stressed. If the people fail to cope with situation they may feel helpless and experience low self-esteem. Perceived adequate support will reduce the stress reaction by increasing one's confidence to cope with the stressful event, by solving the problem, by weakening the importance of the problem, or by reducing the physiological response to stress.

Even the findings of present studies conflict with several previous studies which indicated that depression had a negative direct effect on functional performance (Kempen et al., 1999; Penninx et al., 1998). None of those studies added social support variables to their models. However, this study sample is homogeneous, 67.8% of the study sample reported no depression, 29.7% had mild depression and only 2.5% had severe depression. It is possible there is small or no effect of depression on functional performance in this study sample group. There is need of further study to examine this association in depressive and non depressive groups.

Conclusions

There is reliable evidence indicating that a significant number of Thai elderly are faced with a decline in functional performance and have an increased risk of disability. In 1996-1997, a National survey was performed to investigate the health of the population. It was found that one forth of Thai elderly could not perform activities of daily living. Approximately, 14% of Thai elderly are not comfortable being mobile outdoors. An inability to conduct activities of daily living causes serious impact on both physical and psychological health (including a decline in physical health, an increasing risk of complications, loss of independence, and feeling of low self-esteem). A decline in functional performance of Thai elderly is a crucial public health concern. The phenomenon impacts not only as a cost burden on the government budget, but also as a burden to health supporting units as well as on the psychology of the surrounding people who take care of the elderly. Therefore, understanding factors influencing functional performance of the elderly to a significant degree is necessary and needed in order to develop effective intervention programs for promoting functional performance or disability prevention.

Therefore, this study has been set up and performed to investigate and develop a causal model for explaining the functional performance of the Thai elderly. The study includes an examination of the causal relationship between significant factors such as muscle strength, vision, chronic illness, level of exercise, level of social support, depression and functional performance of the Thai elderly. The work has been carried out using a conceptual framework of the functional consequence theory developed by Miller (1995) and available in supporting literature.

The samples of 320 Thai elderly aged 60 to 94 years old (mean =69.6 years old) who reside in different regions of Thailand were randomly recruited for this study. The majority of the participants (57.2%) was female and married (66.3% of the elderly). Most of them completed primary school (63.8%), and 21.3% had no formal education. Most of them still work (60.3%) and 53.4% of them receive a household income from an occupation or pensions while 36.6% of them receive an income from children/grand-children. Approximately, 80.9% of the participants had a caregiver, while most of caregivers are relations: 88.4% are their children and/or grandchildren.

Regarding functional performance in this study sample, it is found that accessing transportation, cooking, walking outdoors and transferring are reported as performed by Thai elderly most dependently. Sixty three point four percent (63.4%) of the elderly reported having normal vision while 36.6% of them had a visual impairment. Most of the elderly (67.8%) have normal depression and 29.7% suffer mild depression. Regarding chronic illness, most of the elderly (68.1%) have an illness, approximately 54% of this group suffer from one or two chronic illnesses. Diabetes mellitus, hypertension and arthritis are the most common chronic illnesses (31.9%, 31.9% and 21.9%, respectively). With regards to the characteristics of the level of exercise, it is found that 52.2% of the elderly did not participate in vigorous activity. Those who participated did at favorable rate of 1-2 times per week with duration less than 30 minutes. It found that the elderly had low score on vigorous physical activity, leisure walking and sitting but they had moderate score on standing and moving.

From the data evaluation, it is found that most of the elderly had low muscle strength, normal vision, 1or 2 number of chronic illnesses, a low level of exercise, a slightly high level of social support and no depression.

Structural Equation Model (SEM) analysis was performed using LISREL 8.72 software. The pertinent findings for each research question investigated in this study are as follows:

1. Does the hypothesized causal model to explain the functional performance of Thai elderly including muscle strength, vision, chronic illness, level of exercise, level of social support, and depression adequately fit the data?

The SEM analysis results indicated that the proposed model fitted with the empirical data well (χ^2 = 133.59, df =116, p = 0.126, GFI = 0.96 and AGFI = 0.93) and accounted for 66.3% of variance in functional performance in Thai elderly. The findings depicted that the strong predictors are included in the model and the model is parsimonious (χ^2 < 2.df).

2. Do muscle strength, vision, chronic illness, level of exercise, level of social support, and depression have direct effects on functional performance?

The results of the study demonstrated that muscle strength had a non-significant positive direct effect on functional performance (β =0.041, p>.05). The findings of the study revealed that vision had a significant positive direct effect on functional performance (γ = 0.144, p<.05). Chronic illness had a significant negative direct effect on functional performance (γ = -0.233, p<.01) and had a significant indirect effect on depression (γ = -0.030, p<.01). The findings of the study confirm the hypothesis that the level of exercise in the study sample had a significant positive direct effect on functional

performance ($\gamma = 0.481$, $p<.01$). It is found that the total effect of the level of exercise on functional performance was 0.503, $p<.05$. The level of social support had a significant positive direct effect on functional performance ($\beta= 0.063$, $p<.01$). The findings showed that depression had a non-significant negative direct effect on functional performance ($\beta = -0.056$, $p>.05$).

3. Does level of exercise have an indirect effect on functional performance through muscle strength?

The findings showed that level of exercise had a non-significant indirect effect on functional performance through muscle strength ($\gamma = 0.022$, $p>.05$).

4. Does level of social support have an indirect effect on functional performance through depression?

The finding indicated that level of social support had an indirect effect on functional performance through depression ($\gamma = 0.036$, $p<.01$).

The research hypotheses are partially supported by the data. Among the predictors, the level of exercise is the strongest predictor followed by chronic illness, vision, and the level of social support. The model is similar to functional consequence theory in that vision, exercise, chronic illness, social support have direct effects on functional performance but are different from functional consequence theory in that chronic illness and social support have indirect effects through depression on functional performance. Additionally, this study contributes to the functional consequence theory literature by demonstrating that exercise explained 28.7% of the variance in muscle strength and chronic illness and social support explained 95.7% of the variance in depression.

Implications for nursing

The present study has adopted functional consequence theory developed by Miller (1995) as a conceptual frame work to develop the causal model of functional performance in Thai elderly. The model has been developed to examine the relationships between muscle strength, vision, chronic illness, the level of exercise, the level of social support, depression and functional performance of Thai elderly. The developed model was tested and fit well with empirical data. It could explain 66% of the variance in functional performance of Thai elderly. The outcome of this study contributes to nursing by developing the causal model to use for the prediction of the functional performance of the Thai elderly when promoting or improving on relevant significant influencing factors.

The findings confirm a significant relationship between exercise, chronic illness, vision, social support, depression and functional performance of Thai elderly. It means these factors play an important role in enhancing functional performance of the Thai elderly.

The findings show that the level of exercise which is the strongest influencing factor had a significant positive direct effect on functional performance**.** It means increasing level of exercise will significantly improve functional performance of the elderly. However, it is found that the study sample had low level of exercise. Approximately, 52 % of them did not engage vigorous physical activity. As can be seen, the Thai elderly still do not pay much attention on doing exercise. Nursing intervention to promote Thai elderly realized on importance of exercise and to perform exercise is therefore necessary. Nursing intervention shall be developed by considering surrounding

environments and limitations of the Thai Elderly. Implementation of the intervention may need supports from care takers as well as community leader. The intervention shall promote exercise of upper and lower extremity muscles strength in order to maintain the level of muscle strength higher than the threshold level that is significance for conducting activities of daily living.

Regarding chronic illness, it had a significant negative direct effect on functional performance and a significant indirect effect on depression. It means decreasing number of chronic illness will significantly improve functional performance of the elderly. The intervention emphasized on the reducing chronic illness, it also reduces the depression in the elderly, and then their functional performance would be enhanced. The intervention should be promoted in two directions such as preventive chronic illness program in younger or healthy older adults and the other is maintaining and improving program in specific chronic illness. The intervention might emphasize on common chronic illness in Thai elderly usually found such as diabetes mellitus, hypertension, arthritis, and heart disease.

The level of social support has a significant positive direct effect on functional performance and has a significant indirect effect on depression. It means that increasing the level of social support will significantly improve functional performance of the elderly and also decrease depression. Thus, the intervention focus on the motivation of social support levels from family would significantly improve functional performance and also on reducing their depression. The reduction of depression would result indirectly in a positive improvement of the functional performance. Nurses could motivate the family to concern about the significant of the effect of social support including intimacy,

nurturance, self-worth, social integration and assistance on maintaining and improving functional performance in the elderly.

With regard to vision, it had a significant positive direct effect on functional performance. The intervention emphasizes on promoting awareness in the elderly to keep their eyes in a good condition or by reducing the potential of vision impairment would also improve the functional performance of the elderly.

The study contributes to the nursing perspective on understanding interrelationships between significant factors influencing functional performance of the elderly. This is contrary to the past when investigations would have focused on the relationship between vision, chronic illness, depression, the level of exercise, or the level of social support and functional performance. The findings from this research may be employed to suggest practical intervention that would provide useful assistance in slowing or minimizing the decline of functional performance in the elderly. For example, an intervention that instructs the community dwelling elderly to increase their levels of exercise, vision and levels of social support but prevents chronic illness and depression should enhance functional performance in the elderly.

Further findings from the present study indicated that there were significant associations between chronic illness and depression and a significant association between social support and depression. Thus the interventions that assist the elderly in preventing chronic illness, and develop and maintain their social support could be a way of helping them to alleviate depression.

Limitations

This study is a cross-sectional study. It cannot infer a causal relationship nor can it rule out the possibility that reveres causation exists among the study variables. Since the study assessed constructs concomitantly, the causal path in the model is based on the hypothesized relationship that has been assessed in functional consequence theory and has accumulated in literature reviews. It is possible that the effects may occur in other directions.

Recommendations for future research

1. This investigation is an exploratory study conducted within the Thai rural culture. Therefore future studies should be conducted to validate the functional performance in the Thai elderly model in other areas such as the urban or capital areas, other populations, age groups, and people of different socioeconomic status.

2. Since this is a cross-sectional study, it needs the longitudinal study or quasi experimental study to be investigated to replicate these findings.

3. The findings revealed that the relationship among muscle strength and depression and functional performance in the elderly were not as expected. This may be due to the effect of the level social support and the level of exercise. Future research should focus on the relationship between different levels of social support and depression as well as the relationship between different levels of exercise and muscle strength.

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APPENDICES

APPENDIX A

Approval of dissertation proposal

ประกาศ คณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย
เรื่องการอนุมัติหัวข้อดุษฎีนิพนธ์ ครั้งที่ 1/2548 ประจำปีการศึกษา 2548

ตามที่คณะพยาบาลศาสตร์ ได้มีประกาศ เรื่อง การอนุมัติหัวข้อดุษฎีนิพนธ์ ครั้งที่ 2/2547 ประจำปีการศึกษา 2547 แล้วนั้น เนื่องจากมีการปรับแก้บางส่วน จึงขอยกเลิกประกาศหัวข้อวิทยานิพนธ์ของนิสิตในประกาศดังกล่าว จำนวน 2 คน และใช้ประกาศฉบับนี้แทนดังนี้

นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์

รหัสนิสิต	4577979836
ชื่อ-นามสกุล	เรืออากาศเอกหญิง จิรวรรณ อินคุ้ม
สาขา	พยาบาลศาสตร์ (นานาชาติ)
อาจารย์ที่ปรึกษา	ศาสตราจารย์ ดร. วิฒา จีระแพทย์
อาจารย์ที่ปรึกษาร่วม	ผู้ช่วยศาสตราจารย์ ดร. ชนกพร จิตปัญญา
ชื่อหัวข้อดุษฎีนิพนธ์	แบบจำลองเชิงสาเหตุของความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย A CAUSAL MODEL OF FUNCTIONAL PERFORMANCE IN THAI ELDERLY
ครั้งที่อนุมัติ	1/2548
ระดับ	ปริญญาเอก

นิสิตผู้ทำวิจัยและอาจารย์ที่ปรึกษาดุษฎีนิพนธ์

รหัสนิสิต	4577971736
ชื่อ-นามสกุล	ร้อยตำรวจโทหญิง เจือจันทน์ วัฒกีเจริญ
สาขา	พยาบาลศาสตร์ (นานาชาติ)
อาจารย์ที่ปรึกษา	รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์
อาจารย์ที่ปรึกษาร่วม	ผู้ช่วยศาสตราจารย์ ดร. สุรีพร ธนศิลป์
ชื่อหัวข้อดุษฎีนิพนธ์	ผลของโปรแกรมการฟื้นฟูสภาพที่บ้านต่อภาวะการทำงานของร่างกายในผู้ป่วยหลอดเลือดสมอง THE EFFECT OF A HOME-BASED REHABILITATION PROGRAM ON PHYSICAL FUNCTIONAL STATUS IN POST STROKE PATIENTS
ครั้งที่อนุมัติ	1/2548
ระดับ	ปริญญาเอก

ประกาศ ณ วันที่ 6 มิถุนายน พ.ศ. 2548

(รองศาสตราจารย์ ดร. จินตนา ยูนิพันธุ์)
คณบดีคณะพยาบาลศาสตร์

APPENDIX B

Approval of the IRB of Chulalongkorn University

เลขที่ใบรับรอง 068/2548

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์และการใช้สัตว์ทดลองในการวิจัย
กลุ่มวิทยาศาสตร์สุขภาพ จุฬาลงกรณ์มหาวิทยาลัย

โครงการวิจัย : โมเดลเชิงสาเหตุของความสามารถในการทำกิจกรรมในผู้สูงอายุไทย
A CAUSAL MODEL OF FUNCTIONAL PERFORMANCE IN THAI ELDERLY

ผู้วิจัยหลัก : เรืออากาศเอกหญิงจิรวรรณ อินคุ้ม

หน่วยงาน : คณะพยาบาลศาสตร์

คณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์และการใช้สัตว์ทดลองในการวิจัย กลุ่มวิทยาศาสตร์สุขภาพ จุฬาลงกรณ์มหาวิทยาลัย

☑ อนุมัติในแง่จริยธรรมให้ดำเนินการศึกษาวิจัยเรื่องข้างต้นได้

☐ อนุมัติ ภายใต้เงื่อนไข คือ.....

.....

.....

