

Causal Model of Elderly Thais' Self-Management Behaviors of Pre-dialysis Chronic Kidney Disease

Parinda Sritarapipat, Linchong Pothiban, Sirirat Panuthai, Dusit Lumlertgul, Paradee Nanasilp

Abstract: This cross-sectional, predictive study aimed to examine factors, directly and indirectly, affecting elderly Thais' self-management behaviors of pre-dialysis chronic kidney disease. A hypothesized causal model, based on Curtin and Mapes's framework for self-management in chronic kidney disease and Bandura's self-efficacy theory, was used to guide the study. Multistage random sampling was employed to obtain 216 elderly Thais with pre-dialysis chronic kidney disease from six outpatient clinics in four public primary hospitals and two secondary hospitals located within two central Thai provinces. Data were collected, via eight instruments, and analyzed using descriptive statistics, Pearson's product moment correlation coefficient and structural equation modeling using the Generalized Least Squares technique in the LISREL program.

The results indicated six significant predictors (self-efficacy, physical function in instrumental activities of daily living, knowledge about chronic kidney disease, social support from family, cognitive function and social support from health care providers) explained 47.23% of variance in the subjects' self-management behavior. The subjects' self-efficacy, instrumental activities of daily living, chronic kidney disease knowledge and social support from family had a direct positive effect on their self-management behavior. The subjects' cognitive function and social support from health care providers were found to have an indirect positive effect on the subjects' self-management behavior via self-efficacy. Moreover, the subjects' self-efficacy was found to be a mediator between self-management behavior and the other predictors.

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Key words: Self-management; Elderly Thais; Pre-dialysis chronic kidney disease; Causal model

Introduction

Chronic kidney disease (CKD), a global public health problem particularly among those 70 years of age and older,¹⁻³ is a progressive loss of renal function over a period of months or years. CKD is identified by high levels of creatinine, which indicate a lower glomerular filtration rate (GFR), and, as a result, a decrease in the kidneys capability to excrete waste products.^{4,5} The severity of CKD is classified into five stages: Stage I – slight diminished kidney function

Correspondence to: Parinda Sritarapipat, RN, PhD (Candidate)
Faculty of Nursing, Chiang Mai University, 110 Intawaroros Road,
Muang District, Chiang Mai, 50200 Thailand.

E-mail: parinda13@hotmail.com

Linchong Pothiban, RN, DSN. Associate Professor, Faculty of Nursing,
Chiang Mai University, 110 Intawaroros Road, Muang District, Chiang Mai,
Thailand.

Sirirat Panuthai, RN, PhD. Assistant Professor, Faculty of Nursing,
Chiang Mai University, 110 Intawaroros Road, Muang District, Chiang Mai,
Thailand.

Dusit Lumlertgul, MD. Professor Emeritus, Faculty of Medicine, Chiang
Mai University, Chiang Mai, Thailand, 110 Intawaroros Road, Muang
District, Chiang Mai, Thailand.

Paradee Nanasilp, RN, PhD. Associate Professor, Faculty of Nursing,
Chiang Mai University, 110 Intawaroros Road, Muang District, Chiang Mai,
Thailand.

with normal or relatively high GFR (≥ 90 ml/min/1.73m²); Stage II - mild reduction in GFR (60–89 ml/min/1.73m²) with kidney damage; Stage III - moderate reduction in GFR (30–59 ml/min/1.73m²); Stage IV - severe reduction in GFR (15–29 ml/min/1.73m²); and, Stage V - established chronic kidney failure (GFR ≥ 15 ml/min/1.73m²) or end stage renal disease (ESRD).^{4,5}

Treatment of CKD is complex and varies among individuals depending upon the stage of the disease and the existing risk factors. Since there is not a cure for CKD, care focuses on: slowing progression of the disease; treating underlying causes and contributing factors of the disease; treating complications of the disease; and, replacing lost kidney function.^{4,5} Interventions can include, but are not limited to control of such factors as one's blood glucose, blood pressure, diet (protein, sodium, potassium and phosphorous) and fluid intake, as well as avoidance of certain medications (i.e. aspirin, laxatives containing magnesium and aluminum, ulcer medications, H²-receptor antagonists, enemas high in phosphorous, pseudoephedrine, herbal medications, and medications with large amounts of sodium).^{4,5} However, specific medications such as angiotensin-converting enzyme inhibitors (ACE inhibitors) and angiotensin II receptor blockers (ARBs), which slow the progression of CKD, may be required. When an individual's CKD reaches stage V or ESRD, renal replacement therapy (RRT) usually is carried out via peritoneal or hemodialysis.^{4,5}

The physical, psychological and economic health of persons with CKD, as well as that of their families, has been found to be severely impacted, especially during the end-stage of the disease.¹ Similar to the physical impact of diabetes^{6,7} and rheumatoid arthritis,⁸ the physical impact of CKD can influence elders' self-management abilities (i.e. basic and instrumental physical activities of daily living needed to live and function independently) to deal with their illness.^{6,9-11}

Western studies have reported positive correlations between self-management and physical function, cognitive function and disease knowledge in older persons with diabetes, hypertension and heart disease.^{9,12} However, findings from these studies may not be applicable to elderly Thais with early stages of CKD. Therefore, it is necessary to examine factors that might influence older Thais' ability to self-manage their CKD, especially during its early stages of development, as well as prior to them being placed on dialysis.

