

Real-World Reliability and Validity of the EQ-5D-5L in Chinese Patients with Diabetic Kidney Disease: A Cross-Sectional Study

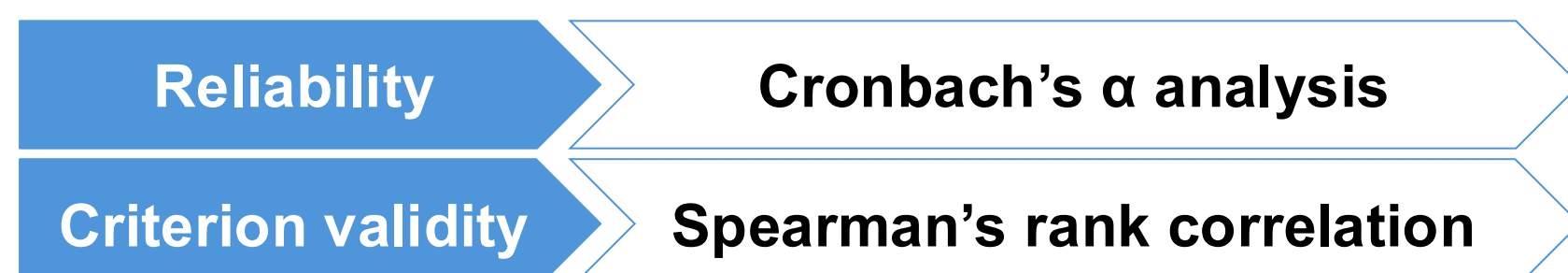
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BACKGROUND & OBJECTIVES

- Diabetic kidney disease (DKD) is a serious complication of diabetes and a leading cause of end-stage kidney disease worldwide. It not only impairs kidney function and increases cardiovascular risk, but also causes fatigue, edema, anxiety, and reduced daily functioning, significantly lowering patients' health-related quality of life (HRQoL).
- Assessing HRQoL is essential to understand the true burden of DKD and to guide patient-centered care.
- The EuroQoL-5 Dimensions-5 Levels (EQ-5D-5L) is a widely used tool for HRQoL assessment, but its reliability and sensitivity in hospitalized Chinese DKD patients remain unclear.
- This study evaluates the EQ-5D-5L in this population, providing key evidence to inform clinical interventions, prioritize care, and optimize healthcare resource allocation.

METHODS

- Study Design** A cross-sectional observational study was conducted from August 2024 and June 2025, enrolling adult inpatients diagnosed with DKD at Xiangya Hospital of Central South University.
- Data Collection**
 - HRQoL Assessment:** validated Chinese EQ-5D-5L and visual analog scale (VAS) to measure five health dimensions and generate utility scores.
 - Hospital medical records:** patient demographics, socioeconomic status, chronic kidney disease (CKD) stage, dialysis status, lab values, symptoms, and complications.
- Statistical Analysis**
 - Descriptive statistics were used to summarize demographic and clinical characteristics, EQ-5D-5L utility scores, VAS ratings.
 - Internal consistency of the EQ-5D-5L was assessed by Cronbach's α (≥ 0.70), and convergent validity was evaluated via Spearman's correlations with VAS scores.
- Separate multivariable linear regression models were constructed for EQ-5D-5L utility scores and VAS ratings to identify clinical drivers of HRQoL, adjusting for demographics, symptoms, and comorbidities.



RESULTS

Patient Characteristics and Clinical Profile

- A total of 225 DKD patients (mean age 60.0 \pm 11.5 years, 64% male) showed long-standing diabetes (mean 12.6 years), advanced chronic kidney disease (34.5% Stage 5; 27.9% on dialysis) (Table 1 and Figure 1).