.....ประธาน
(รองศาสตราจารย์นายแพทย์ปรีดา ทัศนประดิษฐ์)

.....เลขานุการ
(ศาสตราจารย์นายแพทย์สุรศักดิ์ ฐานีพานิชสกุล)

รับรองวันที่ 21 พฤศจิกายน 2548

APPENDIX C

List of the experts

รายชื่อผู้ทรงคุณวุฒิ

ชื่อผู้ทรงคุณวุฒิ	ตำแหน่งทางวิชาการ	ที่ทำงาน
ผู้ช่วยศาสตราจารย์ นายแพทย์ รุ่งนิรันดร์ ประดิษฐสุวรรณ	ผู้ช่วยศาสตราจารย์	คณะแพทยศาสตร์ ศิริราช พยาบาล มหาวิทยาลัยมหิดล
ศาสตราจารย์ ดร. ประนอม โอทกานนท์	ศาสตราจารย์	คณะพยาบาลศาสตร์ มหาวิทยาลัยนเรศวร
ผู้ช่วยศาสตราจารย์ ดร. จิราพร เกศพิชญวัฒนา	ผู้ช่วยศาสตราจารย์	คณะพยาบาลศาสตร์ จุฬาลงกรณ์ มหาวิทยาลัย
ผู้ช่วยศาสตราจารย์ ดร. ขวัญใจ อำนาจสัตย์ซื่อ	ผู้ช่วยศาสตราจารย์	ภาควิชาพยาบาลสาธารณสุข คณะสาธารณสุขศาสตร์ มหาวิทยาลัยมหิดล
ผู้ช่วยศาสตราจารย์ ดร. วันทนา มณีศรีวงศ์กูล	ผู้ช่วยศาสตราจารย์	ภาควิชาพยาบาลศาสตร์ คณะแพทยศาสตร์โรงพยาบาล รามาธิบดี มหาวิทยาลัยมหิดล

APPENDIX D

Informed consent form and participants information sheet

Informed Consent Form

Title: A causal model of functional performance in Thai elderly

Code number: Population or Participant…….

I was informed by the researcher namely Flt. Lt. Jirawan Inkoom, address 88/53 Banpatra-Ramindra Ramindra Soi 5 Ramindra Road Bangkhaen Bangkok 10220,

I am willing to take part in a research study, which help nurse understand Thai older adults' ability to do usual daily activities. This study is about a causal model of functional performance and how the casual relationship between factors and functional performance in Thai elderly. The results of the study will help nurse understand and establish the effective intervention for enhance functional performance in Thai elderly.

I know that I will be one out of 320 older adults who asked to answer some question about personal data, level of social support, level of exercise, chronic disease, depression and ability to do usual daily activity. I will be asked to test (a) muscle strength of knee (2) visual acuity. These tasks will be timed and it will take 30 minute to do.

I have been told that some possible risk such as tiredness and fatigue could occur. I have been told that I will be asked to take a rest after each test and I can stop the task whenever I feel tired or uncomfortable. In addition, the nurse researcher will stand next to me during the task and will observe me for sign of fatigue or weakness

I know that I am free not to be in the study, or I may drop out of the study at any time without penalty. Whether I am in the study or not, there will be no effect on health care service in any way.

I have been told about the results of the study will be present as the whole view of the group. I will be assigned a number and my name will not be connected with the study in any way when the results reported. I know that the researcher will make every effort to keep my identity confidential. Nobody can access my information, except the nurse researcher. However, there is no guarantee that this information can not be obtained by court order.

I understand that during the study I can contact the researcher by calling Jirawan Inkoom at 02-664-1000 ext. 1816 (Nursing faculty of Srinakharinwirote University), 02-551-4483 (home phone), and 09-442-4961 (cell phone).

I have read the information above. I am willing to be in this study and participation is voluntary. After I sign the form, I understand I will receive a copy of this consent form

…….	……
Place/Date	Name of subject/participant
…….	……
Place/Date	(……)
	Main researcher signature
…….	……
Place/Date	Witness signature

Participant Information Sheet

1. Title: A causal model of functional performance in Thai elderly

2. Researcher name: Flt. Lt. Jirawan Inkoom

3. Office: Faculty of Nursing, Srinakharinwirote University, Ongkaruk

Office: 02-664-1000 ext. 1816 Home: 02-551-4483

Mobile phone: 09-442-4961 E-mail: jirawan_inkoom@yahoo.com.

4. Information relevant to informed consent form of this study consists of

4.1 The objectives of the study are to study about a causal model of functional performance in Thai elderly and to examine the casual relationship between factors and functional performance in Thai elderly.

4.2 The benefit of the study will be expected that the results of the study will help nurse understand Thai older adults' ability to do usual daily activities or functional performance and establish the effective intervention for enhancing functional performance in Thai elderly.

4.3 The details and the methods of the study which the participants will be asked to conducted when they participate in the study.

The participant will be asked to answer the interview about personal data, level of social support, level of exercise, chronic disease, depression and ability to do usual daily activity.

The participant will be asked to conduct the test (a) muscle strength of knee (2) visual acuity. These tasks will be timed and it will take 30 minute to do.

4.4 Some possible risk such as tiredness and fatigue could occur. The participant will be asked to take a rest after each test and he or she can stop the task whenever the participant feels tired or uncomfortable. In addition, the nurse researcher will stand next to the participant during the task and will observe the participants for sign of fatigue or weakness

4.5 The participant is free not to be in the study, or the participant may drop out of the study at any time without penalty. Whether he or she is in the study or not, there will be no effect on health care service in any way.

4.6 The participant understand that during the study he or she can contact the researcher by calling Jirawan Inkoom at 02-664-1000 ext. 1816 (Nursing faculty of Srinakharinwirote University), 02-551-4483 (home phone), and 09-442-4961 (cell phone).

4.7 The results of the study will be present as the whole view of the group. Each participant will be assigned a number and his or her name will not be connected with the study in any way when the results reported. The researcher will make every effort to keep participant identity confidential. Nobody can access participant’s information, except the nurse researcher. However, there is no guarantee that this information can not be obtained by court order.

4.8 A number of the participants in the study are around 320 persons

ใบยินยอมของประชากรตัวอย่างหรือผู้มีส่วนร่วมในการทำวิจัย
(Informed Consent Form)

ชื่อโครงการ แบบจำลองเชิงสาเหตุของความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย
เลขที่ประชากรตัวอย่าง หรือผู้มีส่วนร่วมในการทำวิจัย.....

ข้าพเจ้า ได้รับทราบข้อมูลจากผู้วิจัย ชื่อ เรืออากาศเอกหญิง จิรวรรณ อินคุ้ม ที่พักอยู่ที่ 88/53 หมู่บ้านภัทรา-รามอินทรา ซอย รามอินทรา 5 ถนน รามอินทรา เขต บางเขน กรุงเทพมหานคร 10220

ข้าพเจ้ายินดีเข้าร่วมการศึกษาวิจัยนี้โดยความสมัครใจ งานวิจัยนี้ศึกษาเกี่ยวกับ แบบจำลองเชิงสาเหตุของความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย และศึกษาความสัมพันธ์เชิงสาเหตุของปัจจัยกับความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย ผลการวิจัยทำให้พยาบาลเข้าใจความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุมากขึ้นและนำผลการวิจัยที่ได้พัฒนาการปฏิบัติการพยาบาลให้มีประสิทธิผล กล่าวคือผู้สูงอายุพัฒนาความสามารถในการทำกิจกรรม หรือคงไว้ซึ่งความสามารถในการปฏิบัติกิจกรรมให้นานที่สุด

ข้าพเจ้าได้รับทราบว่า ข้าพเจ้าคือ ผู้เข้าร่วมวิจัยคนหนึ่งในจำนวน 320 คน ที่ต้องได้รับการสัมภาษณ์เกี่ยวกับ ข้อมูลส่วนตัว ระดับการสนับสนุนทางสังคม ระดับการออกกำลังกาย ประวัติการเจ็บป่วยด้วยโรคเรื้อรัง ความซึมเศร้า และความสามารถในการปฏิบัติกิจกรรมประจำวัน นอกจากนี้ข้าพเจ้าได้รับทราบว่า ข้าพเจ้าต้องเข้ารับการทดสอบความแข็งแรงของกล้ามเนื้อ และความสามารถในการมองเห็น รวมเวลาในการทำกิจกรรมดังกล่าวทั้งหมดประมาณ 30 นาที

ข้าพเจ้าได้รับทราบว่า อาจจะมีอาการเหนื่อยหรืออ่อนเพลียเกิดขึ้นได้ขณะเข้าร่วมการวิจัย ข้าพเจ้าสามารถพักเมื่อจบการทดสอบแต่ละอย่าง หรือหยุดการสัมภาษณ์หรือทำการทดสอบได้ทุกเวลาเมื่อรู้สึกเหนื่อยหรือไม่สบาย ระหว่างการทดสอบพยาบาลผู้วิจัยจะยืนอยู่ข้างข้าพเจ้า เพื่อคอยสังเกตอาการผิดปกติต่าง ๆ เช่น อาการอ่อนเพลีย หรืออ่อนแรง และคอยช่วยเหลือเมื่อเกิดอาการผิดปกติ

ข้าพเจ้าได้รับทราบว่า ข้าพเจ้าสามารถถอนตัวจากการเข้าร่วมการวิจัยเมื่อใดก็ได้ โดยไม่มีผลกระทบต่อการรักษาพยาบาลที่ได้รับ ข้าพเจ้าสามารถซักถามข้อสงสัยจากผู้วิจัย และเข้าใจว่าข้อมูลของข้าพเจ้าจะนำมาศึกษาวิจัยในภาพรวม โดยใช้รหัสตัวเลข ไม่มีการระบุชื่อและนามสกุลของข้าพเจ้าในผลการวิจัย ผู้วิจัยจะรักษาข้อมูลที่แสดงว่าเป็นข้าพเจ้าอย่างเป็นความลับไม่มีใครเข้าถึงข้อมูลของข้าพเจ้าได้ยกเว้นผู้วิจัย และเป็นไปตามคำสั่งของศาล

ข้าพเจ้าได้รับทราบว่าขณะเข้าร่วมวิจัย ข้าพเจ้าสามารถติดต่อกับผู้วิจัย เรืออากาศเอกหญิง จิรวรรณ อินคุ้ม ได้ทางโทรศัพท์ 02-664-1000 ต่อ1816 (ที่ทำงาน คณะพยาบาลศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ) 02-551-4483 (บ้าน), and 09-442-4961 (มือถือ)

ข้าพเจ้าได้อ่านข้อความข้างต้นทั้งหมด และยินดีที่จะเข้าร่วมการศึกษาวิจัยนี้โดยความสมัครใจ และลงนามในท้ายเอกสารนี้

....

สถานที่/วันที่ ลงนามประชากรตัวอย่างหรือผู้มีส่วนร่วมในการทำวิจัย

....

สถานที่/วันที่ (.....)

ลงนามผู้วิจัยหลัก

....

สถานที่/วันที่ (.....)

ลงนามพยาน

ข้อมูลสำหรับประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัย

(Participant Information Sheet)

1. ชื่อโครงการวิจัย แบบจำลองเชิงสาเหตุของความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย

2. ชื่อผู้วิจัย เรืออากาศเอกหญิง จิรวรรณ อินคุ้ม นิสิตคณะพยาบาลศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

3. สถานที่ปฏิบัติงาน คณะพยาบาลศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ องครักษ์ โทรศัพท์ที่ทำงาน 02-664-1000 ต่อ 1816 โทรศัพท์ที่บ้าน 02-551-4483 โทรศัพท์เคลื่อนที่ 09-442-4961

Email jirawan_inkoom@yahoo.com

4. ข้อมูลที่เกี่ยวข้องกับการให้คำยินยอมในการวิจัยประกอบด้วย คำอธิบายดังต่อไปนี้

4.1 วัตถุประสงค์ของการวิจัย เพื่อศึกษา แบบจำลองเชิงสาเหตุของความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย และศึกษาความสัมพันธ์เชิงสาเหตุของปัจจัย กับความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุไทย

4.2 ประโยชน์ของงานวิจัย ผลการวิจัยทำให้พยาบาลเข้าใจความสามารถในการปฏิบัติกิจกรรมของผู้สูงอายุมากขึ้นและนำผลการวิจัยที่ได้พัฒนาการปฏิบัติการพยาบาลให้มีประสิทธิผล กล่าวคือ ส่งเสริมให้ผู้สูงอายุพัฒนาความสามารถในการปฏิบัติกิจกรรม หรือคงไว้ซึ่งความสามารถในการปฏิบัติกิจกรรมให้นานที่สุด

4.3 รายละเอียดและขั้นตอนที่ผู้มีส่วนร่วมในการวิจัยจะได้รับการปฏิบัติ

ในงานวิจัยนี้ผู้มีส่วนร่วมในการวิจัยจะได้รับการสัมภาษณ์เกี่ยวกับ ข้อมูลส่วนตัว ระดับการสนับสนุนทางสังคม ระดับการออกกำลังกาย ประวัติการเจ็บป่วยด้วยโรคเรื้อรัง ความซึมเศร้า และความสามารถในการปฏิบัติกิจกรรมประจำวัน นอกจากนี้ผู้เข้าร่วมการวิจัยต้องเข้ารับการทดสอบ

ความแข็งแรงของกล้ามเนื้อ และความสามารถในการมองเห็น รวมเวลาในการทำกิจกรรมดังกล่าวทั้งหมดประมาณ 30 นาที

4.4 ความเสี่ยงที่อาจเกิดขึ้นเช่น อาการเหนื่อย หรือ อ่อนเพลียขณะเข้าร่วมการวิจัย แนวทางการรักษาความปลอดภัย และการป้องกันความเสี่ยง ผู้ร่วมโครงการสามารถพักเมื่อจบการทดสอบแต่ละอย่าง สามารถหยุดการสัมภาษณ์หรือทำการทดสอบได้ทุกเวลาเมื่อรู้สึกเหนื่อยหรือไม่สบาย ระหว่างการทดสอบพยาบาลผู้วิจัยจะยืนอยู่ข้างผู้เข้าร่วมโครงการตลอดเวลา เพื่อคอยสังเกตอาการผิดปกติต่าง ๆ เช่น อาการอ่อนเพลีย หรืออ่อนแรง และคอยช่วยเหลือเมื่อเกิดอาการผิดปกติ

4.5 ผู้มีส่วนร่วมในการวิจัย มีสิทธิ์ที่จะปฏิเสธที่จะเข้าร่วมหรือสามารถถอนตัวจากโครงการได้ทุกขณะ การปฏิเสธที่จะเข้าร่วมโครงการวิจัยครั้งนี้จะไม่มีผลต่อการได้รับบริการหรือการรักษาที่ผู้เข้าร่วมการวิจัยจะได้รับแต่ประการใด

4.6 ผู้มีส่วนร่วมในการวิจัยสามารถซักถามข้อสงสัยจากผู้วิจัย สามารถติดต่อกับผู้วิจัยในกรณีมีปัญหา (ตลอด 24 ชั่วโมง) สามารถติดต่อกับผู้วิจัยได้ คือ เรืออากาศเอกหญิง จิรวรรณ อินคุ้ม ได้ทางโทรศัพท์ 02-664-1000 ต่อ 1816 (ที่ทำงาน คณะพยาบาลศาสตร์ มหาวิทยาลัยศรีนครินทรวิโรฒ) 02-551-4483 (บ้าน) และ 09-442-4961 (มือถือ)

4.7 ผลการศึกษาวิจัยจะนำเสนอในภาพรวม ไม่มีการระบุชื่อและนามสกุลของผู้มีส่วนร่วมในการวิจัยในผลการวิจัย ผู้วิจัยจะรักษาข้อมูลที่แสดงว่าเป็นผู้มีส่วนร่วมการวิจัยอย่างเป็นความลับไม่มีใครเข้าถึงข้อมูลได้ยกเว้นผู้วิจัย โดยใช้รหัสตัวเลข ยกเว้นว่าได้รับคำยินยอมไว้โดยกฎระเบียบและกฎหมายที่เกี่ยวข้องเท่านั้น จึงจะเปิดเผยข้อมูลแก่สาธารณชน

4.8 จำนวนของประชากรตัวอย่างหรือผู้มีส่วนร่วมในการวิจัยโดยประมาณที่ใช้ในการวิจัยครั้งนี้ 320 คน

APPENDIX E

Interviewing forms for data collection

แบบสัมภาษณ์ ที่.....