Review of Literature

Physical function has been found to be related to self-management abilities among advanced age individuals and/or those who have a complex illness, i.e. CKD.^{6,9} Physical function is the ability of an individual to perform independent actions, general basic self-care activities,¹⁰ and complex tasks necessary for living and functioning independently (instrumental ADL).¹¹ It has been noted that functional limitations in physical activities of daily living (ADL), including basic (basic ADL) and complex tasks (instrumental ADL), can interfere with self-management by older adults with chronic diseases, such as diabetes^{6,7} and rheumatoid arthritis.⁸ Basic ADL are recognized as things such as eating, grooming, dressing, toileting, ambulating, transferring and climbing stairs. On the other hand, instrumental ADL are seen as consisting of things such as ambulating outdoors, cooking, using public transport, doing heavy housework and exchanging money. A study of elderly Thais, with diabetes, found a positive relationship between physical function and nutritional self-management.¹³

Cognitive function, the capacity of intellectual and mental processes toward direct action,¹⁴ has been proposed to have an effect on one's ability to self-manage an illness.⁹ For example, impairment in

cognitive function have been found to dramatically affect older persons' ability to learn about and self-manage their illness.^{9, 15-17} In addition, prior studies have reported decreased cognitive functioning as an important barrier to self-management among individuals who have diabetes¹⁸⁻²⁰ or pre-dialysis CKD.²¹

As with any chronic illness, self-management of the illness is contingent upon the individual having adequate knowledge to make realistic decisions and problem-solve in response to the ongoing disease process.^{22, 23} Knowledge about the respective illness and its treatments has been reported to influence elders' skills and performance of self-management of CKD,^{21, 24, 25} as well as other chronic illnesses.^{9, 16, 17, 22, 26} In this regard, prior studies have found, among older Westerners with chronic multi-morbidities,^{16, 17} a positive correlation between the level of knowledge about a specific chronic illness and general self-management of the illness. In addition, those who have greater knowledge about their CKD and ESRD, as well as the respective treatments, have been found to be more able to conduct self-management of their illness.^{21, 24}

Self-efficacy (the belief people have in their capability to perform tasks and behaviors required to successfully manage their condition)²⁷ also has been noted to have an impact on one's ability to self-manage an illness. Findings of prior research of older individuals with various chronic illnesses,^{17, 26, 28, 29} have revealed self-efficacy to be positively correlated with self-management, as well as be a significant predictor of one's ability to effectively perform self-management of an illness. In addition, previous studies have found self-efficacy has a positive relationship with self-management of CKD among both older Americans³⁰ and Thais undergoing hemodialysis for ESRD.³¹

Social support (perceived informational, affective, tangible and appraisal assistance people receive from their family and significant others, such as health care providers)³² also has been shown to be a significant factor in elders' self-management of CKD,²¹ as well as among those receiving hemodialysis for ESRD.^{31, 33} In addition, social support has been shown to be positively associated with self-efficacy and to have a direct influence on the self-efficacy and self-management of persons receiving hemodialysis for ESRD,³¹ as well as among those with diabetes mellitus.^{28, 36} Social support also has been shown to directly positively influence elders' self-management or self-care of a chronic illness, i.e., rheumatoid arthritis⁸ and multi-morbidities.^{16, 17, 34, 35}

Although numerous studies of younger persons with chronic illnesses have been conducted,¹² no research could be located regarding elderly Thais with CKD or of those with CKD who were not receiving RRT. In addition, little is known about predictors of CKD when symptoms of the disease are not evident.^{30, 24} The only locatable Thai study, regarding a causal model of self-management of renal disease, was an investigation of Thais receiving hemodialysis for ESRD.³¹ The results of the Thai study revealed the patients' level of self-efficacy and social support experienced had a positive influence on their self-management of their disease.³¹ However, ESRD (stage V) is known to progress differently than the pre-dialysis stages of CKD (stage I - IV).^{4, 5} Thus, there appears to be a need for investigation of the self-management practices of elderly Thais who are in the pre-dialysis stages of CKD and not receiving RRT. This study, therefore, sought to examine a hypothesized causal model of elderly Thais' self-management behavior of their pre-dialysis CKD, so as to facilitate development of appropriate interventions to enhance such individuals' self-management abilities.

Hypothesized Causal Model of Self-Management

The hypothesized causal model of self-management among elderly Thais with pre-dialysis stage CKD (see **Figure 1**) was developed based upon Curtin and Mapes' framework for self-management in CKD³⁷ and Bandura's self-efficacy theory.²⁷ Self-management was defined as individuals' positive attempt to control and participate in health care, in their daily lives, and to embrace tasks in medical, role and emotional management in order to optimize their health, prevent complications, control symptoms, organize medical resources and minimize intrusion of the disease into their preferred lifestyles.³⁷ Five attributes of self-management behavior (communication with health care providers, partnership in care, self-care activities, self-advocacy behaviors and medication adherence behavior)³⁰ were integrated into the self-management component of the framework. Seven selected variables (physical function in basic ADL, physical function in instrumental ADL, cognitive function, CKD knowledge, self-efficacy, social support from family members and social support from health care providers) were included to explain

self-management behavior. Based upon prior research and a review of the literature, about CKD and other chronic illnesses, the following hypothesized relationships were made: a) physical function in basic ADL will have a direct positive influence on self-management behavior of older persons with pre-dialysis CKD; b) physical function in instrumental ADL will have a direct positive influence on self-management behavior of older persons with pre-dialysis CKD; c) cognitive function will have a direct positive influence on self-management behavior of older persons with pre-dialysis CKD; d) self-efficacy will have a direct positive influence on self-management behavior in older persons with pre-dialysis CKD; e) knowledge about CKD will have both a direct positive influence and an indirect positive influence, through self-efficacy, on self-management behavior in older persons with pre-dialysis CKD; f) social support from family members will have both a direct positive influence and an indirect positive influence, through self-efficacy, on self-management behavior in older persons with pre-dialysis CKD; and, g) social support from health care providers will have both a direct positive influence and an indirect positive influence, through self-efficacy, on self-management behavior in older persons with pre-dialysis CKD.

