PREDICTORS OF QUALITY OF LIFE IN THAI ADULTS WITH EARLY-STAGE CHRONIC KIDNEY DISEASE

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ABSTRACT

The incidence and prevalence of chronic kidney disease (CKD) are increasing worldwide. Persons with CKD constitute a large population with a high prevalence of morbidity and mortality in Thailand. Treatment of CKD generally involves a multidisciplinary team and requires a comprehensive assessment and aggressive treatment plan to improve the health status of persons with CKD to slow the disease progression. This study aimed to examine factors that influence quality of life among Thai adults with early-stage CKD and test the constructs of a complex model identifying individual and family factors, knowledge, depression, and self-efficacy related to self-management behavior and quality of life.

Using a conceptual framework for adult self-management behavior based on the Individual and Family Self-management Behavior Theory (IFSMT), this study tested the constructs of this complex model, identifying individual and family factors, physical and social environment, condition-specific factors, and the process of self-management as predictors of both self-management behavior and quality of life. This cross-sectional study collected data between July and September 2018 including 622 Thai adults with CKD stage 1 to 3 from four hospitals in the south of Thailand. Statistical analyses were performed using structural equation modeling.

Results from the structural equation models found that the constructs of self-management knowledge, self-efficacy, and self-management behavior accounted for significant variance in the prediction of quality of life in adults with early stages of CKD. These findings support the constructs of IFSMT as predictors of quality of life. Results of the multiple regression model found significant depression, diabetes, and family support

indicator variables predicting self-efficacy and self-management knowledge. Self-efficacy was a mediator between self-management knowledge and self-management behaviors.

This study addressed a health promotion topic of critical concern to nurses working with adults with mild and moderate CKD in a variety of healthcare management settings. It utilized a complex and holistic approach to persons with CKD focusing on the identification of specific knowledge, self-management behavior and self-efficacy factors related to quality of life. The findings of this study could lead to the development of more appropriate policies, preventive education programs, screening methods and interventions that focus specifically on these factors in Thailand. The results can also inspire future research in this arena by nurse researchers interested in adults with early-stage CKD.

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I. INTRODUCTION

Chronic kidney disease (CKD) is one of the leading causes of death throughout the world (Dobkowski, Zuber & Davis, 2013). It presents clinically as proteinuria, hematuria, or an estimated glomerular filtration rate (eGFR) of less than 60 mL/min/1.73m² measured on two occasions at least 90 days apart (Foundation, 2012; KDIGO CKD Working Group, 2013). Rates of decline greater than 4 mL/min/1.73m² per year are associated with greater progression risk (KDIGO, 2013). If untreated, CKD may progress to end-stage renal disease (ESRD), which requires costly treatments, such as peritoneal dialysis, hemodialysis or kidney transplants (Foundation, 2012). Adverse outcomes of chronic kidney disease can often be prevented or delayed through early detection and treatment (KDIGO, 2013).

Persons with CKD have significantly higher rates of morbidity, mortality, hospitalizations, and healthcare utilization (Inker et al., 2014; USRDS, 2016). By region, the estimated prevalence ranges from 7% in South Asia, 8% in Africa, 11% in North America to 12% in Europe, the Middle East, East Asia, and Latin America (Bello et al., 2017). In low-income and middle-income countries, most people with kidney failure have insufficient access to life-saving dialysis and kidney transplantation (Levin et al., 2017). In the United States, recent data show that there were 678,383 prevalent cases of ESRD in 2014, an increase of 3.5% over 2013 and an increase of 74% since 2000 (USRDS, 2016).

There were 120,688 newly reported cases of ESRD in 2014, and the crude (unadjusted) incidence rate of ESRD was 370 million/year (USRDS, 2016).

In Thailand, CKD was ranked as the 4th leading cause of illness, occurring in 806 per 100,000 persons in 2013 (Jiamjariyaporn et al., 2014). The Thai Screening and Early Evaluation of Kidney Disease (SEEK) program study, involving 3,495 Thai study participants, revealed that 17.5% of Thai adults have CKD based on this representative cross-sectional sample (Ingsathit et al., 2010). Management of CKD is costly, specifically the cost of renal replacement therapy in Thailand. It has increased gradually from 53 million U.S. dollars in 2008 to 1,300 million US dollars in 2012 (Vejakama et al., 2015). Moreover, in-hospital costs and length of hospitalization of patients with CKD represented a substantial economic burden, which is associated with comorbidity, including cardiovascular disease, diabetes, and infections (Anutrakulchai et al., 2016). Specifically, diabetes is an important comorbidity that can lead to the progression of CKD rapidly (Vejakama et al., 2014).

The number of new persons with ESRD is increasing in Thailand (Jiamjariyaporn et al., 2017). Thus the need to further reduce both the incidence and prevalence of this devastating complication of kidney disease is imperative. Although CKD reflects a serious complication which can result from different diseases (Levin et al., 2017), many Thai people with the key risk factors—diabetes and high blood pressure—do not know that they are at risk (Anutrakulchai et al., 2016). While the prevalence of CKD is remarkably high in Thailand, awareness of CKD in the Thai population is quite low. Ingsathit and associates (2010) reported that only 1.9% of Thai adults with CKD were aware that they had CKD. The lack of symptoms in the early stages leads to the lack of awareness of CKD.

Additionally, underdiagnosis might also be another reason for a lower awareness of CKD (Ingsathit et al., 2010).

The growing prevalence of CKD in Thailand and inequity in access to services for this disease disproportionally affect disadvantaged populations. The Ministry of Public Health established the first policy for CKD called PD (Peritoneal Dialysis) First in 2007 to address this problem. Strategies included the provision of peritoneal dialysis to Thai people with ESRD. Since early recognition may help in the prevention of CKD progression and improve survival, surveillance programs are being promoted in Thailand and worldwide (De Nicola & Zoccali, 2015). From this perspective, proper epidemiological information about CKD at the national and regional level in Thailand is fundamental to allow the stakeholders to design and implement appropriate prevention policies. In 2012, other strategies were established to slow the progression of CKD and improve quality of life among people diagnosed with early-stage CKD in Thailand. In addition, the Ministry of Public Health encouraged hospitals in Thailand to set up CKD clinics. Although better access to dialysis and transplantation in Thailand reflects progress on development goals in the past decade, the associated costs have profound consequences for families and health-care systems, and the provision of RRT depends on sustainable health-care infrastructure, personnel, and supplies (Ingsathit et al., 2010; Jiamjariyaporn et al., 2017).

The implementation of the integrated CKD care model in developing countries is feasible (Jiamjariyaporn et al., 2017). In Thailand, the universal health care access package has included renal replacement therapy (RRT) due to the rising number of ESRD cases. This healthcare package can decrease the burden of the significantly high costs of treatment for persons diagnosed with ESRD (Teerawattananon et al., 2016). Because of the

challenges of tackling the increased burden of CKD as part of the universal health care (UHC) policy, the Public Health Ministry has developed concrete efforts to decrease the incidence and clinical progression of CKD. Since the treatment of CKD can have catastrophically high costs for patients and their families, the Public Health Ministry of Thailand has prioritized programs that can subsidize the cost of patients with CKD to a certain extent, depending on available resources (Ingsathit et al., 2010; Unaphak & Rattanamanee, 2015). In addition, educational and psychosocial interventions including a holistic approach for patients with CKD have been provided to Thai people living with CKD in order to improve their quality of life (Teerawattananon et al., 2016; Vejakama et al., 2015).

More recently, as increasing rates of CKD incidence have become evident, nephrologists and nephrology nurses have assumed more responsibility for taking care of persons with CKD before progression to ESRD (Montoya, Sole & Norris, 2016; Vassalotti & Kaufman, 2013). The National Kidney Disease Education Program (NKDEP), based in the U.S. National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), suggested that health care providers raise awareness among people at risk for CKD about the need for testing, educate people with CKD about how to manage their disease, and promote the implementation of evidence-based interventions. The goal is to reduce the progression and improve self-care (NIDDK, 2009), specifically among persons with early-stage CKD. Therefore, aggressive risk factor reduction should be carried out in individuals at increased risk for CKD even when CKD is not clinically apparent (NIDDK, 2009). Comprehensive systems targeting early recognition, prevention and management, and

treatment by primary care physicians and physician extenders are required to slow the progression of CKD (Foundation, 2012; KDIGO, 2013).

Currently, the critical goal in caring for persons with CKD is to slow chronic kidney disease progression and maintain the kidney's function as long as possible from the early stages (Bello et al., 2017). Guidelines to delay the progression include modification of lifestyle, diet control, blood pressure monitoring and medication control (KDIGO, 2013). To manage their illness, persons with CKD must be capable of applying self-management and self-efficacy strategies that help to ensure appropriate health behaviors to prevent deterioration of the kidneys or progression of the disease to end-stage renal disease (Jha et al., 2013) as well as to improve quality of life (Aggarwal, Jain, Pawar & Yadav, 2016).

From the literature review, the factors of knowledge, comorbidity, self-efficacy, self-management behavior, and mental health have a significant association with the reduction of CKD progression. Characterizing the individual health status, depression, and impairments in QOL in persons not yet dependent on renal replacement therapy may improve the health of people with CKD and increase provider understanding of how such health-related domains relate to the CKD progression. However, upon reviewing the literature, it was discovered that most of studies conducted on the quality of life in older adults living with later stages of CKD (Lee et al., 2013; Rebollo Rubio et al., 2016) and/or with dialysis (Gemmell et al., 2016; Ikonomou et al., 2015). Similarly, in Thailand, a majority of research studies have focused on the relationships between what was historically called self-care behavior which is equivalent to SMB, and quality of life or clinical outcomes in older adults with end-stage renal disease (ESRD) who required dialysis (Jiamjariyaporn et al., 2017; Unaphak & Rattanamanee, 2015; Varitsakul et al.,

2013; Yodchai, Dunning, Savage, Hutchinson & Oumtanee, 2014). Few studies related to self-management behavior in Thai people diagnosed with early-stage CKD have been reported (Photharos, 2018).

The most notable risk factors of CKD are diabetes, age, hypertension, and South Asian, African or African Caribbean ethnicity (Coresh et al., 2014; KDIGO, 2013; Reston, dissertation, 2015). Male sex, being a smoker, and heavy alcohol use are also predictors of CKD (KDIGO, 2013). Aging as a risk factor for CKD has emerged as a significant theme in recent years (USRDS, 2016). An individual may be at increased risk for kidney disease if he/she has diabetes, high blood pressure, a family history of kidney disease, is over 60 years of age, is African American, Hispanic, Asian or American Indian (National Kidney Foundation, 2012). Likewise, Anutrakulchai and colleagues (2016) revealed that risk factors for high mortality were being male, persons aged greater than 65 years, having comorbidities, and CKD complications. Hypertension remains the second most common etiology of CKD, and CKD itself can lead to hypertension (KDIGO, 2013). In addition, hypertension is a cardiovascular risk factor and associated with an increased risk of ESRD (Knight, Wong & Perkovic, 2014).

Health-related quality of life is substantially lower for people with CKD than for the general population and falls as GFR declines (Webster et al., 2017). Therefore, effective quality of life improvement is a challenge for clinicians. It is likely due to the lack of understanding about the relationships between the antecedent individual and family characteristics, knowledge of kidney disease, depression, self-efficacy, and self-management behavior on outcomes related to early-stage CKD. A growing body of science has emerged to support the direct and indirect relationships between context, process, and

outcome variables specific to adults living with ESRD. Yet little is known about how SMBs impact distal outcomes. CKD presents particular challenges to patients and families because of the complexity of the treatment plan and the lifestyle changes that are required (Johnson et al., 2016). Knowledge of these relationships will increase the understanding of the quality of life in person with early-stage CKD. An understanding of the knowledge, self-management behavior, self-efficacy, and mental health associated with quality of life in persons living with CKD may aid in reducing the progression of CKD. Development of a model that explains these relationships is, therefore, a necessary step to improving the well-being of people with CKD in Thailand.

There is a gap in nursing knowledge about the relationship between self-management behaviors and quality of life of Thai adults living with early-stage CKD and what factors influence quality of life in this target population. Additionally, previous Thai studies predominantly focused on persons with later stages of CKD. To help bridge this gap, this study contributed to the knowledge related to predictors that impact quality of life in Thai adults with early stages of CKD and investigated the effect of those predictors on self-management behaviors and quality of life in Thai adults with early-stage CKD. The research question for this study was: to what extent do individual and family factors, physical and social environmental factors, condition-specific factors and process variables (e.g., KD knowledge and self-efficacy) predict self-management behavior and quality of life in Thai adults living with early-stage CKD? The purpose of this study was to identify factors that influence the kidney disease quality of life (KDQOL) score among Thai adults with early stages of CKD. This study also tested the constructs of the complex model

identifying individual and family factors, kidney disease knowledge, depression, self-management behavior (SMB) and self-efficacy as a mediator.

Theoretical Framework

The design of this study was guided by the Individual and Family Self-Management Theory (IFSMT) (Ryan & Sawin, 2009). This theory provides a framework that helps to explain the complexity of self-management behavior of chronic illnesses as well as the quality of life in persons living with CKD. Additionally, the conceptual model for this study was developed from a review of the literature concerning behavioral and psychosocial factors relating to CKD and built upon the concepts of self-efficacy, self-management, and quality of life. The need to manage chronic conditions and to actively engage in a lifestyle that fosters health is increasingly recognized as the responsibility of the individual and his/her family (Ryan & Sawin, 2009).

The Individual and Family Self-management Theory (IFSMT) is a mid-range theory developed by Ryan and Sawin (2009) that examined predictors of outcomes across multiple conditions and populations. It was recommended by the theory developers that this theory could serve as a guiding framework for nurses to use when caring for persons with CKD and their families and to further understand significant factors that impact health outcomes related to CKD in adults. The following section introduces IFSMT.

Ryan and Sawin (2009) emphasized that investigators have traditionally studied self-management focused on either the individual and the family but have not viewed this process including individuals and families collectively. They proposed that using both levels concurrently allows for a more comprehensive model and a capability to identify the

changing dynamics within an individual and family structure. Therefore, the family unit in this model is not limited to biological families alone (Ryan & Sawin, 2009).

The IFSMT includes the purposeful incorporation of health-related behaviors into an individual or family's daily functioning. The IFSMT encompasses three broad dimensions; context, process, and outcome (Ryan & Sawin, 2009). Factors in the contextual dimension influence both individual and family engagement in the process of self-management, and directly influence outcomes (Ryan & Sawin, 2009). The context dimension includes condition-specific risk and protective factors, the physical and social environment, and characteristics of individuals and family members (Ryan & Sawin, 2009). Condition-specific factors refer to physiological, structural, or functional aspects of the condition, its treatment, or prevention of the disease that impacts the amount, type, and nature of behaviors needed to self-management (e.g., condition-specific factors include the complexity of condition or treatment, trajectory, physiological stability, or physiological transitions) (Ryan & Sawin, 2009). Condition-specific factors in this study will include comorbidity, CKD stage, and duration of illness. The contextual risk and protective factors consist of health status, individual factors, family factors, and environmental factors. Each risk and protective factor has empirically based subcategories; such as the category of health status having subcategories of the severity of the condition, characteristics of the treatment regimen, disease trajectory, and genetics (Ryan & Sawin, 2009). The characteristics of individuals and family members focus on the needs of families to manage the care required for individuals with chronic conditions.

The second dimension is the process dimension, which includes knowledge and beliefs, self-regulation skills and abilities, and social facilitation (Ryan & Sawin, 2009).

Knowledge and beliefs affect behavior specific self-efficacy, outcome expectancy, and goal congruence. Self-regulation is a method used to change health behavior. This process includes activities such as goal setting, self-monitoring, and reflective thinking, decision making, planning for and engaging in specific behaviors, self-evaluation, and management of physical, emotional and cognitive responses associated with health behavior change (Ryan & Sawin, 2009). Social facilitation comprises the concepts of social influence, social support, and negotiated collaboration between individuals and families and healthcare professionals (Ryan & Sawin, 2009). In this study, the process variables include self-efficacy and self-management knowledge.

Finally, the third dimension of the theory relates specifically to outcomes. Outcomes in the IFSMT can either be proximal or distal. The proximal outcomes include specific behaviors to manage a condition, disease risk, symptoms, and/or drug therapies. Other distal outcomes include health-related quality of life, health status, and costs associated with health (Ryan & Sawin, 2009). While the outcomes of concern are those related to individuals and families, improvement of individual and family outcomes translates to improved outcomes for healthcare practitioners and systems (Ryan & Sawin, 2009). Although self-management has traditionally been applied primarily to chronic illness, this theory expands self-management into the realm of health promotion (Ryan & Sawin, 2009) (See Figure 1). The outcomes in this study include quality of life and self-management behavior.

Figure 1. A Model of The Individual and Family Self-Management Theory

Context	Condition Specific	Physical & Social	Individual & Family
Risk & Protective Factors	Complexity of condition Complexity of treat,emt Trajectory	Environment Access to care, Setting and provider transitions, Transportation Culture, Social Capital	Developmental stages Perspectives, Literacy, Information processing, Capabilities

Process	Knowledge & Beliefs	Self-Regulation Skills & Abilities	Social Facilitation:
of Self-management	Self-efficacy Outcome expectancy Goal congruence	Goal Setting, Self-monitoring and Reflective thinking, Decision making, Planning and Action, Self-evaluation, Emotional Control	Influence Support Collaboration

Outcomes	Self-management Behaviors:	Cost of Health
Proximal	Condition Specific	Care Services

Outcomes	Health Status	Quality of Life or Well Being	Cost of Health
Distal			

Ryan, P., & Sawin, K. J. (2009). The individual and family self-management theory: Background and perspectives on context, process, and outcomes. *Nursing Outlook*, *57*(4), 217-225. Permission to reprint granted by authors on February 28th, 2018.

CKD affects both the individual and family. Once a person has kidney disease it can be difficult for him/her to focus on what needs to be done to manage the disease. Living with kidney disease is not something a person should go through alone (National Kidney Foundation, 2012). Nevertheless, family dynamics often change when one member has a chronic illness. The people closest to an individual with CKD are often emotionally affected (Bautovich et al., 2014). Family members provide important support to persons with chronic conditions (Colorafi, 2016). In CKD, support from family and other social groups has been cited as a key factor in changing dietary patterns (e.g., sodium reduction)

and increasing physical activity, Therefore, including the family in CKD patient education may better equip them to support the family members whom they care for and ultimately lead to improving patient outcomes (Narva et al., 2015).

In Thailand, as in much of Asia, the family and particularly adult children have traditionally played the predominant role in providing old age care and support (Knodel, Kespichayawattana, Wivatvanit & Saengtienchai, 2013). Many Thai families consist of parents and children, as well as grandparents, aunts, and cousins living in the same house. It is common in Thailand to have both parents work and be responsible for the family. If their family member is showing low performance or unhealthy behaviors, Thai parents or other family members will directly address these issues to resolve the problem (Knodel et al., 2013). Therefore, the Thai family plays an important role to manage any problematic situation and helps each member to deal with any problem throughout life.

The IFSMT has been applied in more than 20 studies to date; several involved chronic diseases including hypertension, congestive heart failure, and diabetes (Ryan & Sawin, 2009). Since 2013, the IFSMT has been used in several studies which focused on type 2 diabetes mellitus (Verchota & Sawin, 2016), patient perceptions of patient-empowering nurse behaviors (Jerofke, 2013), the physical and social environment of sleep self-management in postpartum socioeconomically disadvantaged women (Doering et al., 2014), and discharge interventions for parents of hospitalized children (Sawin et al., 2017). The IFSMT was also used in several dissertations including an Internet-based self-management program among patients with persistent pain who were prescribed opioid medication (Wilson et al., 2014), the relationships of self-management behaviors, metabolic control and diabetes-specific health-related quality of life in adolescents with

type 1, diabetes mellitus (Verchota et al., 2014), and the factors related to medication adherence in frail urban older adults (O'Brien, 2014). In Thailand, this theory has been utilized in only one study that focused on self-management behavior in Thai people with early-stage CKD (Potharos et al., 2018).

People with CKD have diverse needs and associated complex comorbidities. It is important to consider individual and family circumstances, physical and social environment, condition-specific, knowledge, self-efficacy, as well as self-management behavior, when applying IFSMT to this population. The IFSMT, which promotes the idea of family self-management, aligned well with this study. The findings will be critical to the future formation of interventions designed to support families through persons diagnosed with early-stage CKD.

As persons progress with a chronic illness, they may face a stressful time because of feelings of powerlessness, loss of autonomy, and disruptions in daily life (Rebollo Rubio, Morales Asencio, & Pons Raventos, 2017). The chronic illness may also trigger a time to reevaluate their lives by taking control through the incorporation of self-management knowledge and skills (Johnson et al., 2016; Lorig & Holman, 2003). This conceptual model is relevant to this study as it appraises the relationship between knowledge, self-management behavior, self-efficacy, mental health, and quality of life in persons with early stages of CKD. It also serves well as a model to examine the predictors influencing the quality of life in those with early-stage CKD.

Conclusion

The critical goal in caring for persons with CKD is to slow chronic kidney disease progression and maintain the kidney's function as long as possible while in the early stages (Bello et al., 2017). The strategies to slow the progression of this disease include modification of lifestyle, diet control, blood pressure monitoring and medication control (KDIGO, 2013). To manage the illness, persons with CKD must be capable of applying self-management and self-efficacy strategies that help to ensure appropriate health behaviors to prevent deterioration of the kidneys or progression of the disease to end-stage renal disease (Jha et al., 2013) as well as to improve quality of life (Aggarwal, Jain, Pawar & Yadav, 2016).

The research study contributed to the literature from a unique perspective. The factors of knowledge, self-efficacy, self-management behavior and mental health have a significant association with the reduction of CKD progression. Characterizing the individual health status, depression, and impairments in QOL in persons not yet dependent on renal replacement therapy may improve the health of people with CKD and increase provider understanding of how such health-related domains relate to the CKD progression. This conceptual model is relevant to this study in appraising the relationship between knowledge, self-management behavior, self-efficacy, mental health, and quality of life in persons with early stages of CKD. It also serves as a model to examine the predictors influencing the quality of life in those with early-stage CKD.