แบบสัมภาษณ์ข้อมูลทั่วไป

คำชี้แจง: ให้ผู้สัมภาษณ์ถามผู้สูงอายุ แต่ละข้อเกี่ยวกับข้อมูลทั่วไป และโปรดทำเครื่องหมาย √ ใน ( ) หน้าข้อความหรือเติมคำในช่องว่างตามที่ผู้สูงอายุตอบแบบสัมภาษณ์ตามความเป็นจริง

	สำหรับผู้วิจัย
1. อายุ.....ปี	
2. เพศ	
1( ) ชาย 2( ) หญิง	
3. สถานภาพสมรส	
1( ) คู่ 2( ) โสด	
3( ) หม้าย 4( ) หย่า /แยก	
4. ศาสนา	
1( ) พุทธ 2( ) อิสลาม	
3( ) คริสต์ 4( ) อื่น ๆ ระบุ.....	
5. ระดับการศึกษา	
1( )ไม่ได้เรียน 2( ) ประถมศึกษาตอนต้น (ป4)	
3( ) ประถมศึกษาตอนปลาย 4( ) มัธยมศึกษาตอนต้น	
5( ) มัธยมศึกษาตอนปลาย 6( ) อนุปริญญาหรือเทียบเท่า	
7( ) ปริญญาตรี 8( ) สูงกว่าปริญญาตรี	
6. ปัจจุบันท่านยังทำงานหรือไม่	
1( ) ทำ 2( ) ไม่ทำ	
7. แหล่งรายได้ของท่าน	
1( )จากการประกอบอาชีพ / บำนาญ 2( ) จากคู่สมรส	
3( )จากบุตรหลาน 4( ) เงินสงเคราะห์จากรัฐบาล	
5( ) อื่น ๆ	
8. ความเพียงพอของรายได้ต่อเดือน	
1( ) ไม่เพียงพอและมีหนี้สิน 2( )ไม่เพียงพอแต่ไม่มีหนี้สิน	
3( ) เพียงพอ แต่ไม่เหลือเก็บ 4( )เพียงพอและเหลือเก็บ	
9. ความสามารถในการฟัง	
1( ) ไม่ได้ยินเสียงเมื่อกระซิบข้างหู 2( ) ได้ยินเสียงเมื่อกระซิบข้างหู	
3( ) ได้ยินเสียงเมื่อพูดปกติ	

10. สถานภาพการอยู่อาศัย 1( )อยู่ตามลำพัง 2( ) อยู่กับคู่สมรส 3( ) อยู่กับบุตร หลาน 4( ) อยู่กับญาติ 5( ) อื่น ๆ ระบุ..... 11. ท่านมีคนคอยดูแลหรือไม่ (ถ้าไม่มีให้ข้ามไปข้อ..13.....) 1( ) ไม่มี 2( ) มี มีความเกี่ยวข้องกับท่านโดยเป็น 2.1( ) ลูกหลาน 2.2( ) ญาติ 2.3( ) ลูกจ้าง หรือ พี่เลี้ยงเ 2.4( ) จ้าหน้าที่ศูนย์ 2.5( ) อื่น ๆ ระบุ..... 12. ระยะเวลาที่คอยดูแลท่าน 1( ) ดูแลนานเท่าที่ต้องการ 2( ) ดูแลเพียงช่วงสั้น ๆ 3( ) ดูแลเฉพาะเรื่อง ระบุ..... 13. ท่านมีความสุขในการดำรงชีวิตหรือไม่ 1 ( ) ไม่มี 2 ( ) มี 14. สภาวะสุขภาพของท่านเป็นอย่างไร 1( ) ไม่ดี 2( )ปานกลาง 3( )ดี 4( ) ดีมาก	**สำหรับผู้วิจัย**

แบบสัมภาษณ์ ที่.....

แบบประเมินความสามารถในการปฏิบัติกิจกรรมประจำวันของผู้สูงอายุ

(Modified Barthel ADL Index)

คำชี้แจง: ให้ผู้สัมภาษณ์ถามผู้สูงอายุแต่ละข้อเกี่ยวกับกิจกรรมที่ผู้สูงอายุทำได้จริงและโปรดทำเครื่องหมาย √ หน้าข้อความตามที่ผู้สูงอายุทำได้จริง

ข้อความ	สำหรับผู้วิจัย
1. ผู้สูงอายุรับประทานอาหาร ด้วยตนเองหรือไม่ 0 ( ) ไม่สามารถตักอาหารเข้าปากได้ต้องมีคนป้อนให้ 1 ( ) ตักอาหารเองได้ แต่ต้องมีคนช่วยตัดอาหารให้เป็นชิ้นเล็ก 2 ( ) ตักอาหารและช่วยตนเองได้เป็นปกติ	
2. ผู้สูงอายุล้างหน้า หวีผม แปรงฟัน โกนหนวด ด้วยตนเองหรือไม่ 0 ( ) ทำไม่ได้ ต้องมีคนช่วย 1 ( ) ทำได้เอง (รวมทั้งที่ทำได้เองถ้าเตรียมอุปกรณ์ไว้ให้)	
3. ผู้สูงอายุลุกจากที่นอนหรือจากเตียงไปยังเก้าอี้ ด้วยตนเอง หรือไม่ 0 ( ) ไม่ได้ลุก (นอนอยู่ตลอดหรือต้องใช้คนอุ้มเพื่อเคลื่อนย้าย) 1 ( ) ลุก แต่ต้องมีคนคอยดูแลหรือช่วยพยุง 2 คน 2 ( ) ลุก แต่ต้องมีคนคอยดูแลเพื่อความปลอดภัย 3 ( ) ลุก ได้ด้วยตนเองและไม่ต้องมีคนคอยดูแลหรือช่วยพยุง	
4. ผู้สูงอายุใช้ห้องสุขาเพื่ออุจจาระ ปัสสาวะด้วยตนเองหรือไม่ 0 ( ) ช่วยตัวเองไม่ได้ 1 ( ) ทำเองได้บ้าง (อย่างน้อยทำความสะอาดตนเองได้หลังจากเสร็จธุระ แต่ต้องการความช่วยเหลือบางสิ่ง) 2 ( ) ช่วยตัวเองได้ดี	
5. ผู้สูงอายุเดินเคลื่อนที่หรือถัดภายในห้อง ภายในบ้านด้วยตนเองหรือไม่ 0 ( ) เคลื่อนที่ไปไหนไม่ได้ 1 ( ) ต้องใช้รถเข็นช่วยตนเองให้เคลื่อนที่ได้เอง (ไม่ต้องมีคนเข็นให้) และต้องเข้าออกมุมห้องหรือประตูได้ 2 ( ) เดินหรือเคลื่อนที่โดยมีคนช่วย เช่น พยุงหรือบอกให้ทำตามหรือต้องให้ความสนใจ ดูแลเพื่อความปลอดภัย	

ข้อความ	สำหรับผู้วิจัย
3 ( ) เดินหรือเคลื่อนที่ได้เอง 6. ผู้สูงอายุสวมใส่และถอดเสื้อผ้า ด้วยตนเองได้หรือไม่ 0 ( ) ต้องมีคนสวมใส่ให้ ช่วยตนเองไม่ได้หรือได้น้อย 1 ( ) ช่วยตัวเองร้อยละ 50 ที่เหลือต้องมีคนช่วย 2 ( ) ช่วยตัวเองได้ดี 7. ผู้สูงอายุขึ้นลงบันได ด้วยตนเองได้หรือไม่ 0 ( ) ไม่สามารถขึ้นลงบันไดได้เอง 1 ( ) ต้องการคนช่วย 2 ( ) ขึ้นลงได้เอง 9 ( ) ที่บ้านไม่มีบันไดหรือมีแต่ไม่ได้ใช้ 8. ผู้สูงอายุอาบน้ำหรือเช็ดตัวเองได้หรือไม่ 0 ( ) ต้องมีคนช่วยหรือทำให้ 1 ( ) ทำได้เองโดยไม่ต้องมีคนช่วย 9. ผู้สูงอายุกลั้นการถ่ายอุจจาระได้หรือไม่ (1สัปดาห์ที่ผ่านมา) 0 ( ) กลั้นไม่ได้ หรือต้องการสวนอุจจาระอยู่เสมอ 1 ( ) กลั้นไม่ได้เป็นบางครั้ง (เป็นน้อยกว่า 1 ครั้ง/สัปดาห์) 2 ( ) กลั้นได้เป็นปกติ 10. ผู้สูงอายุกลั้นปัสสาวะได้หรือไม่ (1สัปดาห์ที่ผ่านมา) 0 ( ) กลั้นไม่ได้หรือใช้สายสวนปัสสาวะ แต่ไม่สามารถดูแลตนเองได้ 1 ( ) กลั้นไม่ได้บางครั้ง (เป็นน้อยกว่า 1 ครั้ง/สัปดาห์) 2 ( ) กลั้นได้เป็นปกติ	

คะแนนรวม Basic ADL = ... **คะแนน** (**คะแนนเต็ม** = 20 **คะแนน**)

แบบสัมภาษณ์ ที่.....

แบบประเมินความสามารถในการปฏิบัติกิจกรรมประจำวันแบบต่อเนื่องของผู้สูงอายุ

(Chula ADL Index)

คำชี้แจง: ให้ผู้สัมภาษณ์ถามผู้สูงอายุแต่ละข้อเกี่ยวกับกิจกรรมที่ผู้สูงอายุทำได้จริงและโปรดทำเครื่องหมาย √ หน้าข้อความตามที่ผู้สูงอายุทำได้จริง

ข้อความ	สำหรับผู้วิจัย
1. ผู้สูงอายุไปไหนมาไหนนอกบ้าน เช่นที่ไกล ๆ หรือไปที่ลานสวนหน้าบ้าน หรือไปที่ถนน หน้าบ้าน ได้ด้วยตนเองได้หรือไม่ 0 ( ) ไม่สามารถไปได้เพราะร่างกายไม่อำนวย 1 ( ) ใช้รถเข็นและช่วยตนเองได้หรือต้องการคนประคอง2 ข้าง 2 ( ) ไปได้แต่ต้องมีคนช่วยพยุงหรือคอยดูแล 3 ( ) ไปได้ด้วยตนเอง 2. ผู้สูงอายุ หุงข้าวหรือทำอาหาร ด้วยตนเองได้หรือไม่ 0 ( ) ทำไม่ได้ 1 ( ) ทำเพียงอุ่นอาหารหรือต้องการคนช่วยในการทำ 2 ( ) ทำเองได้ทั้งหมด 3. ผู้สูงอายุเช็ดถู ทำความสะอาดบ้าน ด้วยตนเองหรือไม่ 0 ( ) ทำไม่ได้ 1 ( ) ทำได้เอง 4. ผู้สูงอายุจ่ายเงินเอง ทอน หรือแลกเงินด้วยตนเองได้หรือไม่ 0 ( ) ทำไม่ได้ด้วยตนเอง 1 ( ) ทำได้ด้วยตนเอง 5. ผู้สูงอายุโดยสารรถไปที่อื่น ด้วยตนเองได้หรือไม่ 0 ( ) ไม่สามารถไปมาด้วยตนเองได้ 1 ( ) ต้องมีผู้อื่นช่วยดูแลไปด้วย 2 ( ) ไปมาเองได้	

รวมคะแนน IADL = ……..**คะแนน** (**คะแนนเต็ม เท่ากับ** 9 **คะแนน**)

คะแนนรวม PF = Basic ADL + IADL = …….. **คะแนน** (**คะแนนเต็ม** 29 **คะแนน**)

แบบสัมภาษณ์ ที่.....