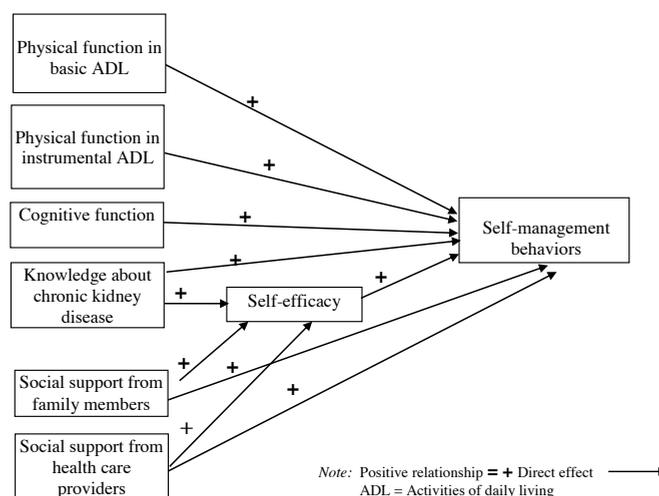


Figure 1 Hypothesized Conceptual Framework for the Causal Model of Elder Thais' Self-Management Behaviors of Pre-Dialysis Chronic Kidney Disease

Method

Design: A cross-sectional, predictive, correlational design was used to test the proposed hypothesized model.

Ethical Considerations: The study was approved by the Research Ethics Review Committee of the primary investigator's (PI) institution, the administrators of the Provincial Public Health offices of the two selected provinces and the Directors of the six hospitals used as study sites. All eligible subjects were informed about: the nature of the study; what study involvement would entail; anonymity and confidentiality issues; voluntary involvement; and the right to withdraw at any time without repercussions. Subjects consenting to participate were asked to sign a consent form.

Setting: Subjects were obtained from the outpatient clinics of four primary care hospitals and two secondary care hospitals located within two provinces in central Thailand.

Sample: The sample size was based on seven selected predictors from the hypothesized model. The desired sample size was determined to be 190 subjects, based an acceptable level of power of 0.90, an alpha level of 0.05 and an effect size of 0.10. An additional 36 (19%) subjects were added, due to the attrition rate noted in prior research,⁵ resulting in a desired sample of 216. Recruitment of the sample was accomplished via review of 300 medical records, at the study sites, of elderly Thais with CKD. The inclusion criteria consisted of Thais who were: 60 years of age and older; diagnosed with stage III, IV or V CKD, with an estimated GFR < 60 ml/min/1.73 m², for at least three months; not on dialysis; only receiving medications and making lifestyle modifications; and, able to understand and communicate in Thai.

The subjects ranged in age from 60 to 88 years (mean = 71.07 years) and were Buddhists. All of them had: CKD for one to 120 months (mode = 12

months; SD = 15.33); a body mass index range of 16.02 to 38.68 (mean = 25.01); an average GFR rate of 32.08 ml/ min/ 1.73 m² (S.D. = 10.21); and, an average serum creatinine level of 2.13 (S.D. = 1.34). Most of the subjects were: female (n = 137; 63.43%); married (n = 137; 63.43%); elementary school graduates (n = 169; 78.24%); unemployed (n = 163; 75.46%); living with either their spouse, children or both (n = 183; 84.72%); diagnosed with stage III CKD (n = 123; 56.94%); diagnosed with two or more co-morbid diseases (n = 199; 92.13%); affected with CKD for less than six months (n = 111; 51.39%); and, currently receiving medication treatment for CKD (n = 208; 96.30%). The majority never smoked (n = 166; 76.85%); perceived having a sufficient income for living and saving (n = 95; 43.98%); and, had health care insurance (n = 178; 82.41%). Their family income ranged from 500 to 51,000 Baht/month (mean = 5,835.64 Baht). Only 18.5% (n = 40) reported receiving CKD information from their physicians or nurses.

Instruments: Eight instruments were used to collect data. They were the: *Demographic Data Form*; *Self-Management Behavior Questionnaire*,³⁰ *Perceived Self-Management Self-Efficacy Questionnaire*,³⁰ *modified Barthel Activities of Daily Living Index*,³⁸ *Chula Activities of Daily Living Index*,³⁹ *Chula Mental Test*,⁴⁰ researcher-developed *CKD Knowledge Scale*; and, *Social Support from Family and Health Care Provider Questionnaire*.⁴¹ The PI-developed *Demographic Data Form* requested information regarding each subject's: gender; age; marital status; religion; educational level; occupation; living status; family income; perceived income adequacy; stage of CKD; duration of CKD; number of co-morbid conditions; serum creatinine level; smoking history; current CKD medication treatment; body mass index; medical payment; and, previous CKD education.

The *Self-Management Behavior Questionnaire (SMBQ)*,³⁰ was used to measure older persons' self-management behaviors. The *SMBQ* is a 37-item instrument consisting of five dimensions of self-management behaviors, including: communication with health care providers (eight items); partnership in care (seven items); self-care activities (11 items); self-advocacy behaviors (10 items); and, medication adherence behavior (one item). Examples of an item from two different dimensions, within the instrument, include: "During the past six months, how often have you kept track of blood glucose (sugar) levels?" (self-care activities); and, "In the past six months, how often have you used additional treatments other than what your doctor prescribed?" (medication adherence behavior). Possible responses to each item ranged from 1 = "never" to 5 = "all of the time." A total score, which could range from 37 to 185, was obtained by summing the response values across all items. The total score indicated the level of self-management behaviors, whereby a score of: 37 to 85.9 = low; 86 to 135.9 = moderate; and, 136-185 = high. Cronbach's alpha for the *SMBQ*, in this study, was 0.95.

