Positive Mental Health and Self-Efficacy in Management of Chronic Kidney Disease: a Mixed-Methods Study in a Rural, Minority Population

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Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in the Duke Global Health Institute in the Graduate School of Duke University

2017
ABSTRACT

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Abstract

**Background:** Chronic kidney disease (CKD) is a progressive, irreversible condition that affects 15% of the US population, causing poor health outcomes and enormous social and economic burden. Rural and minority populations bear significant disparity in CKD outcome. Self-management of CKD and comorbid conditions is important in slowing the progression of CKD and preventing end stage renal disease.

**Methods:** This study uses a mixed-methods study design to investigate the association between positive mental health and self-efficacy and to qualitatively explore the dimensions of positive mental health that influence self-efficacy. A cross-sectional study involving 257 individuals was conducted from May to July 2016. Quantitative data collection involved administration of a questionnaire and clinical assessment of kidney function. Participants were asked about their medical history and attitudes on the chronic disease management (self-efficacy for chronic disease management, coping, social support, and perceived stress), and mental health and illness (positive mental health, depression, anxiety, and PTSD). Ordered logistic regression was used to assess the relationship between positive mental health and self-efficacy, controlling for depression, the interaction between positive mental health and depression, and other covariates. Qualitative data collection involved conducting six focus group discussions...
involving 35 individuals who experience significant life impact due to kidney disease to explore facilitators and barriers of CKD self-management.

**Results:** Individuals with flourishing positive mental health were significantly more likely to have high self-efficacy compared to individuals with languishing positive mental health (p < 0.001, Figure 10). Overall, in the fully adjusted model, the proportional odds ratio of improved self-efficacy was 2.89 (95% CI 1.29-6.47), all other covariates held constant. For individuals with CKD, the proportional odds ratio of improved self-efficacy was 7.67 (95% CI 2.42-24.29), all other covariates held constant. For individuals without CKD, positive mental health was not a significant predictor of self-efficacy (p-value > 0.05). Qualitative data showed support for the broaden and build theory as a possible mechanism linking positive mental health and CKD self-management. Positive emotions derived from positive mental health allowed individuals to acquire personal and social resources such as resilience, optimism, and social support that encourage self-management of CKD.

**Conclusion:** These findings suggest that positive mental health should be incorporated into existing CKD self-management programs to fully address the psychosocial needs of patients and effectively encourage sustainable behavioral changes for CKD self-management. Future efforts should focus on identifying positive mental health interventions that build on the strong familial relationships, and spiritual and
religious organizations in the community to improve positive mental health in this population.
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1. Introduction

1.1 Chronic kidney disease in the United States

Chronic kidney disease (CKD) is a significant public health problem in the United States, affecting 26 million adults, or 15% of the adult population [1]. An additional 15% of the population have moderately high or greater risk of developing CKD [1]. CKD is a progressive condition in which kidney function is lost gradually over time. CKD is classified into five stages by glomerular filtration rate, with stage 1 CKD being normal or high GFR and stage 5 being end stage renal disease (ESRD). In the U.S., more than 670,000 individuals have ESRD, which is a 3.5% increase from 2013 [1]. Of these individuals, 468,000 are receiving dialysis treatment and 193,000 live with a functioning kidney transplant [1]. The prevalence of CKD and ESRD are expected to increase due to an aging population [1].

There is substantial geographic, ethnic and racial, and socioeconomic disparity with respect to the prevalence and incidence in both CKD and ESRD [1-6]. Across the United States, the adjusted incidence rate of ESRD ranged from 83 to 4172 per million person-years (Figure 1) [1], and adjusted prevalence rates of ESRD ranged from 339 per million to 7,134 per million (Figure 2) [1]. Southeastern North Carolina has one of the highest incidence rates and prevalence of ESRD in the U.S. (Figure 1 and 2). Compared with Caucasians, the prevalence of ESRD is about 3.7 greater in African Americans and 1.4 times greater in Native Americans (Figure 3) [1]. In addition to race and ethnicity,
populations living in low socioeconomic status are associated with greater prevalence and incidence of CKD, greater risk for ESRD, and greater mortality rates [3].

The cost of treating CKD is an enormous economic burden. In 2014, over $50 billion of Medicare spending, or 20% of the all Medicare spending, were used by beneficiaries with CKD [1]. $32.8 billion, or 7.2%, of total Medicare fee-for-service spending, were used by ESRD patients [1]. Recognizing the social and economic impacts of CKD, the US Department of Health and Human Services has created strategic goals in the Healthy People 2020 agenda to reduce the incidence of CKD and improve health outcomes in individuals with CKD. Critical to the success of such programs and others aimed at eliminating pernicious ethnic and racial CKD disparities will be interventions that promote disease self-management, which are a crucial set of skills (e.g. medication adherence, communication, lifestyle changes, etc.) shown to slow the progression to kidney failure [7, 8].
Figure 1: Map of the adjusted incidence rate (per million/year) of ESRD, by Health Service area in the U.S. population, 2014. Southeastern North Carolina is highlighted in the red box. Incidence rate was adjusted for age, sex, and race. Data source: USRD ESRD Database.

Figure 2: Map of the adjusted prevalence (per million) of ESRD, by Health Service area in the U.S. population, 2014. Southeastern North Carolina is highlighted in the red box. Incidence rate was adjusted for age, sex, and race. Data source: USRD ESRD Database.
1.2 Self-management of CKD and other chronic diseases

For other chronic diseases such as diabetes, heart failure, and hypertension, self-management has been a major component in many patient education and health promotion programs [12, 13]. Self-management is defined as the active engagement with the day-to-day self-care tasks that individuals with chronic disease participate in over the length of the illness, often lasting throughout the entire lifetime [9, 10]. Self-management may be categorized into three tasks: medical management, role management, and emotional management (Figure 4) [9, 14]. The medical management task involves behaviors such as medical adherence, health monitoring, and maintaining
diet and physical activity. Role management involves creating and maintaining new meaningful behaviors or life roles within the limitations of chronic illness. For example, following the diagnosis of a chronic disease, hobbies or lifestyles may need to be adapted to fit with a new set of self-care principles. The final set of tasks is emotional management. Individuals must learn how to manage and cope with emotions such as anger, fear, frustration, and depression that commonly arise from dealing with chronic disease. Self-management skills, including problem solving, decision making, resource utilization, formation of a patient-provider partnership, action planning, and self-
tailoring, are the core skills that are critical to achieving medical management, role management, and emotional management tasks [9].

Figure 4: Three self-management tasks and six core self-management skills, as proposed by Corbin and Strauss.

Following the three tasks framework for self-management, interventions to improve self-management need to incorporate components to address medical management, role management, and emotional management. However, the majority of interventions address mostly the medical management aspect through patient education and training, without addressing the role and emotional management aspects [9, 12, 13]. Despite this, there is strong evidence to show that self-management interventions improve clinical outcomes such as reduction in glycosylated hemoglobin levels and
blood pressure, and ultimately fewer hospitalizations and days in the hospital, and reduced healthcare costs [12, 13, 15, 16].

The six core self-management skills outlined by Corbin and Strauss align closely with the domains of self-management that are important for individuals with CKD or ESRD (Figure 4) [9]. Self-management may be especially important and complex for individuals with CKD due to multiple comorbidities such as diabetes, hypertension, cardiovascular disease, and anemia [1]. Daily medical management tasks for CKD may include tobacco avoidance, NSAID avoidance, physical exercise, diet modifications, blood sugar monitoring, blood pressure monitoring, and adherence to prescribed medication, dietary, and lifestyle regimens [11]. Role management and emotional management tasks are especially important for patients on dialysis, who experience significant and often irreversible life disruptions.