แบบสัมภาษณ์การเจ็บป่วยเรื้อรังของผู้สูงอายุ

(Chronic illness)

คำชี้แจง: ให้ผู้สัมภาษณ์ถามผู้สูงอายุ แต่ละข้อเกี่ยวกับ การเจ็บป่วยเรื้อรัง ได้แก่ โรคเบาหวาน โรคความดันโลหิตสูง โรคหัวใจ โรคมะเร็ง โรคหอบหืด โรคข้อเข่าอักเสบ โรคไต โรคตับ โรคอัมพฤกษ์ อัมพาต โรคกลั้นปัสสาวะหรืออุจจาระไม่ได้ และโรคอื่น ๆ ซึ่งผู้สูงอายุเป็นอย่างต่อเนื่อง หรือ เป็น ๆ หาย ๆ มานาน ประมาณ 3 เดือน หรือ มากกว่า การเจ็บป่วยเรื้อรังดังกล่าวอาจได้รับการวินิจฉัยจากแพทย์หรือรับรู้ด้วยตนเอง

โปรดทำเครื่องหมาย Ö ใน ช่องที่ตรงกับความคิดเห็นของผู้สูงอายุมากที่สุดเพียงคำตอบเดียว

1. ท่านได้รับการวินิจฉัยจากแพทย์หรือรับรู้ว่าตนเอง มีอาการเจ็บป่วยเรื้อรัง นานประมาณ 3 เดือน หรือมากกว่า

1( ) ใช่ (ตอบข้อถัดไป) 2( ) ไม่ใช่ (ไม่ต้องตอบข้อถัดไป)

2. โรคหรือการเจ็บป่วยเรื้อรัง ระยะเวลาที่เจ็บป่วย และการดูแลการเจ็บป่วยเรื้อรังของตนเอง

โรคหรือการเจ็บป่วยเรื้อรัง	**การรับรู้ว่าเจ็บป่วยเรื้อรัง**	**ระยะเวลาที่เจ็บป่วย (ปี)**	**การดูแลการเจ็บป่วย**
1. โรคเบาหวาน	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่ง ขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้งและเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
2. โรคความดันโลหิตสูง	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่ง ขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง

โรคหรือการเจ็บป่วยเรื้อรัง	การรับรู้ว่าเจ็บป่วยเรื้อรัง	ระยะเวลาที่เจ็บป่วย (ปี)	การดูแลการเจ็บป่วย
			4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
3. โรคหัวใจ	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่งขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
4. โรคมะเร็ง	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่งขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
5. โรคข้อเข่าอักเสบ	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยา

โรคหรือการเจ็บป่วยเรื้อรัง	การรับรู้ว่าเจ็บป่วยเรื้อรัง	ระยะเวลาที่เจ็บป่วย (ปี)	การดูแลการเจ็บป่วย
			มารับประทานเอง ตามที่แพทย์เคยสั่ง ขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
6.โรคหอบหืด	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่ง ขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
7. โรคไต	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่ง ขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
8. โรคตับ	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยา

โรคหรือการเจ็บป่วยเรื้อรัง	การรับรู้ว่าเจ็บป่วยเรื้อรัง	ระยะเวลาที่เจ็บป่วย (ปี)	การดูแลการเจ็บป่วย
			บ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่งขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
9. กลั้นปัสสาวะหรืออุจจาระไม่ได้	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่งขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง
10. อัมพฤกษ์/อัมพาต	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่งขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง

โรคหรือการเจ็บป่วยเรื้อรัง	การรับรู้ว่าเจ็บป่วยเรื้อรัง	ระยะเวลาที่เจ็บป่วย (ปี)	การดูแลการเจ็บป่วย
11. อื่น ระบุ.....	1( ) ใช่ 2( ) ไม่ใช่		1( ) ไม่เคยไปพบแพทย์ เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ไม่ค่อยสนใจดูแลตนเอง 2( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ขาดยาบ่อยครั้ง ดูแลตนเองไม่ต่อเนื่อง 3( ) ไปพบแพทย์เมื่อมีอาการผิดปกติ ซื้อยามารับประทานเอง ตามที่แพทย์เคยสั่ง ขาดยาบางครั้ง ดูแลตนเองไม่ต่อเนื่อง 4( ) ไปพบแพทย์ตามนัดทุกครั้ง และเมื่อมีอาการผิดปกติ ไม่เคยขาดยา ดูแลตนเองอย่างต่อเนื่อง

3. จำนวนชนิดของการเจ็บป่วยเรื้อรังที่ท่านเป็น

0( ) ไม่มีโรค

1( ) 1 โรค 2( ) 2 โรค

3( ) 3 โรค 4( ) 4 โรค

5( ) 5 โรค 6( ) มากกว่า 5 โรค

แบบสัมภาษณ์ ที่.....

แบบประเมินภาวะซึมเศร้าของผู้สูงอายุ

(The geriatric Depression Scale)

คำชี้แจง ก. สัมภาษณ์ผู้สูงอายุโดยขึ้นต้นประโยคว่า “ใน 1 สัปดาห์ที่ผ่านมานี้ท่านรู้สึกว่า.....”

ข. ทำเครื่องหมาย√ “ใช่” เมื่อผู้สูงอายุตอบรับ ซึ่งหมายถึง ข้อความนั้นตรงกับความรู้สึกของผู้สูงอายุ

ทำเครื่องหมาย √ “ไม่ใช่” เมื่อผู้สูงอายุตอบปฏิเสธ ซึ่งหมายถึง ข้อความนั้นไม่ตรงกับความรู้สึกของผู้สูงอายุ

ค. ข้อ 1- 5 ถ้าตอบ “ไม่ใช่” ให้คะแนนข้อละ 1 คะแนน

ถ้าตอบ “ใช่” ให้คะแนนข้อละ 0 คะแนน

ข้อ 6-15 ถ้าตอบ “ใช่” ให้คะแนนข้อละ 1 คะแนน

ถ้าตอบ “ไม่ใช่” ให้คะแนนข้อละ 0 คะแนน

ข้อความ	ใช่	ไม่ใช่	สำหรับผู้วิจัย
1. คุณรู้สึกพอใจในชีวิตความเป็นอยู่รอบตัว			
2. คุณรู้สึกสดชื่นเกือบตลอดเวลา			
3. คุณคิดว่าคุณโชคดีที่มีชีวิตอยู่ในขณะนี้			
4. คุณรู้สึกว่ามีพลังที่จะทำสิ่งต่าง ๆ			
5. คุณรู้สึกมีความสุขอยู่เสมอ			
6. คุณหมดความสนใจและไม่อยากทำกิจกรรมต่าง ๆ			
7. คุณรู้สึกขาดที่พึ่ง			
8. คุณชอบที่อยู่ในบ้านมากกว่าออกไปข้างนอกหรือทำสิ่งใหม่ ๆ			
9. คุณมีปัญหามากเกี่ยวกับความจำ			
10. คุณรู้สึกว่าชีวิตของคุณว่างเปล่า			
11. คุณรู้สึกว่าชีวิตค่อนข้างไร้ค่า			
12. คุณเกิดความรู้สึกเบื่อหน่ายบ่อย ๆ			
13. คุณรู้สึกหมดหวังกับสภาพในปัจจุบัน			
14. คุณคิดว่าคนอื่น ๆ ดีกว่าคุณ			
15. คุณกลัวว่าสิ่งที่ไม่ดีจะเกิดกับคุณ			

คะแนนรวม.....คะแนน

ภาวะซึมเศร้าอยู่ในระดับ.....

เกณฑ์การตีความ ภาวะซึมเศร้าของผู้สูงอายุ

ได้คะแนน 0-5 หมายถึง ไม่มีปัญหาซึมเศร้า

ได้คะแนน 6-10 หมายถึง มีปัญหาซึมเศร้าระดับน้อย

ได้คะแนน 11-15 หมายถึง มีปัญหาซึมเศร้าระดับมาก

แบบสัมภาษณ์ ที่.....

แบบสัมภาษณ์ แรงสนับสนุนทางสังคม

คำชี้แจง ให้ผู้สัมภาษณ์ถามผู้สูงอายุ แต่ละข้อเกี่ยวกับ สมาชิกในครอบครัว ญาติ และเพื่อน ๆ ของผู้สูงอายุได้ปฏิบัติหรือทำสิ่งต่าง ๆ เพื่อสนับสนุนให้ผู้สูงอายุในการทำกิจกรรมใน 1 สัปดาห์
โปรดทำเครื่องหมาย √ ใน ช่องที่ตรงกับความคิดเห็นของผู้สูงอายุมากที่สุดเพียงคำตอบเดียว

ข้อคำถาม	ไม่เห็นด้วยอย่างยิ่ง 1	ไม่เห็นด้วย 2	ไม่แน่ใจหรือเฉยๆ 3	เห็นด้วย 4	เห็นด้วยอย่างยิ่ง 5	สำหรับผู้วิจัย
1. ฉันมีคนที่ฉันรู้สึกใกล้ชิดสนิทสนมที่ทำให้ฉันรู้สึกอบอุ่นปลอดภัย ขณะทำกิจกรรม						
2. ฉันมีกลุ่มเพื่อนหรือเพื่อนบ้านในการทำกิจกรรมซึ่งทำให้ฉันรู้สึกว่าฉันมีความสำคัญกับกลุ่ม						
3. คนรอบข้างหรือเพื่อนร่วมงานบอก หรือแสดงให้เห็นว่าฉันทำกิจกรรม (งานบ้าน หรือที่ทำงาน) ได้ดี						
4. ฉันไม่สามารถพึ่งพาญาติและเพื่อน ที่จะช่วยเหลือฉัน เมื่อฉันมีปัญหาในการทำกิจกรรม						
5. ฉันรู้สึกว่าฉันเป็นคนมีค่าสำหรับญาติและ/หรือเพื่อนๆ เมื่อทำกิจกรรมได้						
6. ฉันใช้เวลาพูดคุย หรือทำกิจกรรมร่วมกับคนอื่นๆ ที่มีความสนใจในเรื่องคล้ายๆกัน						
7. ฉันไม่ค่อยได้เป็นผู้ให้หรือช่วยเหลือผู้อื่น						
8. คนรอบข้างหรือเพื่อนๆ แสดงให้ฉันรู้ว่าเขาชอบที่ได้กิจกรรมร่วมกับฉัน						
9. มีคนพร้อมที่จะสละเวลาช่วยเหลือฉัน ถ้าฉันต้องการความช่วยเหลือในการทำกิจกรรม แม้จะต้องใช้เวลานานพอสมควร						

ข้อคำถาม	ไม่เห็นด้วยอย่างยิ่ง 1	ไม่เห็นด้วย 2	ไม่แน่ใจหรือเฉยๆ 3	เห็นด้วย 4	เห็นด้วยอย่างยิ่ง 5	สำหรับผู้วิจัย
10. ฉันไม่รู้จะระบายความรู้สึกกับใคร เมื่อฉันมีปัญหาในการทำกิจกรรม หรือไม่สบายใจ						
11. ในกลุ่มเพื่อนฝูง เราต่างช่วยเหลือและทำในสิ่งที่เพื่อนชอบให้กันและกัน						
12. ฉันได้มีส่วนช่วยให้เพื่อน หรือคนรู้จักปฏิบัติกิจกรรมได้ดีขึ้น						
13. ครอบครัวของฉันแสดงให้ฉันทราบว่าฉันมีความสำคัญสำหรับเขา ขณะทำกิจกรรม						
14. ฉันมีญาติหรือเพื่อนที่พร้อมจะช่วยเหลือฉัน ถึงแม้ว่าฉันจะไม่สามารถตอบแทนเขาได้						
15. เมื่อฉันรู้สึกไม่สบายใจ ฉันมีคนใกล้ชิดที่เข้าใจฉัน และทำให้ฉันรู้สึกเป็นตัวของตัวเอง						
16. ฉันรู้สึกว่าไม่มีใครมีปัญหาในการทำกิจกรรมมากเท่าฉันหรือเหมือนฉันเลย						
17. ฉันรู้สึกมีความสุขที่จะทำสิ่งพิเศษเล็กๆน้อยๆ ที่ทำให้ผู้อื่นพอใจ						
18. ฉันรู้สึกว่ามีคนชื่นชมฉัน เมื่อสามารถทำกิจกรรมด้วยตนเอง						
19. ฉันมีคนที่รักและให้กำลังใจฉัน เมื่อมีปัญหา						
20. ฉันมีเพื่อนที่จะพูดคุย เที่ยว หรือทำอะไรด้วยกัน						
21. ฉันมีความรับผิดชอบในการช่วยเหลือผู้อื่นเมื่อเขาต้องการ						
22. ถ้าฉันต้องการคำแนะนำ มีคนพร้อมที่จะช่วยฉัน						
23. ฉันรู้สึกว่าฉันเป็นที่ต้องการของเพื่อน ญาติ หรือคนรู้จัก						

ข้อคำถาม	ไม่เห็นด้วยอย่างยิ่ง 1	ไม่เห็นด้วย 2	ไม่แน่ใจหรือเฉยๆ 3	เห็นด้วย 4	เห็นด้วยอย่างยิ่ง 5	สำหรับผู้วิจัย
24. มีคนคิดว่าฉันไม่ได้เป็นเพื่อนที่ดีอย่างที่ฉันควรจะเป็น						
25. ถ้าฉันเจ็บป่วย มีคนที่จะให้คำแนะนำฉันในการทำกิจกรรม						

แบบควบคุมการวัดความแข็งแรงของกล้ามเนื้อ

(Muscle strength testing protocol)

คำชี้แจง: เพื่อให้การวัดความแข็งแรงของกล้ามเนื้อเข่า เป็นไปอย่างถูกต้อง เที่ยงตรง ป้องกันความคลาดเคลื่อน จากการปฏิบัติขั้นตอนที่แตกต่างกัน และป้องกันความเสี่ยงที่อาจจะเกิดขึ้นกับผู้สูงอายุ ให้ผู้ควบคุมการทดสอบปฏิบัติตามลำดับขั้นตอนดังนี้

1. ให้ผู้สัมภาษณ์ อธิบายวัตถุประสงค์ในการวัดความแข็งแรงของกล้ามเนื้อกับผู้สูงอายุ เพื่อให้ผู้สูงอายุเกิดความเข้าใจและยินดีร่วมมือในการวัดความแข็งแรงของกล้ามเนื้อเข่า วัตถุประสงค์ของการวัดความแข็งแรงของกล้ามเนื้อเข่า คือ เพื่อทราบถึงความพร้อม และความสามารถของกล้ามเนื้อเข่า ซึ่งเป็นกล้ามเนื้อที่สำคัญที่จะส่งเสริมและสนับสนุนให้ผู้สูงอายุมีความสามารถในการปฏิบัติกิจกรรมในชีวิตประจำวันได้เป็นผลสำเร็จ อันจะทำให้ผู้สุงอายุมีสุขภาพที่แข็งแรง และคุณภาพชีวิตที่ดี

2. ผู้ควบคุมการทดสอบ สาธิตการวัดความแข็งแรงกล้ามเนื้อเข่าให้กับผู้สูงอายุ เพื่อให้ผู้สูงอายุเข้าใจปฏิบัติได้ถูกต้องและลดความกังวล นอกจากนี้เปิดโอกาสให้ผู้สูงอายุซักถาม ข้อสงสัยต่างๆ ในการวัดความแข็งแรงของกล้ามเนื้อเข่า จนเป็นที่พอใจ