The 12-item *Perceived Self-Management Self-Efficacy Questionnaire (PSMESEQ)*,³⁰ was used to measure each subject's level of perceived self-efficacy for self-management. Examples of items were: "How confident are you in your ability to know what questions to ask a doctor?" and "How confident are you in your ability to adjust your food intake to improve your health?" Each item had possible responses ranging from 1 = "not at all confident" to 5 = "very confident." A total score, which could range from 12 to 60, was obtained by summing the response values across all items. The total score indicated the subject's amount of perceived self-efficacy for self-management, whereby a score of: 12 to 27.9 = low; 28 to 43.9 = moderate; and, 44 to 60 = high. The instrument's internal consistency coefficient, in this study, was 0.96.

The 10-item *Modified Barthel Activities of Daily Living Index (BAI)*,³⁸ was used to measure each subject's ability to perform personal care in basic ADL. Two items addressed activities related to bathing and grooming (i.e., "Were you able to wash your face/do your hair/brush your teeth/shave in the preceding 24-48 hours?") and had responses of either 0 = "require some assistance" or 1 = "do independently." Six items (i.e., "To what degree can you eat food that is cooked and served by others, but not cut up?" and "To what degree can you control your bowels and bladder without accidents?") dealt with the activities of eating, dressing, toileting, urine and bowel continence, and stair climbing. Possible responses were: 0 = "completely dependent;" 1 = "require some assistance;" or, 2 = "do independently." Two items focused on activities of transferring (in and out of bed or chair) and mobility (i.e., "To what degree are you able to move in and out of bed or a chair without assistance, other than using a cane or walker?"). Possible responses were: 0 = "completely dependent;" 1 = "require some assistance;" or, 3 = "do independently." A total score, which could range from 0 to 20, was obtained by summing the response values across all items. The total score indicated the amount of dependence, whereby: 0 to 4 = total; 5 to 8 = severe; 9 to 11 = moderately severe; or, 12 to 20 = mildly severe. The test-retest reliability for the *BAI*, in this study, was $r = 1.000$; $p \leq .001$.

The 5-item *Chula Activities of Daily Living Index (Chula ADL)*³⁹ was used to measure each elder's instrumental ADL. The instrument addressed five complex activities: walking outdoors (one item); cooking (one item); using public transportation (one item); doing heavy housework (one item); and, exchanging money (one item). Examples of items and their possible responses were: "Walking outdoors" (0 = "don't do;" 1 = "need assistance from another;" 2 = "need to be accompanied by another;" or, 3 = "do independently."); "Cooking" (0 = "don't do;" 1 =

“need assistance from another”; or, 2 = “do independently”); “Using public transportation” (0 = “don’t do;” 1 = “need assistance from another;” or, 2 = “do independently”); “Doing heavy housework” (0 = “don’t do” or 1 = do independently”) and, “Money exchange” (0 = “don’t do” or 1 = do independently”). A total score, which could range from 0 to 9, was obtained by summing response values across all items. A low score suggested a low level of functional ability, while a high score suggested the presence of functional independence. The test-retest reliability for the Chula ADL, in this study, was $r = 1.000$; $p \leq .001$.

The 13-item *Chula Mental Test* (CMT)⁴⁰ was used to assess cognitive function regarding: perception (four items: i.e. “Show pen and ask what it is?”); memory (three items: i.e. “How old are you?” and “What time is it?”); attention (three items: i.e. “Clap your hands three times.”); language (one item: i.e. “Read the words, umbrella, pan and door.”); and, recall (two items: i.e. “Repeat the sentence, I like flowers and music, but not dogs.”). Responses to all items were either 0 = “yes” or 1 = “no.” A total score, which could range from, 0 to 19, was obtained by summing the response values across all items. The total score indicated the level of cognitive impairment, whereby: 0 to 4 = severe; 5 to 9 = moderate; 10 to 14 = mild; and, 15 to 19 = none. The test re-test reliability for this instrument, in this study, was $r = 1.000$; $p \leq .001$.

The 15-item, PI-developed *CKD Knowledge Scale* (CKDKS) was used to determine each elder’s knowledge about CKD. Examples of items were: “Do the kidneys control the amount of water, sugar, protein, acid-base balance and waste products in the blood?” and “Can uncontrolled diabetes mellitus and hypertension cause chronic kidney disease, which can lead to a rapid deterioration in kidney function?” Possible responses to each item were either “yes” or “no.” Each correct response received a score of “1,”

while each incorrect response received a score of “0.” A total score, which could range from 0 to 15, was obtained by summing the response values across all items. The total score indicated the level of knowledge, whereby: 0 to 5 = low; 6 to 10 = moderate; and, 11 to 15 = high. The content validity index (CVI) of the CKDKS, assessed by five experts in CKD (four nurse instructors and one nephrologist), was found to be 0.91 for the entire instrument, while the CVI for the individual items ranged from 0.80 to 1.00. In addition, a Kuder-Richardson 20 (KR-20) reliability coefficient of the CKDKS, in this study, was found to be 0.71.

