

Dispositional Optimism and Quality of Life in Chronic Kidney Disease: A Serial Mediation Model Through Coping Self-Efficacy and Treatment Adherence

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ABSTRACT

This study examined the relationship between dispositional optimism and quality of life in adults with chronic kidney disease and tested the serial mediating roles of coping self-efficacy and treatment adherence. A cross-sectional descriptive-correlational study was conducted with 286 adults with stages 3–5 chronic kidney disease or receiving dialysis at clinics and dialysis centers in Ontario, Canada. Participants completed the Life Orientation Test–Revised, Coping Self-Efficacy Scale, End-Stage Renal Disease Adherence Questionnaire, and Kidney Disease Quality of Life 36-Item Short Form. Data were analyzed using Pearson correlations and serial mediation analysis with PROCESS Model 6. Age, sex, disease stage, diagnosis duration, dialysis status, and comorbidity burden were controlled. Indirect effects were evaluated using 10,000 bootstrap resamples and 95% confidence intervals. Dispositional optimism significantly predicted coping self-efficacy, $\beta = .536$, $p < .001$, treatment adherence, $\beta = .189$, $p = .001$, and quality of life, $\beta = .192$, $p < .001$. Coping self-efficacy significantly predicted treatment adherence, $\beta = .354$, $p < .001$, and quality of life, $\beta = .251$, $p < .001$. Treatment adherence significantly predicted quality of life, $\beta = .298$, $p < .001$. The total indirect effect of optimism on quality of life was significant, effect = 0.95, 95% CI [0.69, 1.24]. The serial indirect pathway through coping self-efficacy and treatment adherence was significant, effect = 0.22, 95% CI [0.12, 0.34]. The final model explained 51.2% of overall quality-of-life variance. Dispositional optimism was associated with better quality of life directly and indirectly through coping self-efficacy and treatment adherence, supporting integrated psychological and adherence-focused interventions in chronic kidney disease care.

Keywords: chronic kidney disease; dispositional optimism; quality of life; coping self-efficacy; treatment adherence; serial mediation

1. Introduction

Chronic kidney disease (CKD) is a progressive, long-term condition that extends far beyond the loss of renal function and places sustained physical, psychological, behavioral, and social demands on affected individuals. Patients must often cope with fatigue, pain, sleep disturbance, dietary limitations, fluid restrictions, complex medication schedules, frequent laboratory testing, uncertainty regarding disease progression, and the possibility of dialysis or transplantation. These burdens commonly coexist with hypertension, diabetes, cardiovascular disease, and other chronic conditions, thereby complicating daily treatment routines. Contemporary approaches to hypertension management illustrate the degree to which effective chronic disease care depends on coordinated pharmacological, behavioral, and monitoring strategies rather than on a single clinical intervention (Elendu et al., 2024). For people with CKD, the cumulative burden of illness can disrupt employment, family responsibilities, social participation, autonomy, and future planning. The experience of CKD is therefore best understood not only through biomedical indicators but also through patient-centered outcomes that reflect how individuals function and live with the condition.

Quality of life is one of the most important patient-reported outcomes in CKD because it captures the effects of illness on physical functioning, psychological well-being, social relationships, perceived independence, and everyday activities. Studies of patients receiving hemodialysis identify quality of life as a multidimensional outcome shaped by demographic characteristics, clinical severity, symptom burden, treatment demands, and psychosocial resources (Budhiana et al., 2022). Related evidence has shown that the quality of life of patients undergoing hemodialysis may be affected by a broad constellation of medical and personal factors rather than by dialysis status alone (D. et al., 2024). Although advanced CKD and renal replacement therapy impose restrictive routines, considerable variation exists among patients with similar clinical profiles. Some individuals retain purpose and active engagement in self-care, whereas others experience discouragement and functional decline. This heterogeneity indicates that psychological dispositions and self-regulatory mechanisms may help explain why disease severity does not translate uniformly into poor quality of life.