3. ก่อนที่จะเริ่มการทดสอบ ควรประเมินภาวะสุขภาพในปัจจุบัน โดยการสอบถามว่า “สุขภาพของท่านเป็นอย่างไรในวันนี้ หรือ “ท่านมีปัญหาสุขภาพแบบเฉียบพลันหรือไม่ เช่น ท้องเสีย เป็นไข้ อ่อนเพลียมาก” ในกรณีผู้สูงอายุประเมินว่าตนเองมีปัญหาสุขภาพดังกล่าว ควรงดเว้นการทดสอบไว้ก่อน เพื่อป้องกันภาวะเสี่ยงที่อาจจะเกิดขึ้น เมื่อผู้สูงอายุประเมินว่าภาวะสุขภาพในปัจจุบันของตนเองดี จึงเริ่มดำเนินการทดสอบความแข็งแรงของกล้ามเนื้อเข่า โดยใช้เครื่อง Leg dynamometer ต่อไป

4. ให้ผู้สูงอายุยืนแยกขาอย่างมั่นคง ประมาณ ช่วงไหล่ของตนเอง บนแผ่นพื้นของเครื่อง Leg dynamometer

5. คาดสายรัดของเครื่องวัดเข้ากับเอวของผู้สูงอายุ

6. มือของผู้สูงอายุจับปลายของท่อนไม้แต่ละข้างที่ต่อเข้ากับสายวัดของเครื่อง

7. บอกให้ผู้สูงอายุนั่งย่อเข่าประมาณ 135 องศา โดยให้หลัง สะโพกตั้งฉากกับข้อเท้าทั้งสองข้าง หน้าอกและศีรษะตั้งตรงไปข้างหน้า ผู้ควบคุมการทดสอบควรยืนอยู่ข้างผู้สูงอายุ คอยช่วยเหลือและป้องกันภาวะเสี่ยงที่เกิดขึ้น เมื่อผู้สูงอายุเสียการทรงตัว

8. บอกให้ผู้สูงอายุสูดลมหายใจเข้าลึก ๆ และปล่อยลมหายใจออกช้า ๆ ขณะยืดเข่าขึ้นในลักษณะท่ายืนตรง

9. อ่านค่าความแข็งแรงของกล้ามเนื้อเข่าจากหน้าปัดของเครื่องวัด Leg dynamometer และจดบันทึกลงในแบบบันทึกความแข็งแรงของกล้ามเนื้อ

10. ขณะทำการทดสอบผู้ควบคุมการทดสอบต้องสังเกตอาการผิดปกติ เช่น อาการวิงเวียน เป็นลม เหนื่อยหอบ หายใจเร็วหรือช้าผิดปกติ ใจสั่น เจ็บหน้าอก และภาวะหายใจลำบาก ตลอดเวลา ในกรณีที่ผู้สูงอายุมีอาการดังกล่าว ควรหยุดการทดสอบทันที และตรวจสอบสภาพร่างกาย ได้แก่ วัดความดันโลหิต และตรวจนับชีพจร จัดให้ผู้สูงอายุนอนพักพร้อมกับสังเกตอาการอย่างใกล้ชิด หลังจากนอนพักถ้าอาการดังกล่าวไม่ดีขึ้น ควรนำผู้สูงอายุเข้ารักษายังสถานพยาบาลใกล้เคียง

11. หลังการทดสอบ ผู้ควบคุมการทดสอบควรสอบถามผู้สูงอายุถึงสภาวะสุขภาพในปัจจุบัน เพื่อประเมินอาการผิดปกติต่าง ๆ เพื่อป้องกันภาวะเสี่ยงที่จะเกิดขึ้น

แบบบันทึกความแข็งแรงของกล้ามเนื้อ

แบบบันทึกที่.....

วันที่บันทึก..... สถานที่.....

ความแข็งแรงของกล้ามเนื้อ.....นิวตัน

ผู้ควบคุมการทดสอบ.....

แบบวัดความสามารถในการมองเห็น

(Vision)

คำชี้แจง การวัดความสามารถในการมองเห็นให้ผู้สัมภาษณ์ปฏิบัติตามลำดับขั้นตอนดังนี้

1. ให้ผู้สัมภาษณ์ อธิบายวัตถุประสงค์ในการวัดความสามารถในการมองเห็นกับผู้สูงอายุ เพื่อให้ผู้สูงอายุเกิดความเข้าใจและยินดีร่วมมือในการวัดความสามารถในการมองเห็น เพื่อให้ได้ข้อมูลที่ถูกต้องแม่นยำ วัตถุประสงค์ของการวัดความสามารถในการมองเห็น คือ เพื่อทราบถึงความพร้อม และความสามารถในการมองเห็น ซึ่งเป็นปัจจัยที่สำคัญที่จะส่งเสริมและสนับสนุนให้ผู้สูงอายุมีความสามารถในการปฏิบัติกิจกรรมในชีวิตประจำวันได้เป็นผลสำเร็จ อันจะทำให้ผู้สุงอายุมีสุขภาพที่แข็งแรง และคุณภาพชีวิตที่ดี
2. ผู้สัมภาษณ์สาธิตการวัดความสามารถในการมองเห็นให้กับผู้สูงอายุ เพื่อให้ผู้สูงอายุเข้าใจ ปฏิบัติได้ถูกต้องและลดความกังวล
3. วัดความสามารถในการมองเห็นของตาทั้งสองข้างของผู้สูงอายุ โดยใช้ Snellen chart ดังนี้
   3.1 ให้ผู้สูงอายุยืนห่าง Snellen Chart ประมาณ 6 เมตร หรือ 20 ฟุต
   3.2 ใช้มือปิดตาข้างซ้ายเบา ๆ เพื่อทดสอบการมองเห็นของตาข้างขวา
   3.3 ให้ผู้สูงอายุอ่านตัวเลขจากแถวแรกที่มีขนาดใหญ่สุด และแถวถัดไป เรื่อย ๆ จนกระทั่งไม่สามารถอ่านต่อไปได้
   3.4 บันทึกค่าความสามารถในการมองเห็นของตาขวา ตามขนาดของตัวอักษรที่อ่านได้และระยะที่ผู้สูงอายุยืนห่างจาก Snellen chart เช่น 6/3 หมายถึง ในขณะยืนห่าง ในระยะ 6 เมตร ผู้สูงอายุสามารถมองเห็นอักษรในระยะที่คนปกติมองเห็นที่ 3 เมตร

Metric ยืนห่าง 6 ฟุต	Snellen ยืนห่าง 20 ฟุต
6/6	20/20
6/9	20/30
6/12	20/40
6/15	20/50
6/30	20/100
6/60	20/200

   3.5 วัดการมองเห็นของตาซ้ายโดยใช้มือปิดตาขวาเบา ๆ
   3.6 ให้ผู้สูงอายุอ่านตัวเลขจากแถวแรกที่มีขนาดใหญ่สุด และแถวถัดไป เรื่อย ๆ จนกระทั่งไม่สามารถอ่านต่อไปได้

3.7 บันทึกค่าความสามารถในการมองเห็นของตาซ้าย ตามขนาดของตัวอักษรที่อ่านได้และระยะที่ผู้สูงอายุยืนห่างจาก Snellen chart

แบบบันทึกความสามารถในการมองเห็น

แบบบันทึกที่.....

วันที่บันทึก..... สถานที่.....

ตา	**ความสามารถในการมองเห็นแต่ละข้าง**	**สำหรับผู้วิจัยสรุป ความสามารถในการมองเห็น**		
		ปกติ (1) **น้อยกว่าหรือเท่ากับ** 6/12	**บกพร่อง** (0) **มากกว่า** 6/12	**ความสามารถในการมองเห็นทั้งสองข้าง**
ตาขวา				
ตาซ้าย				

ผู้บันทึก.....

ความสามารถการมองเห็นที่มีค่ามากกว่า 6/12 ให้ค่าคะแนนเท่ากับ 0 หมายถึง ความสามารถในการมองเห็นบกพร่อง
ความสามารถการมองเห็นที่มีค่าน้อยกว่าหรือเท่ากับ 6/12 ให้ค่าคะแนนเท่ากับ 1 หมายถึง ความสามารถในการมองเห็นปกติ

การสรุปค่าความสามารถในการมองเห็นของตาทั้งสองข้างให้ยึดค่าของข้างที่มองเห็น ดีที่สุดเป็นหลัก

แบบสัมภาษณ์ ที่.....

แบบสัมภาษณ์การออกกำลังกายของผู้สูงอายุ

(Level of exercise)

คำชี้แจง ให้ผู้สัมภาษณ์ถามผู้สูงอายุ แต่ละข้อเกี่ยวกับการออกกำลังกายของผู้สูงอายุ ที่ผู้สูงอายุได้ปฏิบัติในช่วง 1 เดือนที่ผ่านมา ได้แก่ กิจกรรมที่ใช้แรงมาก การเดินยามว่าง การนั่ง การยืน และการเคลื่อนไหว อื่นๆ ที่ท่านได้ปฏิบัติเป็นประจำ เป็นต้น

โปรดทำเครื่องหมาย Ö ลงในช่อง ( ) ตรงกับคำตอบของผู้สูงอายุมากที่สุด

1. ในรอบ 1 เดือนที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านได้ออกกำลังกาย หรือทำกิจกรรมที่ต้องใช้แรงอย่างมาก โดยทำอย่างต่อเนื่องอย่างน้อย 10 นาที จนทำให้ท่านรู้สึกเหนื่อย หรือมีเหงื่อออก หรือรู้สึกปวดเมื่อยตามแขนขา หรือมีอัตราการหายใจและการเต้นหัวใจเพิ่มขึ้น

   (0) ไม่เคยปฏิบัติ (ข้ามไปข้อที่ 3)
   (1) 1-3 ครั้งต่อเดือน
   (2) 1-2 ครั้งต่อสัปดาห์
   (3) 3-4 ครั้งต่อสัปดาห์
   (4) 5 ครั้งหรือมากกว่า 5 ครั้ง ต่อสัปดาห์
   (7) ไม่ตอบ
   (8) ไม่ทราบ

   สำหรับผู้วิจัย
   Frequency score =

2. ท่านออกกำลังกายที่ต้องใช้แรงมากและทำอย่างต่อเนื่องในแต่ละครั้ง เป็นเวลานานเท่าไร

   (0) น้อยกว่า 10 นาที
   (1) 10-30 นาที
   (2) 31-60 นาที
   (3) 60 นาที หรือมากกว่า 60 นาที
   (7) ไม่ตอบ
   (8) ไม่ทราบ

   สำหรับผู้วิจัย
   Duration score =

   Weight = 5

Vigorous activity index score: Freq score.....X Duration score.....X Weight .....= .....

3. ในรอบ 1 เดือน ที่ผ่านมา บ่อยครั้งแค่ไหนที่ท่านเดินเล่นยามว่าง เพื่อการพักผ่อน โดยเดินติดต่อกันไม่หยุดเลยอย่างน้อย 10 นาที หรือนานกว่านั้น โดยการเดินนี้ไม่ได้ทำให้ท่านรู้สึกเหนื่อย หรือมีเหงื่อออก หรือรู้สึกปวดเมื่อตามแขนขา หรือ มีอัตราการหายใจและการเต้นของหัวใจเร็วขึ้น

(0) ไม่เคยปฏิบัติ (ข้ามไปข้อ 5)
(1) 1--3 ครั้งต่อเดือน
(2) 1-2 ครั้งต่อสัปดาห์
(3) 3-4 ครั้งต่อสัปดาห์
(4) 5 ครั้ง หรือมากกว่า 5 ครั้งต่อสัปดาห์
(7) ไม่ตอบ
(8) ไม่ทราบ

สำหรับผู้วิจัย
Frequency score =

4. เมื่อท่านเดินเล่นยามว่าง เพื่อการพักผ่อน โดยเดินติดต่อกันไม่หยุดเลย ท่านใช้ระยะเวลาในการเดินนานกี่นาที

(0) น้อยกว่า 10 นาที
(1) 10-30 นาที
(2) 31-60 นาที
(3) มากกว่า 60 นาที
(7) ไม่ตอบ
(8) ไม่ทราบ

สำหรับผู้วิจัย
Duration score =

Weight = 4

Leisurely walking index score: Freq score……..X Duration score…….X Weight ……= ……

5. ในแต่ละวัน ท่านใช้เวลากี่ชั่วโมง ในการเดินทำกิจกรรมต่าง ๆ โปรดระบุเฉพาะระยะเวลาที่ท่านได้เคลื่อนไหวร่างกายจริง ๆ

(0) ไม่ตรงกับข้อ 1-5
(1) น้อยกว่า 1 ชั่วโมงต่อวัน
(2) 1 ชั่วโมงขึ้นไป แต่ไม่เกิน 3 ชั่วโมงต่อวัน
(3) 3 ชั่วโมงขึ้นไปแต่ไม่เกิน 5 ชั่วโมงต่อวัน
(4) 5 ชั่วโมงขึ้นไป แต่ไม่เกิน 7 ชั่วโมงต่อวัน
(5) 7 ชั่วโมงหรือมากกว่า 7 ชั่วโมงต่อวัน
(7) ไม่ตอบ
(8) ไม่ทราบ

สำหรับผู้วิจัย
Moving score =

Weight = 3

Moving index score: Moving score ……...X Weight ……..=……

6. ในรอบ 1 เดือนที่ผ่านมา ในแต่ละวันท่านใช้เวลาในการยืนเฉย ๆ หรือทำกิจกรรม โดยเฉลี่ยนานกี่โมงต่อวัน

(0) ไม่ตรงกับข้อ 1-5
(1) น้อยกว่า 1 ชั่วโมงต่อวัน
(2) 1 ชั่วโมงขึ้นไป แต่ไม่เกิน 3 ชั่วโมงต่อวัน
(3) 3 ชั่วโมงขึ้นไปแต่ไม่เกิน 5 ชั่วโมงต่อวัน
(4) 5 ชั่วโมงขึ้นไป แต่ไม่เกิน 7 ชั่วโมงต่อวัน
(5) มากกว่า 7 ชั่วโมงต่อวัน
(7) ไม่ตอบ
(8) ไม่ทราบ

สำหรับผู้วิจัย
Standing score =

Weight = 2

Standing index score: Standing score .....X Weight .....=.....

7. ในรอบ 1 เดือน ที่ผ่านมา ท่านใช้เวลานั่งทำกิจกรรมต่าง ๆ โดยเฉลี่ยวันละกี่ชั่วโมง

(0) ไม่ตรงกับข้อ 1-4
(1) น้อยกว่า 3 ชั่วโมง
(2) ตั้งแต่ 3 ชั่วโมงขึ้นไป แต่ไม่เกิน 6 ชั่วโมง
(3) ตั้งแต่ 6 ชั่วโมงขึ้นไปแต่ไม่เกิน 8 ชั่วโมง
(4) ตั้งแต่ 8 ชั่วโมงขึ้นไป
(7) ไม่ตอบ
(8) ไม่ทราบ

สำหรับผู้วิจัย
Sitting score =

Weight = 1

Sitting index score: Sitting score .....X Weight .....=.....