The *Social Support from Family and Health Care Provider Questionnaire* (SSFHCPQ),⁴¹ was used to measure social support provided by family members and health care providers. The questionnaire contained 12 items that addressed: emotional support (three items); appraisal support (three items); informational support (three items); and, instrumental support (three items). Examples of items included: “My family takes care of things for me when necessary?” (instrumental support) and “I get information from health care professionals when I need it?” (informational support). Possible responses to each item ranged from 1 = “strongly disagree” to 4 = “strongly agree.” A total score, which could range from 12 to 48, was obtained by summing the response values across all items. The total score indicated the level of social support, whereby: 12 to 24 = low; 25 to 36 = moderate; and, 37 to 48 = high. The reliability coefficient of the SSFHCPQ, for this study, was 0.95 for family members’ support and 0.94, for health care providers.

All of the instruments, except for the SMBQ and PSMSEQ, were originally written in Thai. These two instruments were originally written in English and required translation and back translation to assure no changes in meaning occurred. Translation from English to Thai was done by the PI, while back translation from

Thai to English was done by two bilingual experts (one from the Chiang Mai University Faculty of Nursing and one from the Language Institute). Comparison of the back translated versions of the instruments to the original English versions were made by the PI. Finally, the PI, together with two bilingual experts, modified some of the item statements to improve their appropriateness and assure a closer cultural and context fit for elderly Thais with CKD.

Procedure: Once the name of a potential subject was identified, he/she was approached by either the PI or the trained research assistant (RA), while waiting in the lobby of one of the six study-site outpatient clinics to be seen by a physician. After the study was explained and a potential subject gave signed consent to participate, personal information was obtained from his/her medical record. Then all of the questionnaires were administered to him/her, in a private area of the waiting room, via the PI or RA reading the questionnaire items to the subject. The subject's verbal responses were recorded on his/her respective questionnaires. It took approximately 45 to 80 minutes, per subject, to complete the data gathering process. If a subject became tired, during data gathering, he/she was given a short break. Once data gathering was completed, the subject was thanked for his/her time. For the purpose of identification, code numbers were placed on the completed questionnaires.

Data Analysis: Descriptive statistics were used to describe the demographic characteristics of the

sample. Pearson's product moment correlation was used to analyze the bivariate relationship among all of the study variables and their respective components. A structural equation model, using the Generalized Least Squares (GLS) technique in the LISREL 8.52 program, was utilized to test the relationship between the seven factors (i.e. physical function in basic ADL; physical function in instrumental ADL; cognitive function; knowledge about chronic kidney disease; social support from family members; social support from health care providers; and self-efficacy) and self-management behaviors.

Results

Correlational analyses among the study's seven independent variables (physical function in basic ADL; physical function in instrumental ADL; cognitive function; knowledge about chronic kidney disease; social support from family members; social support from health care providers; and, self-efficacy) and the dependent variable (overall self-management behaviors and each of its individual components) are illustrated in **Table 1**. Significant correlations were found among all of the variables, except for the self-management component, communication with health care providers, the independent variable, support from family, the self-management component, medical adherence, and each of the seven independent variables.

Table 1 Correlation Coefficient Matrix of the Study Variables (n = 216)

Variables	Overall SM	Communication with health care providers	Partnership in care	Self-care activities	Self-advocacy behaviors	Medical adherence behavior
Physical function in BADL	0.29**	0.19**	0.15*	0.34**	0.20**	-0.02
Physical function in IADL	0.42**	0.36**	0.19**	0.47**	0.22**	0.07
Cognitive function	0.42**	0.27**	0.29**	0.48**	0.26**	-0.02
CKD knowledge	0.36**	0.28**	0.29**	0.33**	0.24**	0.05
Self-efficacy	0.65**	0.46**	0.44**	0.70**	0.42**	-0.09
Social support from family	0.23**	0.12	0.20**	0.24**	0.17*	-0.03
Social support from health care providers	0.23**	0.15*	0.24**	0.20**	0.20**	-0.09

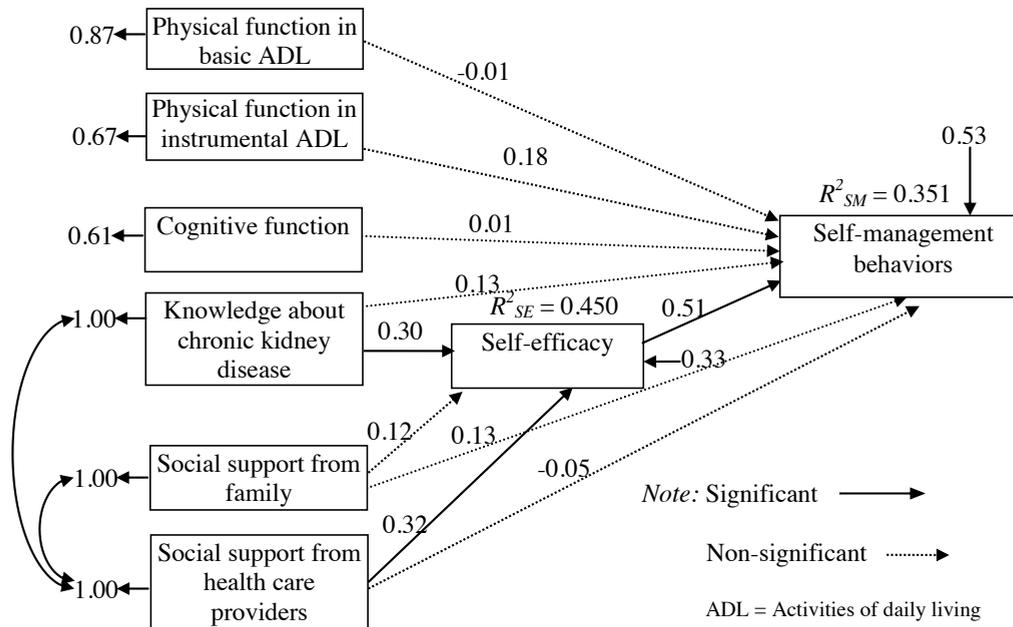
Note: * $p < .05$; ** $p < .01$

SM = Self-Management; BADL = Basic activities of daily living; IADL = Instrumental activities of daily living