Central to promoting or developing optimal self-management skills, which are necessary for performing the core tasks of self-management, is the concept of self-efficacy, defined as the patient’s confidence in his or her ability to carry out the self-management skills [9]. Patient awareness of CKD status is not associated with risk reduction behaviors, suggesting that there are additional barriers to self-management of CKD [11]. In individuals with ESRD, self-efficacy has been shown to be directly correlated with self-management skills and behaviors [17-19]. African Americans have
been found to have lower levels of general self-efficacy compared to Caucasians, which may in part be due to socioeconomic factors [20].

Theory-driven interventions to improve the self-management of individuals with Stages 1 to 4 CKD is an emerging field in nephrology [21]. Overall, while these interventions provided support in medical management through patient education, very few addressed patient needs in the role and emotional management of CKD [21]. Other than one intervention that used motivational interviewing to encourage medication adherence, few interventions addressed the psychosocial needs of the patient in self-management of CKD [11].

1.3 Information-motivation-behavioral skills model

One model useful in developing targeted interventions for promoting self-management of CKD is the information-motivation-behavioral skills (IMB) model (Figure 5). The IMB model suggests that information, motivation, and behavioral skills are the three core determinants for initiating and maintaining health behaviors such as those required for self-management [22]. Self-efficacy is a critical component for optimal self-management in the IMB model and is often measured as one of the behavioral skills in interventions for self-management.

The information-motivation-behavioral skills model can be adapted for CKD self-management (Figure 5). Information necessary for CKD self-management include health knowledge, health literacy, diet or food knowledge, and physical activity
knowledge. The motivation necessary for CKD self-management include personal motivation and personal health beliefs, and social motivation such as perceived social norms of self-management and perceived social support. Acquiring information and motivation leads to increased self-efficacy for CKD management, which is critical in learning and applying self-management skills. Behavioral skills necessary for optimal health outcomes include self-management skills such as communication, partnership in care, self-care activities, and self-advocacy [19]. Individuals who have acquired the information, motivation, and behavioral skills should be more likely to accomplish the health behaviors for CKD self-management, which include medication and treatment adherence, glycemic control, blood pressure control, diet and fluid control, and physical activity.

**Figure 5: Information-motivation-behavioral skills model for CKD self-management. Behavioral skills for CKD self-management adapted from Curtin [19].**
The IMB model has been applied extensively for behavior change in urban, adolescent to young adult populations and not as commonly used in rural, elderly populations. The IMB model for CKD self-management should be adapted to address the contextual barriers for reception of information, motivation, and behavioral skills that are specific to each population. In rural, multiracial regions such as southeastern North Carolina, it is even more critical to incorporate cultural beliefs and individual-level factors such as socioeconomic and psychosocial needs to encourage behaviors in CKD self-management.

1.4 The two continua model of mental health and illness

One potentially key component impacting self-efficacy is positive mental health, which has not been widely explored. Positive mental health affects the way individuals obtain information and are motivated to seek out additional skills and knowledge; therefore, within the IMB model, it may be a critical factor influencing self-efficacy. Recent research suggests that positive mental health is associated with lower mortality in healthy and diseased populations, although the mechanism of the association is unclear [30-32]. Positive mental health, along with mental illness, is a central construct in the two continua model of mental health (Figure 6). This model proposes that mental health and mental illness are related but distinct constructs that together describe the state of mental wellbeing [34, 35]. One can have a high level of positive mental health
while also having mental illness and vice versa. Complete mental health requires both the absence of mental illness and flourishing mental health.

**Two Continua Model of Mental Health and Mental Illness**

![Image of Two Continua Model](image)

**Figure 6**: The two continua model of mental health and mental illness. Adapted from McGill University [33].

### 1.4.1 Positive mental health

Positive mental health, composed of emotional, psychological, and social wellbeing, evolved from the traditions of hedonic and eudaimonic wellbeing (Figure 7). Hedonic wellbeing concerns with the attainment of pleasures (emotional wellbeing), while eudaimonic wellbeing relates to self-actualization and relationships with others (psychological wellbeing and social wellbeing, respectively) [34]. Positive mental health consists of wellness in the emotional, psychological, and social dimensions. Each
dimension of wellbeing is defined by 14 related but distinct aspects of wellbeing. Emotional wellbeing consists of the emotions of happiness, interest in life, and satisfaction in life. Social wellbeing consists of social contribution, social integration, social actualization, social acceptance, and social coherence. Psychological wellbeing consists of self-acceptance, environmental mastery, positive relations with others, personal growth, autonomy, and purpose in life. Flourishing positive mental health is defined as the optimal functioning in both hedonic and eudaimonic domains of happiness, and languishing positive mental health is defined as the poor functioning in hedonic and eudaimonic domains of happiness. Those who are have neither flourishing or languishing positive mental health have moderate positive mental health [34].

**Figure 7: Positive Mental Health.** Positive mental health consists of three domains: emotional wellbeing, social wellbeing, and psychosocial wellbeing.
1.5 Broaden-and-build theory

One possible mechanism to explain the relationship between positive mental health and improved health outcomes is the broaden-and-build theory of positive emotions [36]. Central to this theory is the concept that emotions are associated with specific action tendencies. For example, fear is associated with the urge for the fight-or-flight response, “anger is associated with the urge to attack, and disgust is associated with the urge to expel” [36]. In response to negative events and emotions, specific action tendencies allow an individual to respond quickly and decisively by limiting the momentary thought-action repertoire [36].

The broaden hypothesis states that in contrast to negative emotions, positive emotions “broaden the momentary thought-action repertoires, widening the range of the thoughts and actions that come to mind.” For example, the feeling of interest “creates the urge to explore, take in new information and experience, and expand the self in the process” [36]. Thus, responses associated with positive emotions, including play, explore, savor, and integrate, broaden one’s usual thought patterns, actions, and perspectives. Also in contrast to negative emotions, positive emotions have long-term impacts. Whereas negative emotions tend to narrow thought-action patterns to generate immediate responses, positive emotions create broadened mindsets, which have indirect and long-term beneficial impacts. Specifically, Fredrickson posits that positive emotions build personal resources including intellectual, social, psychological, and physical
resources. Importantly, these resources can be accrued and exist after the positive emotion subsides. These resources are useful for optimal management of negative events, leading to health and fulfillment, which in turn create positive experiences that continue the cycle. Taken together, the broaden-and-build theory of positive emotions hypothesizes that positive emotions broaden one’s usual thought-action repertoire, leading to new thoughts, activities, and relationship. These new experiences build personal resources that allows the individual to better adapt to new circumstances, leading to enhanced health, survival, and fulfillment.

**Broaden-and-Build Theory of Positive Emotions**

![Diagram of Broaden-and-Build Theory]

- **Enhanced health, survival, fulfillment**
- **Building enduring personal resources**
- **Novel thoughts, activities, relationships**
- **Broadening**

Figure 8: Broaden-and-build theory of positive emotions. Adapted from Fredrickson and Cohn [36].

The broaden-and-build theory has significant support from randomized control trials [41-45]. In addition, the theory has also been examined by varying age and cultural
contexts using observational studies [46-50]. Broaden-and-build theory has also served as the conceptual framework for interventions in increasing positive mental health [51-54].

### 1.6 Rationale and study aims

The two continua model of mental health and illness has not been considered in the context of self-management of CKD. Although extensive research has shown that mental illness (e.g. depression, PTSD, anxiety disorder) is negatively associated with self-efficacy, no work has been done to examine the association between positive mental health and self-efficacy [37-40]. Given the importance of psychosocial factors, such as self-efficacy, in the self-management of chronic diseases, it is critical to examine the role of positive mental health, particularly in relation to information, motivation and influences on self-efficacy. At the same time, few studies have explored the psychosocial factors affecting self-management in a rural, elderly, multiracial population with high prevalence of chronic disease. This research project seeks to explore the correlation between positive mental health and self-efficacy of CKD self-management in Robeson County, North Carolina, a rural, multiethnic region with high prevalence of CKD, hypertension, and diabetes.