This study was the first of its kind to examine the relationship between various latent variables, self-management and quality of life among Thai adults with early stages of CKD. The findings will help to better understand the quality of life among people with

mild and moderate CKD as well as lead to theory-based intervention studies that examine self-management behaviors to reduce the progression of CKD and increase quality of life in persons with early-stage CKD in Thailand. In addition, nurses and healthcare providers can utilize these findings to improve KDQOL by increasing knowledge and improving self-management behaviors in people with CKD and to develop lifestyle interventions to slow the progression and achieve the goal of preventing ESRD. Policymakers can also benefit as they determine services provided by governmental programs. The results can also inspire further research in this area by nurse researchers interested in adults with early-stage CKD. Assessment of critical components of QOL early in the disease course will help to identify high-risk persons in whom modifying these predictors may assist in providing an active and healthy life.

This dissertation consisted of a cross-sectional study among Thai adults with early stages of CKD. A psychometric evaluation of the translated instruments is reported in Chapter 2. Chapter 3 presents the results of the study, identifying predictors of quality of life in persons with early-stage CKD. Chapter 4 will summarize the conclusions based on the study findings and the psychometric evaluation. Chapter 4 will also identify the implications for nursing practice, nursing education and health policy. Recommendations for future research will be addressed.

II. PSYCHOMETRIC EVALUATION OF TRANSLATED

INSTRUMENTS FOR THAI ADULTS WITH

CHRONIC KIDNEY DISEASE

INTRODUCTION

Chronic kidney disease (CKD) is a significant health burden to both individuals, families and the health care system worldwide (Remuzzi et al., 2013; Webster, Nagler, Morton & Masson, 2017). It is also ranked as one of the top ten chronic diseases globally (Bello et al., 2017). Persons diagnosed with CKD have a high prevalence of cardiovascular morbidity and mortality (Stevens & Levin, 2013) and consume substantially more health care resources than those without this disease (Webster et al., 2017). Treatment of CKD generally involves a multidisciplinary team as well as a multi-dimensional approach depending on the stage of CKD and the present risk factors (Lin et al., 2013; USRDS, 2016). The physical and psychosocial health of people with CKD, as well as the support from their family, has been found to significantly impact their health condition (Flesher, 2011; Lin et al., 2013; Murphree & Thelen, 2010). Additionally, these issues require a comprehensive assessment and an aggressive treatment plan to improve the health status of persons with CKD and slow the disease progression (Levin et al., 2017).

With the increasing incidence of CKD, nephrologists and nephrology nurses have an increased opportunity to care for persons with CKD before end-stage renal disease (ESRD) develops (Montoya, Sole & Norris, 2016; Vassalotti & Kaufman, 2013). Additionally, persons who fall within the stages of 1 (GFR greater than 90 mL/min/1.73 m²) to 2 (eGFR 60-89 mL/min/1.73m²) should have a focused exam identifying factors impacting CKD (Dobkowski, Zuber & Davis, 2013). Living with kidney disease usually requires changes in a person's lifestyle, especially in the early stages of CKD (KDIGO CKD Working Group, 2013; Vassalotti & Kaufman, 2013). Understanding knowledge of self-management behaviors associated with CKD is vital to addressing the rising global health concern. Cross-cultural surveys that measure these attributes are valuable to develop behavioral interventions to reduce disease progression.

Individuals' capacity to slow the progression of CKD may be limited by their lack of knowledge about the disease, its comorbidities, psychosocial influences and their inability to interact and communicate effectively with their health-care provider (Gray, Kapojos, Burke, Sammartino & Clark, 2015; Lopez-Vargas, Tong, Phoon, Chadban, Shen & Craig, 2014; Narva, Norton & Boulware, 2015). Early and appropriate knowledge of preventing complications of CKD among outpatients might reduce the chance of hospitalization (Anutrakulchai et al., 2016).

Self-efficacy reflects one's confidence in performing a particular behavior and overcoming barriers to that behavior (Bandura, 1987). The self-efficacy theory has been widely applied in the field of health promotion. Self-efficacy has a positive effect on self-management behavior and the overall health condition for persons with chronic diseases (Joboshi & Oka, 2017; Kauric-Klein, Peters & Yarandi, 2017; Li, Jiang, & Lin, 2014; Lorig

& Holman, 2003). Chiou, Lu, and Hung (2016) suggested that improving awareness of self-efficacy for persons with CKD played an important part in self-managing their diseases.

To assist persons with CKD in managing their illness, a valid and reliable measurement of self-management behavior is needed. There have been no studies to date which used validated instruments related to self-management behaviors, knowledge about CKD and self-efficacy in Thai adults with early stages of CKD. Thus, validating an instrument which assesses knowledge, self-management behavior, self-management behavior, and self-efficacy among adults with CKD in Thailand is deemed important and a gap in the research literature. The purpose of this paper is to describe the psychometric properties of three prior validated instruments translated into Thai that measure knowledge, actual health behaviors and self-efficacy related to CKD self-management. These instruments were utilized in a study which focused on early stages of CKD management among Thai adults living in Thailand.

Background

CKD education may motivate people to change their behavior, reduce the fear of this disease, increase understanding of their susceptibility, and increase their belief in their self-efficacy to alter their habits (Joboshi & Oka, 2017; Wright et al., 2011). Support from a multidisciplinary care team, combined with the provision of comprehensive, accessible and practical educational resources may enhance patients' ability and motivation to access and adhere to therapeutic and lifestyle interventions to retard the progression of CKD (Enworom & Tabi, 2015; Welch et al., 2016). Knowledge and awareness of self-

management behaviors in individuals with CKD can be increased through targeted CKD education (Enworom & Tabi, 2015).

In order to effectively modify health behaviors, individuals need to have self-confidence in their capability to adopt a purposeful self-care routine related to CKD (Lin et al., 2013; Walker, Marshall, & Polaschek, 2013). Increasing self-efficacy can promote the success of effective approaches that deal with illness and associated conditions (Bonner et al., 2014; Curtin et al., 2008; Enworom & Tabi, 2015; Ferris et al., 2015; Flesher et al., 2011; Murphee & Thelen, 2010).

Previous studies done by Bonner et al. (2014), Curtin et al. (2008), Ferris et al. (2015), Lee et al., (2016), and Lin et al. (2013) strongly posit the beneficial outcomes of self-management interventions. They also suggest that a targeted self-management program is successful in improving patient self-management and patient-centered outcomes. The self-management approach has been widely accepted and adopted by health care providers, patients, and families who enter into partnerships to manage health care across all aspects of treatment in order to delay the progression of CKD and increase survival (Walker, Marshall & Polaschek, 2013; Wierdsma, van Zuilen & van der Bijl, 2011).

Self-efficacy is an essential component and also well-known as the descriptive and predictive powers of self-management in various parts of life to reduce the severity of disease burden for chronically ill patients (Bandura, 1993). The efficacy of individual beliefs can also help justify the maintenance of complex relationships that occur among self-management endeavors necessary for healthy lifestyle changes in patients with chronic diseases (Bandura, 1997; Walker, Marshall & Polaschek, 2013). Patients with greater self-

efficacy have been shown to practice more self-management behaviors, leading to better disease control, and better physical functioning (Bandura, 1997). Self-efficacy was also found as the moderator or mediator of the notion of self-management (Lee et al., 2016). Li et al. (2014) demonstrated that patients' knowledge, self-efficacy, the availability of social support, and depression were the main factors influencing self-management.

Many studies have focused on the search for factors that impact self-efficacy that consequently influence persons with CKD's behavior (Drenzyk, Gardner & Welch, 2014; Tangri et al., 2013). However, studies describing the relationship between self-efficacy and self-management behaviors which are specifically used for the early stages of CKD are lacking in Thailand. The essential elements of self-efficacy and self-management for CKD patients should be explicitly examined in the early stages of CKD.

METHODOLOGY

This section describes the research design and methods including a description of the pilot study for the three instruments. The translation and cultural adaptation procedures were conducted because these instruments are available in English but not Thai. A description of procedures for ensuring methodological rigor will be described including validity, reliability, scoring methods for all instruments used in the study, threats to internal and external validity, factor analysis, and efforts made to control for error or bias. Study limitations are also identified.

Samples and Settings

A convenience sample was obtained from four outpatient nephrology clinics in the south of Thailand. The rule of thumb indicated 10-20 subjects per estimated parameter

(Byrne, 2016; Kline, 2016). A statistical power analysis for sample size estimation with a power of 0.80, resulted in the need for a minimum sample of 600, with 49 parameters.

Sampling Methods

The convenience sample for this study included 622 Thai adults with CKD who were willing to participate in this study. All were diagnosed with CKD by a nephrologist or physician in four renal clinics in the south of Thailand. Data were collected from July to September 2018. The inclusion criteria included: the diagnosis of CKD stages 1 to 3 (eGFR > 30 mL/min/1.73m² and less than 120-130 mL/min/1.73m²) which was diagnosed at least one year ago, age greater than 18 years old, no visual impairment, and Thai nationality with the ability to understand and read Thai. The exclusion criteria included persons diagnosed with CKD stages 4-5 (eGFR < 30 mL/min/1.73m²), pregnancy, and cognitive impairments that could interfere with the ability to complete the survey.

Ethical principles were integrated into every phase of the research. First, permission from the instrument developers was obtained via email. The Institutional Review Board (IRB) at the University of Massachusetts Lowell, U.S.A. and the Public Health Office in Thailand approved this study. Signed, informed consent was obtained from all participants prior to the commencement of the study.

Measures

Questionnaires were provided to participants after they signed informed consent. The questionnaire consisted of demographic questions and three validated instruments including the Chronic Kidney Disease Self-Management (CKD-SM), Chronic Kidney

Disease Self-Efficacy (CKD-SE), and Chronic Kidney Disease Self-Management Knowledge Tool (CKD-SMKT).

The Chronic Kidney Disease Self-Management (CKD-SM) Questionnaire, a Taiwan-English instrument, has previously been used to measure self-management practices in persons with early stages of CKD. This tool was developed by Lin et al. (2013) to measure self-management behaviors in persons with CKD living in Taiwan. This tool contains 29 items, using response options from a four-point Likert scale ranging from 1 (never) to 4 (always). Construct validity was evaluated by exploratory factor analysis by the original authors. Four factors were extracted and labeled self-integration, problem-solving, seeking social support and adherence to the recommended regimen. The four factors accounted for 60.51% of the total variance (Lin et al., 2013). Internal consistency and test-retest reliability were estimated by Cronbach's alpha and Pearson correlation coefficients. The Cronbach's alpha coefficient for the CKD-SM was 0.95, and each of the four subscales ranged from 0.77–0.92 indicating good internal consistency for this constructed instrument (Lin et al., 2013). The test-retest correlation for the CKD-SM was 0.72, indicating that the CKD-SM was relatively stable over a 2-week period (Lin et al., 2013). The Lin et al. study provided good support for the content and construct validity as well as the internal consistency and retest reliability of the CKD-SM to investigate clinical questions about self-management. The student researcher contacted the original developers and received their permission to translate the instrument to the Thai language. This instrument was then pilot-tested in Thai (See results in Table 1).

The Chronic Kidney Disease Self-Efficacy (CKD-SE) Questionnaire is a 25-item instrument also developed by Lin and colleagues (2012). This tool was first applied to Taiwanese patients with early-stage CKD. This tool was evaluated using exploratory factor analyses (EFA) and measures of reliability. Exploratory factor analysis indicated four distinct factors with loadings ranging from 0.557 to 0.970: autonomy, self-integration, problem-solving and seeking social support, accounting for 64.348% of the total variance (Lin et al., 2012). Responses range from no confidence (1) to the highest degree of confidence (10). The higher the score is, the higher the level of self-efficacy.

The Cronbach's alpha coefficient for the CKD-SE was 0.94, and each of the four subscales ranged from 0.84 to 0.90 indicating very good internal consistency for this constructed instrument (Lin et al., 2012). In addition, the results of test-retest analyses using Pearson's correlation coefficient indicated the CKD-SE was 0.720, which is relatively stable over a 2-week period and the KMO value was 0.97 (Lin et al., 2012). This tool was also utilized in the study of Ma, Xu, Yang, and Zhang (2015) which determined that the Cronbach's alpha of the total scale was 0.97. Another study by Lin, Tsai, Lin, Hwang, and Chen (2013) also showed excellent reliability (Cronbach's alpha = 0.94). The CKD-SE is the first instrument designed to measure self-efficacy in persons with early-stage CKD. This research study was the first time that this tool was used in Thailand. A pilot test examined the reliability of the Thai translated tool (See Table 1).

The Chronic Kidney Disease Self-Management Knowledge Tool (CKD-SMKT), developed by Devraj and Wallace (2013), is used to assess knowledge of various key self-management behaviors in persons with kidney disease. The researchers initially generated a list of potential items to include in the CKD-SMKT. Sixteen content experts reviewed

two drafts of the CKD-SMKT and provided qualitative and quantitative assessments (Devraj & Wallace, 2013). A True/ False/Don't Know format was applied. The "Don't Know" response has been shown to reduce guessing (Devraj & Wallace, 2013). The tool has ten items rated as essential (content validity ratio > 0.49, P < .05). After estimating the overall reading demand of the CKD-SMKT using the Lexile Framework for Reading, the final version of the CKD-SMKT had an overall Lexile score of 470, equivalent to a 3rd-grade reading level (Devraj & Wallace, 2013). The CKD-SMKT is a validated instrument, which upon completion of the proposed pilot testing, was suitable to use in this study. It was translated into Thai and pilot-tested (See Table 1).

Translation and Cultural Adaptation

The original scales of CKD-SMKT are in English while the CKD-SM and CKD-SE were originally developed in Taiwanese language but available in an English translation. This study was conducted with Thai adults with early-stage CKD. Therefore, those instruments that needed to be translated into the Thai language followed the recommended guidelines. The process involved using a comprehensive multi-step process for translating, adapting and cross-validating the instruments. The methodological procedures for the translation and cultural adaptation of three instruments were developed according to the guidelines proposed by Beaton et al. (2007), which are international standards designed to maintain equivalence between the source and the target versions. A health status self-administered questionnaire for use in a new country, culture, and language requires a cross-cultural adaptation, to maintain the integrity of the original tool (Beaton, Bombardier, Guillemin & Ferraz, 2000). To use these instruments across cultures, the items must not only be translated well linguistically but also must be adapted culturally

to maintain the content validity of the instrument at a conceptual level across different cultures (Beaton, Bombardier, Guillemin & Ferraz, 2000). Additionally, as noted, the researcher contacted the original developers to get their permission to translate the instruments to use in Thailand. The process comprised five steps that are described in the subsequent sections.

Stages I: Initial translation into Thai. The first step was the translation of the instrument from English to Thai. Two bilingual translators, whose native language is Thai, independently translated the CKD-SE, CKD-SM, and CKD-SMT scales from English to Thai. The first translator, an associate professor in education at the Faculty of Education, Prince of Songkla University (PSU) in Thailand, has previous experience in translation from English to Thai. The translator's expertise is highly valued with regard to the accurate translation of specific concepts (Beaton et al., 2007). The other translator was a bilingual nephrology nurse who was informed about the concepts involved in the research. Additionally, both translators are fluent in the language of the target population with a good understanding of the English language. Then, after synthesis and consensus between two forward translators, the third translator did a backward translation.

Stage II: Back translation. Back translation is a procedure in which a translator or team of professional translators interpret a document previously translated into another language back to the original language. This process can identify inconsistencies or conceptual errors in translation (Beaton et al., 2007). After obtaining the translations and the summary version in Thai, the instruments were translated back into English by two other bilingual translators. The back-translators should be fluent in the original language with a good understanding of the language in the target population (Gjersing, Caplehorn &

Clausen, 2010). One person in this study who acted as a back-translator was a health professional, and one was not. One of the back-translators has English as a native language, whereas the other person has lived and studied abroad. The same person, who synthesized the translated versions, reviewed the two back-translations. The two back-translated versions were then synthesized into one. Words that were back-translated differently were highlighted and discussed. When an agreement was reached, the agreed upon words were added to the synthesized version.

These translators were aware of the concepts involved in the research and also previously produced a written report on the difficulties encountered and the justification of the choices made in the process of the reverse translation or back translation (BT) (Sousa & Rojjanasrirat, 2011).

Stage III: Review by an expert committee. To further determine the conceptual and content equivalence of the items of the pre-final translated instrument, the use of an expert panel, is highly recommended (Sousa & Rojjanasrirat, 2011). The researcher organized a committee of experts that included a hemodialysis nurse, a peritoneal dialysis nurse, and two associate professors in the medical department, Faculty of Nursing, Prince of Songkla University (PSU). Two of these professionals hold doctoral degrees, and two nurses have experiences in the nephrology field. All members of the committee were fluent in both English and Thai and had completed their degrees in English speaking countries. The role of the expert committee is to combine all the versions of the questionnaire and to develop the new version for the field tests during the pilot test (Beaton et al., 2007).

The four experts first reviewed the questionnaire for content validity. For each section, reviewers evaluated individual items and highlighted those that were deemed

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inappropriate in terms of phrasing and applicability. Consequently, the experts deleted some words that would require a clinical level of expertise, and some items rephased so that a layperson could better understand them.

On the day of the meeting, the expert committee assessed if a word or several words reflected the same ideas in both the original and adapted versions of the questionnaire (Gjersing, Caplehorn & Clausen, 2010). This assessment ensured that items were translated correctly and were relevant in the new setting (Gjersing, Caplehorn & Clausen, 2010). A final step of "smoothing out the language" was made with minor edits in the target language version of the instrument with the original version. The final pilot test version of the questionnaire was agreed upon by consensus of the expert committee.

Stage IV: Psychometric analysis of the instruments

In the psychometric testing phase, these translated instruments were tested to document their reliability and validity. The field testing of the instrument is not only an additional tool to investigate the instruments technical equivalence, but it is vital in providing evidence for achieving criterion and/or conceptual equivalence (McDowell, 2006). The psychometric analysis began in the pilot testing phase and was evaluated in the final study sample as well.

The researcher conducted a pilot study to ensure the feasibility and understandability of the CKD instruments and to ensure pretesting validity. Johanson and Brooks (2010) suggested that 30 representative participants from the population of interest are a reasonable minimum recommendation for a pilot study where the purpose is a preliminary survey or scale development. For this pilot study, a total of 40 participants was

randomly selected from the renal clinic in a community hospital located in the north-east of Thailand. These participants (Thai adult people with CKD stages 1 to 3, age > 18 years old) were excluded from the larger study sample.

On the basis of the results from the pilot test, the researcher evaluated the psychometric properties of the instrument using recognized statistical methods (Gjersing, Caplehorn & Clausen, 2010). After the translation and adaptation process and pilot testing, the next procedure was an evaluation using reliability and validity testing to examine the measurement properties of the various instruments (Beaton et al., 2007).

The pilot test evaluated the statistical reliability and validity of the adapted version. The internal consistency was estimated with Cronbach's alpha coefficient, and the following categories were utilized: $\alpha \geq 0.9$, excellent; $0.8 \leq \alpha < 0.9$, good; $0.7 \leq \alpha < 0.8$, acceptable; $0.6 \leq \alpha < 0.7$, questionable; $0.5 \leq \alpha < 0.6$, poor and $\alpha < 0.5$, unacceptable (Ayre & Scally, 2014; McDowell, 2006). If the Cronbach's alpha coefficient of an item is lower than 0.7, the power of the statistical test can be increased by increasing the sample size (DeVillis et al., 2012).

Validity ensures that each tool measures what it purports to measure. Content validity was initially established by validating the translation process and conducting pretesting (McDowell, 2006). The expert panel then evaluated each item of the instruments for content equivalence and offered suggestions for changing some Thai words to improve the content validity of the translation. They were asked to score each item using the following scale: 1 = not relevant; 2 = unable to assess relevance; 3 = relevant but needs minor alteration; 4 = very relevant and succinct (Sousa & Rojjanasrirat, 2011). These experts rated the relevance and wording of each item. Upon receipt of responses from all

experts, a content validity index (CVI) was calculated for each item as the number of experts giving a rating of 2 or 3, divided by the number of experts—that is, the proportion in agreement about relevance (Polit & Beck, 2012). The CVI of .08 is considered an acceptable value (Polit & Beck, 2012). Problematic items were revised or reworded based on the suggestions from the expert panel. All instruments were changed to words that are suitable for the Thai language. The final of the three tools was then used in the pilot test.

The next step employed the exploratory factor analysis (EFA) to confirm the factor structure previously reported in English speaking samples. The EFA was used for Self-Efficacy and Self-Management. Previous research has not evaluated Self-management knowledge, and the researcher did so in this study for the first time. English speaking construct reliability of the final questionnaire in the total sample was measured. The researcher also employed Confirmatory Factor Analysis (CFA) as a general modeling approach that is designed to test factor structure, when the factor number and interpretation regarding indicators are given in advance (Kline, 2016). To test all tools in this study, the researcher conducted a CFA to verify the factor structure of a set of observed variables as well as to see if indicator variables load as predicted on the expected number of factors.

Data Analysis

Statistical analyses were performed using IBM SPSS version 22 (IBM Corp.) and R Package version 3.5.3 with all tests for statistical significance set at an alpha level of .05. Internal consistency of instruments used in the study was assessed using Cronbach's alpha coefficients, with a minimum acceptable level of .70. A significance level of $p < .05$ was used in all analyses.

This study collected data on observed variables and used exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to examine and confirm a set of variables that define those factors of three tools with the total sample of 622. The study first performed a statistical procedure using EFA to probe the potential structure of the questionnaire. The KMO test was conducted with EFA to indicate adequate sample size. The KMO is close to 1.0 indicating the sample size is adequate for factor analysis (Schumacker, 2016). The Bartlett test indicates whether the correlation matrix is an identity matrix-- that is, whether all diagonal elements are 1.0 and all off-diagonal elements are 0.0, which implies that all the variable are uncorrelated (Schumacker, 2016). The number of factors to be retained was determined by having eigenvalues above 1, the scree plot, and interpreting the resulting factor structure. Items were selected when factor loadings greater than or equal to 0.30 were not cross-loaded and conceptually fit with the individual factor (Tabachnick & Fidell, 2008).

The final step, CFA was carried out to further test the relationship between the observed variables and their underlying latent constructs identified from the EFAs. CFA using the maximum likelihood estimation (MLE) is the common statistical method used to analyze normally distributed data, just as the robust analysis is used when data are not normally distributed (Byrne, 2016). To estimate the study data fit of the hypothetical (original) model, six indices were selected to estimate model fit, each index representing a good fit from a different perspective. These indices included: the chi-square ($\chi2$); degree freedom (*df*); comparative fit index (CFI); and the Tucker-Lewis index (TLI) test for absolute fit, which indicates whether the model structure has construct validity (Kline, 2016; Schreiber et al., 2006). The final fit index used in this analysis was the root mean

square error of approximation (RMSEA) and the root mean square residual (RMSR), these measures correct for the tendency of chi-square to reject any model if the sample is sufficiently large (Hooper et al., 2008; Schreiber et al., 2006). The χ2, *df*, RMSR, and RMSEA were used as cutoffs for model fit (Byrne, 2016). CFI or TLI scores need to be higher than .95 to mean a good fit model (Hooper et al., 2008; Schreiber et al., 2006). RMSEA and RMSR results smaller than .08 are acceptable (Hooper et al., 2008; Schreiber et al., 2006).