คะแนนรวมทั้งหมดหมายถึง Vigorous activity index score + Leisurely walking index score+ Moving index score+ Standing index score+ Sitting index score เท่ากับ.....

APPENDIX F

Permission document for using the PRQ 85

PERMISSION TO USE THE PERSONAL RESOURCE QUESTIONNAIRE

PERMISSION TO USE THE PRQ85 and PRQ2000

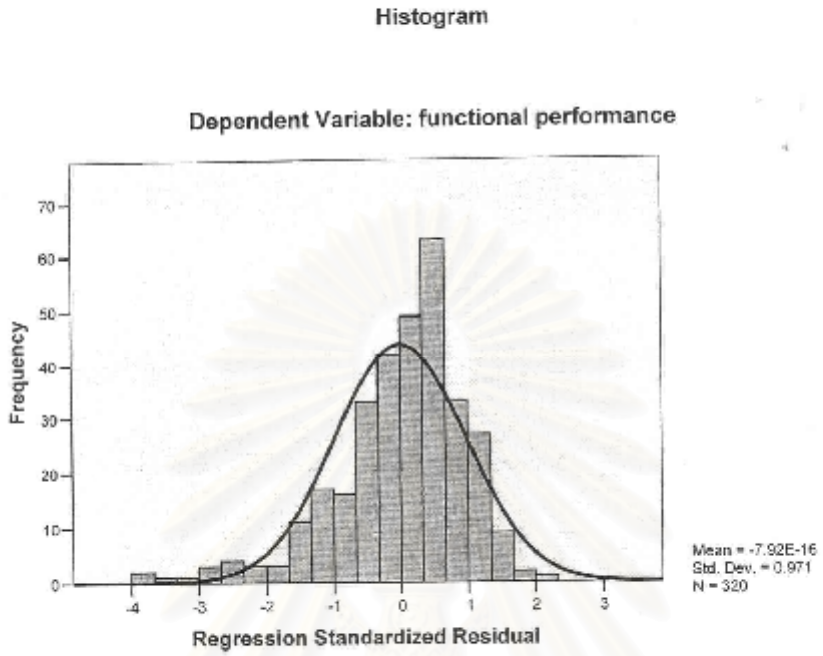
IS GRANTED TO: Jirawan Inkoom

THE PRQ85 IS A TWO PART INSTRUMENT . EITHER PART -1 OR PART -2 OR BOTH PARTS MAY BE ADMINISTERED. HOWEVER, NO PART OF PRQ85 OR PRQ2000 MAY BE MODIFIED WITHOUT CONSULTATION WITH THE AUTHORS.

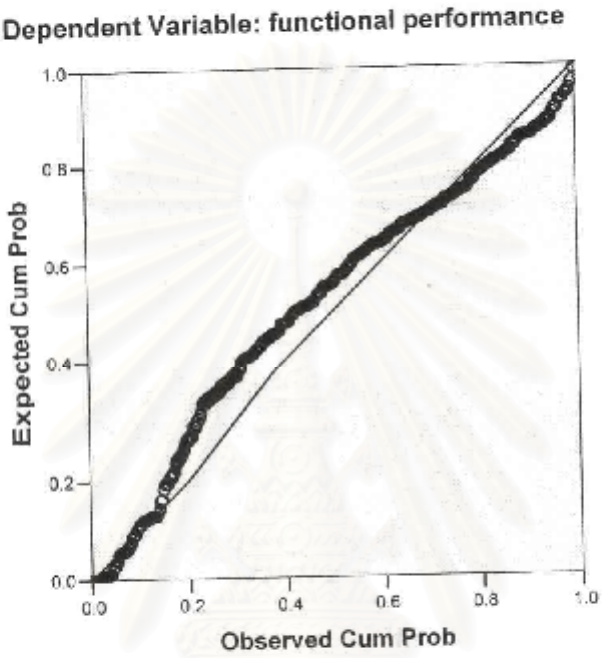
Clarann Weinert, SC,PhD,RN,FAAN DATE: Feb 28, 2006

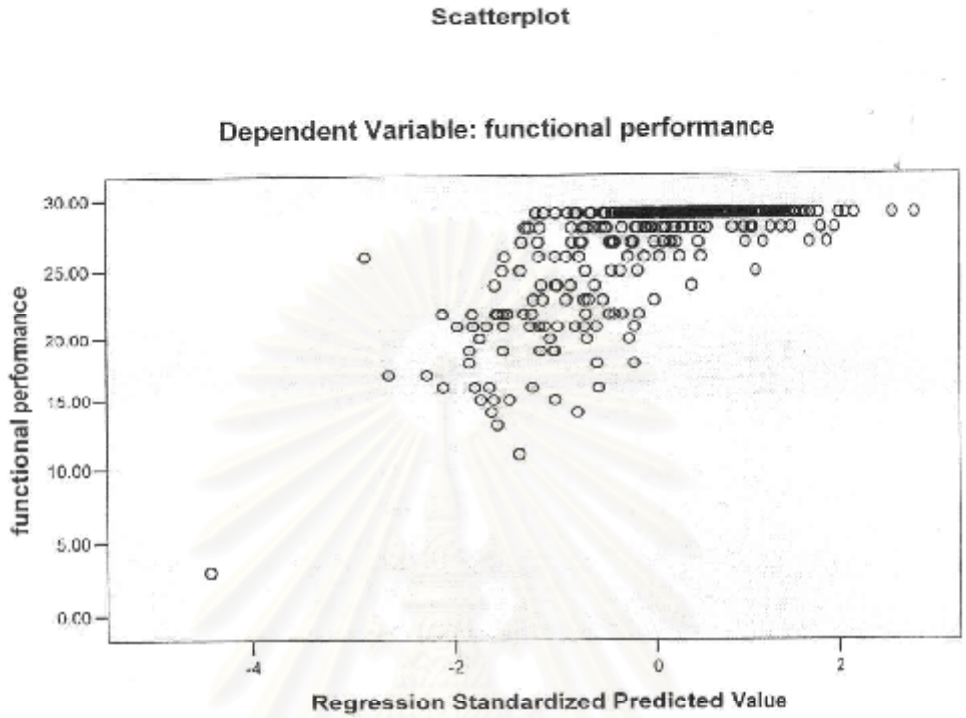
APPENDIX G

Preliminary analysis



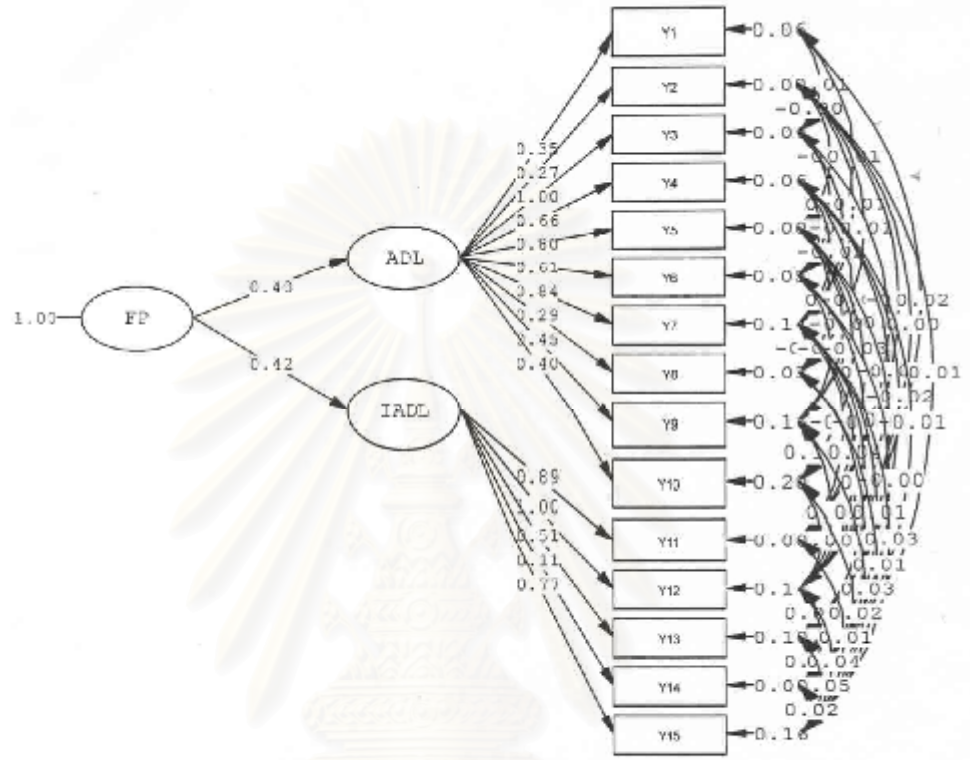
Normal P-P Plot of Regression Standardized Residual





APPENDIX H

LISREL printout of the measurement models



Chi-Square=54.66, df=42, P-value=0.09114, RMSEA=0.031

DATE: 11/ 6/2006
TIME: 16:33

L I S R E L 8.72

BY

Karl G. J"reskog & Dag S"rbom

The following lines were read from file C:\Documents and Settings\TOSHIBA\Local Settings\Temporary Internet Files\Content.IE5\4-YRYLSB\cp_2_order_5_nov[1].lpj:

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LA
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15
KM
1.000
0.388 1.000
0.536 0.468 1.000
0.402 0.447 0.672 1.000
0.488 0.346 0.678 0.614 1.000
0.535 0.419 0.720 0.719 0.684 1.000
0.304 0.268 0.567 0.599 0.484 0.488 1.000
0.294 0.480 0.470 0.413 0.474 0.383 0.260 1.000
0.080 0.098 0.324 0.233 0.192 0.221 0.413 0.305 1.000
0.099 0.210 0.241 0.209 0.145 0.186 0.348 0.249 0.780 1.000
0.417 0.381 0.740 0.613 0.726 0.618 0.498 0.477 0.335 0.260 1.000
0.446 0.479 0.595 0.382 0.578 0.471 0.041 0.453 0.449 0.353 0.679 1.000
0.240 0.297 0.419 0.234 0.430 0.334 0.368 0.274 0.202 0.186 0.437 0.630 1.000
0.104 0.458 0.195 0.009 0.124 0.008 0.319 0.319 0.120 0.122 0.184 0.394 0.592 1.000
0.288 0.322 0.526 0.398 0.459 0.000 0.552 0.388 0.408 0.317 0.594 0.000 0.596 0.314
1.000
SD
0.285 0.191 0.464 0.366 0.439 0.346 0.515 0.330 0.441 0.480 0.437 0.368 0.417 0.295
0.813
SE
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  /
MO NY=15 NX=1 NC=2 LY=FU,FI BE=FU,FI GA=FU,FI PH=SY,FR PS=FU,FI TE=FU,DI
FR LY 1 1 LY 2 1  LY 4 1 LY 5 1 LY 6 1 LY 7 1 LY 8 1 LY 9 1 LY 10 1
FR LY 11 1  LY 13 1 LY 14 1 LY 15 1
FR TE 1 1 TE 2 2 TE 3 3 TE 4 4 TE 10 10 TE 5 5 TE 6 6 TE 7 7 TE 8 8 TE 9 9 TE 11 11 TE
12 12 TE 13 13 TE 14 14
FR TE 15 15
FR GA 1 1 GA 2 1 PS 1 1
ST 1 LY 8 1 LY 12 2
FR TE 10 9 TE 6 4 TE 13  12 TE 8 2 TE 10 13 TE 6 1  TE 12 7  TE 13 7 TE 10 2 TE 14 4
TE 11 8 TE 14 8 TE 11 9
FR TE 12 2 TE 13 7 TE 14 6 TE 13 5 TE 7 3 TE 12 4 TE 8 7 TE 13 12 TE 7 2 TE 8 6 TE 10
6 TE 14 13 TE 14 12
FR TE 15 4 TE 13 14  TE 7 4 TE 9 6 TE 11 2 TE 9 5 TE 10 5 TE 13 9 TE 5 2 TE 6 5 TE 15
10 TE 3 2 TE 3 1 TE 14 7
```

```
SR TE 12 1 TE 15 3 TX 12 9 TE 11 7 TE 15 8 TE 9 4 TE 12 10
LE
ADL LADL
LK
VP
PD
OU ME=ML IV RS TS MT AD=OFF

TI functional performance 2 order 5 Nov 06

                          Number of Input Variables 15
                          Number of Y - Variables   15
                          Number of X - Variables    0
                          Number of ETA - Variables  2
                          Number of KSI - Variables  1
                          Number of Observations   320