The questions to be addressed in this study are:

1. How does self-efficacy differ between individuals with CKD and without CKD?
2. Is there an association between positive mental health and self-efficacy in individuals with CKD and without CKD?

3. How does positive mental health influence self-efficacy?

We hypothesize that self-efficacy is different in individuals with CKD compared with those without and that positive mental health is associated with self-efficacy for self-management of chronic disease. This study will use a mixed-methods approach to investigate a possible association between positive mental health and self-efficacy and to qualitatively explore the dimensions of positive mental health that influence self-efficacy. Qualitative data will also allow the identification of possible mechanisms through which positive mental health impacts self-efficacy. Finally, the study aims to contextualize findings within the framework of the IMB model for CKD self-management. Findings from this study have the potential to inform interventions for chronic disease self-management, especially in a rural, minority, and elderly population.
2. Methods

2.1 Setting

Robeson County is an ethnically and racially diverse county located in rural southeastern North Carolina. Geographically, Robeson County is large (950 sq. miles), agricultural, and rural, with fewer than 150 persons per square mile. In 2015, Robeson County has a population of 134,197 and is a majority-minority county, with the American Indian, African American, and Hispanic population constituting 72.5% of the population [56]. The median household annual income is $30,000, and 30.6% of the population lives in poverty, making it the poorest county in North Carolina [56]. Robeson County is home for the Lumbee Indian of North Carolina, the ninth largest native American tribe in the U.S., and the largest tribe east of the Mississippi River [57]. Diabetes and hypertension prevalence is twice the state average, and CKD is a leading cause of death [55].

The study participants were recruited from the Southeastern Regional Health System, which provides more than 70% of all outpatient healthcare in Robeson County. Participant interviews were conducted in office spaces at Southeastern Health and at the University of North Carolina at Pembroke, a public university with strong historical ties to the local Native American community.
2.2 Participants

Using the electronic health record system at SRMC, we identified 61,231 unique individuals who received outpatient care at SRMC from January 1st, 2014, to March 15th, 2016 (Figure 9). These individuals were stratified by race, age, gender, and CKD status (presumed/definite CKD, very high or high risk for CKD, unknown CKD status, and CKD absent/presumed absent). CKD was defined as an eGFR < 60ml/min/m² and/or albuminuria (defined as microalbumin/Cr ratio > 30mg/g Cr or 24H urinary protein > 30mg). Stratified random sampling was used to select 2500 potential participants for recruitment, with a 5:1 over sampling of those with presumed/definite CKD to ensure a representative sampling of participants with CKD. The inclusions criteria were (1) adults at least 18 years of age who is able and willing to consent; (2) receives primary care within the SRMC Health System; (3) resides in Robeson Co, Cumberland Co, Bladen Co, Scotland Co, Hoke Co, or Columbus Co. Female participants who self-report being pregnant were excluded from the study.
We obtained permission from primary care physicians to mail initial participant recruitment letters. Participants were then informed by mail that they have been chosen to participate in the study and provided information about the purpose, risks, and benefits of the study. If the participant failed to respond to the letter, they were then contacted by phone to encourage participation and screen for inclusion and exclusion.
criteria. Participants were considered nonresponsive after three failed attempts to contact them through the phone. If the participant agreed to participate in the project, an appointment was scheduled for a research staff to obtain informed consent and administer the study survey.

### 2.3 Quantitative data collection

Trained interviewers described the study in detail to the potential participants who were screened by phone. If the participant was interested in enrolling in the study, we scheduled an in-person appointment with the participant. The interviewer obtained informed consent, then collected data via questionnaires administered by interviewers trained in administering the questionnaire. Participants were asked about their medical history and attitudes on the chronic disease management (self-efficacy for chronic disease management, coping, social support, and perceived stress), and mental health and illness (positive mental health, depression, anxiety, and PTSD). Participants also provided blood and urine sample to assess their kidney function. Data collection occurred between May and July 2016. Research staff met with participants at UNC Pembroke, SRMC, or during home visits. All informed consent materials and questionnaires were read aloud. Laptop computers were used to record participant responses directly into a secure REDCap (Research Electronic Data Capture) database hosted at Duke University. On average, the informed consent procedure and survey administration required 1.5 hours to complete. At the completion of the survey,
participants were compensated with a $35 Visa cash card to cover transportation costs and time.

This study was approved by the Institutional Review Board of Duke University, in Durham, North Carolina (#Pro00066073); the Institutional Review Board of the University of North Carolina at Pembroke, in Pembroke, North Carolina (#16.211); and the Institutional Review Board of Southeastern Regional Medical Center, in Lumberton, North Carolina (#16-04-017). The Lumbee Tribal Council endorsed the study.

2.4 Measures

We collected demographic information including age, race, sex, relationship status, level of education, employment status, income, and self-reported medical history. Poverty status was defined using the federal poverty line by household size. We confirmed CKD status for all individuals enrolled by obtaining lab measures of serum creatinine and urine albumin. Awareness of CKD was defined as self-reported CKD among those confirmed to have CKD.

2.4.1 Self-efficacy

Chronic disease management self-efficacy was measured by the Self-Efficacy for Managing Chronic Disease 6-Item Scale from the Stanford Patient Education Research Center [58]. Participants were asked about their confidence in symptom control and role functioning (e.g., "How confident are you that you can keep the fatigue caused by your disease from interfering with the things you want to do?"), the emotional functioning
(e.g., "How confident are you that you can keep the emotional distress caused by your disease from interfering with the things you want to do?"), and self-care behaviors (e.g., "How confident are you that you can do the different tasks and activities needed to manage your health condition so as to reduce your need to see a doctor?"). Responses were collected using a visual analogue scale ranging from 1 (not at all confident) to 10 (totally confident). Values reported for the six items were averaged to obtain the scale score. Participants were rated having low, medium, and high levels of self-efficacy within the study population by tertiles.

2.4.2 Positive mental health

The Mental Health Continuum-Short Form was used to assess emotional, social, and psychological well-being in the past 30 days [59]. Three items queried the frequency of positive functioning in the emotional domain (happy, interested in life, and satisfied), five items queried the frequency of positive functioning in the social domain (social contribution, social integration, social actualization, social acceptance, and social coherence), and six items queries the frequency of positive functioning in the psychological domain (self-acceptance, environmental mastery, positive relations with others, personal growth, autonomy, and purpose in life). Responses are rated from 0 (never) to 5 (every day). Participants were rated having flourishing, moderate, or languishing positive mental health using the guidelines developed by Keyes.
2.4.3 Depression

The Patient Health Questionnaire Depression Scale (PHQ-8) was used to screen participants for depression [60]. PHQ-8 assesses the frequency of eight out of nine diagnostic criteria for major depression as described by the DMV-IV (e.g., "How often during the past 2 weeks were you bothered by little interest or pleasure in doing things?" Responses range from 0 (not at all) to 3 (nearly every day). Participants were rated no depression, mild depression, moderate depression, moderately severe depression, and severe depression following the PHQ-8 screening guideline.

2.4.4 Stress

The Global Perceived Stress Scale from the Jackson Heart Study was used to assess perceived stress [66]. The scale is an 8-item self-report measure of global perception of chronic stress levels in domains such as work, family, caregiving, etc. Responses range from 1 (not stressful) to 4 (very stressful). Values reported for the eight items were averaged to obtain the scale score.

2.4.5 Social support

Social support was measured by the eight-item modified Medical Outcomes Study Social Support Survey (mMOS-SS) [61]. mMOS-SS measures social support from the tangible support (e.g., "If you needed it, how often is someone available to help you if you were confined to bed?") and emotional support (e.g., "If you needed it, how often is someone available to love and make you feel wanted?") domains. Responses range from
0 (never) to 5 (all the time). Values reported for the eight items were averaged to obtain the scale score.