RESULTS

Pilot Test Results

Based on the pilot test, 40 Thai adults diagnosed with early-stage CKD were asked to respond to the initial draft of the translated CKD-SMKT, CKD-SE and CKD-SM instruments for calculating the reliability. The age of participants in the pilot study ranged from 45 to 85, with a mean age of 60.85 (SD = 8.83). Participants were sixty-three percent female (n = 25) and thirty-seven percent male (n = 15). Seventy-two percent of the sample reported elementary school as the highest level of education (n = 29). All participants were Buddhist. The majority of participants were married (n = 28, 70%). Twenty-three percent of participants had CKD stage 1 (n = 9); 27% had been diagnosed with CKD stage 2 (n = 11); 25% were CKD stage 3a (n = 10) and 25% had CKD stage 3b (n = 10). Most of them had one to two comorbidities (n = 30, 75%) and twenty-five percent had three to seven comorbidities (n = 10).

Validity. After translation and back-translation of those tools, content validity was evaluated by a panel of four experts. A content validity index (CVI) was calculated, and

any item scoring less than three was reconsidered by the experts, and suggestions were incorporated. These experts rated the relevance and wording of each item and modified any items that could possibly have ambiguous wording or cause misunderstanding. The Content Validity Index (CVI) which examined equivalence, clarity, and readability of the translated CKD-SMKT, CKD-SE, and CKD-SM instruments were 0.80, 0.91 and 0.93 respectively.

Coefficient Alpha. Cronbach's alpha coefficients of the pilot test (n = 40) were 0.87 for the total scores of the CKD-SM questionnaire, 0.89 for the CKD-SE questionnaire, and 0.52 for the total scores of the CKD-SMKT questionnaire. To improve the CKD-SMKT questionnaire, the researcher revised or reworded problematic items based on the suggestions from the expert panel. All the differences in word use, tense, and phrase were then adjusted to achieve meanings close to the original version. Therefore, the final versions of the three tools were then used in the final study.

Primary Study

Coefficient Alpha. Cronbach's alpha coefficients determined internal consistency for overall scales. Cronbach's alpha coefficients greater than 0.70 were considered satisfactory (Polit & Beck 2006). The results of reliability of three instruments in the actual study were examined with a sample of 622 adults. Cronbach's alpha coefficients were 0.90 for the total scores of the CKD-SM questionnaire and 0.89 for the CKD-SE questionnaire, indicating a high level of reliability while 0.60 for the total scores of the CKD-SMKT questionnaire, indicating a low level of reliability. The alphas for the four subscales of CKD-SE ranged from .76 to .91 ($p < .001$). Alpha coefficient values for four domains of

CKD-SM ranged from .55 to .89 ($p < .001$), indicating some item had a low level of reliability.

Exploratory Factor Analysis. To confirm the factor structure previously reported in the English version questionnaire, EFA was used for the CKD-SE and CKD-SM tools. Previous research has not evaluated self-management knowledge, but the researcher did so in this study for the first time.

Self-efficacy scale. An EFA was conducted on a 25-item instrument with 622 participants designed to measure self-efficacy of Thai adults with early-stage CKD. The results of the CKD-SE factor analysis are presented in Table 1. The Kaiser-Meyer-Olkin (KMO) test and Bartlett test of sphericity were used to assess the appropriateness of factor extraction performance. The results showed that the KMO test of CKD-SE was 0.906 and the Bartlett test of Sphericity indicated suitability for factor analysis ($\chi 2(300) = 9004.36$, $p<0.001$). Following the EFA test, the overall factor loadings ranged from 0.37-0.89, demonstrating an actual correlation between each item and factor scores. Factor loading of autonomy factor ranged from 0.45-.89. self-integration factor ranged from 0.70-0.89, problem-solving factor ranged from 0.37-0.82 and seeking social support factor ranged from 0.58-0.87.

Table 1. Factor Loading and Cronbach's Alpha for The Translated CKD-SE

Item	Factor loading				Cronbach's alpha
	Factor 1	Factor 2	Factor 3	Factor 4	
Factor 1: Autonomy					0.76
Item 1	0.47				
Item 2	0.79				
Item 3	0.62				
Item 4	0.64				
Item 5	0.73				
Item6	0.89				
Item 7	0.86				
Item 8	0.45				
Factor 2: Self-integration					0.91
Item 9		0.70			
Item 10		0.79			
Item 11		0.76			
Item 12		0.70			
Item 13		0.82			
Item 14		0.89			
Item 15		0.77			
Factor 3: Problem-solving					0.84
Item 16			0.82		
Item 17			0.72		
Item 18			0.62		
Item 19			0.37		
Item 20			0.81		
Item 21			0.70		
Factor 4: Social support					0.83
Item 22				0.87	
Item 23				0.85	
Item 24				0.58	
Item 25				0.70	
Total scale					0.89

Note: Loadings with absolute values less than 0.30 are not reported for ease of reading. Both English and Thai versions of the questionnaire are included in Appendix A.

Self-management behavior scale. The results of the EFA testing of the CKD-SM showed that the questionnaire was appropriate for factor analysis. Kaiser-Meyer-Olkin was

0.92, the chi-square value of Bartlett's test of Sphericity was the appropriateness of factor extraction performance ($\chi2(406) = 8178.12$, $p <0.00$). While KMO values' being below 0.50 meant samples were not enough for the factor analysis, the value of 0.92 showed that it was at a very good level. After using the common factor model for factor extraction, standardized factor loading revealed that the four-factor showed lower scores than the standard (0.30). The results showed two items of a problem-solving factor had a lower score of factor loading. For component fit, the factor rotation was performed. The final result indicated that the factor loading of the self-integration factor ranged from 0.34-0.74, problem-solving factor ranged from 0.52-0.81, the seeking social support factor ranged from 0.58-0.79, and adherence to recommended regimen ranged from 0.41-0.55. The overall factor loading ranged from 0.34-0.81 (Table 2).

Table 2. Factor Loading and Cronbach's Alpha for The Translated CKD-SM

Item	Factor loading				Cronbach's alpha
	Factor 1	Factor 2	Factor 3	Factor 4	
Factor 1: Self-integration					0.89
Item 1	0.67				
Item 2	0.72				
Item 3	0.73				
Item 4	0.74				
Item 5	0.69				
Item 6	0.69				
Item 7	0.60				
Item 8	0.74				
Item 9	0.68				
Item 10	0.71				
Item 11	0.34				
Factor 2: Problem-solving					0.80
Item 12		0.80			
Item 13		0.65			
Item 14		0.82			
Item 15		0.54			

Item	Factor loading				Cronbach's alpha
	Factor 1	Factor 2	Factor 3	Factor 4	
Item 16		0.81			
Item 17		0.64			
Item 18		0.52			
Item 19		0.65			
Item 20		0.75			
Factor 3: Seeking social support					0.77
Item 21			0.71		
Item 22			0.79		
Item 23			0.47		
Item 24			0.58		
Item 25			0.61		
Factor 4: Adherence to recommended regimen					0.55
Item 26				0.49	
Item 27				0.41	
Item 28				0.55	
Item 29				0.52	
Total scale					0.90

Note: Loadings with absolute values less than 0.30 are not reported for ease of reading. Both English and Thai versions of the questionnaire are included in Appendix A.

Self-management knowledge scale. The results of the EFA test on the CKD-SMKT showed that the KMO test of sampling adequacy was 0.693, indicating an adequate sample size for the analysis. The Bartlett test of Sphericity was statistically significant ($\chi 2(55) = 522.93$, p<.0001), indicating that sufficient correlations were presented in the matrix for analysis.

A total of 11 items loaded onto three factors. The first factor, knowledge of self-management behavior for CKD, included seven items. Using the sum of item 1-8 scores on the first factor for EFA, factor loading was 0.31. The second factor, named knowledge in diabetes, factor loading was 0.55 including items 8, 9 and 10. The third factor referred

to self-rating on the knowledge of kidney disease comprised of one item (item 11). The factor loading of factor 3 was 0.52. Factor loadings greater than 0.60 are defined as high and the load value between 0.30-0.59 is defined as medium (Kline, 2006). Therefore, the three factors in the CKD-SMKT tool represented the sub-dimensions they are in with a medium level. Low correlations of the items in the sub-dimensions may lead to lower factor loads.

Table 3. Factor Loading and Cronbach's Alpha of the Translated CKD-SMKT

Item	Factor loading			Cronbach's alpha
	Factor 1	Factor 2	Factor 3	
Factor 1: Knowledge of self-management behaviors (sum of item 1-7 scores)	0.31			
Factor 2: DM Knowledge (sum of item 8-10 scores)		0.55		
Factor 3: Self-rating about KD knowledge (sum of item 11 score)			0.52	
Total scale				0.60

Note: Loadings with absolute values less than 0.30 are not reported for ease of reading. Both English and Thai versions of the questionnaire are included in Appendix A.

Confirmatory Factor Analysis. Finally, the researcher used CFA to fit highly restricted measurement models described by previous research, as well as from the previous EFA results from this study. The EFA allows for all possible cross-loadings, while CFA is more restricted and can be used to identify independent sub-factor structures, as well as essentially cross-loadings.

Self-efficacy scale. The results of CFA showed χ2/*df* = 4.18 (criteria < 5) indicating that the model was sensitive to the number of samples. In the initial analysis using the CFA test, a model was modified by adding three items of the autonomy variable to a problem-solving variable and the other one item to a self-integration variable because of incorporation of covariances between some of the items according to modification indexes outcomes. After using CFA test, the overall model indicated an acceptable model fit: χ2 = 994.912, *df* = 232, *p* < 0.001, CFI = 0.908, TLI = 0.890, RMSEA = 0.073, and SRMR = 0.078. All goodness-of-fit indices showed that the Thai version of CKD-SE was a good model-data fit.

Self-management behavior scale. The results of the CKD-SM confirmatory factor analyses with various fit indices are reported in Table 5. Goodness-of-fit indicators were calculated. The results of CFA showed χ2/*df* = 2.99 (criteria < 5) indicating that the model was sensitive to the number of samples. The results of overall model fit indicated a model fit: χ2 = 1048.68, *df* = 350, *p* < 0.001, CFI = 0.912, TLI = 0.89, RMSEA = 0.057, and SRMR = 0.054. These outcomes represented a good structure fit with four domains, CFI and TLI values are closer to 0.9, RMSEA and SRMR values, as well as information criteria, are lower than 0.06.

Self-management knowledge scale. The result of CFA test of the CKD-SMKT showed the χ2 = 2.013, *df* = 1, *p* < 0.10. Other fit indexes indicated CFI = 0.908, TLI = 0.960, RMSEA = 0.040, and SRMR = 0.019. On the basis of the overall and component fit indices, the result of CFA showed a good fit between the data and the model.

DISCUSSION

There is a great interest in the scientific community in developing questionnaires that assess health status. Despite the growing number of developed and applied scales and instruments, not all of them are available in different countries and different languages. Generally, these instruments are found in English, which requires a process of translation and transcultural adaptation as well as the analysis of the measurement properties of the instruments. In addition, this study used the CFA to validate the factorial validity of the models derived from the results of the EFA.

This study tested the psychometric properties of three instruments. The CKD-SM and CKD-SE demonstrated excellent validity and reliability in a sample of Thai adults with early-stage CKD. These validated psychometric tools enabled the measurement of self-efficacy, and self-management behaviors of Thai people diagnosed with CKD stage 1 to 3. The results of the validity and reliability of both CKD-SM and CKD-SE in this study were similar to the original tool reported by Lin and colleagues in 2012 and 2013, which demonstrated strong validity and reliability of these instruments. In addition, the CKD-SM has been translated into the Vietnamese language with good validity and reliability in a Vietnamese-speaking population by adding one question of self-management (Nguyen, Douglas & Bonner, 2019).

While the CKD-SM and CKD-SE scale exhibited good reliability, the CKD-SMKT scale only exhibited acceptable reliability with a Cronbach of 0.60. Even though the CKD-SMKT did not have high reliability, the expert panel evaluated that the content validity was sound. The values of Cronbach's alpha coefficient are highly influenced by the number of items of the measurement instrument (Souza et al., 2017). The CKD-SMKT has a small

number of items per domain in an instrument which may reduce alpha's values, affecting the internal consistency. The test-retest analysis should be conducted for future research. The language of the translated CKD-SMKT was also suitable for participants with low reading ability. The result of CFA testing this tool also indicated a good fit between the data and the model. The total score of each factor was used to calculate in CFA test. This study did include the tool in the final sample to assess patients with kidney knowledge of various key self-management behaviors because of its conciseness and potential suitability for administration to patients with kidney disease in the clinical setting. Future studies are needed to examine the reliability of this tool in additional segments of the Thai population. Used together, the three tools may provide future researchers and possibly clinicians with a comprehensive understanding of self-management knowledge and relationship with self-management behavior among patients with kidney disease.

The CKD-SE and CKD-SM were tested with EFA and CFA to identify and confirm four factors with 25 items of CKD-SE and four factors with 29 items of CKD-SM. The translated version of the CKD-SE instrument demonstrated satisfactory psychometric properties to measure the self-efficacy of Thai adults with early-stage CKD. However, the autonomy factor denoted an unexpected variance. The results of the EFA of both CKD-SM and CKD-SE in this study were similar to the original tool reported by Lin and colleagues in 2012 and 2013. In addition, the result of CFA in this study demonstrated a good fit structure model of instruments. However, the additional studies could examine the unexplained factor variance by adding more questions, taking another sample of respondents, or further investigating any subject response error and any systematic responses (Schumacker, 2016). Internal consistency analysis indicated a satisfactory

degree of interrelatedness among the items of the instrument. The four conceptual dimensions of the CKD-SE tool (i.e., autonomy, self-integration, problem-solving and seeking social support) identified from the empirical data had robust psychometric characteristics. However, this study performed an EFA, and the fit indices of the CFA model were satisfactory after the cross-loading items in the autonomy factor with the self-integration and social support factor.

The translated version of the CKD-SM tool demonstrated a validated tool to use in future Thai research studies. It may also be a useful tool in the clinic setting, but this would require additional evaluation research studies. Cultural differences in scale adaptation studies are often an issue. For this reason, the previous study by Nguyen, Douglas, and Bonner (2019) reported that one item related to self-management was added in a final version of this tool. The Vietnamese CKD-SM version, comprised of 30 items, demonstrated good validity and reliability (Nguyen, Douglas & Bonner, 2019). An initial factor analysis results of the Thai version CKD-SM showed a non-fitting factor analysis solution. After employing an appropriate rotation method of a correct number of factors, the rotation improves interpretability (Belhekar, 2016). The Thai version of CKD-SM is a reflective scale, where items are viewed as influenced indicators of the underlying latent construct of kidney disease self-management that is being evaluated. Therefore, the four factors of CKD-SM were retained.

Limitation

One limitation of this study is that the sample lived in one section of Thailand. Because of the variations in culture and diet across regions of Thailand which may impact kidney disease progression, it may not represent the entire population. Although the final

study sample had adequate power, it may not be representative of the national CKD population. Second, a limitation in this self-administered survey is the potential for social desirability bias as participants may not have been comfortable with reporting some health behaviors. Third, the reliability of the Thai CKD-SMKT instrument was not as strong compared with the original version. Therefore, future research will need to examine face validity, construct validity and test-retest reliability in the Thai population. Fourth, none of the previous researchers used CFA to confirm the structure of these tools in the early stages of CKD, although some of them investigated CFA for other stages using the CKD-SE and CKD-SM. Finally, this study measured persons with CKDs' self-management behaviors, self-efficacy, and knowledge at only one-time point. Future studies may use these tools to examine whether their self-management behavior, self-efficacy, and knowledge improve longitudinally.

CONCLUSIONS

This study provides support for the content and construct validity as well as the good internal consistency reliability of the Thai version of the CKD-SE and CKD-SM. The reliability of the Thai CKD-SMKT was questionable although its construct validity was supported. The CKD-SMKT should be tested in other populations rather than generalizing from these results since linguistic, cultural and health system differences may exist, including patient and healthcare provider expectations and methods of self-management implementation. Self-management is a complex concept (Bandura, 1997). To investigate clinical questions about self-management, there is a need for valid and reliable measures that provide empirical data. The CKD-SMKT, CKD-SM, and CKD-SE instruments evaluated in this study assess how patients self-manage their chronic conditions and could

be used in future studies to develop more relevant, patient-centered teaching and implement interventions tailored to the needs of individual patients.

The translation of the CKD-SE, CKD-SM, and CKD-SMKT into the Thai language and the cultural adaptation of these instruments for Thai adults with early-stage CKD were successfully performed following internationally accepted methodological standards. This study used previously validated instruments to examine persons with CKD from Stages 1 to 3, and the modified model was found to be acceptable. Although one item was omitted, this did not impair the utility of the Thai version of CKD-SMKT, CKD-SE, and CKD-SM tools. The data support the fact that these tools, after some items are rotated, can be used to measure the SM knowledge, self-efficacy and self-management behavior of people with CKD in stages 1 to 3 in Thailand.

Due to the acceptable validity by CFA, the information gained from these multidimensional instruments can help to examine important patient outcomes such as kidney disease self-management knowledge, self-efficacy, self-management behaviors. These screening tools are simple to complete and easily understood. These findings have implications for health care providers seeking to offer interventions to improve the QOL of CKD patients. These instruments may useful for nurses or health care staff when educating or supporting patients in the earlier stage of CKD when adherence to lifestyle modifications and medications are important components of treatment to slow the progression of CKD.

One of the strengths of the main study was having a large sample size and recruiting persons with early-stage CKD from four different hospitals. However, further work is

needed to demonstrate the strong relationships between each subscale of three instruments across additional regions in Thailand.

RECOMMENDATIONS

Overall the results provide initial evidence of the validity and reliability of the CKD-SM and CKD-SE, which has potential clinical and research implications. This report provides new evidence about psychometric properties that may support its use in future research studies in Thailand. Nonetheless, additional validation analyses could yield more information about their measurement properties. Next steps for research with these three instruments should include additional tests of their construct validity and measurement invariance testing across key clinical subgroups of patients. In addition, the reliability of CKD-SMKT needs further evaluation and possible modification to enhance reliability. The present study also does not provide evidence on test-retest reliability. Therefore, further research could assess the stability or test-retest reliability of the instruments.

The CKD-SE and CKD-SM could also be used as an assessment tool to help recognize those early CKD patients who are unable to manage their disease well in the clinical setting. The CKD-SMKT contains sufficient details of SM knowledge that persons with CKD should be aware of. Additionally, these tools may be valuable to not only researchers but also clinicians who wish to assess self-efficacy and knowledge related to self-management of CKD. Nurses and physicians can recommend concrete treatments and interventions for persons with CKD after an assessment using these questionnaires. By better understanding patients' self-management behaviors, healthcare providers can further develop better interventions tailored to the needs of the CKD population. Use of these tools

for clinical use would require additional research studies to examine the practical use of

the implementation of these tools in practice settings.

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III. PREDICTORS OF QUALITY OF LIFE IN THAI ADULTS

WITH EARLY-STAGE CHRONIC KIDNEY DISEASE

INTRODUCTION

Chronic kidney disease (CKD) is an important health concern worldwide. A recent global analysis of trends in kidney disease reported a prevalence of 10% among adults across the world (Bello et al., 2017). Worldwide, only half of those people requiring renal replacement therapy (RRT) are treated; estimates of the number who are untreated range from 2.5 million to 5 million (Levin et al., 2017). In Thailand, CKD and end-stage renal disease (ESRD) impose a tremendous public health burden. Among the 70 million living in Thailand, the total number of persons reported to be living with stages 1-4 of CKD in Thailand is seven million (Varitsakul et al., 2013). The cost of renal replacement therapy in Thailand has risen steadily (Vejakama et al., 2015). CKD is a notoriously silent disease, and patient awareness remains very low, at less than 10% for those with stages 1-3 of CKD (USRDS, 2016).

People diagnosed with CKD require a unique clinical approach to prevent medication toxicities and ensure appropriate management of disease-progressing comorbidities (Garcin, 2015). Living with kidney disease usually requires changes in a person's lifestyle, especially in the early stage of CKD (KDIGO CKD Working Group, 2013; Vassalotti & Kaufman, 2013). They require attention to commonly occurring

complications that may affect disease control and impact quality of life. In Thailand, RRT has become part of the universal health care access package due to the rising number of CKD cases, the significantly high costs of treatment and because this is the only life-saving treatment available to patients (Teerawattananon et al., 2016).

Prior research suggests that self-management programs can slow the progression of CKD and a multifaceted intervention can be cost-effective (Jiamjariyaporn et al., 2017; Lin et al., 2013). People living with CKD experience a compromised quality of life (McKercher et al., 2013), specifically persons with ESRD. Consequently, it is critical to identify and understand factors influencing their quality of life (QOL). Observational studies have recommended that providers examine appropriate renal care interventions including knowledge of CKD (Enworom et al., 2015; Li et al., 2014; Wright et al., 2011), mental health support (McKercher et al., 2013; Rebollo Rubio et al., 2017), self-management behaviors (SMB) (Lin et al, 2013; Lee et al., 2016), self-efficacy (Joboshi & Oka, 2017; Kauric-Klein, Peters & Yarandi, 2017), and kidney disease quality of life (KDQOL) (Lee et al., 2016; Zimbudzi et al., 2016), to delay CKD progression.

Many studies have enrolled persons living with CKD in Thailand who are receiving RRT (Sritarapipat et al., 2012; Unaphak et al., 2014; Varisakul et al., 2013), but no study has focused on KDQOL among Thai adults with early-stage CKD. Additionally, little is known about the factors influencing KDQOL in persons diagnosed with early-stage CKD (Kim & Choi-Kwon, 2012). There have been no studies to date which explored self-management behaviors and quality of life in Thai adults with early stages of CKD in Thailand. There is a gap in nursing knowledge about the relationship between self-management behaviors and quality of life of Thai adults living with early-stage CKD and

what factors influence quality of life in this target population. The purpose of this study was to identify factors that influence quality of life among Thai adults with early stages of CKD and test the constructs of a complex model identifying individual and family factors, knowledge, depression, SMB and self-efficacy as a mediator.