TI functional performance 2 order 5 Nov 06
```

Covariance Matrix

	Y1	Y2	Y3	Y4	Y5	Y6
Y1	0.08					
Y2	0.02	0.04				
Y3	0.07	0.04	0.23			
Y4	0.04	0.03	0.12	0.13		
Y5	0.05	0.03	0.14	0.10	0.19	
Y6	0.05	0.03	0.12	0.09	0.09	0.12
Y7	0.05	0.03	0.12	0.09	0.11	0.09
Y8	0.02	0.02	0.09	0.03	0.05	0.03
Y9	0.01	0.02	0.07	0.04	0.04	0.03
Y10	0.00	0.02	0.06	0.04	0.03	0.03
Y11	0.05	0.03	0.16	0.10	0.14	0.09
Y12	0.07	0.05	0.16	0.08	0.13	0.09
Y13	0.04	0.02	0.08	0.04	0.08	0.05
Y14	0.01	0.02	0.02	0.03	0.01	0.01
Y15	0.04	0.03	0.13	0.07	0.10	0.07

Covariance Matrix

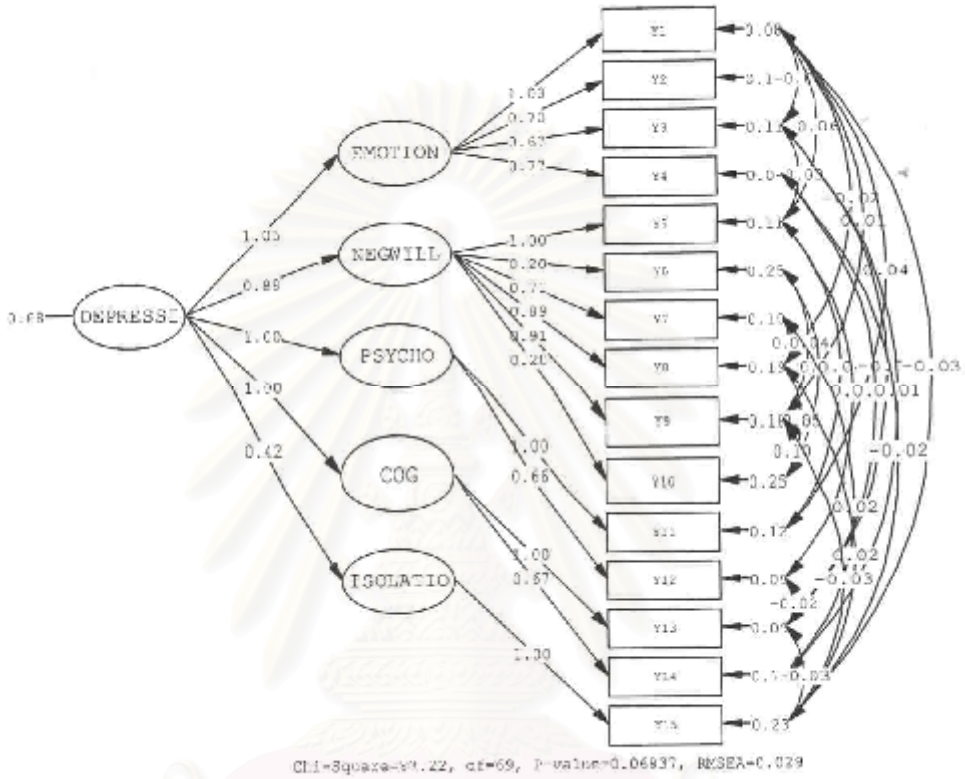
	Y7	Y8	Y9	Y10	Y11	Y12
Y7	0.27					
Y8	0.03	0.05				
Y9	0.09	0.03	0.19			
Y10	0.09	0.03	0.17	0.23		
Y11	0.11	0.04	0.06	0.06	0.19	
Y12	0.19	0.05	0.11	0.10	0.15	0.33
Y13	0.12	0.03	0.05	0.04	0.08	0.14
Y14	0.02	0.01	0.01	0.01	0.02	0.05
Y15	0.15	0.04	0.09	0.08	0.13	0.15

Covariance Matrix

	Y13	Y14	Y15
Y13	0.17		
Y14	0.03	0.04	
Y15	0.13	0.03	0.26

```
TI functional performance 2 order 5 Nov 06

Parameter Specifications
```



DATE: 12/12/2006
TIME: 13:29

LISREL 8.72

BY

Karl G. Jöreskog & Dag Sörbom

The following lines were read from file C:\Documents and Settings\TOSHIBA\Local Settings\Temporary Internet Files\Content.IE5\EXNWC8VT\depression_2order[2].lpj:

TI DEPRESSION 2 order 12 OCT 06
DA NI=15 NO=320 NG=1 MA=CM
LA
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15
KM
1.000
0.340 1.000
0.169 0.247 1.000
0.433 0.360 0.301 1.000
0.757 0.327 0.097 0.357 1.000
-0.026 -0.028 0.081 0.008 -0.037 1.000
0.363 0.205 0.301 0.192 0.307 0.062 1.000
0.193 0.199 0.223 0.248 0.221 0.039 0.344 1.000
0.324 0.187 0.281 0.200 0.208 0.195 0.290 0.182 1.000
-0.039 -0.049 0.089 -0.117 -0.045 0.157 0.090 0.228 0.431 1.000
0.674 0.286 0.275 0.431 0.584 -0.006 0.334 0.293 0.246 -0.022 1.000
0.370 0.257 0.262 0.244 0.376 0.020 0.332 0.263 0.317 0.117 0.322 1.000
0.495 0.404 0.213 0.498 0.439 -0.032 0.220 0.249 0.183 -0.154 0.459 0.184 1.000
0.360 0.259 0.329 0.248 0.266 -0.050 0.427 0.239 0.190 -0.010 0.307 0.226 0.305 1.000
0.022 0.152 0.143 0.016 0.126 0.010 0.119 0.198 0.003 0.081 0.080 0.073 0.013 0.175 1.000
SD
0.414 0.385 0.383 0.381 0.420 0.494 0.361 0.482 0.465 0.500 0.442 0.358 0.412 0.378 0.489

MO NY=15 NK=1 NE=5 LY=FU,FI BE=FU,FI GA=FU,FI PH=FU,FR PS=FU,FI TE=FU,FI
FR LY 2 1 LY 3 1 LY 4 1
FR LY 7 2 LY 8 2 LY 9 2
FR LY 12 3

```
FR LY 14 4
ST 1 LY 15 5 LY 13 4 LY 11 3 LY 5 2 LY 1 1
ST .2 LY 10 2 LY 6 2
FR GA 1 1
VA 1 GA 4 1
FR GA 2 1 GA 3 1 GA 5 1
FR TE 1 1 TE 2 2 TE 3 3 TE 4 4 TE 5 5 TE 6 6 TE 7 7 TE 8 8 TE 9 9 TE 10 10
FR TE 11 11 TE 12 12 TE 13 13 TE 14 14 TE 15 15
FR TE 5 1 TE 13 4 TE 10 9 TE 14 7 TE 8 7 TE 10 8 TE 15 9
FR TE 11 1 TE 14 3 TE 11 5 TE 8 1 TE 15 1 TE 13 12 TE 9 6 TE 12 5
FR TE 10 6 TE 3 1 TE 8 15 TE 5 3 TE 15 13 TE 13 3 TE 15 4 TE 9 1
LE
EMOTION NEGWILL PSYCHO COG ISOLATION
LK
DEPRESSION
PD
OU ME=ML TV TS MR RS SS MI AD OFF
```

TI DEPRESSION 2 order 12 OCT 06

Number of Input Variables 15
Number of Y - Variables 15
Number of X - Variables 0
Number of ETA - Variables 5
Number of KSI - Variables 1
Number of Observations 320

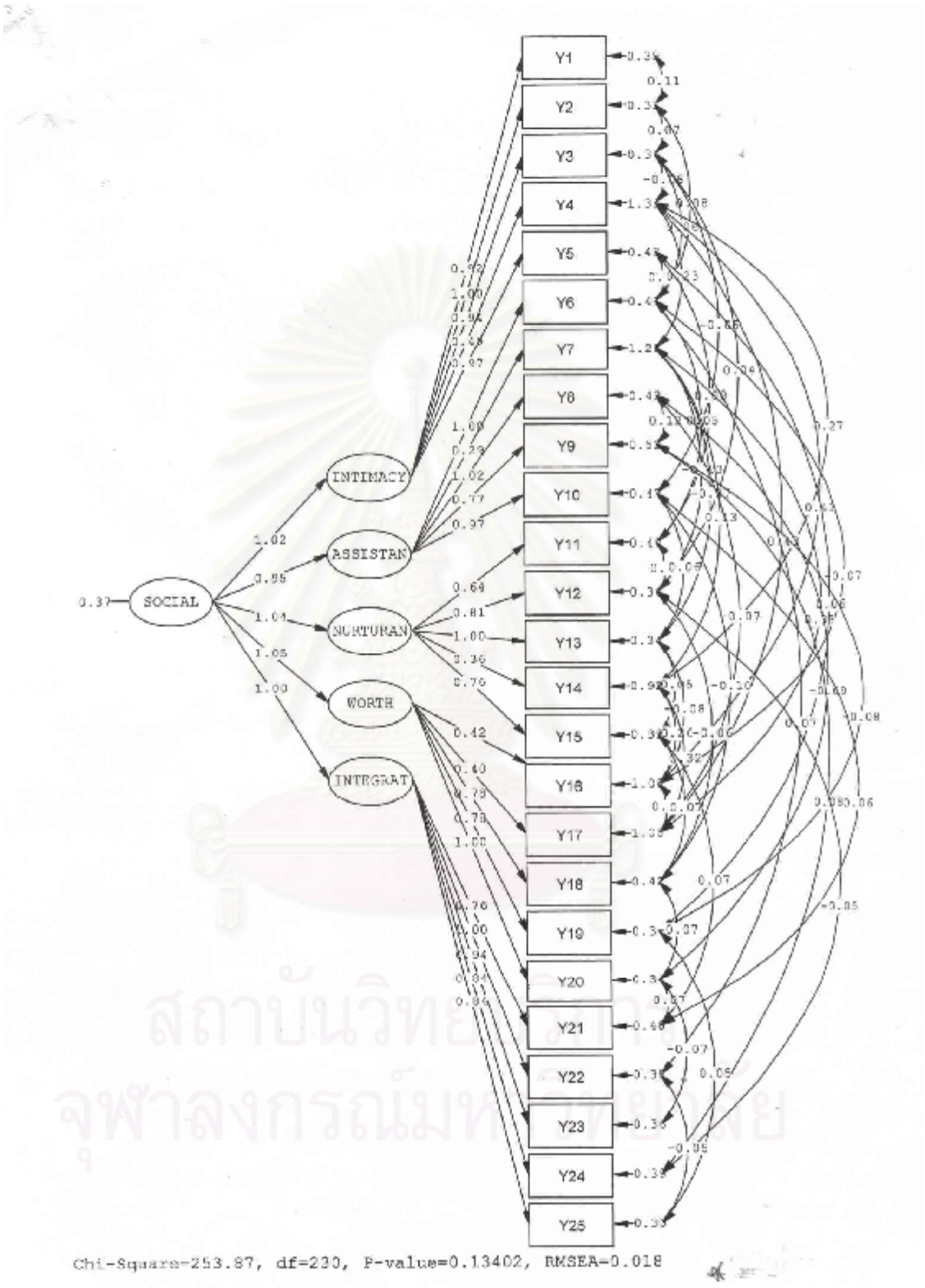
TI DEPRESSION 2 order 12 OCT 06

Covariance Matrix

	Y1	Y2	Y3	Y4	Y5	Y6
Y1	0.17					
Y2	0.05	0.15				
Y3	0.03	0.04	0.15			
Y4	0.07	0.05	0.04	0.15		
Y5	0.13	0.05	0.02	0.06	0.18	
Y6	-0.01	-0.01	0.02	0.00	-0.01	0.24
Y7	0.05	0.03	0.04	0.03	0.05	0.01
Y8	0.04	0.04	0.04	0.05	0.04	0.01
Y9	0.06	0.03	0.05	0.04	0.04	0.04
Y10	-0.01	0.01	0.02	-0.02	-0.01	0.04
Y11	0.12	0.05	0.05	0.07	0.11	0.00
Y12	0.05	0.04	0.04	0.03	0.06	0.00
Y13	0.08	0.06	0.05	0.08	0.08	-0.01
Y14	0.06	0.04	0.05	0.04	0.04	-0.01
Y15	0.00	0.03	0.03	0.00	0.03	0.00

Covariance Matrix

	Y7	Y8	Y9	Y10	Y11	Y12



DATE: 10/16/2006
TIME: 15:27

L I S R E L 8.72

BY

Karl G. Jöreskog & Dag Sörbom

The following lines were read from file D:\Result of Statistic Analysis\Dang dissertation\Measurement model for all variable\social support\social support 2order.spl:

```
DT social support 2 order
DA NI=25 NO=320 NG=1 MA=CM
LA
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15 Y16 Y17 Y18 Y19 Y20 Y21 Y22 Y23 Y24 Y25
KM
1.000
0.666 1.000
0.482 0.609 1.000
0.146 0.186 0.096 1.000
0.323 0.386 0.461 0.744 1.000
0.468 0.600 0.537 0.140 0.621 1.000
0.121 0.117 0.129 0.222 0.128 0.067 1.000
0.416 0.508 0.516 0.119 0.408 0.483 -0.004 1.000
0.406 0.405 0.304 0.151 0.374 0.337 0.012 0.500 1.000
0.428 0.439 0.333 0.230 0.380 0.386 0.125 0.421 0.353 1.000
0.379 0.389 0.384 0.236 0.478 0.423 0.077 0.365 0.383 0.283 1.000
0.413 0.498 0.521 0.293 0.403 0.445 0.001 0.468 0.349 0.360 0.453 1.000
0.489 0.534 0.542 0.209 0.431 0.482 0.025 0.468 0.346 0.353 0.342 0.522 1.000
0.179 0.196 0.268 0.301 0.347 0.112 0.163 0.093 0.10[illegible] 0.087 0.172 0.175 0.211 1.000
0.401 0.484 0.456 0.193 0.409 0.446 0.147 0.369 0.374 0.400 0.412 0.344 0.511 0.162 1.000
0.196 0.174 0.239 0.493 0.196 0.088 0.144 0.[illegible] 0.168 0.158 0.245 0.133 0.107 0.3[illegible] 0.159 1.000
0.338 0.221 0.138 0.482 0.130 0.141 0.340 0.046 0.135 0.173 0.161 0.191 0.179 0.285 0.104 0.313 1.000
0.392 0.458 0.395 0.164 0.398 0.400 0.[illegible] 0.389 0.284 0.250 0.399 0.301 0.438 0.177 0.475 0.152 0.202 1.000
0.373 0.428 0.414 0.094 0.310 0.468 0.081 0.487 0.227 0.414 0.332 0.344 0.457 0.[illegible] 0.367 0.139 0.139 0.422 1.000
0.504 0.483 0.468 0.225 0.493 0.434 0.121 0.366 0.377 0.309 0.367 0.468 0.578 0.139 0.462 0.164 0.197 0.329 0.467 1.000
0.479 0.433 0.352 0.137 0.402 0.358 0.105 0.314 0.278 0.445 0.313 0.366 0.286 0.123 0.456 0.066 0.114 0.300 0.311 0.524 1.000
0.469 0.504 0.499 0.203 0.489 0.571 0.161 0.489 0.351 0.460 0.378 0.496 0.477 0.295 0.411 0.206 0.161 0.385 0.458 0.561 0.469 1.000
0.415 0.521 0.509 0.190 0.449 0.423 0.127 0.421 0.369 0.406 0.392 0.471 0.506 0.230 0.417 0.254 0.190 0.432 0.481 0.419 0.536 0.498 1.000
0.481 0.425 0.376 0.134 0.421 0.419 0.015 0.427 0.440 0.415 0.376 0.380 0.417 0.068
```