2.4.6 PTSD

Participants were screened for PTSD using the four-item Primary Care PTSD Screen [62]. Participants were asked if they have experienced PTSD symptoms in the past month (e.g. In your life, have you ever had an experience that was so frightening, horrible, or upsetting that, in the past month, you have had nightmares about it or thought about it when you did not want to?”). The screen is considered positive if the participant answered yes to three or more items.

2.4.7 Anxiety

Anxiety was assessed using the seven-item generalized anxiety disorder scale (GAD-7) [63]. Participants were asked about frequencies of feeling anxious in the last 2 weeks (e.g. "Over the last two weeks, how often have you been bothered by feeling nervous, anxious or on edge?”) Responses range from 0 (not at all) to 3 (nearly every day). Participants were rated no anxiety, mild anxiety, moderate anxiety, and severe anxiety following the GAD-7 standardized scoring guidelines.

2.4.8 Coping

Brief COPE was used to assess the reliance on coping responses [64]. Brief COPE is a 28-item questionnaire to evaluate utilization of 14 coping responses in responding to stresses in life, with two items measuring each coping response. Participants were
specifically instructed to indicate their frequency of reliance on coping strategies rather than the effectiveness the coping strategies. Responses range from 1 (*I haven’t been doing this at all*) to 4 (*I’ve been doing this a lot*). Coping strategies were grouped into emotional-focused strategies, problem-focused strategies, and dysfunctional coping strategies (Figure x, appendix) [65]. Each participant received average scores over the coping responses for emotional-focused strategies, problem-focused strategies, and dysfunctional coping strategies.

### 2.5 Qualitative data collection

Purposive sampling was used to recruit participants who experience significant life impact due to kidney disease for focus group discussions. Research staff explained the purpose and details of the focus group discussion to the participants in-person or by phone. After informed consent, participants were invited to participate in focus group discussions. Prior to the start of the focus group discussion, participants completed a short questionnaire. Information collected include participant contact information, demographic characteristics (age, sex, race, marital status, religion, and highest educational level), and history of kidney disease (year of diagnosis, dialysis status, and transplant status, and primary healthcare system utilized). Focus groups were conducted at the Southeastern Regional Medical Center from June 14 to July 14, 2016. Focus groups were stratified by race. Focus groups were facilitated by a research staff with experience leading group interventions. Following a semi-structured interview
guide based on the relevant literature, the moderator asked open-ended questions to explore the psychosocial impacts of kidney disease and the facilitators and barriers of self-care behaviors for kidney disease. All sessions were audio-recorded and included two note takers. On average, focus group discussions lasted 90 minutes. Participants were compensated with a $35 Visa cash card to cover transportation costs and time.

2.6 Quantitative data management and analysis

All data were collected and managed using REDCap electronic data capture tools hosted at Duke University [67]. REDCap is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources.

Quantitative data were analyzed using STATAv.14.2 (STATA Corp., College Station, TX). Descriptive statistics, including median and interquartile ranges were calculated variables measured by scales. For categorical variables, the percentages of participants belong in each category were calculated. Chi-squared or Fisher’s exact tests were used to examine the association of level of self-efficacy and positive mental health with sociodemographic factors (i.e. sex, ethnicity, age, education, income, employment, relationship status) and self-reported medical history. Ordered logistic regression was used to explore the association between positive mental health and self-efficacy
stratified by CKD status. Models were adjusted for depression and assessed for the
effect of interaction between depression and positive mental health. Models were
subsequently adjusted for covariates a priori considered to be potential confounders of
the relationship between positive mental health and self-efficacy. Model 1 adjusted for
age, employment, partner, educational level, race, gender. Model 2 adjusted for
covariates in model 1 and anxiety, PTSD, social support, stress, and coping. Model 3
adjusted for covariates in model 2 and CKD awareness, histories of hypertension,
diabetes, and cardiovascular disease. Proportional odds ratios, 95% confidence intervals,
and p-values were reported. The models did not adjust for household income because
12% of participants chose not to report. All p-values were interpreted at a 5%
significance level.

2.7 Qualitative data management and analysis

Audio files of the focus group discussions were transcribed verbatim by research
staff trained in qualitative transcription. Participant identifying information was
removed from the transcripts. Transcripts were then quality checked for accuracy and
participant de-identification. Qualitative data was analyzed using NViVOv.11.4 (QRS
International Pty Ltd, Melbourne, Australia). Analysis was completed using a deductive
approach through identifying relationships between self-efficacy and self-management
behaviors with the 14 factors of positive mental health. Codes were determined a priori
following the structure and content of the MHC-SF. Emotional wellbeing, psychological
wellbeing, and social wellbeing formed the larger coding categories and the 14 dimensions of positive mental health formed the sub-codes. Codes were applied to qualitative data that explicitly stated or implied one or more dimensions of positive mental health contributing to self-efficacy or self-management of CKD. The codes and collated data was examined for emergent themes or pathways linking self-management behaviors and positive mental health. Grounded theory was used to generate emergent themes and connections. Representative quotations from the themes and codes were presented.
3. Results

3.1 Description of survey participants

We enrolled 265 individuals in the study (Table 1). The median age of participant was 65 years (IQR = 53-72). The participant distribution by race was similar to the racial distribution in Robeson County (26% white in the study vs 32% white in the county; 33% African Americans in the study vs 24% African American in the county; 40% Native Americans in the study vs 40% Native American in the county). Most participants were female (n = 162; 63%), unmarried (n = 132; 51%), and completed high school or GED as the highest level of education (n = 109; 43%). Most participants were retired (n = 102; 40%) or disabled (n = 83; 32%). The median household income was 28000 (IQR 15600-50000) and nearly half of the participants lived near poverty or were in poverty. Participants who self-reported having heart disease (n = 74; 29%), diabetes (n = 130; 51%), and hypertension (n = 207; 81%) were common. Of all participants, 162 (63%) had CKD, 39% of whom were unaware of their CKD status. Older age, unemployment, lower income, and history of self-reported diabetes and/or hypertension were associated with CKD (p < 0.05 for all). 3% of participants with CKD self-report having diabetes, compared to 29% of those without CKD. 89% of participants with CKD self-report having hypertension, compared to 66% of those without CKD.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Participants</th>
<th>p-value †</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall (n = 257)</td>
<td>CKD Absent (n = 95, 37%)</td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;= 40</td>
<td>26 (10%)</td>
<td>16 (17%)</td>
</tr>
<tr>
<td>41-60</td>
<td>78 (30%)</td>
<td>31 (33%)</td>
</tr>
<tr>
<td>61-75</td>
<td>108 (42%)</td>
<td>34 (36%)</td>
</tr>
<tr>
<td>&gt;=76</td>
<td>45 (18%)</td>
<td>14 (15%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>66 (26%)</td>
<td>28 (29%)</td>
</tr>
<tr>
<td>Black</td>
<td>86 (33%)</td>
<td>21 (22%)</td>
</tr>
<tr>
<td>Native American</td>
<td>102 (40%)</td>
<td>44 (46%)</td>
</tr>
<tr>
<td>Other</td>
<td>3 (1%)</td>
<td>2 (2%)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>95 (37%)</td>
<td>35 (37%)</td>
</tr>
<tr>
<td>Female</td>
<td>162 (63%)</td>
<td>60 (63%)</td>
</tr>
<tr>
<td><strong>Relationship Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/Living with partner</td>
<td>125 (49%)</td>
<td>50 (53%)</td>
</tr>
<tr>
<td>Single/Divorced/Widowed</td>
<td>132 (51%)</td>
<td>45 (47%)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8th grade or less</td>
<td>13 (5%)</td>
<td>6 (6%)</td>
</tr>
<tr>
<td>9-11th grade</td>
<td>34 (13%)</td>
<td>8 (8%)</td>
</tr>
<tr>
<td>High school graduate</td>
<td>109 (43%)</td>
<td>41 (43%)</td>
</tr>
<tr>
<td>Some college</td>
<td>50 (20%)</td>
<td>15 (16%)</td>
</tr>
<tr>
<td>College graduate</td>
<td>50 (20%)</td>
<td>25 (26%)</td>
</tr>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>53 (21%)</td>
<td>28 (29%)</td>
</tr>
<tr>
<td>Full-time</td>
<td>43 (17%)</td>
<td>24 (25%)</td>
</tr>
<tr>
<td>Part-time</td>
<td>10 (4%)</td>
<td>4 (4%)</td>
</tr>
<tr>
<td>Not working</td>
<td>15 (6%)</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>Looking for a job</td>
<td>4 (2%)</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Retired</td>
<td>102 (40%)</td>
<td>36 (38%)</td>
</tr>
<tr>
<td>Disabled</td>
<td>83 (32%)</td>
<td>23 (24%)</td>
</tr>
</tbody>
</table>
Overall, participants had high levels of self-efficacy (median 7.9 out of 10) (Table 2). Most participants had flourishing positive mental health (n = 82, 32%). Most participants did not have depression (n = 125, 49%) and had mild anxiety (n = 128, 50%). A few participants screened positive for PTSD (n = 36, 14%). Most participants had low levels of perceived stress (median 0.6 out of 3). Participants relied on problem-focused coping strategies and emotion-focused coping strategies equally (median 2.8 out of 4), and relied less on dysfunctional coping strategies (median 1.7 out of 4). No psychosocial variables were associated with CKD status (all p > 0.05).
Table 2 Psychosocial measures in participants.