Background

CKD is the progressive and irreversible loss of the kidneys' ability to filter toxins and wastes from the blood (KDIGO CKD Working Group, 2013). Renal function is measured by the glomerular filtration rate (GFR), which is the amount of blood filtered by the nephron's glomeruli in a minute (KDIGO, 2013). The most notable risk factors of CKD are diabetes, age, hypertension, and South Asian, African or African Caribbean ethnicity (Coresh et al., 2014; KDIGO, 2013; Reston, dissertation, 2015). Male sex, being a smoker, and heavy alcohol use are also predictors of CKD (KDIGO, 2013). Aging as a risk factor for CKD has emerged as a significant theme in recent years (USRDS, 2016).

Self-management is defined as a person's ongoing attempts to regulate and contribute to health care maintenance for good health in his/her life (Bandura, 1997; Lorig & Holman, 2003). Self-management behaviors in persons with CKD are related to their confidence in their capability to monitor their self-care routines (Lin et al., 2013; Walker, Marshall, & Polaschek, 2013). It appears that self-management behaviors can decelerate the progression of CKD. The approaches of self-management have been widely accepted and adopted by health care providers, patients, and families who enter into partnerships to manage health care across all aspects of treatment in order to delay the progression of CKD and increase survival (Walker, Marshall & Polaschek, 2013; Wierdsma, van Zuilen & van der Bijl, 2011).

Self-efficacy, which plays an important role in the reduction of CKD progression, has been included in various approaches for persons diagnosed with CKD in all stages. Patients with greater self-efficacy practice more self-management behaviors, leading to better disease control, and better physical functioning (Bandura, 1997).

Depression is the most common psychological disorder among persons with CKD (Pereira et al., 2017). Depression is known to have a substantial impact on quality of life in persons with CKD who are pre-dialysis as well as in patients with ESRD receiving dialysis (Kittiskulnam, Sheshadri & Johansen, 2016). Patients with CKD and depression have a worse overall quality of life and significantly faster decreases in eGFR with rapid progression to ESRD (Palmer et al., 2013). There is substantial evidence to suggest that mental health issues such as depressive symptoms or anxiety related to CKD can impact quality of life in persons with CKD.

Quality of life is defined as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns (WHO, 1996). Factors associated with quality of life included age, gender, income, education level, mental health, self-management behaviors, and comorbidity (Hill et al., 2017; Ikonomou et al., 2015; Lemos, Rodrigues & Veiga, 2015). The authors also suggested that early assessment of the health-related quality of life in persons with early-stage CKD will help to establish the interventions providing an active and healthy life for persons with CKD to improve their quality of life (Aggarwal et al., 2016).

Based on a literature review, the factors of knowledge (Joboshi & Oka, 2017; Wright-Nunes et al., 2012), self-efficacy, self-management behavior, and mental health

have a significant association with the reduction of CKD progression (Bonner et al., 2014; Ferris et al., 2015; Lee et al., 2016; Lin et al.,2013). Characterizing the individual health status, depression, and impairments in quality of life in persons not yet dependent on renal replacement therapy may improve the health of people with CKD and increase provider understanding of how such health-related domains relate to the CKD progression (Baek et al., 2017; Hill et al., 2017; Ikonomou et al., 2015; Lemos, Rodrigues & Veiga, 2015).

The Individual and Family Self-management Theory (IFSMT) is a mid-range theory developed by Ryan and Sawin (2009) that examined predictors of health outcomes across multiple conditions and populations. It was recommended by the theory developers that this theory could serve as a guiding framework for nurses to use when caring for persons with CKD and their families and to further understand significant factors that impact health outcomes related to CKD in adults.

The IFSMT includes the purposeful incorporation of health-related behaviors into an individual or family's daily functioning. The IFSMT encompasses three broad dimensions; context, process, and outcome (Ryan & Sawin, 2009). The context dimension includes condition-specific risk and protective factors, the physical and social environment, and characteristics of individuals and family members (Ryan & Sawin, 2009). The second dimension is the process dimension, which includes knowledge and beliefs including self-efficacy, self-regulation skills and abilities, and social facilitation (Ryan & Sawin, 2009). The third dimension of the theory relates specifically to either proximal or distal outcomes (Ryan & Sawin, 2009). This conceptual model served as a guide to examine the predictors influencing the quality of life in those with early-stage CKD. The primary conceptual framework for this study is depicted in Figure 2.

Figure 2. Conceptual Framework for the Study

Independent Variables   **Dependent Variable**
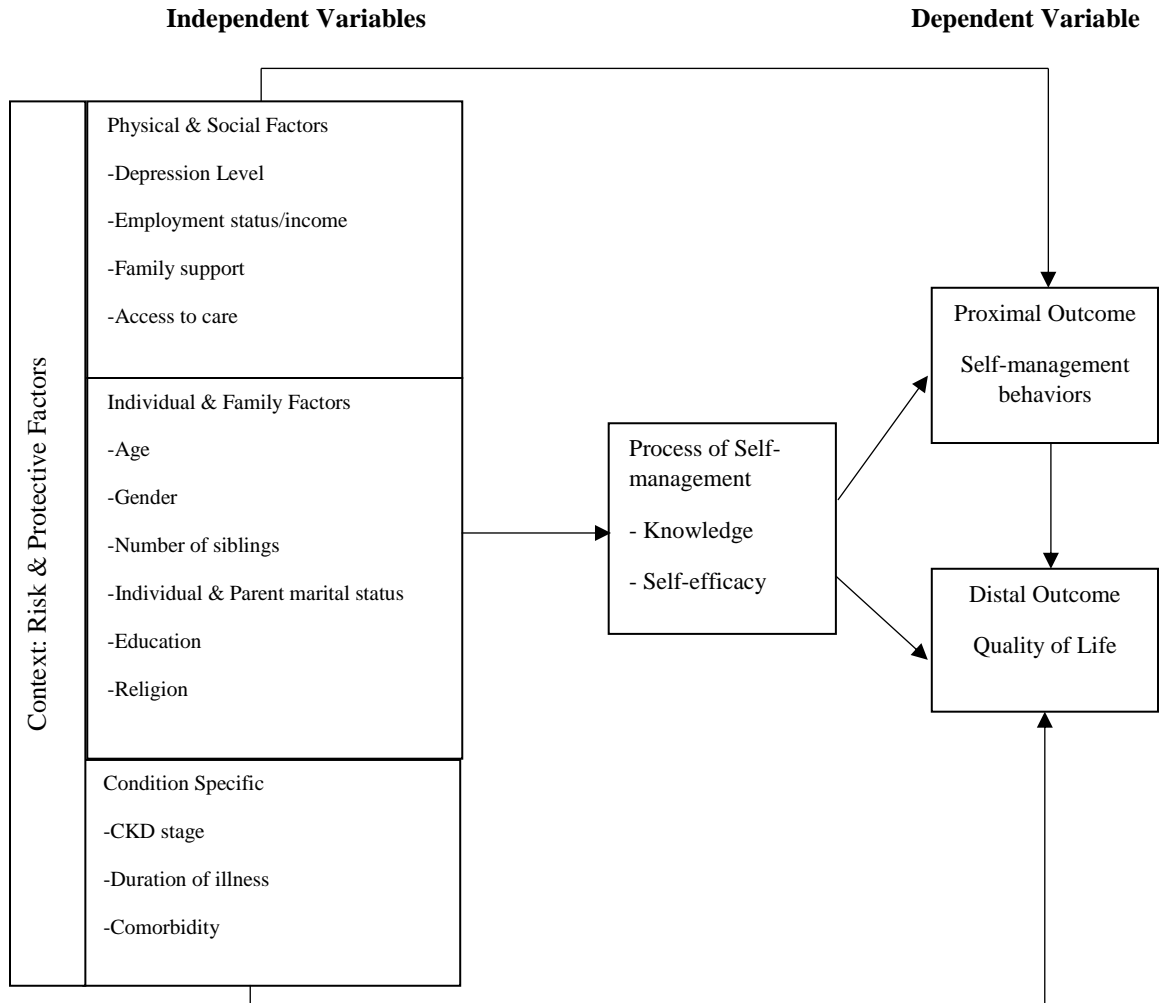
Note: Permission to use the Individual and Family Self-Management Theory was granted by authors (Rayan & Sawin, 2009) on February 28th, 2018.

METHODOLOGY

Study Design

A cross-sectional, predictive, correlational study design was developed to test the proposed hypotheses and used to examine the relationship between kidney disease knowledge, self-efficacy, self-management behavior, mental health, and quality of life of people living with early stages of CKD in Thailand.

Study Questions and Hypotheses

This study was designed to answer the following research question: What are the factors that impact self-management and quality of life (QOL) in Thai adults with early stages of CKD?

Research Question 1: What is the relationship of context variables (e.g., individual and family characteristics) and process variables (e.g., SM knowledge and self-efficacy) on self-management behaviors?

Hypothesis 1a: The individual and family characteristics, family support, reside at home, access to care, depression, eGFR level, and comorbidity are related to self-management behavior.

Hypothesis 1b: Higher kidney disease knowledge and self-efficacy scores are related to improved self-management behaviors.

Research Question 2: What is the relationship of context variables and process variables and the proximal outcome, SMB, on KDQOL?

Hypothesis 2a: The individual and family characteristics, family support, reside at home, access to care, depression, eGFR level, and comorbidity are related to kidney disease quality of life.

Hypothesis 2b: Higher kidney disease knowledge and self-efficacy scores are related to improved kidney disease quality of life.

Hypothesis 2c: Higher self-management behavior scores will be positively associated with improved kidney disease quality of life.

Research Question 3: Does self-efficacy mediate the relationship of self-management knowledge on self-management behavior in Thai adults living with early-stage CKD?

Hypothesis 3: Self-efficacy will mediate the relationship between self-management knowledge and self-management behavior.

Research Question 4: To what extent do context and process factors predict self-management behavior and kidney disease quality of life in Thai adults living with early-stage CKD?

Hypothesis 4a: Individual and family factors, physical and social environmental factors, and condition-specific factors will account for significant variance in predicting KD knowledge and self-efficacy among Thai adults living with early-stage CKD.

Hypothesis 4b: Individual and family factors, physical and social environmental factors, condition-specific factors and process variables will account for significant variance in predicting SMB and QOL among Thai adults living with early-stage CKD.

Participants and Settings

A convenience sample was obtained from four outpatient nephrology clinics in the south of Thailand. The sample size required for structural equation modeling (SEM) applied the rule of thumb which indicated 10-20 subjects per estimated parameter were required (Byrne, 2016; Kline, 2016). In this study with 49 parameters, the researcher recruited 600 participants.

Inclusion criteria included Thai adults diagnosed with early-stage CKD with stages 1 to 3 (eGFR > 30 mL/min/1.73m² and less than 120-130 mL/min/1.73m²) by the nephrologist or physician in the kidney clinic, age greater than 18 years old, no visual impairment, and Thai nationality with the ability to understand and read Thai. The exclusion criteria included persons diagnosed with CKD stages 4-5 (eGFR < 30 mL/min/1.73m²), pregnancy, and cognitive impairments that could interfere with the ability to complete the survey.

Study approval was obtained from the Institutional Review Board (IRB) at the University of Massachusetts Lowell, U.S.A. and the Public Health Office in Thailand. Signed, informed consent was obtained from all participants prior to the commencement of the study.

Measures

This study estimated a structural equation model using the constructs of the IFSMT represented by latent variables. The independent predictors were physical and social factors, individual and family factors, condition-specific factors, self-efficacy, and kidney

disease knowledge. The dependent outcomes included self-management behavior and quality of life.

Five validated instruments included The Chronic Kidney Disease Self-Management (CKD-SM) Questionnaire, which is a Taiwan-English instrument developed by Lin et al. (2013) to measure self-management behaviors in persons with CKD. This validated tool contains 29 items, using response options from a four-point Likert scale ranging from 1 (never) to 4 (always). Four factors were extracted and labeled self-integration, problem-solving, seeking social support and adherence to the recommended regimen (Lin et al., 2013).

The Chronic Kidney Disease Self-Efficacy (CKD-SE) Questionnaire is a 25-item tool that was also developed by Lin and colleagues (2012). Prior exploratory factor analysis has indicated four distinct factors: autonomy, self-integration, problem-solving and seeking social support (Lin et al., 2012). Responses range from no confidence (1) to the highest degree of confidence (10). The higher the score is, the higher the level of self-efficacy (Lin et al., 2012).

The Chronic Kidney Disease Self-Management Knowledge Tool (CKD-SMKT) was developed and validated by Devraj and Wallace (2013) to assess patients with kidney disease knowledge of various key self-management behaviors. A True/False/Don't Know format was applied. The "Don't Know" response has been shown to reduce guessing (Devraj & Wallace, 2013).

The 9-item Patient Health Questionnaire (PHQ-9) is a nine-item questionnaire used to determine the occurrence and severity of depression (McKercher et al., 2013). The scale

has total scores ranging from 0 to 27. The interpretation of the PHQ-9 score is as follows; 0-4: minimal depression, 5-9: mild depression, 10-14: moderate depression, 15-19: moderately severe depression, 20-27: severe depression. It has been commonly used in Thailand (Artiwitchayanon et al., 2015; Jiamjariyaporn et al., 2014).

The Kidney Disease Quality of Life – Version 1.3 (KDQOL) is a 36-item validated tool developed by Hays et al. (1995). This instrument was developed for use in many populations; eight dimensions of HRQOL that can be summarized into the Physical Component Summary (PCS) and the Mental Health Component Summary (MCS) scores (Hays et al., 1995). The KDQOL-36 version 1.3 was translated into Thai by Thaweethamcharoen and colleagues (2013) for the kidney disease targeted domain. Cronbach's alpha of patients with hemodialysis (HD) ranged from 0.799 to 0.827 and patients with peritoneal dialysis (PD) ranged from 0.706 to 0.781 (Thaweethamcharoen et al., 2013). In relation to the SF12, both SF-12PCS, and SF-12MCS had intraclass correlation coefficients (ICCs) of more than 0.90 (Thaweethamcharoen et al., 2013). Construct validity of this tool was satisfactory, with a statistically significant difference between low- and high-score groups. Spearman correlation of patients with HD between kidney disease–targeted scores, PCS, MCS, and utility scores had a positive correlation, and all these correlations were statistically significant ($P < 0.05$) (Thaweethamcharoen et al., 2013).

Translation and Cultural Adaptation

The original CKD-SM, CKD-SE, and CKD-SMKT instruments were developed in English. To survey Thai adults with early-stage CKD, these instruments needed to be translated into the Thai language. The researcher followed recommended guidelines that

included a comprehensive multi-step process for translating, adapting and cross-validating instruments. The process included four steps: 1) Initial translation into Thai, 2) Back translation, 3) Review by an expert committee, and 4) Psychometric analysis of the instruments (Beaton et al., 2007).

A pilot study was conducted among 40 participants who met study criteria to test the translated tools. Statistical reliability and validity were documented in the pilot testing process as well as the final study (see Chapter II).

Measures

Variables. The latent variables were physical and social factors, individual and family factors, condition-specific factors, self-management kidney disease knowledge, self-efficacy, self-management behavior, and quality of life.

Dependent variables (DV). In addition to the SEM, multiple regression was estimated to predict factors of quality of life and SMB from the constructs of the IFSMT.

Independent variables (IV). Independent variables included in the SEM were self-management kidney disease knowledge, self-efficacy, and SMB.

Demographic measures. Demographics of the sample included age, gender (male, female), religion, number of siblings, education, marital status, employment, income, depression, access to care, family support, CKD stage, and comorbidity.

Data Analysis Plan

Statistical analyses were performed using IBM SPSS version 22 (IBM Corp.) and the *lavaan* package for R ver. 3.5.3 (CRAN) with all tests for statistical significance set at

an alpha level of .05. Descriptive statistics (means and standard deviations) were calculated for demographic variables. Pearson's correlation coefficients were used to examine the relationship between the key continuous variables in this study with the range of the statistical correlation is -1.0 to 1.0, suggesting for the absolute value of $r < .39$; weak, $.40 < r < .59$; moderate, and $r > .60$; strong (Evans, 1996). If one or both of the variables were nominal or ordinal in measurement, then a Spearman correlation was conducted instead. Multiple regression was used to test hypotheses related to research questions 3 and 4.

Structural Equation Modeling Analysis

Structural equation modeling (SEM), with maximum likelihood estimation, was used to test the substantive theory related to hypothesis 4: Individual and family factors, physical and social environmental factors, condition-specific factors and process variables will account for significant variance in predicting SMB and QOL among Thai adults living with early-stage CKD. The model was used to study both the direct and indirect effects of variables involved in this conceptual model.

Global model fit was evaluated using the chi-square test of model fit (Hooper et al. 2008), the comparative fit index (CFI), Tucker-Lewis index (TLI), standardized root mean square residual (SRMR), and root mean squared error of approximation (RMSEA) (Kline, 2016; McDonald & Ho, 2002). Chi-square and SRMR represent absolute fit indices, CFI and TLI are incremental indices, and RMSEA presented a parsimony-adjusted measure (Byrne, 2016).

Modification indices were used to evaluate misfit due to correlated residuals. Indices indicating large sources of misfit were expressed in a subsequent model and tested

for improvement in model fit using the chi-square difference test and both Akaike's information criterion (AIC) and Bayes information criterion (BIC). AIC and BIC do not have cut-offs, rather than are used to compare models where lower AIC and BIC scores indicate a better fitting model. For BIC, a 10-point difference represents a 150:1 likelihood ($p < .05$) that the model with the lower BIC value fits best (very strong support for the model with the lower BIC value), and differences in the 6–10-point range indicates strong support (Raftery, 1995).

To test hypothesis 3, a mediation model was estimated to test the hypothesized indirect relation between SM knowledge and SMB through Self-Efficacy. In *lavaan*, mediation models are computed using the Delta method with bootstrapped standard error estimation (*lavaan*, 2019).

Figure 3. Hypothesized Latent Variable Model
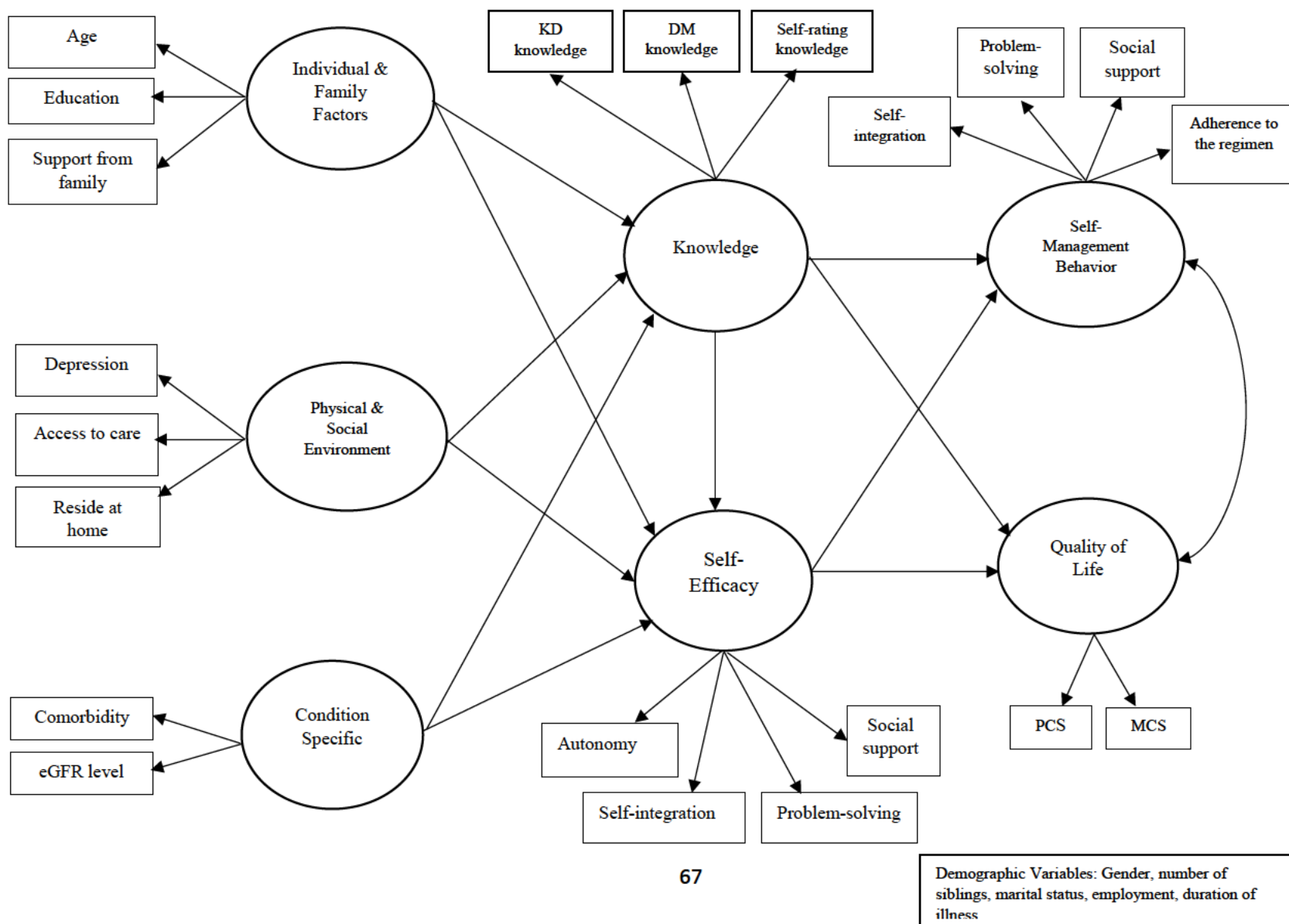
RESULTS

This section will first describe sample characteristics followed by hypotheses testing. In total, 622 surveys from Thai adults with early-stage chronic kidney disease were collected and directly entered into SPSS version 22 and R Package version 3.5.1 for statistical analysis.