For model testing, all the fit indices obtained indicated the hypothesized model did not fit the actual data (see **Figure 2**). Hence, modification of the model was done (three times) until it fit the data well. In the first modification, the pathway between cognitive function and self-efficacy was added based on acceptable modification indices and evidence from previous studies of older persons with other chronic diseases that showed a strong relationship between the two variables.^{9, 42} In the second modification, a pathway between instrumental ADL and self-efficacy

was added to get better indices for a goodness-of-fit. In the third modification, the non-significant relationship between basic ADL and self-management was deleted, based on suggested modification indices. After deletion, all fit indices for goodness-of-fit testing showed the final model was saturated and adequately fit with the data. Results of the direct, indirect and total effects of self-management of elderly Thais with CKD at pre-dialysis stage are presented in **Table 2**.

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Chi-square (χ^2) value = 75.50; df = 3; *p*-value = 0.00; RMSEA = 0.34; GFI = 0.66; AGFI = -3.04; RMR = 0.20

Figure 2 Hypothesized Causal Model of Elder Thais' Self-Management Behaviors of Pre-Dialysis Chronic Kidney Disease

Table 2 Structural Path Coefficients of the Final Study Model (n = 216)

Causal variables	Self-management behaviors			Self-efficacy		
	DE	IE	TE	DE	IE	TE
Physical function in IADL	0.18*	0.15**	0.33**	0.30*	-	0.30*
Cognitive function	0.01	0.17*	0.18**	0.35**	-	0.35**
CKD knowledge	0.13*	0.06*	0.19**	0.12*	-	0.12*
Social support from family	0.13*	0.09*	0.22*	0.18*	-	0.18*
Social support from health care providers	-0.05	0.15*	0.11*	0.30**	-	0.30**
Self-efficacy	0.51**	-	0.51**	-	-	-
R ² for structural equation	0.4723			0.5451		

Note: * *p* < .05. ** *p* < .01

DE = Direct effect; IE = Indirect effect; TE = Total effect; IADL = Instrumental activities of daily living

In the final causal model (see **Figure 3**), 47.23% of total variance in self-management behavior was predicted by six significant predictors (self-efficacy, physical function in instrumental ADL, CKD knowledge, social support from family, cognitive function and social support from health care providers). Basic ADL did not significantly affect self-management

behaviors. Self-efficacy was found to be the mediating variable, with strongest positive effect, between physical function of instrumental ADL, cognitive function, CKD knowledge, and social support from both family and health care providers, and self-management.

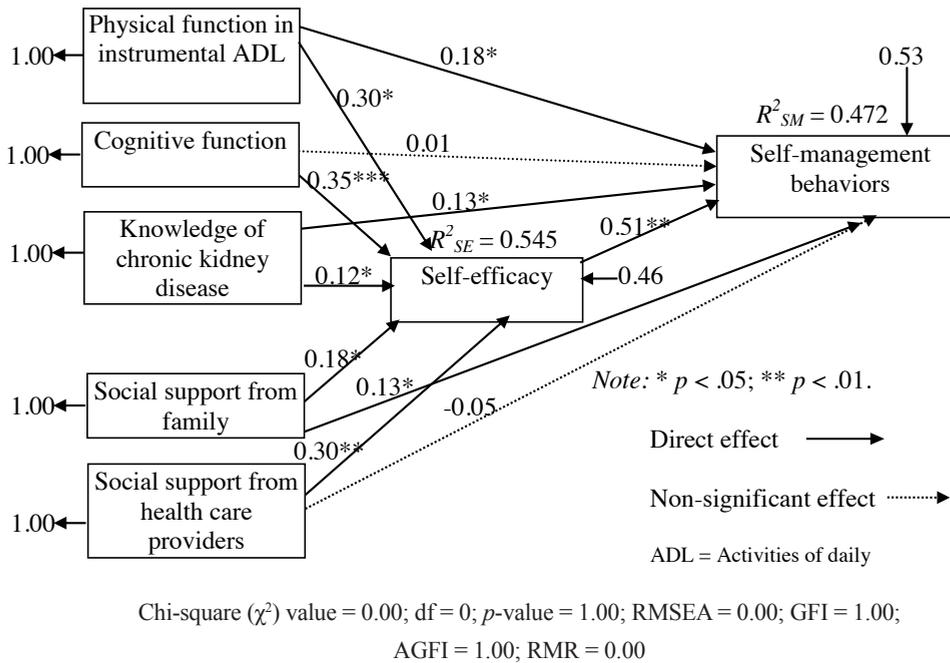


Figure 3 Final Modified Model of Elder Thais' Self-Management Behaviors of Pre-Dialysis Chronic Kidney Disease

Discussion

The results suggested that all of the independent variables, except for physical function in basic ADL, in the hypothesized model, could explain self-management behaviors of older persons with pre-dialysis stage CKD. Although self-management behaviors could be affected by physical function in basic ADL, in previous studies of older individuals with various chronic diseases,^{9, 16, 17} there was no

significant association found, in this study, between physical function in basic ADL and self-management behaviors. Between the two aspects of physical function, basic ADL showed a low correlation coefficient ($r = 0.29, p < .01$), while instrumental ADL had a much higher correlation coefficient ($r = 0.61, p < .01$). The weaker correlation of basic ADL to self-management behaviors caused it to be excluded from the model.