<table>
<thead>
<tr>
<th></th>
<th>Overall (n = 257)</th>
<th>CKD Absent (n = 95, 37%)</th>
<th>CKD Present (n = 162, 63%)</th>
<th>p-value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy† (med, IQR)</td>
<td>7.9 (6-9)</td>
<td>7.9 (6.3-9.3)</td>
<td>7.6 (5.9-8.9)</td>
<td>0.111</td>
</tr>
<tr>
<td>Self-efficacy‡</td>
<td></td>
<td></td>
<td></td>
<td>0.636</td>
</tr>
<tr>
<td>High (n, %)</td>
<td>82 (32%)</td>
<td>33 (35%)</td>
<td>49 (30%)</td>
<td></td>
</tr>
<tr>
<td>Medium (n, %)</td>
<td>85 (33%)</td>
<td>32 (34%)</td>
<td>53 (33%)</td>
<td></td>
</tr>
<tr>
<td>Low (n, %)</td>
<td>90 (35%)</td>
<td>30 (32%)</td>
<td>60 (37%)</td>
<td></td>
</tr>
<tr>
<td>Positive mental health</td>
<td></td>
<td></td>
<td></td>
<td>0.916</td>
</tr>
<tr>
<td>Flourishing</td>
<td>195 (76%)</td>
<td>73 (78%)</td>
<td>122 (76%)</td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>44 (17%)</td>
<td>15 (16%)</td>
<td>29 (18%)</td>
<td></td>
</tr>
<tr>
<td>Languishing</td>
<td>16 (6%)</td>
<td>6 (6%)</td>
<td>10 (6%)</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td></td>
<td></td>
<td>0.933</td>
</tr>
<tr>
<td>No depression (n, %)</td>
<td>125 (49%)</td>
<td>43 (45%)</td>
<td>82 (51%)</td>
<td></td>
</tr>
<tr>
<td>Mild depression (n, %)</td>
<td>71 (28%)</td>
<td>28 (29%)</td>
<td>43 (27%)</td>
<td></td>
</tr>
<tr>
<td>Moderate depression (n, %)</td>
<td>39 (15%)</td>
<td>15 (16%)</td>
<td>24 (15%)</td>
<td></td>
</tr>
<tr>
<td>Moderately severe depression (n, %)</td>
<td>19 (7%)</td>
<td>8 (8%)</td>
<td>11 (7%)</td>
<td></td>
</tr>
<tr>
<td>Severe depression (n, %)</td>
<td>3 (1%)</td>
<td>1 (1%)</td>
<td>2 (1%)</td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td></td>
<td></td>
<td></td>
<td>0.695</td>
</tr>
<tr>
<td>No anxiety (n, %)</td>
<td>1 (0%)</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
<td></td>
</tr>
<tr>
<td>Mild anxiety (n, %)</td>
<td>128 (50%)</td>
<td>49 (52%)</td>
<td>79 (49%)</td>
<td></td>
</tr>
<tr>
<td>Moderate anxiety (n, %)</td>
<td>77 (30%)</td>
<td>25 (26%)</td>
<td>52 (32%)</td>
<td></td>
</tr>
<tr>
<td>Severe anxiety (n, %)</td>
<td>51 (20%)</td>
<td>21 (22%)</td>
<td>30 (19%)</td>
<td></td>
</tr>
<tr>
<td>PTSD (n, %)</td>
<td>36 (14%)</td>
<td>10 (11%)</td>
<td>26 (16%)</td>
<td>0.218</td>
</tr>
<tr>
<td>Perceived stress‡ (med, IQR)</td>
<td>0.6 (0.3-1)</td>
<td>0.6 (0.3-1)</td>
<td>0.5 (0.3-0.9)</td>
<td></td>
</tr>
<tr>
<td>Coping§</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problem-focused (med, IQR)</td>
<td>2.8 (2.4-3.2)</td>
<td>2.8 (2.3-3.2)</td>
<td>2.9 (2.4-3.2)</td>
<td>0.275</td>
</tr>
<tr>
<td>Dysfunctional (med, IQR)</td>
<td>1.7 (1.4-2.1)</td>
<td>1.6 (1.3-1.8)</td>
<td>1.6 (1.3-1.8)</td>
<td>0.067</td>
</tr>
<tr>
<td>Emotion-focused (med, IQR)</td>
<td>2.8 (2.4-3.2)</td>
<td>2.8 (2.3-3.2)</td>
<td>2.9 (2.4-3.2)</td>
<td>0.250</td>
</tr>
</tbody>
</table>

*Chi-squared test and Wilcoxon rank-sum test were used to compare the distribution of self-efficacy between participants with and without CKD
†Score range for self-efficacy is 1 to 10, with 10 being high level of self-efficacy
‡Level of self-efficacy as determined by tertiles in the study population. Low self-efficacy 0-6.7; medium self-efficacy 6.9-8.6; high self-efficacy 8.7-10.
§Score range for perceived stress is 0 to 3, with 3 being high level of global chronic stress
$Score range for coping is 1 to 4, with 4 being high reliance on coping strategy
3.2 Association between positive mental health and self-efficacy

Individuals with flourishing positive mental health are significantly more likely to have high self-efficacy compared to individuals with languishing positive mental health ($p < 0.001$, Figure 10). Among those who had flourishing positive mental health, 40% have high self-efficacy and 29% have low self-efficacy. Among those who have languishing positive mental health, 13% have high self-efficacy and 63% have low self-efficacy.

Figure 10: Distribution of self-efficacy by positive mental health.

Ordered logistic regression was used to assess the relationship between positive mental health and self-efficacy, controlling for depression, the interaction between positive mental health and depression, and other covariates. Overall, in the fully adjusted model (model 3), going from languishing to moderate or moderate to
flourishing positive mental health, the odds of higher self-efficacy 2.89 times greater (p-value 0.010, 95% CI 1.29-6.47; Table 3). Depression was not a significant predictor of self-efficacy (AOR 0.73, p-value 0.493).