Descriptive Statistic

The age of participants in this study ranged from 30 to 96, with a mean age of 64.86 (SD = 11.86). The majority were 61 to 70 years old (n = 215, 34.5%). Participants were sixty-two percent female (n = 387) and thirty-eight percent male (n = 235). More than half of the participants were Buddhist (n = 343, 55.1%), and 44.5 percent were Muslim (n = 277). The majority of participants were married (n = 445, 71.5%), while twenty-one percent were widowed (n = 133). Over half of Thai adults with early-stage CKD had less than a high school degree (n = 418, 67.2%) and fourteen percent of them had no formal school education (n = 90). The average education level in Thailand is the completion of high school (55.5%) (Thailand Educational Statistic, 2016). Sixty-six percent of the sample had a number of siblings less than 5 (n = 411). Approximately forty-six percent had between 3 to 5 children (n = 283), and eighty-three percent had between 3 to 5 family members who lived in the same house (n = 517). Most of their own parents were not living (n = 444, 71.3%). Nearly half of the participants did not work (n = 291, 46.8%) because they were either retired or unable to work. Forty-five percent of the sample had a full-time working job (n = 283). There was a difference between male and female in terms of employment. The majority of workers in the sample were women (55.5%). Most were employed as rubber farmers, which is consistent with the Thailand census annual report

(2017) that describes the major occupation to be rubber farmers. The majority had a family

income less than 100,000 Bahts (less than 2,900 U.S. dollars) per year (n = 281, 45.2%),

while forty-two percent had an income ranging from 100,001 to 350,000 Bahts (2,900-

10,000 U.S. dollars) per year (n = 265). The average family income in Thailand report is

322,980 Bahts per year (9,000 U.S. dollars per year).

Twenty-nine percent of participants had CKD stage 1 (n = 182), thirty-five percent

had been diagnosed with CKD stage 2 (n = 219), twenty-one percent were CKD stage 3a

(n = 131), and fourteen percent had CKD stage 3b (n = 90). An average eGFR level was

72.53 mL/min/1.73m² (SD = 24.10, Min = 30, Max = 128). Twenty-three percent reported

a one to two years duration of illness (n = 458). Most of them had one to two comorbidities

(n = 543, 87.3%) and thirteen percent had three to seven comorbidities (n = 79) (See Table

4).

Table 4. Sample Characteristics

Characteristics (n=622)	Number n (%)
Age (years)	
18-30	1 (0.2)
31-40	13 (2.1)
41-50	53 (8.5)
51-60	151 (24.3)
61-70	215 (34.5)
71-80	121 (19.5)

Characteristics (n=622)	Number n (%)
More than 80	68 (10.9)

Range 30-96 years $\bar{x}$=64.86 SD=11.86

Sex

Male	235 (37.8)
Female	387 (62.2)

Religion

Buddhist	343 (55.1)
Muslim	277 (44.5)
Christian	2 (0.3)

Education

No formal school education	90 (14.5)
Less than high school degree	418 (67.2)
High school degree or equivalent	68 (10.9)
Associate degree	18 (2.9)
Bachelor's degree	25 (4.0)
Graduate degree	3 (0.5)

Number of siblings

Less than 5	411 (66.1)
6-10	205 (32.9)
More than 10	6 (1.0)

Number with children

Characteristics (n=622)	Number n (%)
Less than 3	232 (37.3)
3-5	283 (45.5)
6-8	99 (16)
9-10	8 (1.2)
Number of family members who live in the same house	
1-5	517 (83.1)
6-10	101 (16.2)
More than 10	4 (0.7)
Marital status	
Single	25 (4.0)
Married	445 (71.5)
Widowed	133 (21.4)
Separated	11 (1.8)
Divorced	8 (1.3)
Job status	
Part-time work	48 (7.7)
Full-time work	283 (45.5)
Do not work	291 (46.8)
Family income (average Bahts per year)	
Less than 100,000	281 (45.2)
100,001-350,000	265 (42.6)

Characteristics (n=622)	Number n (%)
350,001-600,000	61 (9.8)
600,001-850,000	5 (0.8)
More than 850,000	10 (1.6)
Range 10,000-3,600,000 $\bar{x}$=173,675.76 SD=249609.68	
CKD stage	
Stage 1 (eGFR >90 ml/min/1.73m²)	182 (29.3)
Stage 2 (eGFR 60–89 ml/min/1.73m²)	219 (35.2)
Stage 3a (eGFR 45–59 ml/min/1.73m²)	131 (21.1)
Stage 3b (eGFR 30–44 ml/min/1.73m²)	90 (14.4)
Duration of illness (years)	
1-2	458 (73.7)
3-4	114 (18.3)
More than 5	50 (8.0)
Range 1-8 year $\bar{x}$=2.03 SD=1.323	
Comorbidities	
Grade 0 (no comorbidity)	0
Grade 1 (1-2 comorbidities)	543 (87.3)
Grade 2 (3-7 comorbidities)	79 (12.7)

Chronic Kidney Disease Self-Management Knowledge (CKD-SMKT) and PHQ-9 Descriptive Analysis

The CKD self-management behavior knowledge of the sample was measured with a translated version of CKD-SMKT questionnaire. The result found that most of the sample had a high score of SM knowledge (91%). Among those who were specifically diagnosed with DM (n=348), the finding showed that most of them had the highest score (88%). The report from PHQ-9 found that most of the participants had minimal depression (n=549, 88%).

Table 5. Descriptive Analysis of Chronic Kidney Disease Self-management Knowledge (CKD-SMKT), PHQ-9, and KDQOL

Characteristics (n=622)	Number n (%)
Chronic kidney disease self-management knowledge	
Low Score (0-4)	53 (8.6)
High Score (5-7)	569 (91.4)
Range 0-7 Mean = 6.03 SD = 1.016	
Diabetes Knowledge (n=348)	
Low Score (0-2)	41 (11.7)
High Score (3)	307 (88.3)
PHQ-9	
Minimal depression (Score 0-4)	549 (88.3)

Characteristics (n=622)	Number n (%)
Mild depression (Score 5-9)	58 (9.3)
Moderate depression (Score 10-14)	15 (2.4)
KDQOL	
PCS Scores (18 scores)	
Score less than 9	15 (2.4)
Score greater than 9	607 (97.6)
Range 8-18 $\bar{x}$=13.36 SD=1.84	
MCS Scores (22 scores)	
Score less than 11	87 (25.6)
Score greater than 11	535 (74.4)
Range 9-22 $\bar{x}$=13.92 SD=3.67	

Correlation Among Key Variables

Results indicated that SM knowledge had a weak positive association with the indicator variables of diabetes $r(622) = 0.369$, $p<.001$, while negatively associated with depression r $(622) = -.198$, $p<.001$. Also, a significant association was found between SM knowledge and education, $r(622) = .28$, $p<.05$. Self-efficacy had a positive correlation with SM knowledge, $r(622) = .821$, $p<.001$, support from family, $r(622) = 0.136$, $p<.001$, while negatively associated with diabetes, $r(622) = -.806$, $p<.001$. The SMB had a moderate positive, significant associated with SM knowledge, $r(622) = .489$, $p<.001$, and self-efficacy ($r(622) = .538$, $p<.001$). The quality of life latent variable had a weak positive,

significant association with SM knowledge, r(622) = .102, p<.001, SMB, r(622) = .248, p<.001, and self-efficacy, r(622) = .042, p<0.001.

SEM Results

The hypothesized structural model presented was investigated. Direct paths were specified from age, education, eGFR level, depression, family support, reside at home, access to care, comorbidities to SM knowledge and self-efficacy. In turn, self-management knowledge and self-efficacy had direct paths to SMB and QOL. Covariance among the two latent factors, proximal outcome (SMB) and distal outcome (QOL), were allowed.

This initial model indicated an overall model fit with $\chi2(30) = 287.393$, p<0.001, CFI = 0.793, TLI = 0.553, RMSEA = 0.117, SRMR = 0.049, AIC = 1096.24, and BIC = 1272.5. Therefore, this model did not meet acceptable levels of model fit. Respecification of the hypothesized model was conducted to improve model fit by evaluating modification index values using the modification index function in the *lavaan* package.

From the possible correlated uniqueness suggested by modification indices, the researcher then used age, depression, education, and family support to analyze in the model. The overall result of the final model demonstrated that the various goodness of fit indices is acceptable with $\chi2(26) = 82.019$, p<0.001, CFI = 0.956, TLI = 0.888, RMSEA = 0.059, SRMR = 0.020, AIC = 897.86, and BIC = 1092.9.

The initial model was compared with this second model using the test of the change in chi-square, as well as differences in AIC and BIC. The BIC difference between the hypothesized model and the modified model was greater than 10, which indicated very strong support. Using a chi-square difference test, the improvement of this model from the

initial model was significant ($\Delta\chi2 = 205.37$, $\Delta df = 4$, p<.001). Therefore, the final modified model had a better fit compared with the hypothesized model. This is logical; therefore, the modification was retained.

Chi-square is one of many indexes used to test model fit. In SEM results, chi-square test reported p-value <.001, indicating the model developed based on SEM analysis did not fit well to observed data because of the chi-square test is very sensitive to sample size. The bigger the sample size, the higher the chance of getting a significant result (smaller p-value) However, other indexes such as CFI and RMSEA showed good results.

The final structural model (Figure 5) describes the up-stream associations of self-management knowledge, self-efficacy, and self-management behavior on QOL as well as their interactions. The squared multiple correlations (similar to R² in regression analysis) calculated for QOL was 0.341 which indicates that the model explained 34% of the variance in quality of life.

Figure 4. The Modified Model of Quality of Life in Thai Adults with Early-stage

Chronic Kidney Disease
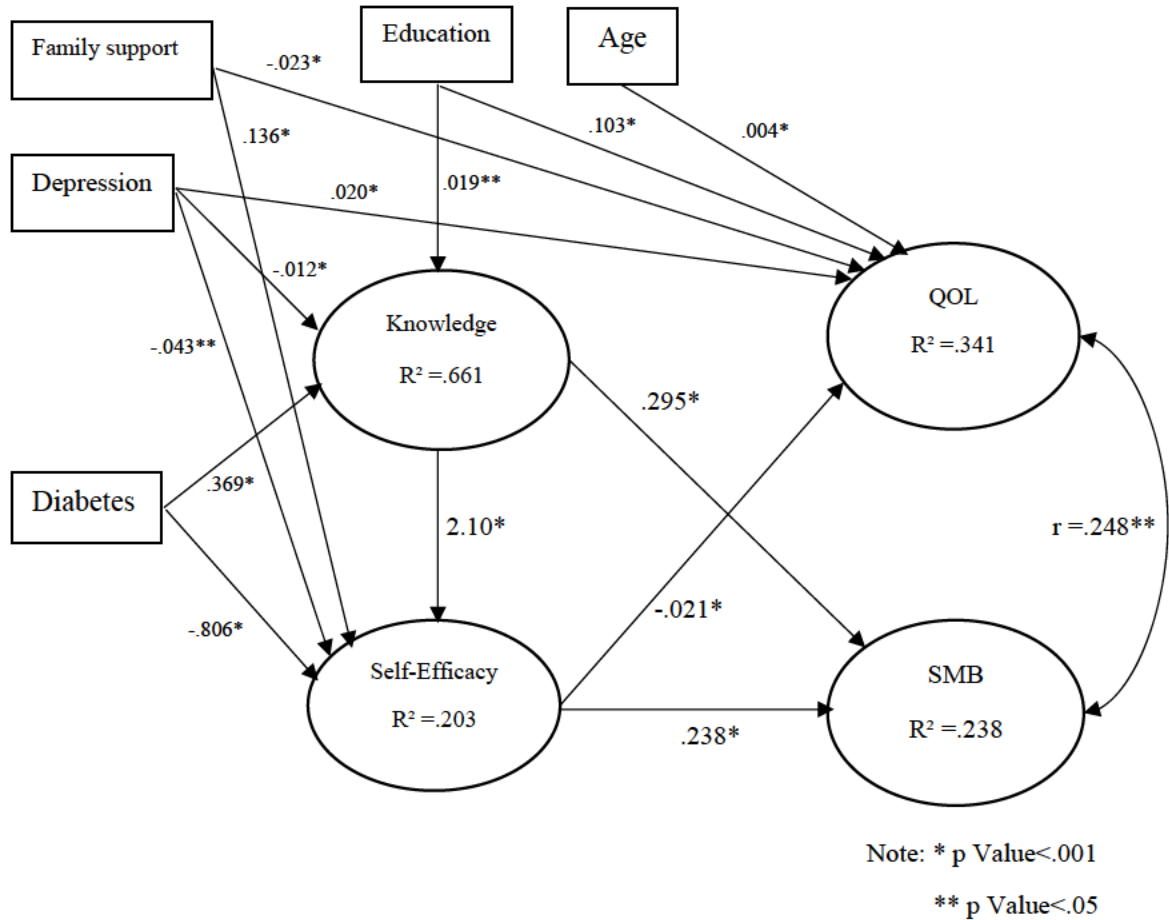
Mediated Effect

The mediation model in the model was estimated with the same latent variables of self-efficacy predicting the latent variable of SM knowledge which then predicted the latent variable of SMB. As expected, SM knowledge was significantly correlated with SMB, $\beta = .295$, $p < .001$ (path C). The SM knowledge also associated with self-efficacy, $\beta = 2.1$, $p < .001$ (path a). Additionally, self-efficacy had a significant association with SMB, $\beta = .238$,

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p < .001 (path B). Using self-efficacy to mediate between SM knowledge and SMB, the estimated coefficient of indirect effect demonstrated β = .50, p < .001 (path AB). The total effect (path C + path AB) indicated the estimated coefficient of 0.794 (p < .001), which suggests that self-efficacy is the mediator between self-management knowledge and SMB (Figure 5.).

Figure 5. Mediation Model between Self-management Knowledge, Self-efficacy and Self-management Behavior

Note: *p-Value < 0.05
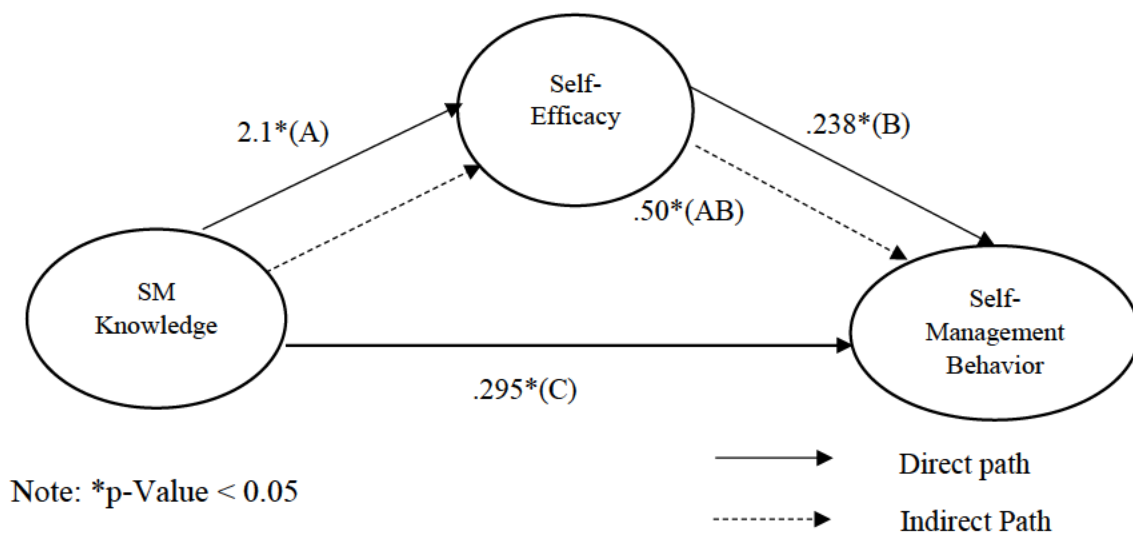
DISCUSSION

This study explored the relationship between factors influencing the quality of life in Thai adults with early-stage CKD. By including a number of variables into one conceptual model and analyzing those variables simultaneously, the study is unique in that it was able to describe a complex network of association between the factors that impact quality of life. The findings helped to better understand the quality of life among people with mild and moderate CKD as well as lead to theory-based intervention studies that

examine self-management behaviors to reduce the progression of CKD and increase quality of life in persons with early-stage CKD in Thailand. The findings have supported the hypotheses of this study as the followings.

The findings in this study demonstrated the association between indicator variables and latent variables based on the hypotheses of the study. However, since the individual and family factors, physical and social environment, and condition-specific latent variables were dropped from the model, its effects were not determined by the results of the SEM and hypothesis 1 and 2 were therefore partially supported by findings from the indicator variables.

Hypothesis 1 was found to be not supported. Because of the low factor loading in the latent variables of individual and family factors, physical and social environment, and condition-specific factor, this study used the indicator variables instead of latent variables to analyze the data. There was no relationship between all indicator variables of three latent variables and SMB. On the other hand, some indicator variables of context latent variables related to the latent variables of SM knowledge and self-efficacy. The findings revealed a relationship between diabetes, depression and SM knowledge as well as support from family related to self-efficacy.

Depression had a statistically significant but low negative correlation with SM knowledge, indicating that a person who reported a higher depression score reported a lower SM knowledge score. Consistent with the previous study by Narva et al. (2015), individuals' capacity to reduce the progression of CKD may be limited by their lack of knowledge about the disease, its comorbidities, and psychosocial influences. Persons with CKD are at risk for developing or worsening pre-existing psychological illnesses such as

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depression and anxiety (Kittiskulnam, Sheshadri & Johansen, 2016). In the early stages of CKD, people might feel a loss of wellness, as well as the more practical losses related to lifestyle and independence (Bautovich et al., 2014). Persons with early-stage CKD may experience with a new consequence of this disease without knowledge of the disease and how to treat themselves. Therefore, it may affect their emotional functioning. Increasing self-management knowledge is required to make lifestyle changes and reduce stress (Khalil & Abdalrahim, 2014; Stanifer et al., 2016). Several studies suggested that educating persons who are at risk of developing CKD about the importance of maintaining their healthy behaviors (e.g., reducing sodium intake, maintaining a healthy diet, and being compliant with their hypertension medication) can decrease their anxiety and depression (Gemmell et al., 2016; Rebollo Rubio, Morales Asencio & Eugenia Pons Raventos, 2017).

Interestingly, diabetes was found to be related to SM knowledge and self-efficacy. This disease is an important comorbidity in people with CKD. The results showed that it affects a person's knowledge and his or her confidence to self-manage this disease. Therefore, it is essential to assist persons with CKD, specifically those with DM, building self-confidence to self-manage their health care; such practice may reduce patients' feelings of anxiety related to living with co-morbid chronic conditions (Johnson et al., 2016). Research by Junchai, Therawiwet, and Imamee (2012) assessed the effectiveness of diabetes education and self-management program in Thai persons with type 2 diabetes. The results showed that the intervention group that participated in this program had a significantly better understanding of knowledge and self-management behaviors. The researchers recommended that this diabetes education and self-management program should be provided to persons with type 2 diabetes. Additionally, the activities should be

included that focused on the development of self-efficacy for managing the problem of diabetes (Junchai, Therawiwat & Imamee, 2012).

Family support had a significant relationship with self-efficacy. This finding was supported by several studies. Once a person has kidney disease it can be difficult for him/her to focus on what needs to be done to manage the disease. Living with kidney disease is not something a person should go through alone (National Kidney Foundation, 2012). The people closest to an individual with CKD are often emotionally affected (Bautovich et al., 2014). Therefore, persons with CKD need more support from their family member when they were diagnosed with CKD. Family members provide important support to persons with chronic conditions (Colorafi, 2016) and may help to increase patients' confidence to take care of themselves.

The results also supported hypothesis 1b. The findings revealed that higher SM knowledge and self-efficacy scores are related to improved SMB. Self-efficacy is a notable predictor of the adoption of healthy practices (Lin et al., 2013). Including self-efficacy in developing tailored and targeted interventions is essential to support persons with CKD in managing their illness. Patients with greater self-efficacy practice more self-management behaviors, leading to better disease control, and better physical functioning (Bandura, 1997). Similar to the Thai study by Artiwitchayanon, Keeratiyutawong, and Duangpaeng (2015), the findings showed that self-management knowledge, family support, and depression were significantly related to self-management (Artiwitchayanon et al., 2015). Another Thai study also revealed that knowledge of kidney disease, perceived benefits of slow disease progression by appropriate self-care, and perceived self-efficacy to slow the CKD progression were positively associated with self-management behaviors (Unaphak et

al., 2014). Studies strongly posit the beneficial outcomes of self-management interventions including the knowledge of CKD and self-care behaviors and suggest that a targeted self-management program can improve patient self-management and health outcomes (Bonner et al., 2014; Ferris et al., 2015; Lee et al., 2016; Lin et al.,2013).

The hypotheses 2a and 2c were rejected. There was no relationship between all indicator variables of context latent variables and the quality of life latent variable. The SMB also had no relationship with quality of life. In contrast, the findings supported hypothesis 2b. The quality of life had a significant correlation with SM knowledge and self-efficacy, indicating higher SM knowledge and self-efficacy scores positively associated with improved quality of life. Consistent with QOL by other studies, the study by Srithanee (2016) revealed that knowledge was related to quality of life. The older adults with an education level of primary school and beyond had 3.12 times higher quality of life than those with lower education level (OR = 3.121, 95% CI = 1.665-5.851). In addition, the older adults with a high score of KD knowledge also had a higher score of quality of life. The authors recommended taking into consideration the kidney disease education of persons when evaluating the quality of life among older adults (Srithanee, 2016).

The hypothesized model based on theoretical considerations utilized an iterative process of inspection of the statistical significance of path coefficients and theoretical relevance of constructs in the model to derive an optimal SEM that best fit the dataset and were theoretically meaningful. The findings show that SM knowledge has the greatest impact on self-efficacy. SM knowledge had a positive direct effect on self-efficacy, self-management behaviors and quality of life. Previous studies have consistently reported factors related to quality of life in persons with various CKD stages and dialysis modalities

(Aggarwal et al., 2016; Bonner et al., 2014; Lee & Son, 2016). It is, therefore, essential to consider knowledge that could be used to improve quality of life. Improving QQL will not only enhance patient well-being but may convey a survival advantage (Jesky et al., 2016). Improved awareness and understanding of kidney disease in these patients by nephrology nurses could have practical implications for better health outcomes (Lee & Son, 2016).

Self-efficacy was found as a mediator with SM knowledge and SMB. This finding related to several studies that suggested to consider self-efficacy as a mediator with self-care strategies to influence people's ability to self-manage their CKD (Curtin et al., 2008; Lee et al., 2016; Lin et al., 2013). The efficacy of individual beliefs can also help justify the maintenance of complex relationships that occur among self-management endeavors necessary for healthy lifestyle changes in patients with chronic diseases (Bandura, 1997; Walker, Marshall & Polaschek, 2013). Bandura found that those with low self-efficacy relegate control to others, which in turn limits experiences that would build confidence (Bandura, 1997). Knowing this might inspire health care providers to create opportunities for their clients that will foster confidence and engagement in their plan of care. Self-efficacy was selected as an important factor in assessing factors and mediators related to self-management of healthy behaviors (Sritarapipat et al. 2012). Using sources of perceived self-efficacy information to influence self-management behavior among patients with CKD may, therefore, be beneficial.