```
0.429 0.085 0.068 0.429 0.469 0.469 0.494 0.467 0.439 1.000
 0.430 0.498 0.500 0.167 0.469 0.305 0.068 0.481 0.349 0.445 0.319 0.419 0.356 0.174
0.399 0.145 0.144 0.442 0.526 0.467 0.330 0.420 0.418 0.494 1.000
 SD
 0.867 0.856 0.860 1.198 0.911 0.863 1.179 0.880 0.845 0.886 0.750 0.789 0.868 0.969
0.790 1.077 1.047 0.820 0.787 0.867 0.831 0.849 0.930 0.809 0.747
 SE
 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
 19 20 21 22 23 24 25 /
 MO NY=25 NK=1 NE=3 LY=FU,FI BE=FU,FI GA=FU,FI PH=FU,FR PS=FU,FI TE=FU,FI
 FR LY 1 1 LY 3 1 LY 4 1 LY 5 1
 FR LY 7 2 LY 8 2 LY 9 2 LY 10 2
 FR LY 11 3 LY 12 3 LY 14 3 LY 15 3
 FR LY 16 4 LY 17 4 LY 18 4 LY 19 4
 FR LY 21 5 LY 23 5 LY 24 5 LY 25 5
 FR GA 2 1 GA 4 1 GA 3 1 GA 1 1
 FR GA 5 1 LY 2 1 LY 6 2 LY 13 3 LY 20 4 LY 22 5
 FR TE 2 2 TE 4 4 TE 10 10
 FR PS 1 1
 FR TE 1 1 TE 3 3 TE 5 5 TE 6 6 TE 7 7 TE 8 8 TE 9 9 TE 11 11 TE 12 12 T
 TE 13 13 TE 14 14 TE 15 15 TE 16 16 TE 17 17 TE 18 18 TE 19 19 TE 20 20 TE 21 21 TE
22 22 TE 23 23 TE 24 24 TE 25 25
 FR TE 17 4 TE 9 8 TE 17 14 TE 16 4 TE 6 5 TE 17 7 TE 20 8 TE 19 9 TE 18 10 TE 21 20
 FR TE 2 1 TE 14 4 TE 19 5 TE 17 16 TE 6 2 TE 11 5 TE 16 14 TE 10 3 TE 24 9 TE 12 11
 FR TE 3 2 TE 18 15 TE 25 19 TE 7 4 TE 22 6 TE 24 12 TE 16 13 TE 20 18 TE 25 22
 FR TE 6 3 TE 16 6 TE 12 7 TE 13 10 TE 14 7 TE 17 8 TE 18 12 TE 21 15 TE 25 20
 FR TE 21 10 TE 12 5 TE 17 13 TE 4 3 TE 23 7 TE 11 8
 LK
 INTIMACY ASSISTANCE  NURTURANCE WORTH  INTEGRATION
 LK
 SOCIAL
 ED
 OU ME=ML TV RS PS MI AD=OFF

 TI social support 2 order
```

```
                    Number of Input Variables 25
                    Number of Y - Variables   25
                    Number of X - Variables    0
                    Number of ETA - Variables  3
                    Number of KSI - Variables  1
                    Number of Observations   320
```

```
 TI social support 2 order
```

Covariance Matrix

	Y1	Y2	Y3	Y4	Y5	Y6
Y1	0.75					
Y2	0.49	0.73				
Y3	0.36	0.47	0.74			
Y4	0.15	0.19	0.10	1.44		
Y5	0.41	0.43	0.36	0.16	0.83	
Y6	0.35	0.44	0.40	0.14	0.49	0.74
Y7	0.12	0.11	0.12	0.30	0.13	0.09
Y8	0.32	0.40	0.39	0.13	0.33	0.37
Y9	0.30	0.28	0.28	0.15	0.29	0.25
Y10	0.33	0.33	0.27	0.24	0.31	0.29
Y11	0.24	0.23	0.25	0.21	0.22	0.27
Y12	0.28	0.34	0.36	0.22	0.30	0.30
Y13	0.36	0.39	0.40	0.22	0.34	0.36
Y14	0.15	0.13	0.14	0.36	0.13-	0.10
Y15	0.27	0.33	0.31	0.10	0.29	0.30
Y16	0.11	0.16	0.13	0.92	0.16	0.09
Y17	0.22	0.20	0.12	0.84	0.13	0.13

Chi-Square=6.63, df=3, P-value=0.08464, RMSEA=0.062

DATE: 11/24/2006
TIME: 19:39

LISREL 8.72

BY

Karl G. Jöreskog & Dag Sörbom

The following lines were read from file F:\24 NOV\EXE measurement 24 nov no 2.lpj:

```
TI LEVEL OF EXERCISE  MEASUREMENT MODEL
DA NI=5  NO=320 MA=CM
LA
VIGOROUS WALKING MOVING  STANDING SITTING
KM
1.000
.100 1.000
-.064 .324 1.000
-.097 .334 .420 1.000
-.076 .057 -.066 .101 1.000
SD
.816 .910 .881  .748 0.723
MO NY=5 NE=1 PS=FU,FI TE=FU,FI
VA .50  LY 1 1
FR LY 3 1
VA .45  LY 2 1
FR LY 5 1  LY  4 1
FR TE 1 1
FR  TE 2 2
FR  TE 3 3
FR  TE 4 4
FR  TE 5 5  TE 4 1  TE 4 3  TE 3 1 TE 5 4
VA .68 PS 1 1
LE
EXERCISE
PD
OU PC RS FS MI ND=3 AD=OFF
```

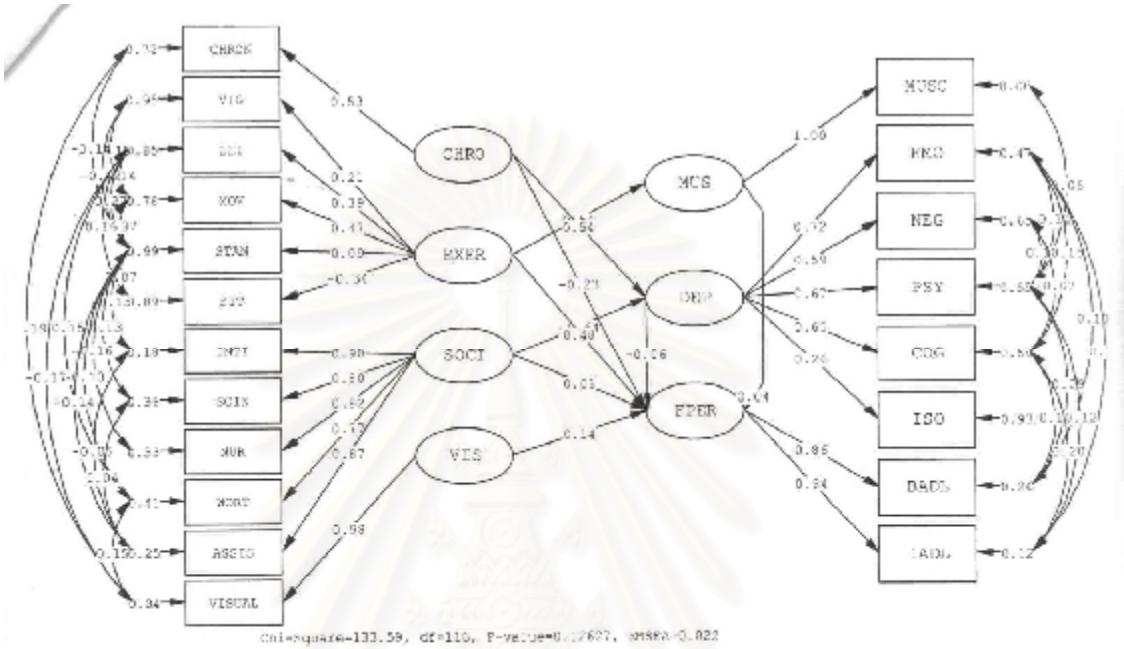
TI LEVEL OF EXERCISE MEASUREMENT MODEL

Number of Input Variables 5
Number of Y - Variables 5
Number of X - Variables 0
Number of ETA - Variables 1
Number of KSI - Variables 0
Number of Observations 320

TI LEVEL OF EXERCISE MEASUREMENT MODEL

APPENDIX I

LISREL printout of the structural equation model



DATE: 12/14/2006
TIME: 11:15

LISREL 8.72

BY

Karl G. Jöreskog & Dag Sörbom

The following lines were read from file FAFULL_model.LPJ:

```
FULL MODEL
DA NI=20 NO=320 NG=1 MA=CM
LA
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12
KM
1.000
-0.307 1.000
-0.353 0.444 1.000
-0.241 0.637 0.493 1.000
-0.247 0.632 0.330 0.463 1.000
-0.110 0.119 0.156 0.095 0.112 1.000
0.422 -0.300 -0.372 -0.260 -0.175 -0.231 1.000
0.472 -0.275 -0.369 -0.227 -0.160 -0.229 0.806 1.000
-0.208 0.284 0.384 0.228 0.305 0.165 -0.370 -0.387 1.000
0.391 -0.078 -0.196 -0.068 -0.037 -0.054 0.166 0.214 -0.013 1.000
0.308 -0.241 -0.244 -0.237 -0.219 0.106 0.244 0.290 -0.195 0.078 1.000
0.229 -0.321 -0.165 -0.306 -0.290 -0.096 0.289 0.342 -0.249 -0.074 0.338 1.000
0.062 -0.068 -0.075 -0.094 -0.016 0.133 0.082 0.098 -0.174 -0.115 0.331 0.427 1.000
-0.172 0.206 0.092 0.178 0.176 0.110 -0.208 -0.260 0.166 -0.072 0.060 -0.057 0.101 1.000
0.320 -0.654 -0.423 -0.588 -0.586 -0.211 0.321 0.264 -0.229 0.083 0.323 0.304 -0.070 -0.198 1.000
0.286 -0.487 -0.382 -0.444 -0.437 -0.180 0.347 0.267 -0.241 0.072 0.173 0.206 -0.081 -0.205 0.729
1.000
0.316 -0.511 -0.367 -0.467 -0.461 -0.152 0.258 0.212 -0.153 0.174 0.152 0.164 -0.146 -0.169 0.724
0.639 1.000
0.221 -0.496 -0.318 -0.455 -0.463 -0.218 0.269 0.199 -0.135 0.071 -0.003 0.191 -0.081 -0.145 0.697
0.611 0.667 1.000
0.302 -0.545 -0.456 -0.493 -0.492 -0.206 0.409 0.315 -0.233 0.111 0.152 0.201 -0.114 -0.169 0.740
0.731 0.719 0.656 1.000
```

```
0.035 0.192 0.114 0.206 0.156 -0.132 0.086 0.141 -0.040 0.093 -0.162 -0.002 -0.073 -0.076 -0.125 -
0.142 -0.089 0.035 -0.115 1.000
SD
.830 1.085 1.526 0.652 0.638 0.489 2.558 1.674 1.137 11.995 10.994 3.155 1.847 0.723 0.655 0.582
0.565 0.581 0.596 0.482

MO NX=12 NY=8 NK=4 NE=3 LY=FU,FI LX=FU,FI BE=FU,FI GA=FU,FI PH=SY,FR PS=DI,FR
TE=FU,FI TD=FU,FI
FR LY(2,2) LY(4,2) LY(5,2) LY(6,2) LY(7,3)
FR LX(2,2) LX(3,2) LX(4,2) LX(5,2) LX(6,2) LX(7,3) LX(8,3) LX(9,3) LX(10,3)
FR LX(11,3) GA(1,2) GA(2,1) GA(2,3) GA(3,1)
FR GA(3,4)
FI LX(1,1) LX(12,4) LY(1,1)
VA 1 LX(1,1)
VA 1 LX(12,4)
VA 1 LY(1,1) LY(3,2) LY(8,3)
FR TE(2,2) TE(3,3) TE(4,4) TE(5,5) TE(6,6) C
TE(7,7) TE(8,8)
FR TD(1,1) TD(2,2) TD(3,3) TD(4,4) TD(5,5) TD(6,6) TD(7,7) TD(8,8) C
TD(9,9) TD(10,10) TD(11,11)
FI TD(12,12)
VA .01 TD(12,12)
FI GA(3,2)
VA .77 GA(3,2)
VA .10 GA(3,3)
VA -.10 BE(3,2)
FR BE(3,1)
FR TH(2,1)
FR TD(5,2) TD(5,3) TD(5,4) TD(11,7) TD(12,3)
FR TD(6,5) TD(7,5) TD(8,5) TD(9,5) TD(10,5) TD(11,5)
FR TD(11,7) TD(11,8) TD(12,10) TD(10,3) TD(12,10)
FR TE(5,2) TE(5,3) TD(12,1) TD(4,2) TD(4,3) TD(6,3) TE(4,2)
FR TE(8,5) TE(7,5) TH(7,2) TH(11,7)
FR TH(7,2) TH(12,6) TH(1,3) TH(11,7) TE(4,3) TE(8,2) TE(8,4)
FR TE(5,3) TH(3,6) TH(8,7) TE(4,2) TD(5,3) TH(11,7) TH(7,2) C
TH(7,4) TH(12,6) TE(7,2) TH(3,1) TH(6,3)
FR TH(7,5) TH(5,6) TH(11,6) TE(7,4) TE(4,1) TH(4,3) TD(5,1)
LE
MUS DEP FPER
LK
CHRO EXER SOCI VIS
PD
OU SE TV EF FS SS RS MI ND=3 AD=OFF

FULL MODEL

                Number of Input Variables 20
                Number of Y - Variables  8
                Number of X - Variables  12
                Number of ETA - Variables  3
                Number of KSI - Variables  4
                Number of Observations  320
```

BIOGRAPHY

I am flight lieutenant Jirawan Inkoom. I was born on January 9, 1968 at Nakhorn Prathom province, central part of Thailand. I finished my bachelor degrees of nursing science at the Royal Thai Air-Force Nursing College in 1990. During 1990-1996, I had worked as the nurse instructor who was responsible for teaching fundamental nursing subject and adult nursing subject at the Royal Thai Air-Force Nursing College.

During 1996-1998, I had studied in master degree of nursing science at the faculty of nursing, Mahidol University by receiving the scholarship from Srinakharinwirote University. The thesis title is “A study of health promoting behaviors in the elderly with coronary artery disease”. I graduated in 1998.

During 1998 – 2002, I worked as the nurse instructor in the faculty of nursing, Srinakharinwirote University. I was responsible for teaching gerontological nursing and adult nursing in the faculty.

In mid of year 2002, I started to perform PhD study in nursing science at the faculty of nursing, Chulalongkorn University. In 2007, I graduated and obtained the doctor of philosophy in nursing science. After graduation, I have returned to teach again in the faculty of nursing, Srinakharinwirote University. My office telephone number is 02-664-1000 Ext. 1618.