**Table 3: Adjusted odds ratio (AOR) for self-efficacy for all participants.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1* AOR (95% CI)</th>
<th>p-value</th>
<th>Model 2 AOR (95% CI)</th>
<th>p-value</th>
<th>Model 3 AOR (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive Mental Health</td>
<td>2.59 (1.26-5.30)</td>
<td>0.009*</td>
<td>2.66 (1.22-5.79)</td>
<td>0.014*</td>
<td>2.89 (1.29-6.47)</td>
<td>0.010*</td>
</tr>
<tr>
<td>Depression</td>
<td>0.57 (0.27-1.22)</td>
<td>0.147</td>
<td>0.78 (0.33-1.83)</td>
<td>0.570</td>
<td>0.73 (0.29-1.80)</td>
<td>0.493</td>
</tr>
<tr>
<td>Positive Mental Health x Depression</td>
<td>0.81 (0.53-1.25)</td>
<td>0.350</td>
<td>0.78 (0.49-1.23)</td>
<td>0.282</td>
<td>0.76 (0.47-1.24)</td>
<td>0.280</td>
</tr>
</tbody>
</table>

*Model 1 adjusted for age, employment, partner, educational level, race, gender. Model 2 adjusted for covariates in model 1 and anxiety, PTSD, social support, stress, and coping. Model 3 adjusted for covariates in model 2 and CKD awareness, histories of hypertension, diabetes, and cardiovascular disease.

For those with CKD, positive mental health was significantly associated with self-efficacy (Table 4). In the fully adjusted model (model 3), going from languishing to moderate or moderate to flourishing positive mental health, the odds of higher self-efficacy were 7.67 times greater, all else held constant (p-value 0.001, 95% CI 2.42-24.29). Depression was not a significant predictor of self-efficacy (AOR 1.50, p-value 0.516).

However, the relationship between positive mental health and self-efficacy is modified by depression severity (p-value 0.012).
Table 4: Adjusted odds ratio (AOR) for self-efficacy for participants with CKD.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AOR (95% CI)</td>
<td>p-value</td>
<td>AOR (95% CI)</td>
<td>p-value</td>
<td>AOR (95% CI)</td>
<td>p-value</td>
</tr>
<tr>
<td>Positive Mental Health</td>
<td>6.94 (2.36-20.38)</td>
<td>&lt;0.001*</td>
<td>7.25 (2.36-22.28)</td>
<td>0.001*</td>
<td>7.67 (2.42-24.29)</td>
<td>0.001*</td>
</tr>
<tr>
<td>Depression</td>
<td>1.12 (0.38-3.29)</td>
<td>0.842</td>
<td>1.39 (0.42-4.60)</td>
<td>0.590</td>
<td>1.50 (0.44-5.13)</td>
<td>0.516</td>
</tr>
<tr>
<td>Positive Mental Health x Depression</td>
<td>0.50 (0.27-0.91)</td>
<td>0.024*</td>
<td>0.45 (0.24-0.85)</td>
<td>0.014*</td>
<td>0.43 (0.23-0.83)</td>
<td>0.012*</td>
</tr>
</tbody>
</table>

For those without CKD, positive mental health and depression were not significant predictors of self-efficacy (all p-values > 0.05; Table 5).

Table 5: Adjusted odds ratio (AOR) for self-efficacy for participants without CKD.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th></th>
<th>Model 2</th>
<th></th>
<th>Model 3</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AOR (95% CI)</td>
<td>p-value</td>
<td>AOR (95% CI)</td>
<td>p-value</td>
<td>AOR (95% CI)</td>
<td>p-value</td>
</tr>
<tr>
<td>Positive Mental Health</td>
<td>1.35 (0.41-4.45)</td>
<td>0.618</td>
<td>0.96 (0.18-5.10)</td>
<td>0.962</td>
<td>1.08 (0.16-7.46)</td>
<td>0.938</td>
</tr>
<tr>
<td>Depression</td>
<td>0.50 (0.15-1.64)</td>
<td>0.251</td>
<td>0.89 (0.14-5.65)</td>
<td>0.903</td>
<td>0.70 (0.10-4.92)</td>
<td>0.718</td>
</tr>
<tr>
<td>Positive Mental Health x Depression</td>
<td>1.03 (0.52-2.03)</td>
<td>0.942</td>
<td>1.17 (0.44-3.09)</td>
<td>0.747</td>
<td>1.25 (0.44-3.54)</td>
<td>0.668</td>
</tr>
</tbody>
</table>

3.3 Description of focus group participants

Thirty-eight participants participated in six focus groups (Table 5). The majority of the participants were aged between 54 to 69.5 years, with 2 participants aged less than or
equal to 40 years, 12 participants aged 41 to 60 years, 20 participants aged 61 to 75 years, and 4 participants aged 75 years or more. Focus groups ranged in size from 5 to 7 participants. 17 (45%) of the focus group participants were male. 17 (45%) of the focus group participants were receiving dialysis and 1 (3%) participant received a kidney transplant. 14 (37%) of the participants were Black, 13 (34%) of the participants were Native American, and 11 (29%) of the participants were White.

![Table 6: Focus group participants’ characteristics.](image)

We identified the dimensions of emotional, psychological, and social wellbeing associated with self-efficacy and self-management in participants who reported experiencing significant life impact due to kidney disease. These factors within positive mental health may influence self-efficacy for chronic disease self-management. Overall, positive mental health was often presented in the context of stress management and
adaptive coping through maintaining active, productive lifestyles, establishing and sustaining positive relationships with others, and maintaining resilience against stress and negative affect.

### 3.4 Emotional wellbeing and self-efficacy

We identified happiness, interest in life, and satisfaction in life – all components of emotional well-being – as being associated with self-efficacy and self-care. Many participants placed emotional wellbeing in the context of maintaining the daily routines and lifestyles that bring them pleasure before they were diagnosed with kidney disease.

I still got my jockeys on, I get my dog on a leash and I go. I walk about mile and a half down road now and then come back and shower […] and then by that time I’m ready for dialysis. (FG 5 – Lumbee, 6)

Maintaining an active professional life is a goal for many participants. Even if continued employment is not possible, participants try to maintain an energetic, productive life at home.

Oh, I’ve been fortunate enough that- that I still, I’d go in the morn- I has to go in at 6 o’clock, to start my treatment (referring to hemodialysis), and I get through about, you know, between 11 and 11:30, depending on how soon, you know, they get me in. But most days, uh, I’m getting up, that I leave and I go to work. […] But I’m not doing strenuous work. […] But that helps me some too, like you said, to be able to get up and keep going to work. (FG 3 – White, 2)

But now for me, when I get up every morning shower, I dress like I’m going to work and what I’ve got to do. […] But I find if I stay in my pajamas, I don’t do anything. […] Yeah, I got, I have to keep my routine going. (FG 5 – Lumbee, 3)

A few participants mentioned stress in relation to emotional wellbeing. We observed that positive mental health achieved from maintaining a pleasurable lifestyle
and keeping an active, productive schedule led to adaptive coping of stress, which may in turn have led to improved self-management:

I can get in my kitchen and just cook and cook and meditate and- because I have to help look after my mom. And so I do a lot, I do a lot of cooking [...] That’s stress relief for me. As long as I, as long as I’m in my little happy place. If I’m in my little happy place, hey, I’m good. (FG 5 - Lumbee, 3)

You gotta find something to do. You gotta take yourself off it (referring to chronic illness). If you dwell on it, you gonna make yourself sicker. If you think about it constantly your blood pressure’s gonna go up. (FG 6 – White, 5)

3.5 Social wellbeing and self-efficacy

Of the five dimensions of social wellbeing, we identified social contribution and social integration as important contributors of self-efficacy and self-care. In this community, social contribution and social integration were most strongly associated with spirituality and the church. Social contribution, social integration, and purpose in life were closely related constructs in relation to spirituality and the church:

You know, I have things I do. And I love people. I love people. So in my community they call me Mother Theresa (laughs) because I try to, to help people all I can, you know. And I have a great big prayer [...] people at church, they just stand behind me. Little children even will tell me “Miss (participant’s name), I love you, I’m prayin’ for you.” And you know, that does something for me. And I don’t hardly ever get discouraged because I know that I’ve got too much too important… (FG 6 – White, 3)