Self-efficacy also had a positive direct path on quality of life. The model yields partial support for extending the IFSMT to the distal outcome, quality of life. In addition, the model revealed that self-efficacy is determinant of quality of life and plays a role as

mediator between SM knowledge and SMB. The finding was consistent with related studies (Li, Jiang & Lin, 2014; Montoya, Sole & Norris, 2016; Slesnick et al., 2015; Unaphak et al., 2014). Interventions that explore effective methods to improve patients' undergoing hemodialysis self-management by including self-efficacy training are recommended (Li, Jiang & Lin, 2014). This confidence can be applied to managing their chronic conditions and supporting healthy behaviors that can reduce the impact of these conditions (Bandura, 1993; Chen et al., 2011; Moattari et al., 2012). The increase in perceived self-efficacy can help patients have more confidence to take care of themselves, maintain their healthy kidney function as well as increase their quality of life (Montoya, Sole & Norris, 2016; Slesnick et al., 2015; Unaphak et al., 2014).

Self-management behavior had a significant direct effect on quality of life. However, this effect was not strong. Given the findings of this direct path, interventions should include this factor because extensive scientific research on self-management has been performed and a wide range of self-management programs have been developed for various target populations. This study found a weak correlation between SMB and QOL ($r(622) = 0.248$). This result may be caused by the predominant ages of the study participants. The majority of participants (64.9%) in this study were older adults (> 60 years). Therefore, many participants with CKD are dependent on their family members or caregiver. Some activities or behaviors may be limited to them. In addition, persons with early-stage CKD may be asymptomatic. Therefore, the PCS and MCS may reflect lower scores. Results from meta-analyses show that self-management can improve quality of life, certain disease-specific outcomes and may reduce health care costs (Lee, Wu, Hsieh & Tsai, 2016; Welch et al., 2015). Self-management behaviors in persons with CKD are

related to their confidence in their own capability to monitor their self-care routines (Lin et al., 2013; Walker, Marshall, & Polaschek, 2013). Researchers studying self-management have concluded that, by developing effective approaches to deal with illness and associated conditions, individuals can improve their healthy behaviors (Bonner et al., 2014; Enworom & Tabi, 2015; Ferris et al., 2015; Johnson et al., 2016). Moreover, the Kidney Disease: Improving Global Outcomes (KDIGO) CKD guideline recommended that self-management behaviors should be incorporated into the treatment plan at all stages of chronic kidney disease to improve quality of life (Levin et al., 2017).

The absence of any significant direct relationships between the individual and family factors, physical and social environmental factors and condition-specific factor may also be explained by the fact that specific questions or tools focused on those factors were not suitable to collect the data. Some of the measured variables had only one question. Future research will consider instruments with various aspects of variance surrounding these factors and will need to understand which aspects of each factor are the most powerful in explaining outcomes.

Limitations

This study has several limitations. First, this study uses a cross-sectional study design, which does not allow for any cause and effect inferences to be made (Polit & Beck, 2012). Second, there is a lack of generalizability due to the necessary use of a convenience sample (Polit & Beck, 2012). However, the demographics of the sample were comparable to the Thai population in terms of education, age, and gender. Third, the areas for collecting data were limited to only in the south of Thailand due to the limitation of funding. Last, using a self-reported questionnaire may lead to social desirability response bias, which

refers to the tendency of some individuals to misrepresent themselves by giving answers that are congruent with prevailing social values (Polit & Peck, 2012) which may affect the validity of a questionnaire (Streiner & Norman, 2015). To minimize social desirability in this study, the instruments predominately offered multiple response options (for example, strongly agree, agree, disagree, strongly disagree) rather than one socially desirable and one socially undesirable response option (for example, agree, disagree) (Polit & Beck, 2012).

CONCLUSIONS

This study presented a causal model that described the factors accompanied by the relationship between self-management behavior and quality of life in Thai adults with early-stage CKD. The results highlighted the association of diabetes, family support, depression, self-efficacy, SM knowledge, self-management behavior and quality of life. This study adds to a growing body of evidence that conceptualizes individuals' quality of life within a theoretical framework of IFSMT. The findings have demonstrated that the final model explained the relationship between patient characteristics and outcomes. The final model found the variables including self-management knowledge, self-efficacy, and self-management behaviors had a direct effect on quality of life while the indicators of diabetes, depression, and family support had a direct effect on SM knowledge and self-efficacy. Although the final model explained only 34% of the variance, this was not unexpected as the target population remains largely asymptomatic in the early stages of kidney disease.

The predictors such as self-efficacy, SM knowledge, and SMB may achieve a well-combined effect in improving the quality of life in people with CKD. Self-efficacy played

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a mediating role between SM knowledge and SMB. These results are consistent with the several studies indicating that this factor is a mediator of SMB. The context variables such as diabetes, depression, and family support should be considered to include in the nursing assessment for people with CKD stage 1 to 3. Early identification of disease risks and efforts at improvement might not assure its reversal but may delay its progress in many instances. Prevention planning must be individualized to meet specific patient-centered goals (Fadem, 2015). Self-management knowledge, self-efficacy, and self-management behavior, as well as psychological and environmental circumstances, add to management strategies to improve quality of life. Therefore, the model can also be used to inform the development of interventions for persons with early-stage CKD.

RECOMMENDATIONS

CKD is often progressive; however, in the early stages, it has no symptoms. Therefore, slowing the loss of kidney function is a critical goal of kidney disease clinics. Additionally, both the major approaches to prevention as well as lifestyle modification need to consider all predictors to make definitive recommendations for further nursing interventions for persons with CKD.

This study provided knowledge of predictors related to quality of life that can be used to increase options for nurses and health care providers to facilitate improved self-management behaviors and quality of life in people living with CKD. The results of this study also provided information on strategies, to help manage self-care behaviors and how they can improve quality of life. In addition, nurses and healthcare providers can utilize these factors to improve KDQOL regarding self-management knowledge, self-efficacy, and self-management behaviors in people with CKD and to develop lifestyle interventions

to slow the progression and achieve the goal of preventing ESRD. By adopting the principles of self-efficacy in research interventions or practice, for example, new strategies can be developed to assist people in building confidence. The CKD-SE validated instrument is recommended for use in future studies, particularly involving Thai adults followed in renal clinics as its factors include the important measures of autonomy, self-integration, problem-solving, and the seeking of social support.

Policymakers can also benefit as they determine services provided by governmental programs. This model can use as a guideline when creating nursing implications for persons with CKD or may apply for use in a clinical setting. Assessment of critical components of QOL early in the disease course will help to identify high-risk persons in order to target interventions which will focus on health promotion to minimize the risk of disease progression. Longitudinal cohort studies examining QOL changes over time from early- to later-stage are also recommended.

The results can also inspire further research in this area by nurse researchers interested in adults with early-stage CKD by using the IFSMT to develop specific intervention programs that are suitable for persons with early-stage CKD. Lifestyle modification programs, for example, could be provided to adjust persons with CKD's lifestyle that involves not just the patient, but also the family and the surrounding environment. Qualitative research design is also recommended to examine the phenomenon of KDQOL from the individual's and family's perspectives. In addition, future replication studies are recommended in other areas of Thailand using this model to compare results across urban vs. rural areas as well as various cultural groups from varied regions across the country.

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IV. CONCLUSION

This study examined predictors influencing self-management behavior and quality of life in Thai adults with early-stage CKD using a cross-sectional survey. Two instruments utilized, the PHQ-9 and KDQOL, have been validated previously in the Thai adult population. The other three validated instruments related to kidney disease knowledge (CKD-SMKT), self-efficacy (CKD-SE), self-management behaviors (CKD-SM) were translated into Thai for this study and validated. The process of ethics in nursing research was followed using the policies of the University of Massachusetts Lowell's IRB, the Prince of Songkla University's IRB, and the Public Health Ministry of Thailand research guidelines. Psychometric properties in the translated tools for this study revealed adequate reliability and validity.

The main purpose of this study was to examine predictors of quality of life using SEM. The results indicated that individuals and family factors, physical and social environmental factors, condition-specific factors, knowledge, self-efficacy, and self-management behavior influenced the quality of life in Thai adults with early-stage CKD. This study is an important step in understanding the factors that impact SMB and QOL in Thai adults with early-stage CKD. The Individual and Family Self-Management Theory was utilized to frame this study and was found to be a comprehensive framework to

examine this issue. It also supports IFSMT as a useful framework to guide future interventions. The findings help to better understand features that impact the quality of life among people with mild and moderate CKD.

This research study contributed to the literature from a unique perspective. Characterizing the individual health status, depression, and impairments in QOL in persons not yet dependent on renal replacement therapy may improve the health of people with CKD and increase provider understanding of how such health-related domains relate to the CKD progression. This study was the first study to examine knowledge, self-management behaviors, self-efficacy, and mental health in relation to KDQOL in Thai people with early-stage CKD by using the IFSMT as a theoretical framework.

Results of this study revealed that the IFSMT constructs of process and outcome variables have a significant explanation of variances in the prediction of quality of life in a national sample of Thai adults (34%). While this significant variance does not explain a majority of the variance related to QOL, this is not unexpected as the target population has not yet experienced a major impact on QOL in the early stages of predominantly asymptomatic CKD. Results from both SEMs and the regression model indicated that the constructs from IFSMT included self-management knowledge, self-efficacy, and self-management behavior in the prediction of quality of life. Results from the regression model also found that indicators in contextual factors included depression, family support, and diabetes had a direct effect on the process of self-management factors, self-efficacy and self-management knowledge as well as quality of life.

The results of this study could lead to the development of more appropriate policies, health promotion or education programs, and interventions that focus specifically on these

factors related to quality of life. Implications for nursing include the need for a more holistic approach to the slow progression of CKD recognizing a covariation of other behaviors and incorporating factors identified in this study as predictors of quality of life. Nurses need to support routine screening for risk behaviors in adults with early-stage CKD in their practices, developing more appropriate measures using standardized tools appropriate for use in this group. They need to be educated in the principles of self-management behavior, CKD disease knowledge, and brief motivational interviewing techniques to enhance self-efficacy. The family also needs to be involved in monitoring, supporting and communicating with their member who is diagnosed with CKD. More research is needed by nurse researchers on adults with early-stage CKD including the impact of appropriate follow-up referrals, educational family-based programs and other interventions appropriate for persons with CKD across all stages of the disease.

Health promotion implications include the need for further research on quality of life and the impact of governmental health promotion campaigns. It is recommended that the non-communicable guidelines of health care policy of the Ministry of Public Health include the promotion of healthy behaviors among adults with early-stage CKD.

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Appendix A

Biographical Sketch of Author

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Diploma in Nursing Science Boromarajonani Pha-Putthabat College of Nursing, Thailand (1991-1994)

Master of Science (Public Health), Mahidol University, Thailand (1999-2004)

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WORK EXPERIENCES

2012 – Present: Lecturer at Faculty of Nursing, Prince of Songkla University, Thailand.

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Appendix B

Survey Questionnaire: English Version

Medical Information for The Researcher to Fill out

CKD stage…………………………… eGFR level……………. ..mL/min/1.73m²

…………………………………………………………………………………………………

ID……………

Your Health and Well-Being Questionnaires

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities.

Please fill your information in this form by writing in the answer or placing a check (√) in the appropriate box.

Part 1: Personal Information

Age………………years

Gender

☐ Male   ☐ Female

Religion

☐ Buddhist   ☐ Muslim   ☐ Christian   ☐ Other………………

Education

☐ No formal school education

☐ Less than high school degree

☐ High school degree or equivalent

☐ Associate degree

☐ Bachelor's degree

☐ Graduate degree

Number of siblings ………………….

Number of children………………….

Number of family members who live in same house……………………

Your marital status

☐ Single   ☐ Married   ☐ Widowed   ☐ Separated   ☐ Divorced

Parents' marital status

☐ Single ☐ Married ☐ Widowed ☐ Separated ☐ Divorced

Job status

☐ Part-time work

☐ Full-time work

☐ Do not work

Family income (average per year)……………………………….Bahts

Present illness

How long have you had chronic kidney disease? …………months………years

Please check √ in the box if you have any health problem

☐ Diabetes

☐ High blood pressure

☐ Stroke

☐ Heart Disease

☐ Asthma

☐ Other…………..

Part 2: Kidney disease knowledge

Please answer the questions with the best answer for you. There are no right or wrong answers.

Section A: For each item, please put √ in the boxes of true, false, don't know, or does not apply to me that you think is best for you. Please answer only ONE answer in each of these four columns.

Next, think back over the past 3-6 months. Have you done what is listed? Put √ in the YES or NO in the gray box.

To help my kidneys, I need to:	True	False	Don't know	Does not apply to me	I have done this in the past 3–6 months	
					YES	NO
know what my blood pressure goal is						

To help my kidneys, I need to:	True	False	Don't know	Does not apply to me	I have done this in the past 3–6 months	
					YES	NO
take my blood pressure medicine(s) like my doctor tells me to						
have my urine ("pee") tested at least once a year						
get my blood checked every few months						
eat more salt						
keep a healthy body weight						
not take some over-the-counter pain medicines (for example, Motrin, Aleve, Ibuprofen, Naproxen)						

Section B

Do you have diabetes? If YES, answer the three items below. If NO, skip to Section C. To help my kidneys, I need to:	True	False	Don't know	Does not apply to me	I have done this in the past 3–6 months	
					YES	NO
keep track of my blood sugar each day						
eat less sugar						
take my diabetes medicine(s) like my doctor tells me to						

Section C: Please put √ in one box.

	1	2	3	4	5
	I know everything I need to know	I know a lot	I know some	I know a little	I know nothing
How much do you know about your kidney health?					

Part 4: Patient Health Questionnaire-9 (PHQ-9)

Please use √ to indicate your answer.

Over the last two weeks, how often have you been bothered by:	Not at all	Several days	More than half the days	Nearly every day
1.Little interest or pleasure in doing things				
2.Feeling down, depressed, or hopeless				
3.Trouble falling or staying asleep, or sleeping too much				
4.Feeling tired or having little energy				
5.Poor appetite or overeating				
6.Feeling bad about yourself—or that you are a failure or have let yourself or your family down				
7.Trouble concentrating on things, such as reading the newspaper or watching television				
8.Moving or speaking so slowly that other people could have noticed? Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual				
9.Thoughts that you would be better off dead or of hurting yourself in some way				

10. If you checked off any problem as several days, more than half of the days or nearly every day, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

☐ Not difficult at all ☐ Somewhat difficult ☐ Very difficult ☐ Extremely difficult

Part 5: Chronic kidney disease self-management behavior

The following statements are about how you feel and how things have been with you **during the past three months.** There is no right or wrong answer. Please place a "√" in the column the best represents your answer in relation to your chronic kidney disease.

During the past three months, how often have you been:	Never	Occasionally	Usually	Always
1.Discussing your kidney problem with family or friends while questioning or worrying about it				
2.Thinking about reasons about bad laboratory results				
3.Telling family or friends about your treatment plan				
4.Sharing your experience with other patients				
5.Actively understanding the meaning of laboratory results				
6.Finding out possible reasons for your high blood pressure value				
7.Managing food to avoid harm to your kidneys				
8.Not following the dieticians' suggestions to choose food				
9.Utilizing different ways to solve problems				
10.Sharing helpless and frustrated feelings with other patients/people				
11.Merging your kidney disease management into your daily life				
12.Heeding habits that may affect kidney function				
13.Not following care providers' suggestions to exercise				
14.Changing your lifestyle to avoid worsening of your kidney function				

| During the past three months, how often have you been:	Never	Occasionally	Usually	Always
15.Asking family or friends for help when helpless or frustrated				
16.Actively seeking resources to better control your kidney disease				
17.Not following care providers' suggestions to adjust your eating habits				
18.Managing your kidney disease to stay healthy				
19.Giving up bad habits that are harmful to the kidneys				
20.Actively understanding the risk factors for kidney disease				
21.Not following care providers' suggestions to control weight				
22.Managing food portions and choices in social activity				
23.Adjusting kidney disease care to fit new situations				
24.Finding out reasons for signs and symptoms				
25.Managing food choices based on health care providers' suggestions				
26.Adjusting lifestyle to maintain the best health condition				
27.Utilizing different ways to clarify questions about your treatment plan				
28.Participating selectively in social activities				
29.Actively seeking information about kidney disease				

Part 6: Chronic kidney disease self-efficacy

The following contains statements regarding management of chronic kidney disease.

Please rank the following from 0-10; 0 meaning no confidence and 10 meaning great confidence.

- The answer is based on your own level of self-assurance on carrying out the activity of each item (please refer to the following picture):
- The greater the number of your answer, the higher the level of confidence that you are able to do that.
- The smaller the number of your answer, the lower the level of confidence that you are able to do that.

No Confidence   **Great Confidence**

0   1   2   3   4   5   6   7   8   9   10
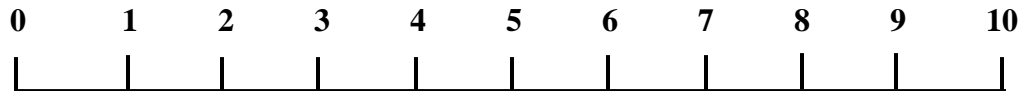
The number you fill in is NOT based on what is right/wrong or what is good/bad. Just answer honestly according to your own assurance you feel.

In the blocks following each question below, write a number between 0 to 10 that represents your level of confidence

1.I am sure I am comfortable telling others that I suffer from chronic kidney disease…………………………………………………………………………………………. ☐

2.I am sure I can actively seek out information that explains kidney disease-related signs and symptoms (like high blood pressure, urine test results, or other symptoms)……… ☐

3.I am sure I can actively understand the meaning of kidney disease related to blood test results……………………………………………………………………………………. ☐

4.I am sure I can accept the fact that I have suffered from chronic kidney disease …… ☐

5.I am sure I can actively understand the risk factors associated with kidney disease (like high blood pressure, diabetes, drug) ……………………………………………………. ☐

6.I am sure I would be able to discuss my worries with my family or friends for solutions ☐

7.I am sure I would seek for help whenever I am stressed out by work or family matters so that it would not affect my kidney disease……………………………………….. ☐

8.I am sure I can actively seek out necessary precautions to prevent my kidney disease from worsening……………………………………………………………………. ☐

9.I am sure I am willing to share my experience of self-managing the kidney disease with other patients…………………………………………………………………………. ☐

10.I am sure I would be able to adjust the self-management (e.g., how much and what I eat, exercise amount, taking my medication, etc.) of my kidney disease to fit different situations (like traveling or during festive celebrations etc.) ……..………………… ☐

11.I am sure I am comfortable asking my doctor/health care providers about my current medical condition……………………………………………………………... ☐

12.I am sure I can face the challenges of living with kidney disease…………………… ☐

13.I am sure I can actively seek out resources for better control of my kidney disease… ☐

14.I am sure I can actively tell my family and/or friends about my CKD treatment plans (like diet control and medication etc.) to gain their support……………………………. ☐

15.I am sure I would be able to control my diet, even if I am attending a wedding or other celebrations, in order not to increase the workload of my kidney………………………. ☐

16.I am sure I would be able to manage my kidney disease as I am maintaining my health……………………………………………………………………………………... ☐

17.I am sure I would take the initiative to tell any physicians that I have chronic kidney disease………………………………………………………………………………… ☐

18. I am sure I would take the initiative to ask the physician for advice whenever any questions about the medications I am taking occur to me………………………………... ☐

19. I am sure I would be able to choose the type and amount of food appropriate to my disease when participating in social activities……………………………………………

20. I am sure I would be able to look for information related to kidney disease through various channels (e.g., Internet, flyers, magazines, newspapers)……………………….

21. I am sure I would use all necessary means, like making phone calls or returning for follow-up examinations prior to the appointment, to contact the healthcare providers for advice whenever any questions about my disease or treatment occur to me, even before the appointment date………………………………………………………………

22. I am sure I would be able to adhere to the diet restrictions recommended by the healthcare providers……………………………………………………………………

23. I am sure I would be able to adjust my dietary habits in accordance with the recommendations of the dietitians or health care providers……………………………

24. I am sure I would selectively participate in social activities (e.g., attending weddings dinners or gatherings) in order to control of my kidney disease…………………………

25. I am sure I can actively seek for help from my family or friends whenever I am feeling depressed or frustrated with my kidney disease………………………………….

Part 7: Kidney Disease and Quality of Life

This part of the survey includes a wide variety of questions about your health and your life. We are interested in how you feel about each of these issues.

1.In general, would you say your health is: (Mark a check √ in the one box that best describes your answer.)

Excellent	Very good	Good	Fair	Poor
☐	☐	☐	☐	☐

The following items are about activities you might do during a typical day. Does your health now limit you in these activities? Is so, how much? (Mark a check √ in a box for each question on each line that represents your answer)

Does your health limit you in a typical day for:	Yes, limited a lot	Yes, limited a little	No, not limited at all
2. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf………………………………			
3. Climbing several flights of stairs…………………			

During the **past four weeks**, have you had any of the following problems with your work or other regular daily activities as a result of your physical health? Check (√) one box.

During the **past 4 weeks**, as a result of your physical health have you:	Yes	No
4. Accomplished less than you would like……………………………		
5. Been limited in the kind of work or other activities you could do…		

During **the past 4 weeks**, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

During the **past for 4 weeks** have you	Yes	No
6. Accomplished less than you would like……………………………		
7. Been unable to do work or other activities as carefully as usual……		

8. During **the past four weeks**, how much did pain interfere with your normal work (including both work outside the home and housework)? Check √ in box that fits for you.

Not at all	A little bit	Moderately	Quite a bit	Extremely
☐	☐	☐	☐	☐

These questions are about how you feel and how things have been with you during **the past four weeks.** For each question, please give the one answer that comes close to the way you have been feeling. Check a √ in the box

How much of the time during the past four weeks	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
9. Have you felt calm and peaceful?						
10. Did you have a lot of energy?						
11. Have you felt downhearted and blue?						

12. During **the past four weeks**, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relative, etc.)? Check a √ in the box.