Consistent with previous research in other fields,^{9, 10, 13} the findings of this study validated and extended knowledge by providing one explanation for the positive direct and indirect effects of physical function in instrumental ADL on self-management behaviors via self-efficacy. A plausible explanation may be that the elders, who had high instrumental ADL, were living independently. The presence of complex skills are needed for both living independently and performing self-management behaviors. Therefore, the instrumental ADL score was paramount in influencing the self-management score.

Congruent with prior findings regarding older persons with chronic diseases,^{12, 22, 26, 28, 29} including those with pre-dialysis CKD and ESRD receiving hemodialysis,^{30, 31} self-efficacy was found, in this study, to be a predictor of self-management. In addition, the findings support the fact that, in the final model, self-efficacy had a mediating effect between all of the other independent variables and the dependent variable, self-management behaviors. This finding adds additional support to the evidence that older individuals with CKD, who have high self-efficacy, are more likely to engage in self-management behaviors.

The findings also revealed, consistent with prior findings of hemodialysis patients,^{31, 33, 43} that social support from family, directly and indirectly by way of self-efficacy, had a positive effect on self-management behaviors. A possible explanation may be that family members often help an elder control his/her disease, lessen the elder's sense of helplessness in regards to the illness, and share in the elder's health care experience. According to Bandura,²⁷ social support from one's family can influence an individual's self-efficacy.

Similar to prior findings regarding the important role health care providers play in building an individual's self-efficacy and, thereby, enhancing self-management behaviors,^{31, 44} the finding of this

study revealed that social support from health care providers affected self-management behaviors indirectly through self-efficacy. Although health care providers may teach a patient about care related to his/her illness and assist in building his/her confidence in personal self-care abilities, manifestation of self-management behaviors are totally dependent upon the individual's personal beliefs in his/her own capabilities. This may help explain why social support from health care providers had only an indirect effect, via self-efficacy, on self-management behaviors. Another possible explanation for a non-significant direct effect of health care providers' support on self-management behaviors may have been due to the lack of adequate health care education from health care providers. Most of the elders (n = 176; 81.5%) reported they had not received any type of intensive education on CKD or self-management skills from the health care professionals (i.e. nurses, physicians, pharmacists and dietitians). Therefore, the elders' self-management behaviors did not depend upon the health care providers' support.

Finding positive direct and indirect, through self-efficacy, effects of knowledge about CKD on self-management behavior was consistent with prior studies conducted on individuals with other chronic illnesses.^{13, 16, 22-24, 26, 28} The fact the indirect effect of CKD knowledge, through self-efficacy, on self-management behavior was statistically stronger than the direct effect of knowledge about CKD on self-management behavior could suggest the importance knowledge plays in enhancing self-efficacy, which, in turn, more strongly influences self-management behavior. Even though knowledge about CKD can influence self-management behavior, having self-efficacy can enhance the influence that knowledge plays.

Contrary to prior studies of individuals with chronic diseases,^{18, 20, 45, 46} wherein better self-management behavior was found among older patients

who had better general cognitive function, the findings of this study failed to support a direct positive effect of cognitive function on self-management behavior. This may be due to the non-specificity of the general cognitive function tool used. The *Chula Mental Test* (CMT)⁴⁰ may not have been sensitive enough to predict CKD self-management abilities. Prior studies used assessment measures different from the one used in this study (i.e. Mini Mental State Examination, the Clock Drawing Test, or disease-specific test of abstract reasoning and problem solving). Thus, other specific cognitive function assessments (i.e. executive cognitive function, which assesses problem solving, decision making, delayed learning and memory) may need to be considered for use in future studies on self-management behavior among elders with CKD. In addition, the findings verified that cognitive function indirectly affected self-management behaviors, via self-efficacy, and that cognitive function was the strongest predictor of self-efficacy. This finding indicated that the elders with CKD, who had good cognitive function, did not necessarily self-manage well unless their self-efficacy was high. According to Bandura,²⁷ self-efficacy with complex tasks depends on individual cognitions and motivation. In concordance with a previous study,⁴⁷ the findings of this study confirmed that cognitive function, especially affective states, is an important source of self-efficacy in elderly Thais with pre-dialysis CKD. This finding also implied that, among the elderly, poor cognitive function may decrease self-efficacy. Elderly Thais with pre-dialysis CKD, who retained normal cognitive function, appeared to have been more likely to have high self-efficacy, which resulted in their ability to perform CKD self-management behavior.

Another interesting point for the moderate ability of the study's model, in explaining self-management behavior, may have been due to the lack of any significant relationship between the proposed predictors and medication adherence behavior (see

Table 1). This limitation was of concern because medication adherence generally consists of a set of behaviors. However, in the *SMBQ*,³⁰ which was used in this study, only one question was asked to measure medication adherence. Therefore, it is possible that medication adherence was not adequately measured, resulting in medication adherence behavior not being adequately reflected.

Limitations and Recommendations

When interpreting and using these findings, there are limitations that need to be considered. The subjects used in this study were elders who had been diagnosed with stage III, IV or V CKD, with an estimated GFR < 60 ml/min/1.73 m² for at least three months, and were in the pre-dialysis stage. In addition, the elders were from only the central region of Thailand. Therefore, generalizability of the findings to individuals not meeting these criteria may be limited. Also, the instrument used to assess medication adherence may not have been adequate for detecting the nuances of the elders' medication adherence. Therefore, the findings related to medication adherence may not be totally correct.