Table 1. Clinical and demographic characteristics of patients with DKD

Variable	Diabetic kidney disease (N=225)	mean \pm SD/%
Demographics		
Age (years)	60.0 \pm 11.5	
Male proportion	64.0%	
BMI (kg/m ²) [†]	24.3 \pm 3.6	
Socioeconomics		
Health insurance type		
Urban resident basic medical insurance	53.8%	
Marital status		
Married	94.7%	
Occupation		
Employed	36.0%	
Farmer	22.2%	
Healthcare utilization		
Number of hospitalizations	2.8 \pm 3.3	
Mode of admission		
Outpatient	93.8%	
Emergency	5.8%	
Inter-hospital transfer	0.4%	
Disease characteristics		
Diabetes-related		
Duration of diabetes (years) [†]	12.6 \pm 7.9	
Glycated hemoglobin (HbA1c, %) [†]	8.3 \pm 2.2	
Renal-related		
24-hour urinary protein (g/24 h) [‡]	4.4 \pm 4.3	
eGFR (mL/min/1.73 m ²) [†]	43.9 \pm 36.9	
Serum creatinine (μ mol/L) [‡]	332.4 \pm 361.4	
Dialysis [§]	27.9%	

BMI = body mass index; eGFR = estimated glomerular filtration rate. [†]N=218; [‡]N=224; [§]N=184; [¶]N=80; [‡]N=220; [§]N=222.

- Patients commonly present with frequent symptoms (e.g., urinary frequency, edema, numbness, and fatigue), a high prevalence of renal complications (including renal anemia, end-stage kidney disease, and mineral and bone disorders), and multiple comorbidities such as hypertension, diabetic neuropathy, respiratory diseases, and retinopathy (Figure 2 and Figure 3).