All of the time	Most of the time	Some of the time	A little of the time	None of the time
☐	☐	☐	☐	☐

How true or false is each of the following statements for you?	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
13. My kidney disease interferes too much with my life					
14. Too much of my time is spent dealing with my kidney disease					
15. I feel frustrated dealing with my kidney disease					
16. I feel like a burden on my family					

During **the past four weeks**, to what extent were you bothered by each of the following?	Not at all bothered	Somewhat bothered	Moderately bothered	Very much bothered	Extremely bothered
17. Soreness in your muscles					
18. Chest pain					
19. Cramp					
20. Itchy skin					
21. Dry skin					
22. Shortness of breath					
23. Faintness or dizziness					
24. Lack of appetite					
25. Washed out or drained					
26. Numbness in hands or feet					
27. Nausea or upset stomach					

Effects of kidney disease on your daily life

Some people are bothered by the effects of kidney disease on their daily life, while others are not. How much does kidney disease bother you in each of the following areas? Please place a check mark √ in the appropriate box.

How much does kidney disease bother you in each of the following areas?	Not at all bothered	Somewhat bothered	Moderately bothered	Very much bothered	Extremely bothered
28. Fluid restriction					
29. Dietary restriction					
30. Your ability to work around the house					
31. Your ability to travel					
32. Being dependent on doctors and other medical staff					
33. Stress or worries caused by kidney disease					
34. Your sex life					
35. Your personal appearance					

Thank you for completing these questions!

Appendix C

Correlations Among the Key Study Variables

Table C1. Pearson's Correlation Coefficient Among Context Variables: Individual and Family Factor, Physical and Social Environment Factor, and Condition-Specific Factor

Variable	1	2	3	4	5	6	7	8
1.Age	1							
2.Education	-.255**	1						
3.Family support	-.049	.101	1					
4.Depression	.044	.044	-.240**	1				
5.Access to care	.031	.031	.088*	.028	1			
6.Reside at home	-.172**	-.172	-.059	.039	.070	1		
7.Comorbidity	-.031	-.031	.031	.048	-.17	.017	1	
8.eGFR level	-.528**	.148*	.87*	-.123**	-.046	.035	-.38	1

**. Correlation is significant at the 0.01 level.
*. Correlation is significant at the 0.05 level.

Table C2. Correlations Among Four Factors of Self-Efficacy

Factors	Correlation			
	1	2	3	4
1.Autonomy	1			
2.Self-integration	0.45*	1		
3.Problem-solving	0.44*	0.08	1	
4.Seeking social support	0.33*	0.12*	0.59*	1

*. Correlation is significant at the 0.001 level.

Table C3. Correlations Among Four Factors of Self-Management Behavior

Factors	Correlation			
	1	2	3	4
1.Self-integration	1			
2.Problem-solving	0.47*	1		
3.Seeking social support	0.35*	0.19*	1	
4.Adherence to recommended regimen	0.15	0.17	0.33*	1

*. Correlation is significant at the 0.001 level

Table C4. Correlations Among Three Factors of the CKD-SMKT Tool

Factors	Correlation		
	1	**2**	**3**
1.Self-management knowledge	1		
2.DM knowledge	.273**	1	
3.Self-rating in kidney disease knowledge	-.126*	-.198**	1

**. Correlation is significant at the 0.01 level.
*. Correlation is significant at the 0.05 level.

Appendix D

The English and Thai Version Questionnaire of Translated Tools

Table D1. The CKD-SE Questionnaire in English Version

Factors	Items
Autonomy	1. I am sure I am comfortable telling others that I suffer from CKD 2. I am sure I can accept the fact that I have suffered from chronic kidney disease 3. I am sure I am willing to share my experience of self-managing the CKD with other patients 4. I am sure I am comfortable asking care provides about my current medical condition 5. I am sure I can face the challenges of living with CKD 6. I am sure I would take the initiative to tell the physicians that I am suffering from chronic kidney disease 7. I am sure I would take the initiative to ask the physician for advice whenever any questions about the medications I am taking occur to me 8. I am sure I would use all necessary means, like making phone calls or returning for follow-up examinations prior to the appointment, to contact the healthcare providers for advice whenever any questions about my disease or treatment occur to me, even before the appointment date
Self-integration	9. I am sure I would be able to adjust the self-management of my CKD to fit different situations 10. I am sure I would be able to control my diet, even if I am attending wedding or celebration feasts, in order not to increase the workload of my kidney 11. I am sure I would be able to manage my CKD as I am maintaining my health 12. I am sure I would be able to choose the type and amount of food appropriate to my disease when participating in social activities 13. I am sure I would be able to adhere to the diet restrictions recommended by the healthcare providers 14. I am sure I would be able to adjust my dietary habits in accordance with the recommendations of the dietitians or health care providers 15. I am sure I would selectively participate in social activities in order to control my CKD
Problem-solving	16. I am sure I can actively seek out information that explains the CKD-related signs and symptoms 17. I am sure I can actively understand the meaning of the CKD-related laboratory data. 18. I am sure I can actively understand the risk factors associated with CKD 19. I am sure I can actively seek out necessary precautions to prevent my CKD from worsening 20. I am sure I can actively seek out resources for better control of my CKD 21. I am sure I would be able to look for information related to CKD through various channel
Social support	22. I am sure I would be able to discuss my worries with my family or friends for solutions 23. I am sure I would seek for help whenever I am stressed out by work or family matters so that it would not affect my disease 24. I am sure I can actively tell my family and/or friends about my CKD treatment plans to gain their support 25. I am sure I can actively seek for help from my family or friends whenever I am feeling depressed or frustrated with my CKD

Table D2. The CKD-SM Questionnaire in English Version

Factors	Items
Self-integration	1. Managing food to avoid harm to kidney
	2. Merging CKD management into daily life
	3. Heeding habits that may affect kidney function
	4. Changing lifestyle to avoid worsening of kidney function
	5. Managing CKD to stay healthy
	6. Giving up bad habits harmful to kidney
	7. Managing food portions and choices in social activity
	8. Adjusting CKD care to fit new situation
	9. Managing food followed to care providers' suggestions
	10. Adjusting lifestyle to maintain the best condition
	11. Participating selectively in social activity
Problem-solving	12. Thinking over reasons about bad laboratory
	13. Actively understanding the meaning of laboratory data
	14. Finding out possible reasons about high BP value
	15. Utilizing different ways to solve problems
	16. Actively seeking resources to better control
	17. Actively understanding risk factors of CKD
	18. Finding out reasons for signs and symptoms
	19. Utilizing different ways to clarify questions about treatment plan
	20. Actively seeking information about kidney disease
Seeking social support	21. Discussing with family or friends while questioning or worrying
	22. Telling family or friends about treatment plan
	23. Sharing experience with other patients
	24. Sharing helpless and frustrated feeling with other patients/people
	25. Asking family or friend for help when helpless or frustrated
Adherence to recommended regimen	26. Don't follow the dieticians' suggestions to choose food
	27. Don't follow care providers' suggestions to exercise
	28. Don't follow care providers' suggestion to adjust diet habit
	29. Don't follow care providers' suggestion to control weight

Table D3. The CKD-SMKT Questionnaire in English Version

Factors	Items
Knowledge of self-management behaviors	1. know what my blood pressure goal is
	2. take my blood pressure medicine(s) like my doctor tells me to.
	3. have my urine ("pee") tested at least once a year.
	4. get my blood checked every few months.
	5. eat more salt
	6. keep a healthy body weight
	7. not take some over-the-counter pain medicines
Diabetes knowledge	8.A8.keep track of my blood sugar each day
	9. eat less sugar
	10. take my diabetes medicine(s) like my doctor tells me to.
Self-rating about kidney disease knowledge	11. How much do you know about your kidney health?

Table D4. The CKD-SE Questionnaire in Thai Version

Factors	Items
Autonomy	1. ฉันมั่นใจว่าฉันสามารถคุยกับผู้อื่นเกี่ยวกับความทุกข์ที่เกิดจากโรคไตวายเรื้อรังได้
	2. ฉันมั่นใจว่าฉันสามารถยอมรับความจริงที่ว่า ฉันป่วยเป็นโรคไตวายเรื้อรังได้
	3. ฉันมั่นใจว่าฉันคิดที่จะแบ่งปันประสบการณ์ของการจัดการโรคไตด้วยตนเองกับผู้ป่วยคนอื่นๆ
	4. ฉันมั่นใจว่าฉันสะดวกที่จะสอบถามแพทย์/พยาบาล เกี่ยวกับการรักษาโรคไตวายเรื้อรังในปัจจุบัน
	5. ฉันมั่นใจว่าฉันสามารถเผชิญหน้ากับความท้าทายของการใช้ชีวิตเมื่อเป็นโรคไตวายเรื้อรังได้
	6. ฉันมั่นใจว่าฉันมีความคิดที่จะบอกแพทย์ท่านอื่นว่าฉันเป็นโรคไตวายเรื้อรัง
	7. ฉันมั่นใจว่าฉันมีความคิดที่จะบอกแพทย์ท่านอื่นว่าฉันเป็นโรคไตวายเรื้อรัง
	8. ฉันมั่นใจว่าฉันได้ทำในสิ่งที่จำเป็น เช่น การโทรหาหรือการมาติดตามผลการตรวจก่อนวันนัดหมายจริง การติดต่อขอรับคำแนะนำจากแพทย์/พยาบาลเมื่อฉันมีข้อสงสัยเกี่ยวกับแนวทางการรักษา แม้ว่าจะเป็นช่วงก่อนวันเวลานัดหมายก็ตาม
Self-integration	9. ฉันมั่นใจว่าฉันจะสามารถจัดการตัวเองเมื่อเป็นโรคไต (เช่น จำกัดจำนวนและชนิดของอาหาร การออกกำลังกาย การรับประทานยา เป็นต้น) เพื่อให้เข้ากับสถานการณ์ เช่น ในระหว่างการท่องเที่ยว หรือการร่วมงานรื่นเริงต่างๆ เป็นต้น
	10. ฉันมั่นใจว่าฉันสามารถควบคุมการกินอาหารได้ แม้ว่าฉันจะไปร่วมงานแต่งงาน หรืองานอื่น ๆ โดยที่ไม่ทำให้ไตของฉันทำงานหนักมากขึ้น
	11. ฉันมั่นใจว่าฉันสามารถจัดการกับโรคไตของฉัน โดยที่ฉันรักษาสุขภาพของฉันควบคู่ไปด้วย
	12. ฉันมั่นใจว่าฉันสามารถเลือกชนิดและจำนวนอาหารที่เหมาะสมกับโรค เมื่อฉันต้องไปงานสังคม
	13. ฉันมั่นใจว่าฉันสามารถที่จำกัดการกินอาหาร ตามคำแนะนำของแพทย์/พยาบาลได้
	14. ฉันมั่นใจว่าฉันสามารถปรับตัวเรื่องการกินอาหารตามคำแนะนำของนักโภชนาการ/แพทย์/พยาบาลได้
	15. ฉันมั่นใจว่าฉันได้เลือกอาหารเมื่อเข้าร่วมงานสังคม เช่น งานแต่งงาน หรืองานพบปะสังสรรค์ต่าง ๆ ได้อย่างรอบคอบ เพื่อควบคุมโรคไตของฉัน
Problem-solving	16. ฉันมั่นใจว่าฉันสามารถค้นหาข้อมูลโรคไตวายเรื้อรัง ในเรื่องอาการและอาการแสดงได้ (เช่น ระดับความดันโลหิตสูง ผลการตรวจปัสสาวะ หรืออาการอื่นๆ)
	17. ฉันมั่นใจในว่าฉันสามารถเข้าใจอย่างรวดเร็วเกี่ยวกับผลการตรวจเลือดที่สัมพันธ์กับการทำงานของไต
	18. ฉันมั่นใจว่าฉันสามารถเข้าใจถึงปัจจัยเสี่ยงต่อโรคไต (เช่น ระดับความดันโลหิตสูง โรคเบาหวาน การใช้สารเสพติด) ได้เป็นอย่างดี
	19. ฉันมั่นใจว่าฉันสามารถหาข้อควรระวังที่จำเป็นเพื่อป้องกันมิให้โรคไตที่ฉันเป็นอยู่แย่ลงกว่าเดิม
	20. ฉันมั่นใจว่าฉันสามารถแสวงแหล่งข้อมูลต่างๆ เพื่อช่วยควบคุมโรคไตของฉันให้ได้ดียิ่งขึ้น
	21. ฉันมั่นใจว่าฉันสามารถค้นหาข้อมูลที่เกี่ยวข้องกับโรคไตผ่านหลายช่องทาง เช่น อินเทอร์เน็ต ใบปลิว นิตยสาร หนังสือพิมพ์ เป็นต้น
Social support	22. ฉันมั่นใจว่าฉันสามารถนำปัญหาไปพูดคุยปรึกษากับครอบครัวและเพื่อนๆ เพื่อช่วยกันแก้ปัญหา
	23. ฉันมั่นใจว่าฉันจะขอความช่วยเหลือ เมื่อฉันรู้สึกเครียดจากการทำงาน หรือจากเรื่องราวต่างๆ ในครอบครัว เพื่อมิให้ความเครียดนั้นส่งผลต่อโรคไตที่ฉันเป็นอยู่

Factors	Items
	24. ฉันมั่นใจว่าฉันสามารถบอกครอบครัว/เพื่อน ให้ทราบถึงแผนการรักษาโรคไตวายเรื้อรังของฉัน (เช่น การควบคุมอาหาร และการรับประทานยา เป็นต้น) เพื่อขอรับการสนับสนุนจากพวกเขา
	25. ฉันมั่นใจว่าฉันสามารถขอความช่วยเหลือจากครอบครัวหรือเพื่อน ๆ ได้ทันทีเมื่อฉันรู้สึกหดหู่ หรือท้อแท้กับการที่เป็นโรคไต

Table D5. The CKD-SM Questionnaire in Thai Version

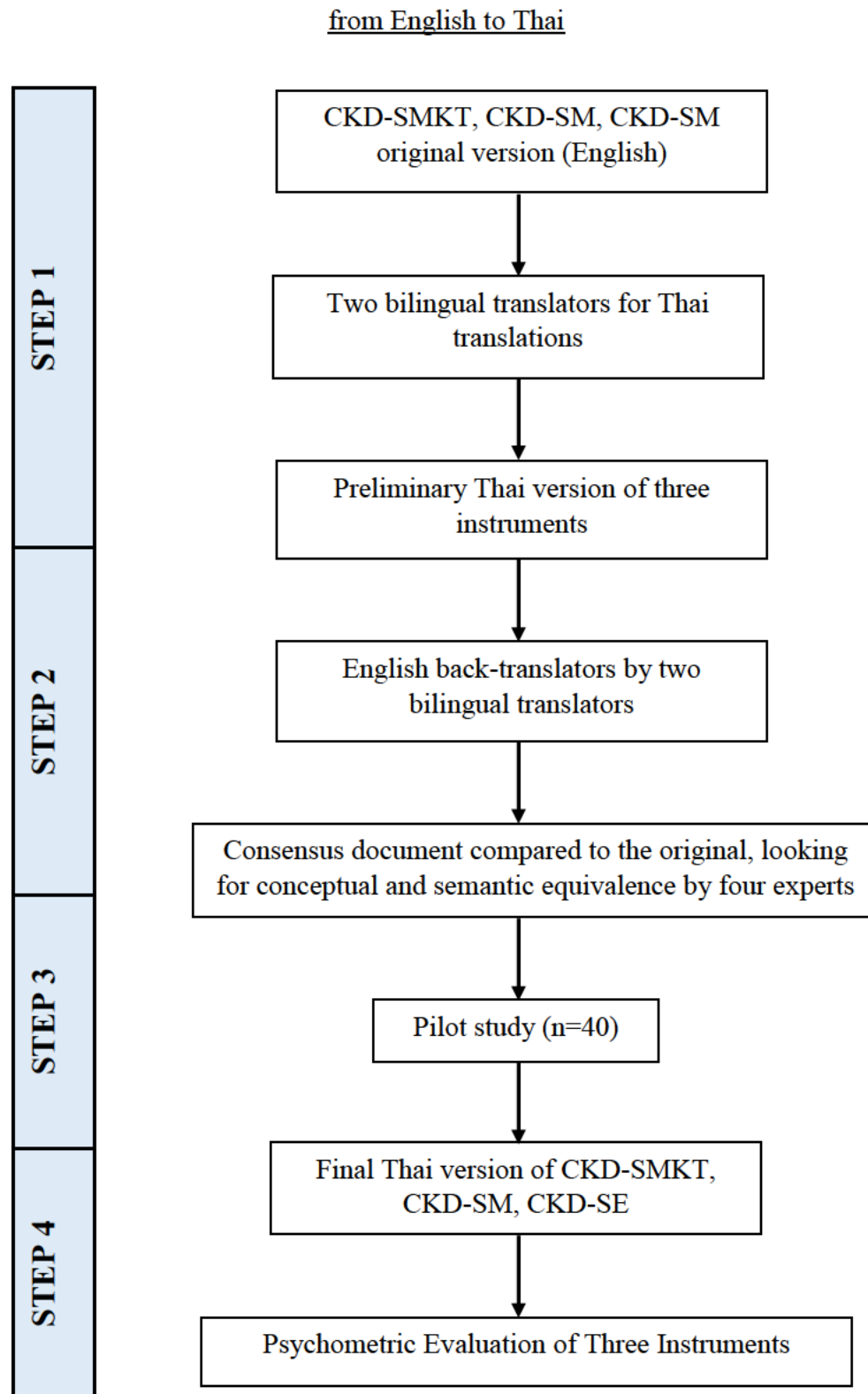| Factors	Items
Self-integration	1. เลือกอาหารที่ไม่ส่งผลเสียต่อไตของท่าน
	2. มีการจัดการโรคไตของท่านให้เข้ากับชีวิตประจำวันของท่าน
	3. เอาใจใส่ในพฤติกรรมบางอย่างของตนเองที่อาจส่งผลกระทบต่อการทำงานของไต
	4. ปรับเปลี่ยนการใช้ชีวิตของท่าน เพื่อลดผลกระทบต่อการทำงานของไต
	5. ดูแลตนเองเพื่อให้ไตของท่านทำงานได้ดี
	6. เลิกพฤติกรรมที่ไม่เหมาะสมต่างๆ ซึ่งส่งผลเสียต่อการทำงานของไต
	7. ควบคุมสัดส่วนและชนิดของอาหารเมื่อต้องกินขณะไปร่วมงานสังคม
	8. ปรับเปลี่ยนวิธีการดูแลโรคไตให้เข้าความเปลี่ยนแปลงที่เกิดขึ้นในชีวิต
	9. จัดเมนูอาหาร ตามคำแนะนำของแพทย์/พยาบาล
	10. ปรับเปลี่ยนวิถีการดำเนินชีวิตเพื่อที่จะรักษาสุขภาพให้สมบูรณ์แข็งแรงที่สุด
	11. เข้าร่วมกิจกรรมกับกลุ่มทางสังคมที่ได้พิจารณาความเหมาะสมแล้ว
Problem-solving	12. คิดหาสาเหตุที่ทำให้ผลการตรวจเลือด/ปัสสาวะ ออกมาไม่ดี
	13. กระตือรือร้นที่จะทำความเข้าใจความหมายของผลการตรวจเลือด/ปัสสาวะ
	14. หาสาเหตุที่ทำให้ค่าความดันโลหิตของท่านสูงขึ้น
	15. แสวงหาแหล่งช่วยเหลือจากที่ต่างๆ มาช่วยในการแก้ปัญหาที่เกิดขึ้น
	16. กระตือรือร้นในการค้นหาข้อมูล เพื่อจัดการตนเองเมื่อเป็นโรคไต
	17. สนใจเกี่ยวกับปัจจัยเสี่ยงต่างๆ ที่ก่อให้เกิดโรคไต
	18. หาคำอธิบายเกี่ยวกับอาการและอาการแสดงที่เกิดขึ้นกับตนเอง
	19. หาวิธีการที่หลากหลายเพื่อใช้ในการวางแผนการรักษาที่เหมาะสม
	20. กระตือรือร้นในการค้นหาแสวงหาข้อมูลเกี่ยวกับโรคไต
Seeking social support	21. เมื่อมีปัญหาหรือกังวลใจเกี่ยวกับโรคไตของท่าน ท่านพูดคุยปรึกษาปัญหากับคนใน ครอบครัว/เพื่อน
	22. บอกคนในครอบครัว/เพื่อน เกี่ยวกับแผนการรักษาโรคไตวายเรื้อรัง
	23. แลกเปลี่ยนประสบการณ์เกี่ยวกับโรคไตของท่านกับผู้ป่วยคนอื่นๆ
	24. แลกเปลี่ยนความรู้สึกผิดหวังและสับสนกับผู้ป่วยหรือคนอื่น ๆ
	25. ขอความช่วยเหลือจากครอบครัว/เพื่อน เมื่อรู้สึกผิดหวังหรือสับสน
Adherence to recommended regimen	26. ไม่ทำตามคำแนะนำของนักโภชนาการเกี่ยวกับการเลือกรับประทานอาหาร
	27. ไม่ออกกำลังกายตามคำแนะนำของแพทย์/พยาบาล
	28. ไม่ทำตามคำแนะนำของแพทย์/พยาบาล ในการปรับเปลี่ยนนิสัยการรับประทานอาหาร
	29. ไม่ควบคุมน้ำหนักตามคำแนะนำของแพทย์/พยาบาล

Table D6. The CKD-SMKT Questionnaire in Thai Version

Factors	Items
Knowledge of SMB in CKD	1. ฉันต้องรู้ระดับความดันโลหิตที่เหมาะสม ว่าควรอยู่ในระดับใด
	2. ฉันต้องกินยาควบคุมความดันโลหิตสูงตามแพทย์สั่ง
	3. ฉันต้องตรวจปัสสาวะอย่างน้อยปีละครั้ง
	4. ฉันต้องตรวจเลือดทุก ๆ 1-2 เดือน
	5. ฉันต้องกินเกลือให้มากขึ้น
	6. ฉันต้องควบคุมน้ำหนักให้เหมาะสม
	7. ฉันต้องไม่กินยาแก้ปวดมากเกินความจำเป็น
DM Knowledge	8. เฝ้าสังเกตระดับน้ำตาลในเลือดของฉันในแต่ละวัน
	9. ทานหวานน้อย
	10. รับประทานยาเบาหวานตามที่แพทย์สั่ง
Self-rating about KD knowledge	11. ท่านคิดว่าท่านรู้มากน้อยเพียงใด เกี่ยวกับสุขภาพไตและความสามารถในการทำงานของไตท่าน

Appendix E

Flowchart of Translation and Back-Translation of Instruments

Figure E1. The Translation and Back-Translation Flowchart of Three Instruments

from English to Thai

STEP 1	CKD-SMKT, CKD-SM, CKD-SM original version (English)
	↓
	Two bilingual translators for Thai translations
	↓
	Preliminary Thai version of three instruments