Based upon the study's limitations, future studies need to consider the use of individuals from a wider age range, who are newly diagnosed with CKD and who are from all regions of Thailand. In addition, use of another instrument to assess medication adherence would be advisable. Because self-management behavior depends on the duration and experience of having CKD, future studies need to consider the use of longitudinal intervention studies that examine the long term effects of programs that focus on promoting self-management behaviors among elders with pre-dialysis CKD. The planned programs need to incorporate information and activities that address: the disease and treatment aspects of CKD; promotion of family and health care providers support;

facilitation of cognitive function; physical function in instrumental ADL; and, promotion of self-efficacy. Lastly, since basic ADL were not found to have a direct or indirect effect on self-management behavior, future studies need to examine this factor further.

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แบบจำลองเชิงสาเหตุของการจัดการตนเองของผู้สูงอายุไทยที่เป็นโรคไตเรื้อรังระยะก่อนการบำบัดทดแทนไต

ปริญา ศรีธราพิพัฒน์, ลินจง โปธิบาล, ศิริรัตน์ ปานอุทัย, ดุสิต ลำเลิศกุล, ภารดี นานาคิลป์

บทคัดย่อ: การศึกษาเชิงพรรณนาแบบภาคตัดขวางครั้งนี้มีวัตถุประสงค์เพื่อทดสอบปัจจัยที่มีอิทธิพลทางตรงและทางอ้อมต่อการจัดการตนเองของผู้สูงอายุไทยที่เป็นโรคไตเรื้อรังระยะก่อนการบำบัดทดแทนไต โดยแบบจำลองสมมติฐานเชิงสาเหตุในการศึกษานี้ใช้แนวคิดการจัดการตนเองในโรคไตเรื้อรังของเคอร์ทีนและมาเปสและทฤษฎีสมรรถนะแห่งตนของแบนดูรา กลุ่มตัวอย่างถูกคัดเลือกโดยวิธีการสุ่มแบบหลายขั้นตอน คือ ผู้สูงอายุที่เป็นโรคไตเรื้อรังระยะที่ 3 ถึง 5 ก่อนการบำบัดทดแทนไต จำนวน 216 ราย ที่มาตรวจตามนัดที่คลินิกอายุรกรรมในแผนกผู้ป่วยนอกของโรงพยาบาลสังกัดกระทรวงสาธารณสุขระดับปฐมภูมิ 4 แห่ง และระดับทุติยภูมิ 2 แห่งในสองจังหวัดเขตภาคกลาง การเก็บข้อมูลใช้แบบสอบถามจำนวน 8 ฉบับ การวิเคราะห์ข้อมูลใช้สถิติเชิงพรรณนา สถิติสหสัมพันธ์เพียร์สัน และสถิติการวิเคราะห์โมเดลสมการโครงสร้าง

ผลการศึกษาแบบจำลองเชิงสาเหตุของพฤติกรรมจัดการตนเองโดยปัจจัย 6 ปัจจัย ประกอบด้วย สมรรถนะแห่งตน การทำหน้าที่ด้านร่างกายในการทำกิจวัตรประจำวันขั้นสูง ความรู้เกี่ยวกับโรคไตเรื้อรัง การสนับสนุนจากครอบครัวการทำหน้าที่ด้านสติปัญญาและการสนับสนุนจากบุคลากรสุขภาพสามารถอธิบายความแปรปรวนของพฤติกรรมจัดการตนเองของผู้สูงอายุไทยที่เป็นโรคไตเรื้อรังระยะก่อนการบำบัดทดแทนไตได้ร้อยละ 47.23 โดยสมรรถนะแห่งตน การทำหน้าที่ด้านร่างกายในการทำกิจวัตรประจำวันขั้นสูง ความรู้เกี่ยวกับโรคไตเรื้อรัง และการสนับสนุนจากครอบครัวมีอิทธิพลโดยตรงทางบวกต่อพฤติกรรมจัดการตนเองอย่างมีนัยสำคัญทางสถิติ ($p < .05$) ส่วนการทำหน้าที่ด้านสติปัญญาและการสนับสนุนจากบุคลากรสุขภาพมีอิทธิพลโดยอ้อมทางบวกต่อพฤติกรรมจัดการตนเองโดยผ่านสมรรถนะแห่งตนอย่างมีนัยสำคัญทางสถิติ ($p < .05$) นอกจากนี้สมรรถนะแห่งตนเป็นปัจจัยสื่อกลางระหว่างพฤติกรรมจัดการตนเองและปัจจัยทำนายอื่น

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คำสำคัญ: การจัดการตนเอง/ ผู้สูงอายุโรคไตเรื้อรังระยะก่อนการบำบัดทดแทนไต/ แบบจำลองเชิงสาเหตุ

ติดต่อที่: ปริญา ศรีธราพิพัฒน์, RN, PhD (Candidate)
คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ 110 ถ.อินทวิโรต จังหวัดเชียงใหม่ 50200 ประเทศไทย
E-mail: parinda13@hotmail.com
ลินจง โปธิบาล, RN, DSN. รองศาสตราจารย์ คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ ประเทศไทย
ศิริรัตน์ ปานอุทัย, RN, PhD. ผู้ช่วยศาสตราจารย์ คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ ประเทศไทย
ดุสิต ลำเลิศกุล, MD. ศาสตราจารย์ เกียรติคุณ คณะแพทยศาสตร์ มหาวิทยาลัยเชียงใหม่ ประเทศไทย
ภารดี นานาคิลป์, RN, PhD. รองศาสตราจารย์ คณะพยาบาลศาสตร์ มหาวิทยาลัยเชียงใหม่ ประเทศไทย