One participant finds meaning in his life through connecting with and encouraging others with kidney disease:

I’m like, ”God, why me?” [...] And you know what He answered me in sayin’? ”Why not you?” ’Cause (?see?), somebody needs encouragement, somebody coping- (cross talk, murmurs of agreement) But, but I know that people that I
met, if I were not on dialysis, I would not meet them, and I see where the Lord had helped me into their lives, and speaking words of encouragement, I can share a word of hope, I can say a word of prayer, to get them encouragement. (FG 1 – Black 1, 2)

Several participants mentioned contributions to family as central to their positive mental health and self-care:

No, I’ve got too much to gain to give up. I think about, I’ve got my family and I’ve even got to my grandchildren and I’m raisin’ them. They are only 10 and 11 and I can’t give up. […] They need somebody. […] It keeps me going. […] if I didn’t have ‘em that I might not be, that I might not fight as hard, you know? (FG 2 – Lumbee 1, 1)

What motivates me- for one, I’m not ready to leave here. […] I love my kids. […] I’m raising them the best I can. I’m a single parent. I’ve got two, three beautiful girls at the house […] and I’m doing damn good raising girls, you feel me? And… They just keep you motivated, I want to inspire and set goals for the younger minds. (FG 4 – Black 2, 7)

One participant described his contribution to the local community as helping him coping with kidney disease:

You gotta find something else to do. You can’t dwell on it all the time. […] Me and my wife done it together, we coached baseball for 24 years. We coached youth ball, uh I had the eleven, twelve-year-old aged kids, she had the eight and under kids um [inaudible] she teachin’ school and we we’d go have baseball practice have the game come home and go to the clinic and she’d take naps on the floor while I do a treatment on the machine… (FG 6 – White 2, 1)

Multiple participants in the focus groups expressed interest in meeting other individuals with kidney disease, and forming support groups for kidney disease. One person expressed it this way:
Well, just little thing here would keep me going for a bit. Cause I’ve learned. You can spread this out, you can vent, get it out, you can release your frustrations, release that stress, that anxiety, that tension. (FG 1 – Black 1, 6, 2)

3.6 Psychological wellbeing and self-efficacy

We identified psychological wellbeing as a critical component of self-management of CKD. Self-acceptance, environmental mastery, personal growth, autonomy, positive relations with others, and purpose in life were all identified as important elements of psychological wellbeing that contribute to self-efficacy and self-care. In relation to self-management of kidney disease, self-acceptance, environmental mastery, and personal growth were closely related in achieving resiliency and self-esteem in being able to manage one’s own health. Positive relations with others were beneficial for self-care through the provision of tangible and emotional support. Purpose in life was most commonly associated with spirituality and allowed participants to overcome fear and maintain positive affect, leading to greater acceptance of kidney treatments.

Self-acceptance, environmental mastery, and personal growth were associated with increased self-efficacy. A few participants demonstrated confidence and pride in their resiliency towards lifestyle changes due to kidney disease. They emphasized that personal growth and environmental mastery are critical psychological components of self-efficacy.

I don’t let myself go to that state. I keep myself lifted up. I don’t look at myself like I’m sick. […] When I go to dialysis I have a smile on my face now. I do not
make, my husband keeps me lifted up. [...] I don’t act like I’m sick. I don’t think that way. [...] I can’t go there. I cannot. I refuse to. (FG 4 – Black 2, 2)

And- I just decided that I was not going to play the poor little me, and I was going to go down fightin’. And I got on the computer, I got on the telephone, and I found ways of getting’ my medicine. Don’t ever give up, whatever you do, whatever the situation, don’t give up or give in. And you’ll be stronger for it. [...] So just don’t give up. There’s always a way. Don’t worry about it. Do somethin’ about it. (FG 3 – White 1, 1)

Positive relations with others helped with self-management of kidney disease through family members and close friends providing social support. Positive relations with family members and close friends are especially important for tangible support, helping with medication and supply management, household chores, and reminders.

My wife helps me. She orders all the supplies, does the inventory, stores it, you know sets the machine up. I do my little part my sticking myself with needles things like that. (FG 5 – Lumbee 2, 5)

My special support is my daughter. [...] She takes over, she does all my medication. I don't order. She orders and I take approximately 28 pills a day because I have other things wrong with me. (FG 6 – White 2, 3)

Most of the time somebody’s going to have to tell you to take care of it. You’re going to be careless with it. [...] But if people around you really care, they’ll look at you when you come over and they’ll say, ‘did you take your meds today?’ And then, ‘oh I forgot to do this one.’ It brings you back to what you are going to do. And it keeps you levels off on your meds and stuff. [...] But even a phone call or a text sayin’ ‘are you doing all right today?’ It’s one of the biggest things you can do. (FG 2 – Lumbee 1, 5)

Positive relations with others was also a source of emotional support. Emotional social support from friends and acquaintances were helpful for self-management.

They might come by and bring you a sandwich, um just sit with you for an afternoon, just- just support. Just bein’ there. Just knowin’ that you could pick up
that phone at any moment and call these people, and that they’re always gonna be there for you. (FG 2 – Lumbee, 3)

Positive relations with others were more frequently mentioned in the context of the nuclear family. These relationships help participants maintain resilience and overcome depression, leading to greater self-efficacy.

And you gotta strong family behind you, that’s not gonna let you down. [...] As long as you feel their love and their strength behind you, you’ll feel yourself want to be there for ‘em. (FG 1 – Black, 5)

I get a lot of support from my mom’s too. [...] I waiting for the word, I said I don’t want that dialysis, but if my mother tell me, (laugh) I gotta get it, I’m going. (Cross talk, laughing) [...] But if my mom tell me, "W, you gotta do that," I’ma do it. She’s 91, and I’m 74, and we’ve been traveling this road for a long time together, so. I might a well try, you know, Imma try. (FG 1 – Black, 6)

I have a strong-willed husband and when he hit the floor in the morning, is on the go, so he make sure I’m up and doing something. He don’t let me be stiff. And he keeps active, he makes sure and he don’t let me get depressed. He always keep me laughin’, talking. (FG 4 – Black, 2)

In addition to positive relations with family members, spirituality is another significant source of purpose in life. Similar to positive relations with family members, spirituality improves optimism and positive affect.

I was depressed, uh, when I came home from the hospital. And I laid in the bed, just layin’ there, feelin’ bad about everythin’, I can’t do this, I can’t work anymore, I can’t do this, they put this thing in my arm, and now they got this thing up in my chest here, and god. And the Lord said, "Get up out of that bed. Get up out of the bed, get up out of-" and from that day to this day I get up every morning at 6 o’clock, every morning, so no more depression. (FG 1 – Black 1, 4)

She said it’s your soul that keeps you moving. It’s what’s your soul that gets you through. Because when this body gone that soul still going to be here. So that’s what you need to nurture. You need to nurture your soul to give it happiness
and positivity and stuff. Knowing that one day you’ll be able to have a new body and gold everywhere, and a new house. [...] So I nurture my soul, because it helps me to take care of myself. I nurture my soul. (FG 4 – Black 2, 3)
4. Discussion

Overall, positive mental health was associated with greater self-efficacy. For those with CKD, the relationship between positive mental health and self-efficacy was modified by depression severity. In this population, self-efficacy for chronic disease self-management was high. There was no significant difference in levels of self-efficacy between those with and without CKD. In those without CKD, positive mental health was not associated with greater self-efficacy. We also observed evidence that positive mental health may promote self-efficacy and self-management through building resilience and adaptive coping of stress and depression.

The relationship between positive mental health and self-efficacy varied by CKD status. Effect modification was observed when the participants were stratified by self-reported hypertension or diabetes status, suggesting that chronic disease status may be the modifying variable between positive mental health and self-efficacy. Self-efficacy was lower for those who self-reported having hypertension or diabetes, although this result was not statistically significant. For individuals with chronic disease, positive mental health may be an especially important predictor of self-efficacy because they have low levels of self-efficacy due to worse physical or mental health, or vice versa. The modifying effect of chronic disease might also suggest that self-efficacy for chronic disease self-management may have different meanings and reflect different aspects of life for individuals with and without CKD. Because individuals with chronic disease are
more likely to be experienced with and understand the complexities of self-management of chronic disease compared to those who do not have chronic disease, these two groups may have different concepts of self-efficacy for chronic disease self-management, leading to those without chronic disease to have high self-efficacy.

The qualitative findings in this study suggest that positive mental health influences self-efficacy by building individual social and psychological resources to encourage motivation and information-seeking for self-management of disease, following the broaden-and-build theory of positive emotions. In those with CKD, positive mental health was associated with positive emotions such as joy, gratitude, contentment, interest, hope, and pride. These positive emotions created a range of responses including increased perceptions of social connection and community, urges to express kindness and to care for others, and refined sense of self and priorities [68]. These responses in turn build resources such as social support, resilience, and optimism, allowing the individual to build skills necessary for self-management of CKD [68-70]. Positive mental health can thus be viewed as a precursor variable that contributes positive emotions, which improves self-efficacy for CKD self-management through the broaden and build theory of positive emotions.

It is notable that over three-quarters of participants have flourishing positive mental health and only 6% have languishing positive mental health. Such a high level of positive mental health may seem counterintuitive among a population living with
multiple chronic diseases such as heart disease, diabetes, and kidney disease, as well as socioeconomic stressors in the community such as poverty, unemployment, and crime. Reasons for the high prevalence of flourishing positive mental health have yet to be explored in this community, but may be understood in part due to relative disparities and community factors that contribute to resilience. The majority of participants in this study have health insurance and are receiving treatment for medical conditions, while 26% of residents in Robeson County are uninsured [56]. The greater access to healthcare for participants compared to other individuals in the county may lead to greater rates of flourishing positive mental health. A strong sense of community and family, which was evident from the focus group discussions and consistent with Lumbee traditions, may also make this community resilient. Likewise, well-established religious groups and thriving spirituality in this population may also be protective of positive mental health.

These findings are important for informing self-management programs for chronic diseases that incorporates the holistic psychosocial needs of the patient. Most self-management models only address patient need to information without focusing on the psychosocial aspects of self-management, such as mental health or social support [21]. If the mental health aspect is addressed, the focus is primarily on mental illness, without any consideration on positive mental health [37-40]. Despite the growing acceptance of the two continua model for mental health and illness, most chronic disease self-management interventions have invested mainly in the treatment of mental illness.
and minimizing negative affect while neglecting to promote or protect positive mental health [21]. There is an increasing number of interventions at a population level which show that positive mental health can be improved [72-75]. Interventions that encourage emotional wellbeing include but are not limited to meditation [76] gratitude-enhancing exercises [77-78], and self-affirmation [79]. Interventions that address psychological and social wellbeing include individual or group-based well-being therapy, life review, positive psychology interventions, acceptance and commitment therapy, mindfulness interventions and identity interventions [71].

Given that contextual considerations should drive the design and implementation of chronic disease self-management programs, future efforts should focus on identifying the acceptability of these positive mental health interventions in this rural, minority, and elderly population with high burden of chronic diseases. Research efforts should seek to integrate effective positive mental health interventions in clinical settings as a complementary aspect of existing clinical and mental illness services. Positive mental health interventions in this population should consider incorporating existing strengths in this community such as strong family relationships, spirituality, religious organizations, or tribal ties to build personal and community resources for the self-management of CKD and comorbid conditions.

To our knowledge, no previous study has examined the relationship between positive mental health and self-efficacy of chronic disease self-management. This study
also focused on rural, minority participants with significant socioeconomic
disadvantages, which are known groups to face significant health disparities in
outcomes in kidney disease. This study also involved clinical assessment of kidney
function, which allowed for objective evaluation of kidney function instead of reliance
on self-reported CKD status. One of the study’s main strengths is its use of mixed-
methods. The qualitative data obtained from focus group discussion with participants
with CKD allows for better understanding of how positive mental health impacts self-
efficacy and self-management of CKD. Together, they highlight the potential importance
of positive mental health in individuals with CKD and provide evidence for the broaden
and build theory that explains the relationship between positive mental health and self-
efficacy for CKD self-management, within the IMB Model

Due to the cross-sectional study design, conclusions cannot be drawn regarding
a causal relationship between positive mental health and self-efficacy. Additionally, this
study is unable to demonstrate causation between positive mental health and self-
management behaviors or health outcomes due to the single time point study design.
Although measures were used to assess mental illness were validated screening
instruments, they were not diagnostic in nature. The qualitative data collection did not
involve participants without CKD, so we were unable to explore possible factors linked
to the moderating effect of CKD status on the relationship between positive mental
health and self-efficacy. The sampling frame in this study was limited to individuals
who have accessed healthcare at Southeastern Health, which prevents the generalization of study findings to populations without access to the healthcare system.
5. Conclusion

In summary, positive mental health is associated with self-efficacy for chronic disease self-management in individuals with CKD. By broadening and building motivation and information-seeking behaviors, positive mental health may lead to increased self-efficacy and critical CKD self-management behaviors. These findings suggest that positive mental health should be incorporated into existing chronic disease self-management programs to fully address the psychosocial needs of patients and effectively encourage sustainable behavioral changes for chronic disease self-management.
Table 5: Adjusted odds ratio (AOR) for self-efficacy, stratified by chronic disease status.

<table>
<thead>
<tr>
<th>Disease Status</th>
<th>Positive Mental Health</th>
<th>Depression</th>
<th>Positive Mental Health x Depression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>2.41 (0.33-17.78) 0.010*</td>
<td>0.73 (0.29-1.80) 0.493</td>
<td>0.76 (0.47-1.24) 0.280</td>
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<tr>
<td>CKD Absent</td>
<td>0.83 (0.46-1.50) 0.355</td>
<td>0.32 (0.12-0.79) 0.111</td>
<td>0.76 (0.47-1.24) 0.280</td>
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<td>7.67 (2.42-24.29) 0.001*</td>
<td>1.50 (0.44-5.13) 0.516</td>
<td>0.43 (0.23-0.83) 0.012*</td>
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<td>3.00 (1.00-9.52) 0.011</td>
<td>6.99 (1.69-28.19) 0.009*</td>
<td>1.25 (0.44-3.54) 0.668</td>
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<tr>
<td>DM Absent</td>
<td>0.33 (0.03-3.48) 0.110</td>
<td>0.001 (0.00-0.48) 0.007*</td>
<td>0.05 (0.00-1.95) 0.007*</td>
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<td>1.08 (0.37-4.03) 0.738</td>
<td>7.67 (2.42-28.91) 0.001*</td>
<td>0.001 (0.00-0.48) 0.007*</td>
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<td>7.30 (0.44-12.93) 0.001*</td>
<td>1.26 (0.26-6.27) 0.778</td>
<td>0.001 (0.00-0.48) 0.007*</td>
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<td>1.00 (0.00-1.95) 0.007*</td>
<td>1.00 (0.00-1.95) 0.007*</td>
<td>0.001 (0.00-0.48) 0.007*</td>
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<tr>
<td>HTN Absent</td>
<td>0.11 (0.03-3.48) 0.110</td>
<td>0.001 (0.00-0.48) 0.007*</td>
<td>0.05 (0.00-1.95) 0.007*</td>
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<td>1.00 (0.00-1.95) 0.007*</td>
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<tr>
<td>CVD Absent</td>
<td>0.05 (0.00-1.95) 0.110</td>
<td>0.001 (0.00-0.48) 0.007*</td>
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*Adjusted odds ratios are statistically significant at an alpha level of 0.05.
References