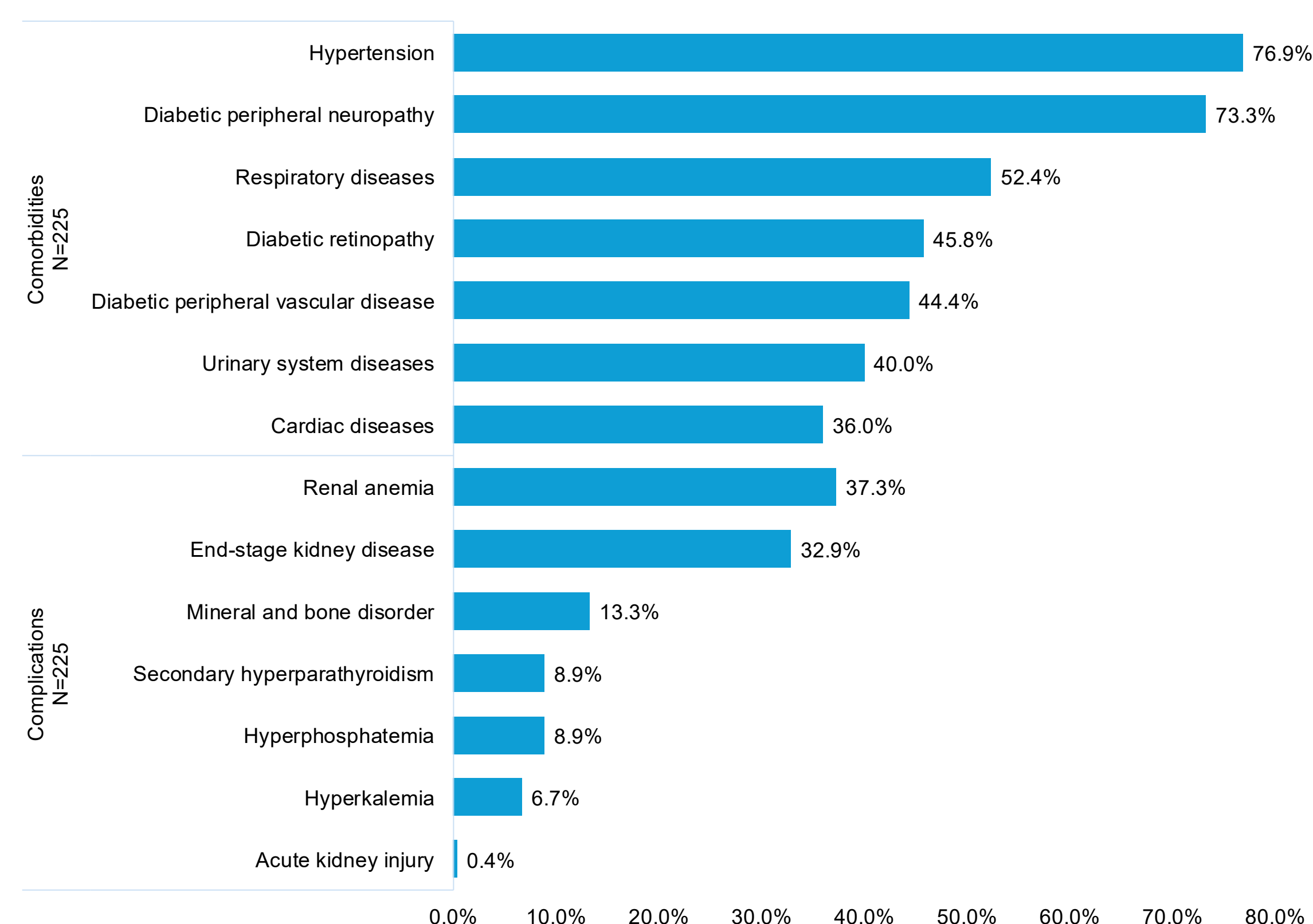


Figure 3. Comorbidities and complications of patients with DKD

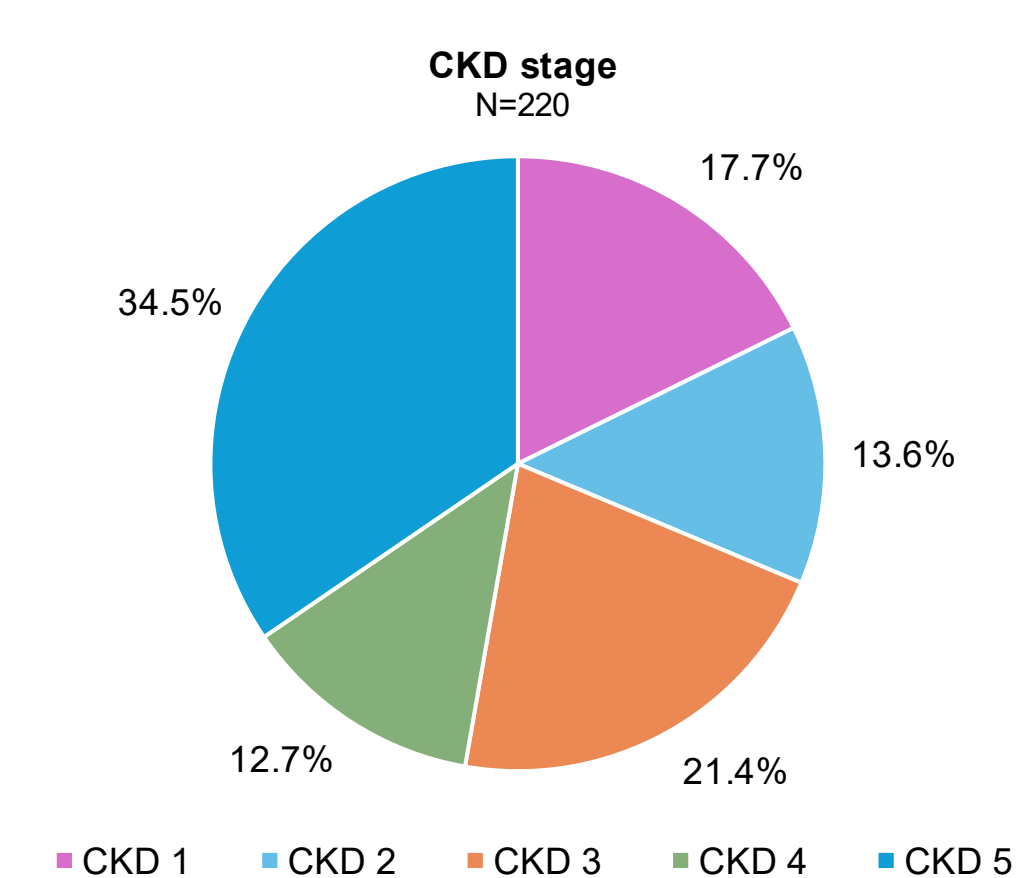


Figure 1. CKD stage of patients with DKD

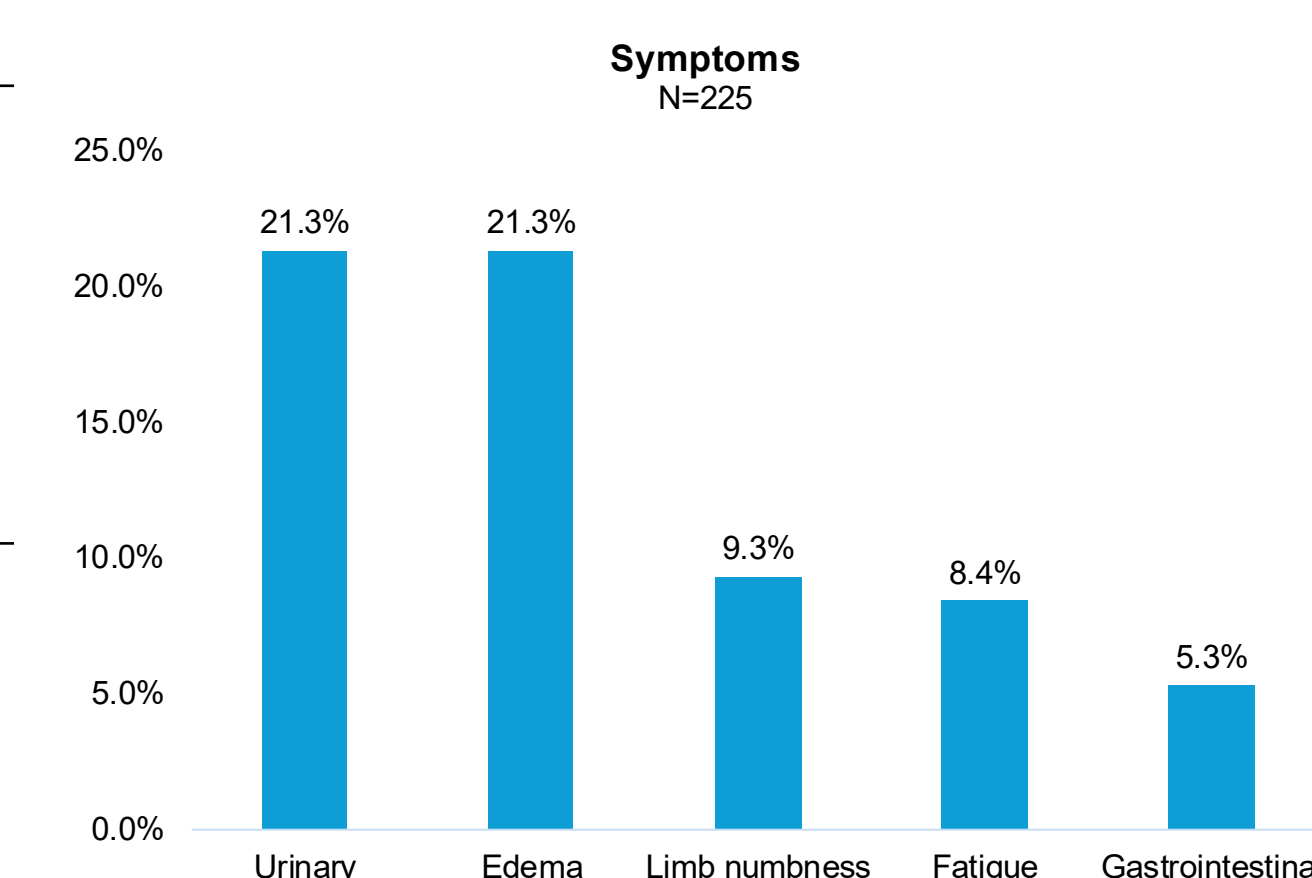


Figure 2. Symptoms of patients with DKD

HRQoL Outcomes

- Mean EQ-5D-5L utility score: 0.839 \pm 0.219
- Mean VAS score: 79.5 \pm 18.7

Psychometric Performance of EQ-5D-5L:

Internal consistency and Convergent validity

- The EQ-5D-5L demonstrated acceptable internal consistency, with a Cronbach's α of 0.758 (Figure 4), exceeding the conventional threshold of 0.70.
- Sensitivity analysis showed that removal of individual dimensions slightly reduced α , indicating that no single dimension disproportionately influenced the overall internal consistency.
- Given that EQ-5D-5L is designed as a multi-attribute system rather than a unidimensional scale, the α should be interpreted as supportive evidence of structural coherence rather than scale reliability.