STEP 2	↓
	English back-translators by two bilingual translators
	↓
	Consensus document compared to the original, looking for conceptual and semantic equivalence by four experts

| STEP 3 | ↓ |
| | Pilot study (n=40) |

STEP 4	↓
	Final Thai version of CKD-SMKT, CKD-SM, CKD-SE
	↓
	Psychometric Evaluation of Three Instruments

Appendix F

Scree Plot of Three Instruments

Figure F1. Scree Plot of the CKD-SMKT
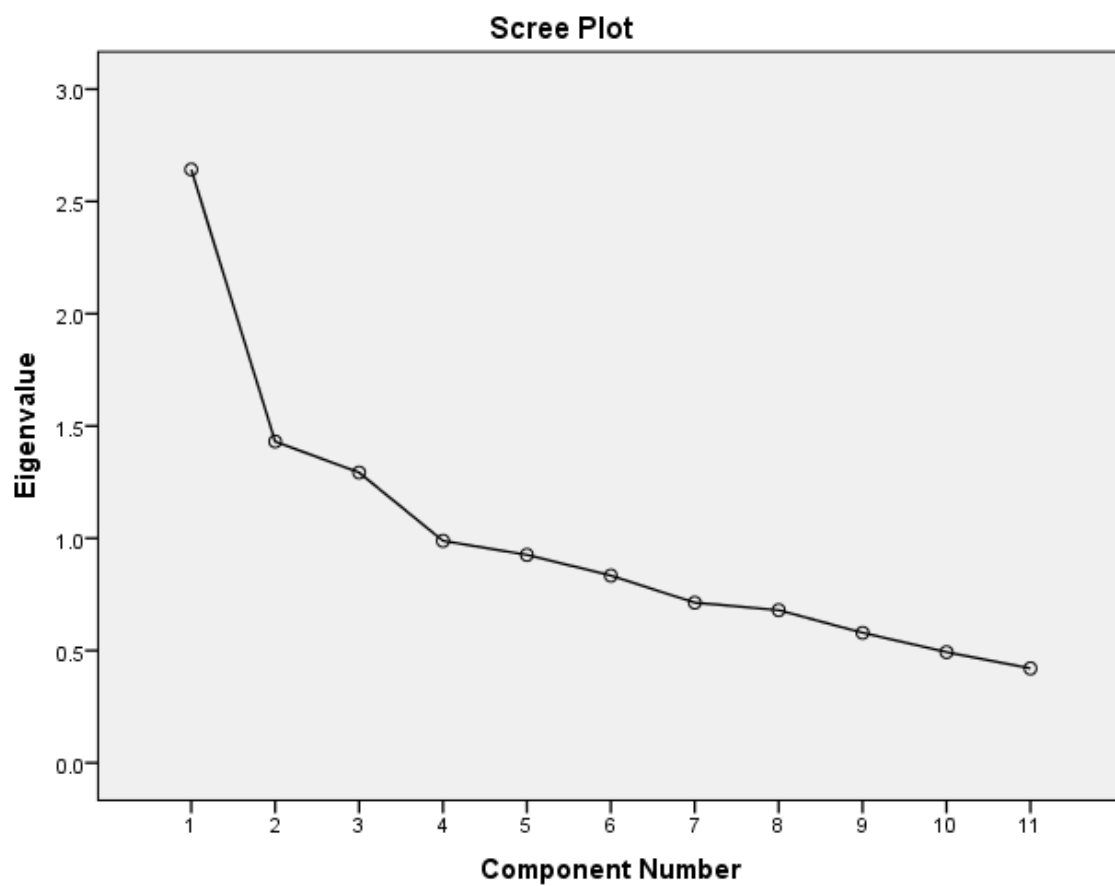
Figure F2. Scree Plot of the CKD-SM
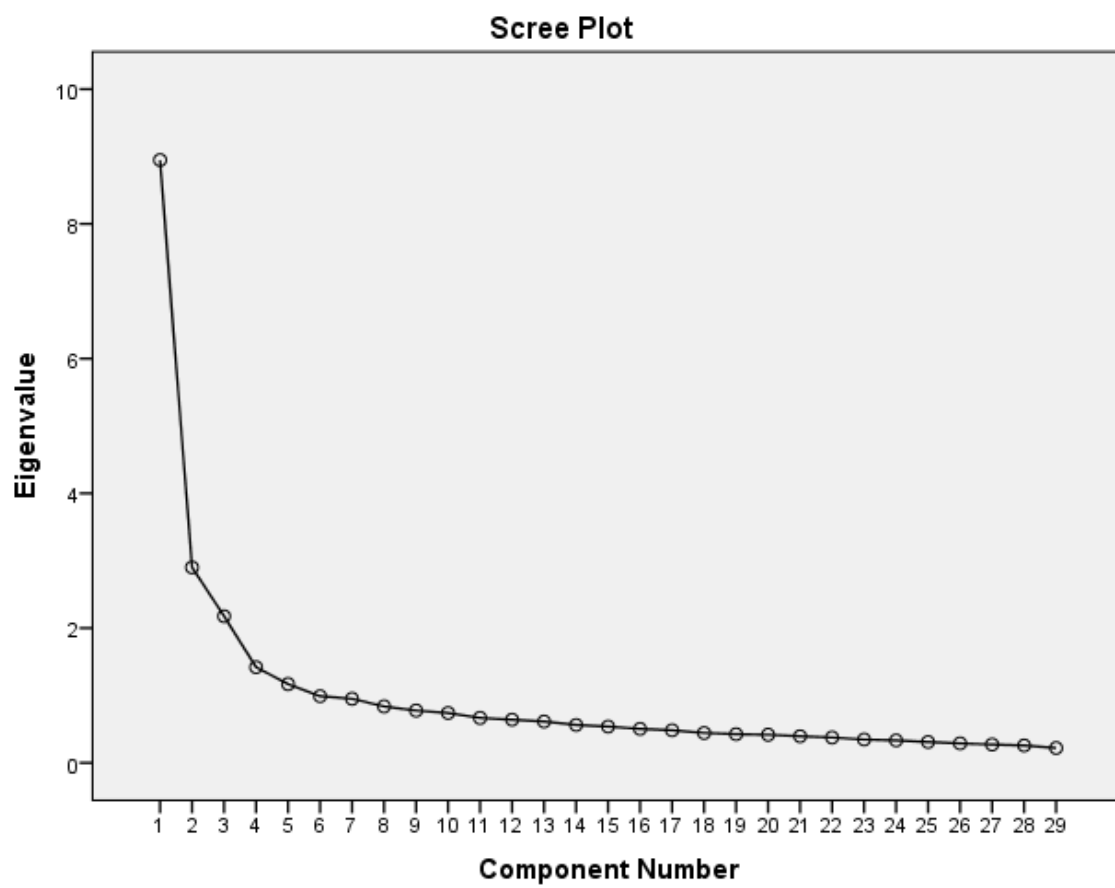
Figure F3. Scree Plot of the CKD-SE
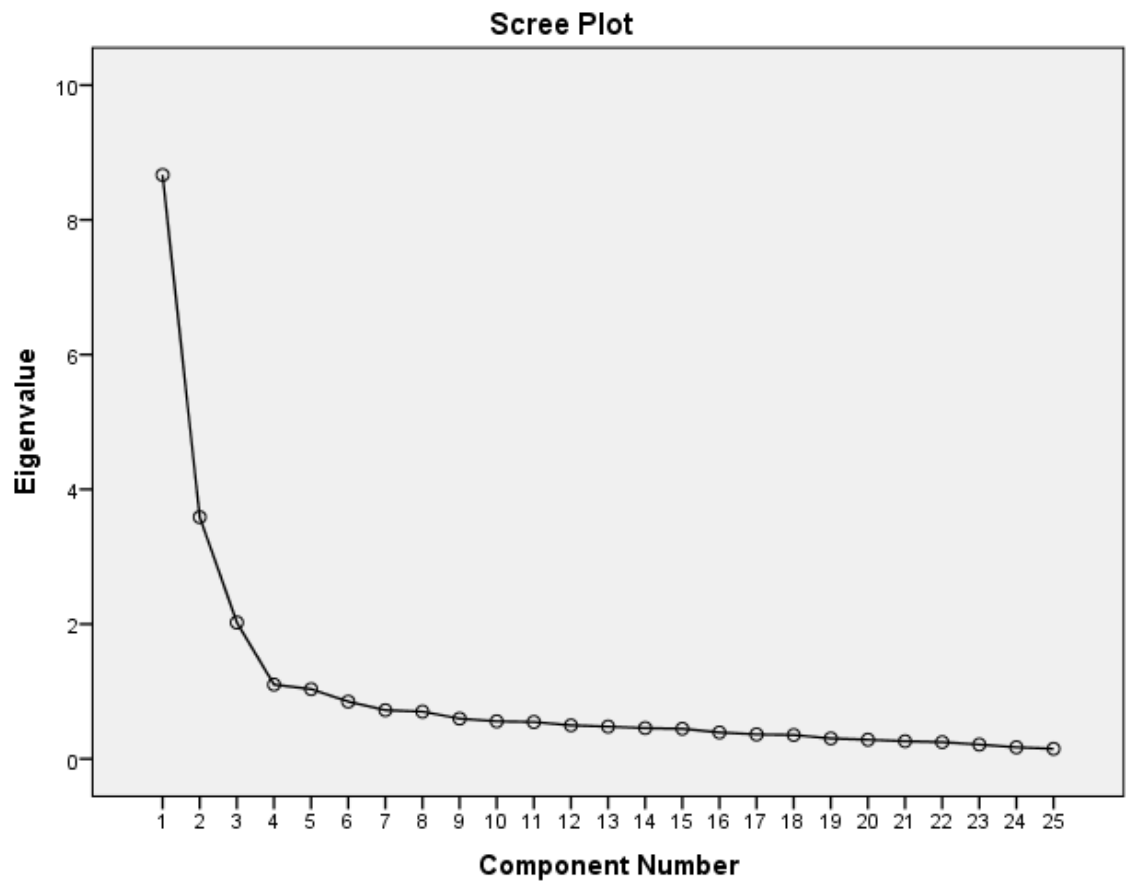
Appendix G

Permissions to Use the Instruments

1.Reprint permission from the Individual and Family Self-Management Theory (IFSMT)

Re: Reprint permission

POLLY A RYAN ·

Wed 2/28/2018 3:59 AM

To: Sorat, Warissara <Warissara_Sorat@student.uml.edu>;

📎 4 attachments (1 MB)

Maierle and Ryan Evaluation of satisfaction and use of electronic intervention for behavior change.pdf; Ryan Integrated Theory of Health Behavior Change CNS.pdf; Ryan Weiss Testing the Integrated Theory HBC Post Partum Weight.pdf; Marek Nurse Care Coordination and Technology Effects on Health Status of Frail Elderly via Enhanced Self-management of Medication 2013.pdf;

Hi Warissara,

Thanks for your email. You do have my permission to use the theory and model for your dissertation. I am attaching a couple articles you may or may not have seen. Also, we have an article accepted by the Journal of Nursing Measurement on the use of substruction process to ensure theoretical validity of measures (doctoral students are often interested in this). I am not sure of the publication date.

While I have left the University of Wisconsin Milwaukee they maintain information about the theory on their web site.

Polly Ryan, PhD, MSN, RN, ACNS, FAAN
Senior Scientist, School of Nursing
University of Wisconsin Madison
Signe Skott Cooper Hall, Room5139
701 Highland Avenue, Madison Wisconsin

Associate Adjunct Professor Medical College of Wisconsin and Clinical Associate Professor, College of Health Sciences. Marquette University

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From: Sorat, Warissara
Sent: Tuesday, February 27, 2018 3:16:20 PM
To: POLLY A RYAN
Subject: Reprint permission

Dear Dr. Ryan

My name is Warissara Sorat. I am a Ph.D. student at School of Nursing, University of Massachusetts Lowell, MA, U.S.A. Currently, I am writing my dissertation tentatively titled predictors of quality of life in Thai adults with early-stage CKD under the direction of my dissertation committee chaired by Professor Barbara Manw. I am interested in using your Individual and Family Self-Management Theory as a guide in my dissertation. I was wondering if I could have your permission to reprint the illustration of the framework and include in my dissertation.

I have admired your outstanding work in this area and look forward to hearing from you.

If you have any question or suggestion, please do not hesitate to contact me. Thank you for your consideration.

2.Permission of the Chronic Kidney Disease Self-Management Knowledge Tool (CKD-SMKT) owner.

3.Permission of the Chronic Kidney Disease Self-Management (CKD-SM) and Chronic Kidney Diseases Self-Efficacy (CKD-SE) owner.

Dear Warissara,

Greetings!
I am pleased that you are interested in the instruments of CKD-SE and CKD-SM we developed.

Attached please find the materials you need. I authorize you to use these two instruments. However, I would remind you that please be sure to cite the reference when you report the study results.

I wish you well in your work and your studies.

Best regards,
Chiu-Chu

Chiu-Chu Lin, PhD RN
Professor,
School of Nursing, Kaohsiung Medical University, Taiwan
http://www.kmu.edu.tw/
Email address:

2017-11-29 18:09 GMT+08:00 Chiu-Chu Lin   >:

4.Permission of the Kidney Disease Quality of Life – 36 Thai Version owner.

คณะแพทยศาสตร์ศิริราชพยาบาล
มหาวิทยาลัยมหิดล
ฝ่ายวิจัย สำนักงานคณบดี
2 ถ.วังหลัง บางกอกน้อย กรุงเทพฯ 10700
โทร.02-4192680 โทรสาร 02-4183307

ที่ ศธ 0517.07/ 2194

วันที่ 6 มีนาคม 2561

เรื่อง ยินดีให้ความอนุเคราะห์การใช้แบบสอบถามและคู่มือการสัมภาษณ์

เรียน นางสาววริศรา โสรัจจ์ นักศึกษาปริญญาเอก

อ้างถึง หนังสือ University of Massachusetts Lowell ลงวันที่ 26 ธันวาคม 2560

       ตามที่ นางสาววริศรา โสรัจจ์ นักศึกษาหลักสูตรปริญญาเอก (Ph. D. in Nursing) สาขาวิชา
การพยาบาล ณ School of Nursing University of Massachusetts Lowell สหรัฐอเมริกา มีความประสงค์
ที่จะขออนุญาตใช้แบบสอบถามและคู่มือการสัมภาษณ์ผู้ป่วยด้วยแบบสอบถาม KDQOL-36 ซึ่งจัดทำโดย
ภกญ.ประภาพร นพรัตยาภรณ์ และ ดร.ภกญ.ฐนิตา ทวีธรรมเจริญ เพื่อนำไปใช้สอบถามกลุ่มตัวอย่าง คือ
ผู้ป่วยไตวายเรื้อรังที่มารับบริการคลินิกโรคไต ของโรงพยาบาลในเขตภาคใต้และภาคอีสาน และมีกำหนด
สอบวิทยานิพนธ์ เรื่อง "Predictors of Quality of Life in Thai adults with Early-Stage Chronic Kidney
Disease" ความละเอียดดังแจ้งแล้วนั้น

       คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล พิจารณาแล้วยินดีอนุมัติให้
นางสาววริศรา โสรัจจ์ เข้าใช้แบบสอบถามและคู่มือการสัมภาษณ์ผู้ป่วยด้วยแบบสอบถาม KDQOL-36 ได้
ตามที่ขอความอนุเคราะห์มา ทั้งนี้ในส่วนของรายละเอียดขอให้ประสานงานโดยตรงได้ที่ หน่วยวิจัยเพื่อ
ขับเคลื่อนนโยบายสุขภาพ โทร.0 2419 2633, 2635

       จึงเรียนมาเพื่อโปรดทราบ

ขอแสดงความนับถือ

(ศาสตราจารย์ แพทย์หญิงสุวรรณี สุรเศรณีวงศ์)
รองคณบดีและผู้อำนวยการโรงเรียนแพทย์ศิริราช
ปฏิบัติงานแทนคณบดีคณะแพทยศาสตร์ศิริราชพยาบาล

สำเนาเรียน รองคณบดีฝ่ายวิจัย, หน่วยวิจัยเพื่อขับเคลื่อนนโยบายสุขภาพ

Appendix H

Recruitment Flyer for Participants

Taking care of your kidneys is important. We would like to know about your quality of life and how you take care of yourself. That way, you can help nurses and doctors to provide the best care that they can!

You are invited to participate in the study of quality of life in Thai adults with chronic kidney disease. This survey is being conducted by a Thai nurse who is completing a PhD degree at the University of Massachusetts Lowell, USA

What do you get from this study? You will receive a free breakfast and a new pill box in appreciation for participating in this study. The results of this study will help develop a clinic program to help persons with chronic kidney disease to improve their health behavior if needed, as well as to improve their quality of life.

What are the Risks of Being in this Study? There are no known risks. We will protect your identity and not collect your name on the survey itself. Your nurses, doctors and clinic staff will not be allowed to read your answers; only the study nurse will see the answers. You can stop the study at any time. Participating or not participating in this study will not affect the care you receive in the clinic in any way!

You are an important person for helping in this study

If you have a question or would like to participate in this study, please contact

Miss Warissara Sorat, student researcher of this study, Tel. _____ *or E-mail:* _____

Appendix I

Recruitment Process for Clinic Staff

Guidelines for Screening Research Participants for Recruitment

Study Title: Predictors of Quality of Life in Thai Adults with Early-stage Chronic Kidney Disease
Principal Investigator: Professor Barbara Mawn, University of Massachusetts Lowell, USA
Student Investigator: Warissara Sorat

Study Purpose: The purpose of this research study is to identify factors that influence the quality of life among Thai adults with early stages of chronic kidney disease (CKD). These factors will include: individual demographic and family factors, kidney disease knowledge, depression, self-management behavior and self-efficacy.

Inclusion Criteria: To participate in this research, participants must be a Thai adult, 18 years old or older, who has been diagnosed with stage 1 to 3 of chronic kidney disease (eGFR > 30 ml/min/1.73m² and less than 120-130 ml/min/1.73m²) at least one year before the study. The participant has no visual impairment that would interfere with completing a survey. Eligible participants must have a Thai nationality with the ability to understand and read Thai and must be willing to participate in this study. Also, an eGFR level must be available within the past year.

Exclusion Criteria: Persons diagnosed with CKD stages 4-5 (eGFR < 30 ml/min/1.73m²), pregnancy, cognitive impairments that could interfere with the ability to complete the survey would exclude persons from participating in this study. Persons who are not Thai are excluded from this study.

Participation in this study involves: Sitting in a private waiting area and responding to the survey questionnaire using a pen or pencil for approximately 30 minutes.

Enrolled: A participant is considered enrolled in the research study once the participant signs the consent form.

Withdrawal: A subject is considered to be withdrawn from the study if he/she decides to stop completion of the survey or decides not to start the survey after consent is signed. Note: A participant may voluntarily cease participation at any time after the consent document is signed.

Study Incentives: Each participant will receive a breakfast meal and a small medicine box as a token of appreciation for participation.

Protocol when Ms. Sorat is Present on Site: A designated clinic nurse will be trained about the study protocol by Warissara, Sorat, RN, M.S., the Ph.D. student researcher, in advance of the study start date. The student researcher will rotate being on site for recruitment at each of the four clinics involved in the study. When Ms. Sorat is on site – she will collaborate with the designated clinic nurse to examine the roster of patients arriving that day to determine who is eligible for the study. Those who are eligible will receive a briefly written flyer with a summary of the study and also will speak with Ms. Sorat if they are interested in participating. If they are eligible and interested, they will meet with Ms. Sorat in an assigned clinic room to review the informed consent and the protocol. If they agree to participate and sign the consent, they will begin the paper and pencil survey. This may take up to 30 minutes. She will remain nearby in case they have any questions or do not understand any parts of the survey, or they wish to stop the study, which they can at any time. Once they have completed the survey, they will be invited to share in a healthy breakfast, supplied by Ms. Sorat and will receive a small medicine weekly planner box. If the doctor is ready for them while they are taking the survey, they will be asked to complete the survey after the doctor's examination. Ms. Sorat will also ask to look at their medical book to see what their latest eGFR level is. If it is not recorded and verified signed by clinic personnel, she will consult the medical record. Each participant will receive a unique code written on the survey in advance to identify him/her; no names will be recorded.

Protocol when Ms. Sorat is NOT Present on Site: As noted, a designated clinic nurse will be trained by Warissara, Sorat, RN, M.S., the Ph.D. student researcher, in advance in terms of the protocol. When Ms. Sorat is not on site, the designated clinic nurse will be asked to identify eligible participants and inform them of the study. They will receive a flyer to read and if interested, will go to a private clinic room to review the informed consent with the designated clinic nurse. If they agree to participate and sign the consent which will be reviewed by the clinic nurse, they will be given the survey and a pencil with instructions to read each question carefully and respond in the best way that describes them. They will be informed there are no "right" or "wrong" answers. They will be told by the nurse that he/she will not be reviewing the answers; only the nurse researcher who returns later that week will see their answers. The nurse will periodically return to the room and give instructions as to where she will be in case there are any questions about the survey. The study participants will be told they can stop the survey at any time for any reason and it will not interfere with their clinical care in any way whether they complete the study or not. Once they complete the survey, it will go immediately into an envelope, provided in advance by Ms. Sorat which gets sealed and

then placed in a securely locked box at the clinic site provided by Ms. Sorat. The clinic designated nurse and staff will not review any of the recorded answers prior to placing it in the box. After completion of the survey, the participants will receive breakfast, set up in advance by Ms. Sorat and a pill box, in appreciation of their time and contributions to the study.

Benefits of Participation: This study will not have a direct benefit for participants, but answers from participants can be used to increase options for nurses and health care providers to facilitate improved self-management behaviors and quality of life in people living with CKD. The results of this study will provide information on strategies, to help manage self-care behaviors and how they can improve quality of life. Findings may be used by nurses, clinic staff, and policymakers for developing interventions or programs that can assist in CKD management.

The nurse researcher will present the results of the study after its completion at each cooperating site. No individual information will be shared; all data will be aggregated. If any participant's survey indicates that they have depression, only the aggregate results of each clinic site will be reported separately for this one scale in the event there is a large number of participants who might require additional screening, although individual names will not be identified.

Researcher Contact Information:

This dissertation research is conducted for the requirements of a Ph.D. in Nursing by Warissara Sorat, RN, M.S. under the direction of Professor Barbara Mawn, University of Massachusetts Lowell, USA. Ms. Sorat will make an appointment at each participating site to review the study and train the identified designated collaborating nurse.

If you have additional questions or concerns, please contact Warissara Sorat at:

- Phone:

- Email: