

# Kidney360

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### Abstract:

**Background:** How someone copes may alter the trajectory of their kidney function. We aimed to evaluate whether coping behaviors were associated with incident chronic kidney disease (CKD) or rapid kidney function decline.

**Methods:** We used data from the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study (Baltimore, MD) for this longitudinal analysis. Adaptive and maladaptive coping behavioral constructs were measured using the Brief COPE Inventory at visit 1. We used multiple logistic regression to assess the odds of incident CKD and rapid kidney function decline per point increase in coping scales and adjusted for baseline demographics and clinical variables.

**Results:** Of 1935 participants, mean age was 48 years, 44% were male, 56% were Black persons, and baseline mean (SD) estimated glomerular filtration rate (eGFR) was 91(16) ml/min/1.73m<sup>2</sup>. After a median of 8.2 years, 113 participants developed incident CKD, and 341 had rapid kidney function decline. Compared to those who reported they usually did not use adaptive coping behaviors at all (such as emotional support), those with the highest use of adaptive coping had lower odds of incident CKD. Every 1-unit increase in adaptive coping corresponded with a 2% lower adjusted odds of incident CKD (OR 0.98, 95% CI 0.95 to 0.99). There was no association between maladaptive coping behaviors and incident CKD. Coping behaviors were not associated with rapid kidney function decline.

**Conclusions:** Adaptive coping behaviors were associated with lower odds of incident CKD and could represent a target to facilitate CKD prevention. The role of medical care in this association is an area worthy of further investigation.

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## **Coping Behaviors and Incident Kidney Disease**

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## KEY POINTS

- Adaptive coping behaviors are associated with lower odds of incident chronic kidney disease.
- Coping behaviors could represent a target to prevent chronic kidney disease prevention.

## ABSTRACT

**Background:** How someone copes may alter the trajectory of their kidney function. We aimed to evaluate whether coping behaviors were associated with incident chronic kidney disease (CKD) or rapid kidney function decline.

**Methods:** We used data from the Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study (Baltimore, MD) for this longitudinal analysis. Adaptive and maladaptive coping behavioral constructs were measured using the Brief COPE Inventory at visit 1. We used multiple logistic regression to assess the odds of incident CKD and rapid kidney function decline per point increase in coping scales and adjusted for baseline demographics and clinical variables.

**Results:** Of 1935 participants, mean age was 48 years, 44% were male, 56% were Black persons, and baseline mean (SD) estimated glomerular filtration rate (eGFR) was 91(16) ml/min/1.73m<sup>2</sup>. After a median of 8.2 years, 113 participants developed incident CKD, and 341 had rapid kidney function decline. Compared to those who reported they usually did not use adaptive coping behaviors at all (such as emotional support), those with the highest use of adaptive coping had lower odds of incident CKD. Every 1-unit increase in adaptive coping corresponded with a 2% lower adjusted odds of incident CKD (OR 0.98, 95% CI 0.95 to 0.99). There was no association between maladaptive coping behaviors and incident CKD. Coping behaviors were not associated with rapid kidney function decline.

**Conclusions:** Adaptive coping behaviors were associated with lower odds of incident CKD and could represent a target to facilitate CKD prevention. The role of medical care in this association is an area worthy of further investigation.

## INTRODUCTION

A diagnosis of kidney disease carries notable challenges for individuals. Kidney disease is associated with a high medication burden, frequent appointments, nuanced dietary restrictions and financial resource strain.<sup>1-3</sup> There is a high burden of emotional distress among people with kidney disease, and limited therapeutic success of antidepressant medications.<sup>2,3</sup> In order to prevent kidney disease from developing and progressing, individuals must be active participants in their medical care, advocate for themselves, and manage comorbidities. Existing literature suggests that how individuals cope with challenges may make them more or less likely to engage in care and manage comorbidities, potentially altering the trajectory of their kidney function.<sup>4-11</sup>

Coping has been defined as constantly changing cognitive, behavioral and emotional efforts to manage particular external and/or internal demands that are appraised as taxing or exceeding the resources of a person.<sup>12-15</sup> Typical responses to stressful events vary across populations and cultures. However, certain coping tendencies are thought to promote resolution of conflict and greater adaptation than others. Adaptive coping behaviors involve active ways to deal with stressful events, including problem solving, reframing the meaning of the problem, seeking information, or turning to instrumental or religious support.<sup>12</sup> Maladaptive coping behaviors promote feelings of helplessness, reliance on others to resolve the stressful event, or result in avoidance, withdrawal or wishful thinking, although these strategies sometimes develop as a way to survive uncontrollable stressors.<sup>12</sup> It is unknown whether coping behaviors are associated with the development of CKD or disease progression.

We aimed to evaluate whether coping behaviors were prospectively associated with incident CKD or rapid kidney function decline among community dwelling adults with normal kidney function. We hypothesized that greater use of adaptive coping behaviors would be associated with lower odds of incident CKD and rapid kidney function decline, and that greater use of maladaptive coping behaviors would be associated with higher odds of incident CKD and rapid kidney function decline.

## METHODS

### *Healthy Aging in Neighborhoods of Diversity Across the Life Span study*

We analyzed data from the National Institute on Aging, Healthy Aging in Neighborhoods of Diversity across the Life Span (HANDLS) study, which has been described in detail.<sup>16</sup> HANDLS is a population-based cohort study examining the interaction of race and socioeconomic status on the development of health disparities among historically minoritized populations and people with lower socioeconomic status. The cohort includes 3720 Black and white community-dwelling individuals aged 30-64 sampled from 13 neighborhoods in both low and high socioeconomic strata (self-reported household income <125% and ≥125% of 2004 Federal Poverty Guidelines) in Baltimore, Maryland. Participant enrollment occurred between August, 2004, and November, 2008, with the plan for 20 years of five triennial study visits. Each participant provided informed consent and was compensated monetarily, and the National Institute of Environmental Health Sciences, National Institute of Health, approved the study protocol. Data from HANDLS visits 1 (August 2004 – March 2009), 3 (June 2009 – July 2013) and 4 (September 2013 – September 2017) were used for this study.

## Study Sample

Participants were excluded from this study if they did not complete their baseline medical examination (N = 1066), if they were missing the Brief COPE Inventory (N = 568), or if they had prevalent eGFR <60 ml/min/1.73m<sup>2</sup> (N = 151) at visit 1 (**Figure 1**). The final study sample included 1935 participants, and the analytic samples with complete cases for the incident CKD and rapid decline analyses were 1552 and 1147, respectively.

## Measurement of Coping Behaviors

Coping behaviors were measured using the Brief COPE Inventory<sup>14,17-20</sup> as part of the audio computer-assisted self-interview questionnaires on the mobile research vehicles (**Figure 2**). The Brief COPE Inventory included 28 items, with 14 subscales and 2 items per subscale. It assessed tendencies to use positive reinterpretation, active coping, use of humor, acceptance, planning, religious coping, use of instrumental support, use of emotional support, behavioral disengagement, self-distraction, focus on venting of emotions, self-blame, denial and substance use. Inventory questions were modified to assess what participants usually do when confronted with a stressful event by adding the word “usually” to responses. All statements began with “When I am confronted with a difficult or stressful event.” Responses were scored as 1: “I usually don’t do this at all,” 2: “I usually do this a little bit,” 3: “I usually do this a medium amount,” or 4: “I usually do this a lot.”

Based on existing literature, we categorized the subscales into two groupings: adaptive coping and maladaptive coping.<sup>21</sup> Adaptive coping consisted of 8 subscales:

positive reinterpretation, active coping, humor, acceptance, planning, religious coping, use of instrumental support, and use of emotional support. Maladaptive coping consisted of 6 subscales: behavioral disengagement, self-distraction, focus on venting of emotions, self-blame, denial, and substance use. Adaptive and maladaptive coping were both analyzed as continuous variables reflecting the sum of constituent subscales. Adaptive coping can range from 16 to 64, and maladaptive coping can range from 12 to 48, with higher values reflecting higher self-reported use of the behaviors within that grouping.

### *Measurement of Outcomes*

Primary outcomes were incident CKD and rapid kidney function decline. We included both outcomes to determine if the relation between coping behaviors and kidney disease development differed from the relation with kidney disease progression. Incident CKD was defined as first occurrence of eGFR  $<60$  ml/min/1.73m<sup>2</sup> and  $\geq 25\%$  decline in eGFR at study visits 3 or 4 in relation to visit 1.<sup>22,23</sup> Rapid kidney function decline was defined as eGFR loss of  $>3$  ml/min/1.73m<sup>2</sup> per year between study visits 3 and 4.<sup>23,24</sup> Both outcomes were analyzed as dichotomous variables (yes/no). We used the creatinine-based CKD Epidemiology Collaboration 2021 equation to estimate glomerular filtration rate.<sup>25</sup>

Fasting blood samples were obtained during study visit medical assessments. Serum creatinine was measured at Quest Diagnostics Inc. by isotope dilution mass spectrometry (Olympus America Inc., Melville, NY) and standardized to the reference laboratory at the Cleveland Clinic.



## Measurement of Covariables

Sex at birth, self-identified Black or white race, and household income above or below 125% of the federal poverty level were ascertained at enrollment. Depressive symptoms were measured using the twenty-item Center for Epidemiologic Studies Depression (CES-D)<sup>26,27</sup> during visit 1, which ranged from 0-30, and higher values indicated higher depressive symptoms. Total CES-D was analyzed as a categorical variable (low: <10, moderate:10-20, or severe:  $\geq 21$ ).<sup>17,28-30</sup> Hypertension status was defined as (yes/no) self-report of hypertension, measured blood pressure >140/90 mmHg, or prescription of antihypertensive medications at visit 1. Diabetes status was defined as (yes/no) self-report of diabetes, fasting glucose  $\geq 126$  mg/dL, prescription of diabetes medications, or serum hemoglobin A1c  $\geq 6.5\%$  at visit 1. Urine samples were obtained during study visit medical assessments. Urine albumin-to-creatinine ratio measurement was performed at Quest Diagnostics Inc. using an immunoturbidimetric assay (Kamiya Biomedical Co., Seattle, WA).

## Statistical Analysis

We described participants' characteristics using proportions for categorical variables and means (standard deviation [SD]) or medians (interquartile range [IQR]) for continuous variables. We evaluated frequencies of each coping behavior.

We used multiple logistic regression to assess whether adaptive and maladaptive coping at visit 1 were associated with kidney outcomes at visits 3 and 4. For each outcome, we fit regression models with two levels of adjusters in addition to coping variables. In conjunction with existing literature and our conceptual framework, we

chose the models with the greatest parsimony and least amount of missing data. The first model adjusted for age, race, sex at birth, poverty status, and visit 1 eGFR; the second model additionally adjusted for visit 1 hypertension and diabetes status to account for the potential impact of comorbidities on coping and outcomes. As a post-hoc exploratory analysis, for scales found to be significantly associated with outcomes, we used multiple logistic regression to assess whether individual behaviors were associated with the outcome.

To explore whether relations between coping and outcomes vary in the setting of different levels of depressive symptoms, we evaluated for effect modification by depressive symptoms by including interaction terms for adaptive coping × CES-D and maladaptive coping × CES-D. To explore whether coping behaviors drive the previously documented association between depression and kidney outcomes, we used the mediation package in R to evaluate for mediation of depressive symptoms at visit 1 and outcomes at visits 3 and 4 by coping behaviors at visit 1.<sup>31-33</sup>

Follow-up time was dictated by data availability. We accounted for time by adjusting for visit 1 eGFR. Differential time to follow up between study visits was accounted for by adjusting for the time difference between visit 1 and visit 4. Mean imputation was used for participants missing visit 4. All analyses were performed using R Statistical Software (version 4.1.2; R Core Team 2021). A p-value  $\leq 0.05$  was considered statistically significant.

## RESULTS

### *Primary Analysis*

Among 1935 individuals in the study population, mean (SD) age was 48 (9.1) years, 847 (43.8%) were male, 1080 (55.8%) were Black persons, mean (SD) baseline eGFR was 91.4 (15.5) ml/min/1.73m<sup>2</sup>, and mean (SD) baseline urine albumin-creatinine ratio was 26.1 (144.5) mg/g (**Table 1**). Median (IQR) adaptive and maladaptive coping was 43 (36 to 49) and 23 (19 to 27), respectively. Active coping, planning, acceptance, and religious coping behaviors were common (**Supplement Figure 1**). HANDLS participants who were excluded for missing the Brief COPE Inventory did not differ substantially from those included in the study (**Supplement Table 1**).

We followed participants for a median of 8.2 years. There were 1552 participants with complete information in the incident CKD analytic sample, of whom 113 (7.2%) developed CKD. For every one-point increase in adaptive coping, the odds of incident CKD decreased by 2% (adjusted odds ratio [OR] 0.98, 95% confidence interval [CI] 0.96 to 0.999) (**Table 2, Figure 3**). For example, compared to those with the lowest score on the adaptive coping scale (score = 16), those with the highest reported use of adaptive coping behaviors (score = 64) had 96% lower odds of incident CKD. Use of positive reinterpretation and religious coping were independently associated with reduced odds of incident CKD (**Supplement Table 2**). Maladaptive coping was not significantly associated with incident CKD (adjusted OR 1.02, 95% CI 0.98 to 1.05 for every one-point increase in maladaptive coping).

There were 1147 participants with complete information in the rapid kidney function decline analytic sample, of whom 341 (29.7%) experienced the outcome. Adaptive coping was not associated with rapid kidney function decline (adjusted OR 0.99, 95% CI 0.98 to 1.01 for every one-point increase in adaptive coping). Maladaptive coping was not associated with rapid kidney function decline (adjusted OR 1.00, 95% CI 0.98 to 1.02 for every one-point increase in maladaptive coping).

### *Exploratory Analyses*

The relationships between coping behaviors and incident CKD were not modified by depressive symptoms (p interaction 0.52 for adaptive coping; p interaction 0.99 for maladaptive coping). The relationships between coping behaviors and rapid kidney function decline were not modified by depressive symptoms (p interaction 0.32 for adaptive coping; p interaction 1.00 for maladaptive coping). We did not find an association between depressive symptoms at visit 1 and outcomes, so formal evaluation for mediation by coping behaviors was not performed.

## DISCUSSION

In this prospective cohort study of urban-dwelling adults with normal baseline kidney function, higher self-reported use of adaptive coping was associated with lower odds of incident CKD, but not rapid kidney function decline. Maladaptive coping behaviors were not associated with incident CKD or rapid kidney function decline.

To our knowledge this is the first study to evaluate the relationship between multiple coping behaviors, incident CKD and rapid kidney function decline. Our findings are similar to past studies that have highlighted the positive impact of religion, social

support, and other coping tendencies on kidney outcomes.<sup>34,35</sup> For example, in a study that included 76,443 adults with low socioeconomic status, Black persons who reported high spirituality had reduced kidney failure risk after multivariate adjustment.<sup>36</sup> Among people with kidney disease, coping behaviors have been found to impact mental wellbeing, symptoms and overall quality of life.<sup>37-39</sup> For example, individuals on dialysis who deal with stress through avoidance strategies (focus on work or distractions to not think about stress), tend to find their illness more intrusive and have lower quality of life.<sup>4</sup>

Emotional distress is common among people with kidney disease, and hospitalizations due to anxiety, depression and substance abuse are 1.5-3 times more common than individuals with other chronic diseases.<sup>40</sup> We found that associations between coping and outcomes did not differ according to severity of depressive symptoms. We did not find an association between depressive symptoms and outcomes, unlike past studies,<sup>29</sup> and therefore did not assess for mediation by coping behaviors. Our study may have been underpowered to evaluate the nuanced relationships between coping, depression, and kidney disease, or an association between maladaptive coping behaviors and outcomes, and future larger studies are needed.

Adaptive coping behaviors may be linked to kidney disease via development and control of comorbidities and health promoting behaviors. People with higher use of adaptive behaviors might be more consistent with their self-care, play a more active role in managing their medical conditions, or minimize disruptions in health and medical care when they encounter stressful life events. Adaptive coping may also impact health

through neurohormonal mechanisms. Stress is postulated to enhance sympathetic nervous system activity, the renin-angiotensin-aldosterone system, inflammatory cytokines, the hypothalamic-pituitary-adrenal axis, and endothelin-A.<sup>41-46</sup> By mitigating stress, adaptive coping behaviors might lower levels of hypertension, diabetes, obesity and vascular disease, all risk factors for kidney disease. Age, gender, and socioeconomic status may be associated with use of adaptive behaviors, although studies on predictors of various coping behaviors are mixed.<sup>20,34,35</sup> Additional studies that examine whether coping behaviors influence care processes such as being seen by a specialist and obtaining control of blood pressure and glycemia are needed.

Inquiring about coping and encouraging the use of adaptive coping behaviors could be incorporated into clinical practice, which may promote CKD prevention by optimizing management of comorbidities. Providing individuals and their family members with opportunities to become kidney disease advocates could facilitate positive reinterpretation and the opportunity to make sense of their diagnosis (i.e. “I developed kidney disease so I can help others and raise awareness”).<sup>47</sup> Motivational interviewing is a communication style that helps people resolve ambivalent feelings and find internal motivation, and can be used to encourage acceptance and positive reinterpretation.<sup>48</sup> Giving patients the tools they need to properly manage their disease and feel in control, and facilitating positive psychological strategies might facilitate active coping and planning. For example, meditation and mindfulness have been associated with reduction in blood pressure and stress.<sup>49,50</sup>

Inquiring about faith and religious preferences, and whether patients would like to involve religious leaders could facilitate religious coping. Use of instrumental and

emotional support could be encouraged by including family members or their support system when making decisions about clinical care, or disease-specific support groups could be offered to strengthen patients' connections and sense of belonging.<sup>51</sup> Trauma-informed care is a standardized approach to deliver sensitive care to people who have experienced a variety of traumatic experiences, including illness related trauma, that is sensitive and avoids re-traumatization, and should be considered in all medical settings to facilitate a trusting and supportive relationship with healthcare staff.<sup>52,53</sup>

Strengths of this study include the prospective design and identification of a novel risk factor for kidney disease among people with normal kidney function.

Some limitations bear mention. We categorized behaviors as adaptive or maladaptive to be consistent with other studies that used the Brief COPE Inventory. Whether one coping behavior, or a combination, produces a superior outcome likely depends on the individual, the stressor, and the context, and it is difficult to capture the nuanced effects of each unique behavior.<sup>12</sup> We analyzed behaviors as continuous variables to avoid assigning arbitrary cutoffs, with higher values reflecting higher self-reported use of the behaviors within each grouping. The exact amount of adaptive coping needed to make a difference clinically is difficult to discern. We evaluated how someone usually copes, but whether these behaviors are functionally the same in the short term is unclear. By using a single baseline assessment of coping behaviors, we were unable to capture how participants' coping changed over time. Additional studies on specific behaviors, their frequency of use, how they change over time, their meaning in an individual's life, and relation with kidney disease are needed.

Those who completed the baseline medical examination or Brief COPE Inventory as part of HANDLS might have been more engaged in the study, and introduce selection bias if their distribution of coping behaviors differed from those who did not complete the Brief COPE Inventory. Our findings may not be generalizable to non-urban populations, or populations with different ethnic compositions, given cultural nuances in coping behaviors.

In conclusion, we found that higher self-reported use of adaptive coping was associated with lower odds of incident CKD. Our work highlights a potential target for kidney disease prevention. Longitudinal studies that apply qualitative methods and studies using larger cohorts are needed to delineate the mechanisms underlying coping and the development of CKD.

## DISCLOSURES

P. Rathouz reports the following: Consultancy: Consultant for Sunovion Pharmaceuticals, unrelated to this work presented here. T. Novick reports the following: Consultancy: Cricket Health. D. Crews reports the following: Consultancy: Yale New Haven Health Services Corporation Center for Outcomes Research and Evaluation (CORE); Research Funding: Somatus, Inc.; Baxter International; Honoraria: Maze Therapeutics; Advisory or Leadership Role: Editorial Board--Journal of Renal Nutrition, Clinical Journal of the American Society of Nephrology, Journal of the American Society of Nephrology; Associate Editor, Kidney360; Co-Chair, Bayer HealthCare Pharmaceuticals Inc. Patient and Physician Advisory Board Steering Committee for Disparities in Chronic Kidney Disease Project; Advisory Group, Health Equity Collaborative, Partner Research for Equitable System Transformation after COVID-19



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## SUPPLEMENTAL MATERIAL

Supplement Figure 1. Frequency of individual coping behavior.

Supplement Table 1. Comparison of HANDLs participants who were included versus those who were excluded due to missing the Brief COPE Inventory.

Supplement Table 2. Association between Adaptive Coping subscales and Incident CKD.

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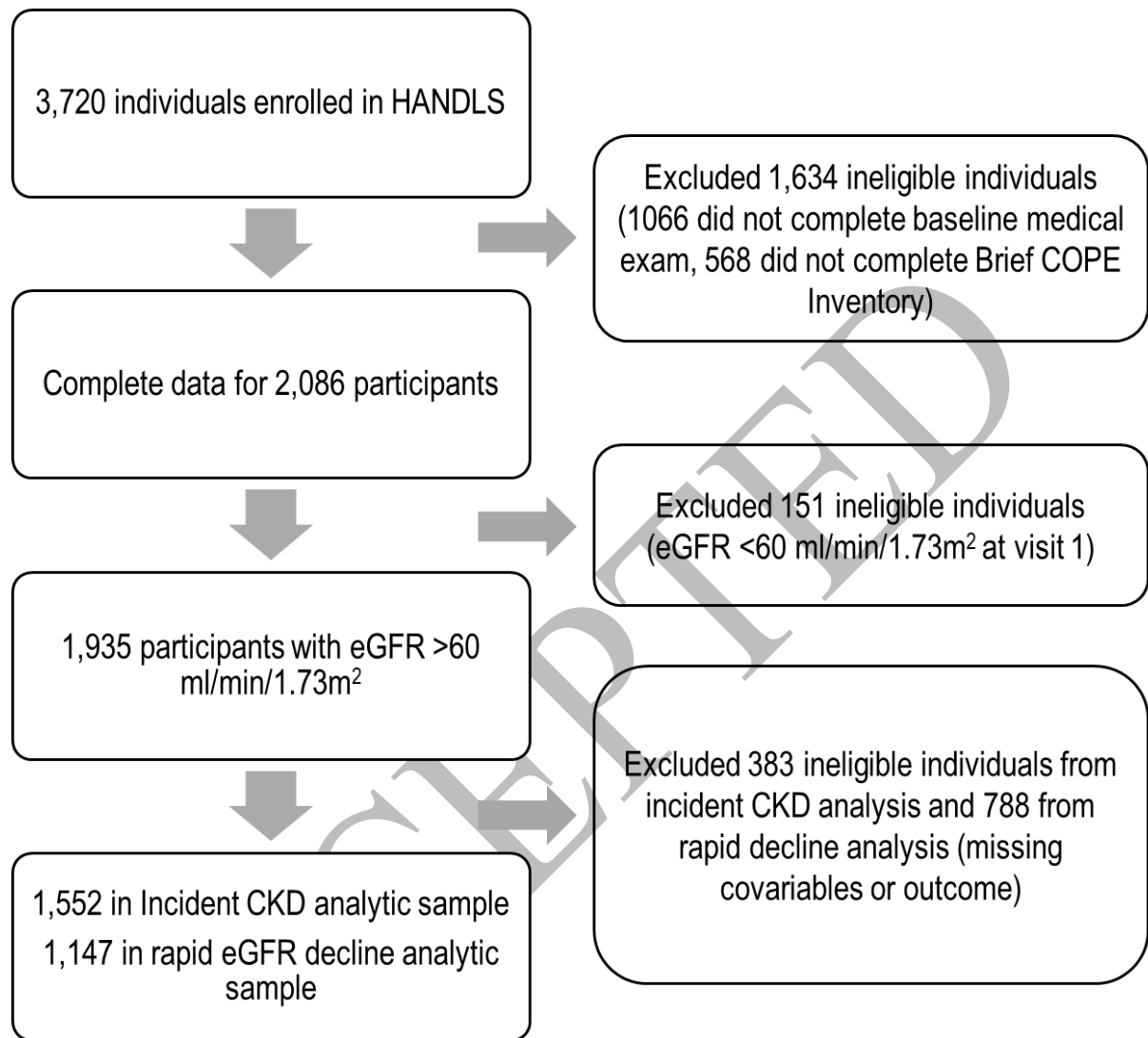
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**Figure 1.** Study flow diagram.



Abbreviations: CKD – chronic kidney disease; eGFR – estimated glomerular filtration rate; HANDLS – Healthy Aging in Neighborhoods of Diversity across the Life Span

Note: We defined incident CKD as the first occurrence of eGFR <60 ml/min/1.73m<sup>2</sup> and ≥25% decline in eGFR at study visits 3 or 4 in relation to visit 1, and rapid decline as eGFR loss of >3 ml/min/1.73m<sup>2</sup> per year between study visits 3 and 4. The rapid kidney function decline analytic sample was smaller because there were fewer participants who had eGFR data from both visits 3 and 4.

**Figure 2.** Subscales of the Brief COPE Inventory.

Adaptive Coping

**Positive reinterpretation**

I usually try to see it in a different light to make it seem more positive.

I usually look for something good in what is happening.

**Active coping**

I usually concentrate my efforts on doing something about the situation.

I usually act to try to make the situation better.

**Humor**

I usually make jokes about it.

I usually make fun of the situation.

**Acceptance**

I usually accept the reality of the fact that it has happened.

I usually learn to live with it.

**Planning**

I usually try to come up with a strategy about what to do.

I usually think hard about what steps to take.

**Religious coping**

I usually pray or meditate.

I usually try to find comfort in my religion or spiritual beliefs.

**Use of instrumental support**

I usually get help and advice from other people.

I usually try to get advice or help from other people about what to do.

**Use of emotional support**

I usually get emotional support from others.

I usually get comfort and understanding from someone.

Maladaptive Coping

**Behavioral disengagement**

I usually give up trying to deal with it.

I usually give up the attempt to cope.

**Self-distraction**

I usually turn to work or other activities to take my mind off of things.

I usually do something to think about it less, such as going to the movies, watching TV, reading, daydreaming, sleeping, or shopping.

**Focus on venting of emotions**

I usually say things to let my unpleasant feelings escape.

I usually express my negative feelings.

**Self-blame**

I usually criticize myself.

I usually blame myself for the things that happened.

**Denial**

I usually say to myself, "This isn't real."

I usually refuse to believe that it has happened.

**Substance use**

I usually use alcohol or other drugs to make myself feel better.

I usually use alcohol or other drugs to help me get through it.

All statements begin with “When I am confronted with a difficult or stressful event;” responses were scored as 1: “I usually don’t do this at all,” 2: “I usually do this a little bit,” 3: “I usually do this a medium amount,” and 4: “I usually do this a lot.” Adaptive and Maladaptive coping were analyzed as continuous variables reflecting the sum of constituent subscales. Adaptive coping can range from 16 to 64, and maladaptive coping from 12 to 48, with higher values reflecting higher self-reported use of the behaviors within that factor.

ACCEPTED

**Table 1.** Study sample characteristics.

<b>Characteristic</b>	<b>Total N=1935</b>
<b>Age, mean (SD) years</b>	48 (9.1)
<b>Sex, N (%)</b>	
Women	1088 (56.2)
Men	847 (43.8)
<b>Race, N (%)</b>	
White	855 (44.2)
Black	1080 (55.8)
<b>Income &lt;125% Federal poverty level, N (%)</b>	
Above	1140 (58.9)
Below	795 (41.1)
<b>Adaptive coping, mean (SD)</b>	42.5 (9.2)
<b>Maladaptive coping, mean (SD)</b>	23.5 (5.9)
<b>Baseline eGFR, mean (SD) ml/min/1.73m<sup>2</sup></b>	91.4 (15.5)
<b>Baseline urine albumin/creatinine ratio, mean (SD) mg/g</b>	26.1 (144.5)
<b>Hypertension, N (%)</b>	
No	1104 (57.8)
Yes	807 (42.2)
Missing	24 (1.2)
<b>Diabetes, N (%)</b>	
No diabetes	1262 (66.2)
Pre-diabetes	350 (18.4)
Diabetes	294 (15.4)
Missing	29 (1.5)
<b>Depressive Symptoms, N (%)</b>	
Low (CES-D <10)	779 (40.3)
Moderate (CES-D 10-20)	575 (29.7)
Severe (CES-D ≥21)	549 (28.4)
Missing	32 (1.7)
<b>Health insurance</b>	
No	621 (33)
Yes	1260 (67)
<b>Postponed seeking healthcare in the last 12 months</b>	
Needed but did not postpone	858 (45.6)
Yes	639 (34)
Did not need health care	384 (20.4)
Missing	54 (2.8)

Abbreviations: HANDLS- Healthy Aging in Neighborhoods of Diversity across the Life Span; CES-D – Center for Epidemiologic Study Depression; eGFR – estimated glomerular filtration rate; SD – standard deviation.



Note: There were 1935 individuals in the study sample. Among those, only complete cases were included in the analytic samples. There were 1552 participants in the incident CKD sample and 1147 participants in the rapid kidney function decline analysis.

ACCEPTED

**Table 2.** Primary analysis. Association between coping behaviors, incident CKD and rapid kidney function decline.

Primary Analysis: OR (95% CI) of the outcome per 1-point increase in coping scale		
Exposure	Model 1	Model 2
Incident CKD <sup>a</sup> (N = 1552; Events = 113)		
Adaptive <sup>b</sup>	0.98 (0.95 - 1.00)	0.98 (0.96 - 0.999)
Maladaptive <sup>b</sup>	1.02 (0.98 - 1.05)	1.02 (0.98 - 1.05)
Rapid kidney function decline <sup>a</sup> (N = 1147; Events = 341)		
Adaptive	0.99 (0.98 - 1.01)	0.99 (0.98 - 1.01)
Maladaptive	1.00 (0.97 - 1.02)	1.00 (0.98 - 1.02)

Abbreviations: CKD – chronic kidney disease; OR – odds ratio; CI – confidence interval

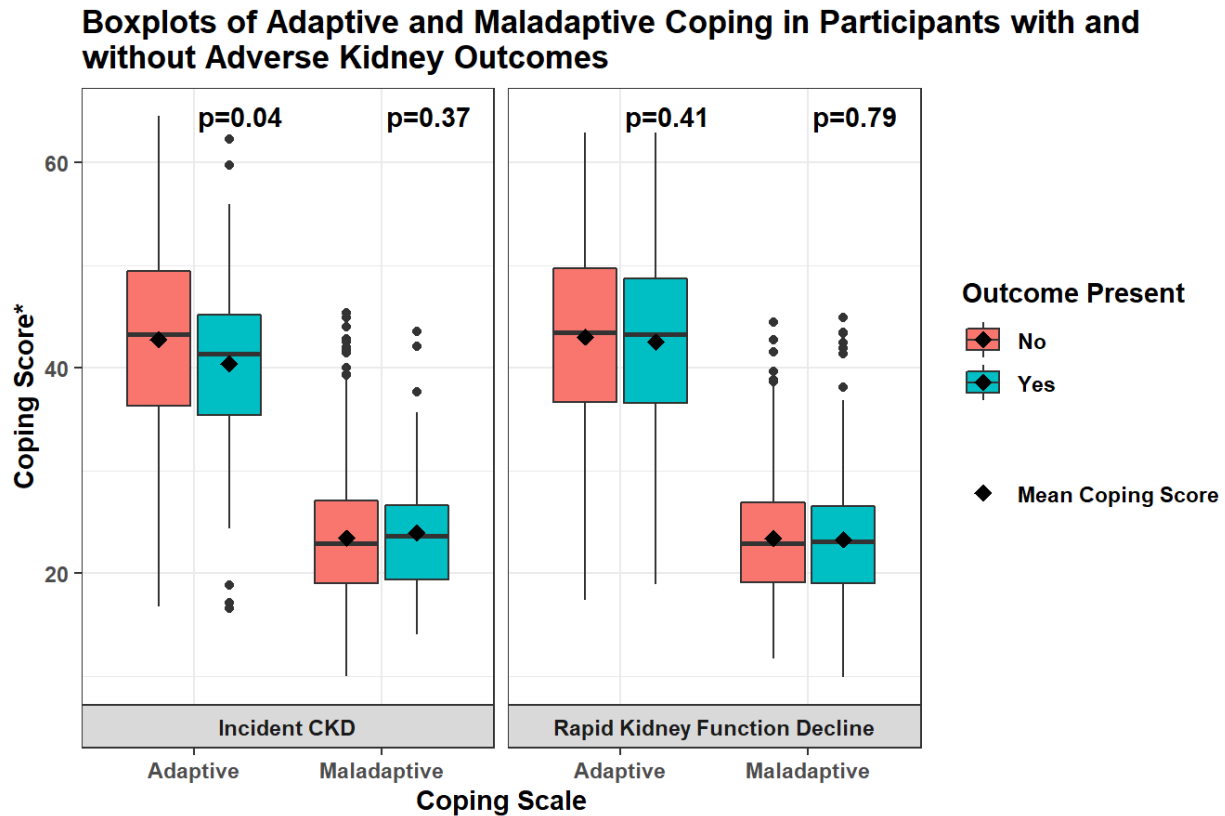
Model 1: adaptive and maladaptive coping + adjustment for age, differential time to follow-up, sex, race, baseline eGFR, and poverty status.

Model 2: model 1 + adjustment for baseline hypertension and diabetes status.

a) Incident CKD was defined as eGFR <60 ml/min/1.73m<sup>2</sup> and ≥25% decline at study visits 3 or 4 in relation to visit 1; rapid kidney function decline was defined as eGFR loss of >3 ml/min/1.73m<sup>2</sup> per year.

b) Adaptive and Maladaptive coping were analyzed as continuous variables reflecting the sum of constituent subscales. Adaptive coping ranged from 16 to 64, and maladaptive coping ranged from 12 to 48, with higher values reflecting higher self-reported use of the behaviors within that factor. Adaptive coping consisted of 8 subscales: positive reinterpretation, active coping, humor, acceptance, planning, religious coping, use of instrumental support, and use of emotional support. Maladaptive coping consisted of 6 subscales: behavioral disengagement, self-distraction, focus on venting of emotions, self-blame, denial, and substance use.

**Figure 3.** Relationship of coping behaviors with incident CKD (eGFR <60 ml/min/1.73m<sup>2</sup> and ≥25% decline at study visits 3 or 4 in relation to visit 1) and rapid kidney function decline (eGFR loss of >3 ml/min/1.73m<sup>2</sup> per year).



\*Coping scores adjusted for baseline age, sex, race, income <125% federal poverty level, baseline eGFR, hypertension diagnosis, diabetes diagnosis, and the coping scale counterpart

Abbreviations: CKD – chronic kidney disease; eGFR – estimated glomerular filtration rate

Note: P-values correspond to associations between 1-point increase in coping scales and outcomes.