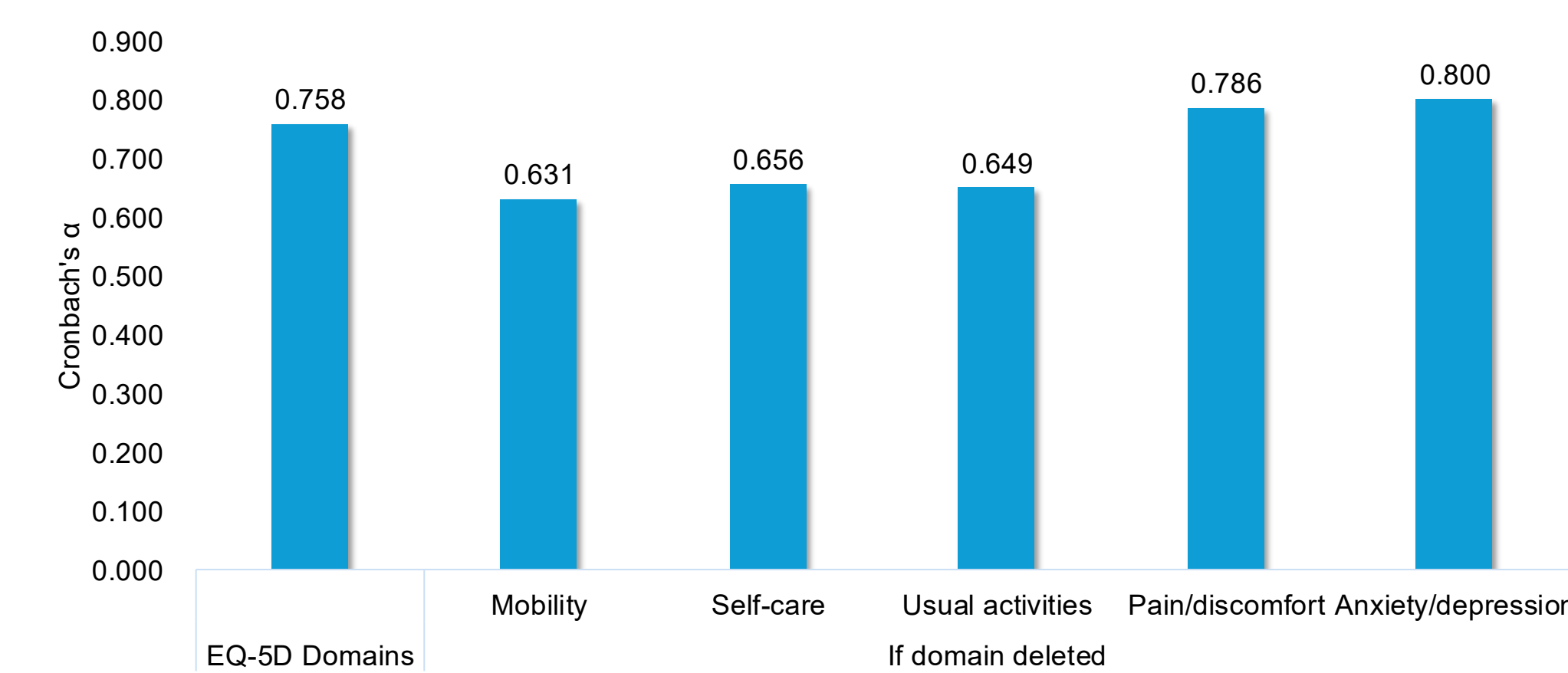


Figure 4. Cronbach's α coefficient for the EQ-5D in the included study population

- Convergent validity was supported by a moderate positive correlation between EQ-5D-5L utility index scores and patient-reported VAS ratings ($r = 0.606$, $P < 0.001$) (Figure 5).
- This exploratory finding suggests that higher utility index scores, which integrate all five dimensions, are generally aligned with better self-reported overall health.
- Dimension-level analyses showed that mobility and usual activities had the strongest correlations with VAS scores, whereas self-care showed weaker but still significant correlations, suggesting that all dimensions may contribute to patient-perceived health.

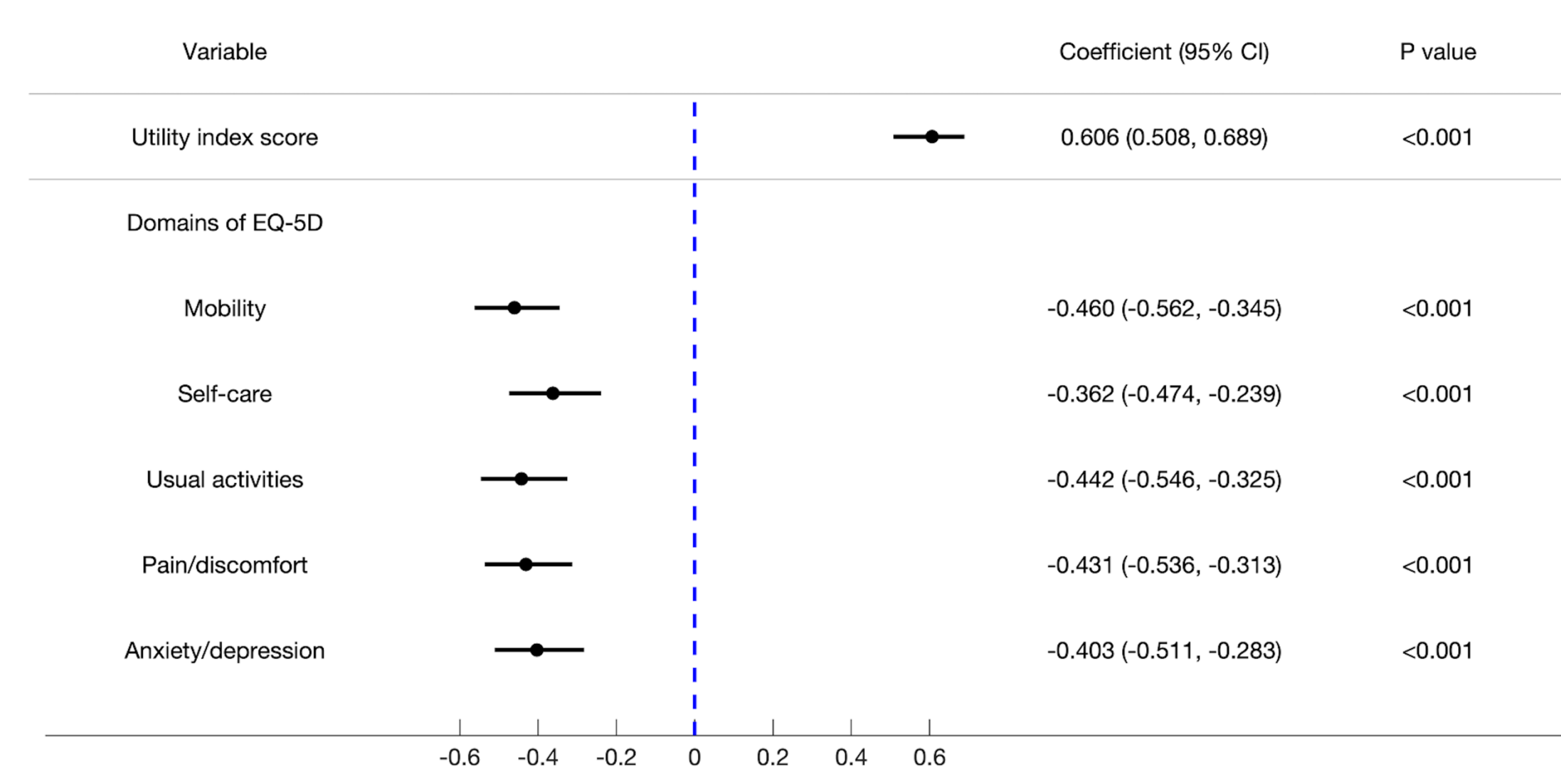


Figure 5. Spearman's rank correlation coefficients between EQ-5D utility index scores and VAS scale

Multivariable Determinants of HRQoL

- The multivariable linear regression models identified several independent predictors of health utility (Figure 6). Demographic factors including older age and female sex (with males scoring higher) were significantly associated with lower EQ-5D utility scores.
- From a clinical perspective, the presence of gastrointestinal symptoms, hemodialysis-related complications, and comorbid cardiac disease were the strongest predictors of diminished HRQoL. Notably, objective renal markers such as eGFR, dialysis status, and most other comorbidities did not remain significant after adjustment.

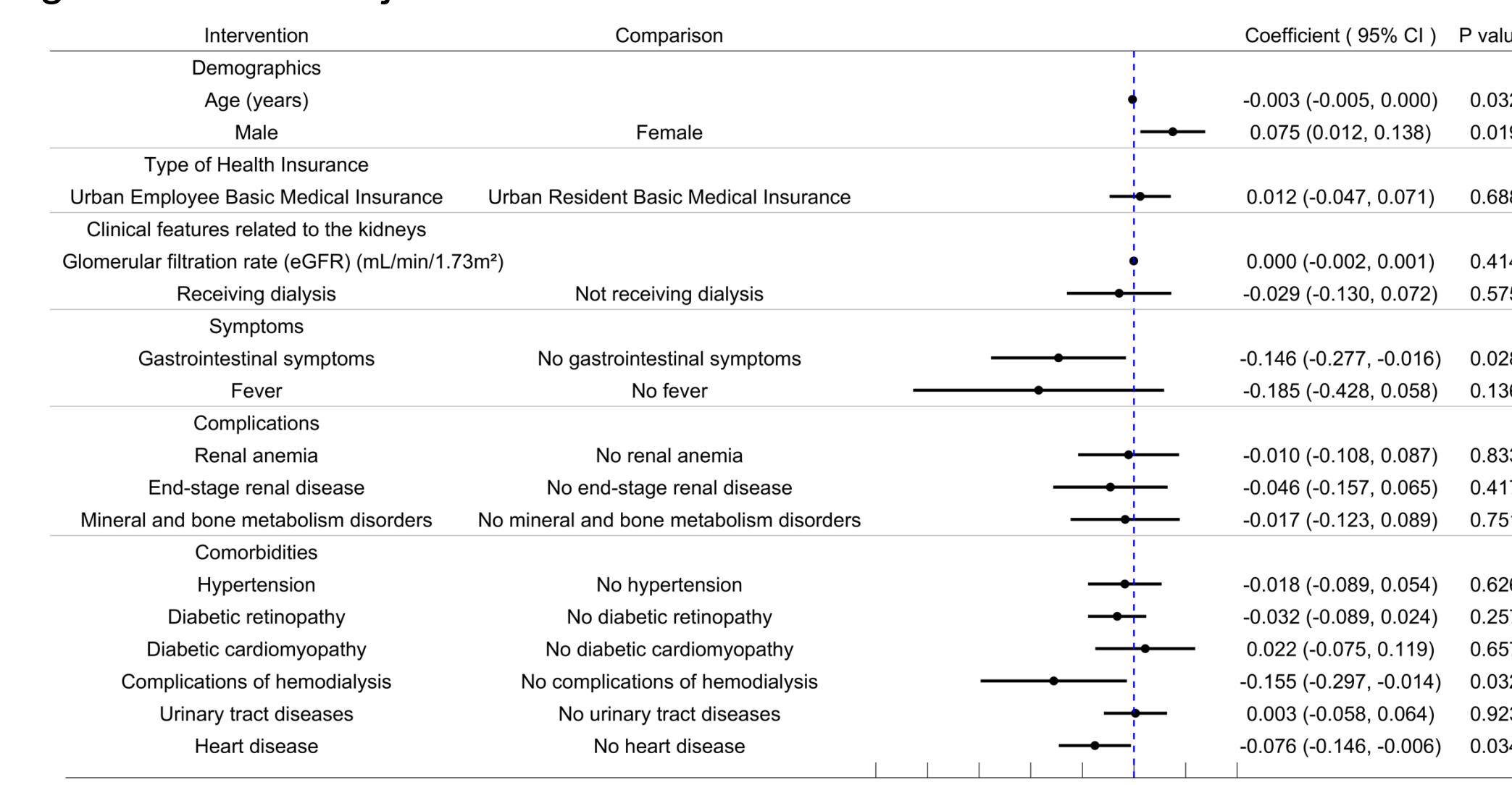


Figure 6. Multivariate linear regression of predictors for EQ-5D utility index

- In contrast, when VAS scores were treated as the dependent variable, no single demographic or clinical factor reached statistical significance (Figure 7).
- This suggests the VAS reflects a patient's overall health perception, psychological resilience, and adjustment to chronic illness.

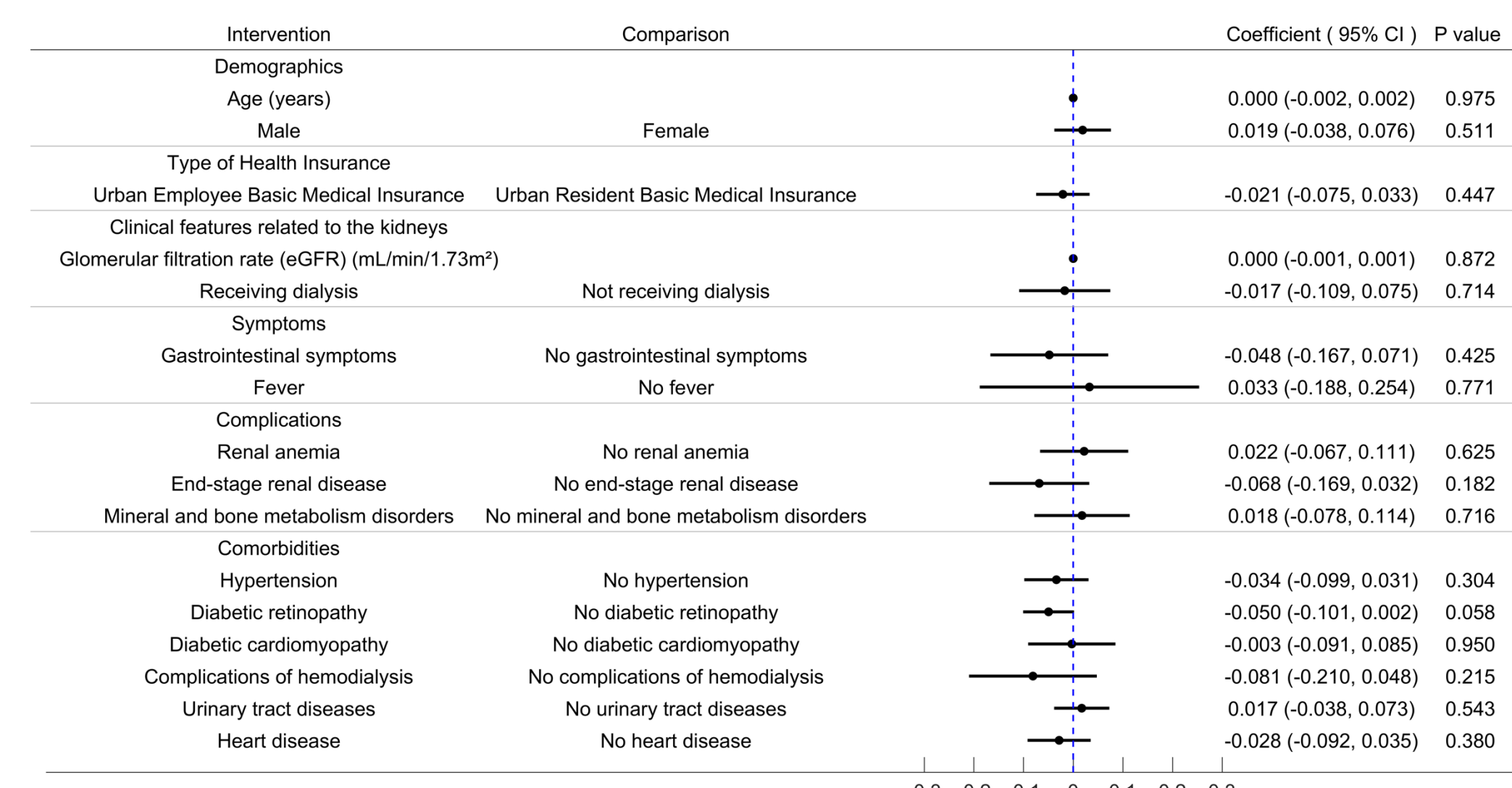


Figure 7. Multivariate linear regression of predictors for normalized VAS

CONCLUSIONS

- The EQ-5D-5L demonstrated acceptable internal consistency and exploratory convergent validity in Chinese patients with DKD, supporting its applicability for assessing multidimensional HRQoL in this population.
- Health utility was primarily influenced by age, sex, gastrointestinal symptoms, dialysis-related complications, and cardiac disease rather than renal function alone. These findings highlight the importance of symptom burden and comorbidity management in preserving patient well-being.