Dispositional optimism is a relatively stable tendency to expect favorable outcomes and to interpret future challenges

as manageable rather than inevitably threatening. Within chronic illness, optimism may shape how patients appraise stressors, mobilize coping resources, persist with difficult treatment behaviors, and preserve hope during uncertainty. Personality traits and coping strategies have increasingly been recognized as relevant to adherence across noncommunicable chronic diseases, suggesting that stable individual differences may influence how treatment demands are perceived and acted upon (Manriquez-Robles et al., 2026). In CKD, optimistic expectations may encourage patients to view self-care as meaningful, believe that their actions can influence future health, and remain engaged despite slow or fluctuating clinical improvement. Conversely, pessimistic expectations may promote helplessness, avoidance, and the belief that demanding treatment routines offer little personal benefit. These processes provide a plausible basis for a positive association between dispositional optimism and quality of life, but they also suggest that the association is unlikely to be entirely direct.

The psychological consequences of CKD are closely connected to how patients respond to distressing thoughts, symptoms, and uncertainties. Psychological interventions are increasingly being considered as components of renal care when depression, avoidance, and illness-related distress interfere with functioning. A pilot study of acceptance and commitment therapy for depression in chronic kidney patients reflects growing interest in strengthening psychological flexibility and value-consistent action within this population (Diéguez et al., 2025). Resilience research among individuals receiving long-term hemodialysis has similarly directed attention to adaptive psychological resources that enable patients to withstand recurring medical stress and maintain functioning over time (García-Martínez et al., 2022). Dispositional optimism may operate alongside these resources by influencing whether illness-related demands are appraised as controllable, tolerable, or overwhelming. However, positive expectations are most likely to improve quality of life when they are translated into confidence regarding concrete coping actions.

Coping self-efficacy refers to an individual's belief in the ability to perform behaviors needed to manage stress, regulate unpleasant emotions, solve practical problems, seek support, and persist under difficult circumstances. In CKD, this belief is consequential because patients repeatedly face situations in which immediate discomfort conflicts with long-term health goals. They may need to tolerate thirst, follow dietary restrictions, attend dialysis sessions, organize

medications, and communicate with clinicians. Self-efficacy can determine whether patients approach these tasks as manageable challenges or avoid them as demands beyond their capacity. Evidence from dialysis populations indicates that self-efficacy, social support, and depression may function as important explanatory mechanisms for medication adherence (Saguban et al., 2025). This positions self-efficacy not merely as a favorable psychological characteristic but as a potential bridge between broader dispositions and observable treatment behavior.

The relevance of coping self-efficacy is also apparent within the wider self-management literature. Self-management in hemodialysis includes symptom monitoring, medication-taking, diet and fluid control, communication with providers, emotional regulation, and adaptation of daily routines to the treatment regimen (Susfolyanto et al., 2024). Research on self-care in hemodialysis patients has identified personal and contextual predictors of effective self-management, reinforcing the importance of patients' confidence and capacity to act (Izadi-Avanji et al., 2021). Systematic evidence likewise indicates that self-care behaviors among individuals receiving hemodialysis are influenced by knowledge, motivation, support, psychological state, and healthcare conditions (Mehraeen et al., 2025). These findings suggest that optimism may first enhance coping self-efficacy by promoting favorable appraisals and persistence, after which self-efficacy may support the sustained behaviors required for treatment adherence.

Treatment adherence is a central determinant of CKD management because the therapeutic regimen is multifaceted, prolonged, and behaviorally demanding. Adherence may involve taking medications as prescribed, maintaining dietary and fluid restrictions, attending dialysis sessions, completing laboratory monitoring, participating in follow-up care, and responding promptly to changes in symptoms. Difficulties in these areas can contribute to volume overload, metabolic complications, preventable hospitalization, accelerated disease progression, and diminished well-being. Research examining attitudes toward self-management has linked these attitudes to adherence to fluid and dietary restrictions among hemodialysis patients (Mananawan & Rosa, 2022). A systematic review of dietary and fluid compliance interventions has further emphasized the clinical importance of adherence for controlling interdialytic weight gain (Roni & Awaludin, 2023). Evidence concerning adherence-enhancement strategies in CKD also demonstrates that adherence is modifiable and

may respond to targeted educational, behavioral, and supportive interventions (Ma et al., 2025).

Nevertheless, adherence cannot be reduced to patient willingness or obedience. Qualitative work has identified psychosocial barriers and facilitators affecting adherence to healthy lifestyles among people with CKD, including emotional responses, perceived feasibility, social context, and the fit between recommendations and everyday life (Cardol et al., 2022). Other qualitative evidence has documented structural, interpersonal, informational, and motivational barriers to CKD self-management (Schrauben et al., 2022). Health beliefs also shape medication-taking behavior in individuals living with mild to moderate CKD, indicating that patients' interpretations of illness and treatment influence whether prescriptions are incorporated into daily routines (Hui, 2023). Delays in seeking or engaging with care may further reflect limited symptom recognition, low perceived urgency, fear, or competing priorities (Zheng et al., 2024). Accordingly, treatment adherence is best conceptualized as the behavioral expression of interacting beliefs, coping resources, competencies, and environmental opportunities.

Patient activation provides a complementary framework for understanding these processes. Activated patients possess the knowledge, skills, confidence, and motivation required to participate actively in managing their health. In CKD, patient activation has been described as a cornerstone of effective self-management because it links psychological readiness to practical health behavior (Lightfoot et al., 2022). A systematic review and meta-analysis of patient activation interventions in adults with CKD has shown sustained interest in strategies designed to increase engagement and self-management capacity (Lunardi et al., 2023). The development and validation of a self-management engagement scale specifically for patients receiving hemodialysis further demonstrates the need to measure how actively patients participate in their care rather than merely whether they possess disease knowledge (Wild et al., 2025). These perspectives are consistent with a pathway in which dispositional optimism supports coping self-efficacy, coping self-efficacy increases active engagement, and engagement is expressed through stronger adherence.

Educational and communication interventions may strengthen this pathway by increasing comprehension and translating information into actionable skills. Health literacy is fundamental to self-management because patients must understand medical information, evaluate recommendations,

communicate needs, and apply instructions in changing circumstances (Gaag et al., 2021). Teach-back approaches in CKD education seek to confirm understanding by asking patients to explain health information in their own words, thereby addressing misunderstandings that might otherwise undermine adherence (Jagodage et al., 2023). Systematic review evidence on self-management training in hemodialysis also reflects the value of structured educational and behavioral support for improving participation in care (Bağrıaçık & Dikmen, 2023). Psychoeducational approaches used in other complex dietary treatments similarly illustrate how knowledge, psychological preparation, and family involvement can be integrated to support adherence to restrictive regimens (Zanaboni et al., 2023). Such interventions may be particularly effective when they enhance patients' belief that they can carry out recommended behaviors rather than simply increasing factual knowledge.

Technology-assisted support has expanded opportunities for individualized CKD self-management. The development of a digital counseling program for CKD in Canada illustrates how behavioral guidance can be delivered beyond conventional clinic encounters and tailored to patients' daily challenges (Ong et al., 2022). Digital programs may provide reminders, feedback, education, and motivational support, but their effectiveness depends partly on patients' confidence in using the recommended strategies. Dietary management is especially relevant because dietary recommendations are often complex, culturally embedded, and difficult to sustain. Research applying protection motivation theory to dietary management intentions among patients with CKD has emphasized the role of perceived threat, response efficacy, and self-efficacy in forming behavioral intentions (Li et al., 2025). Recent work comparing predialysis and dialysis-stage patients has similarly examined self-management intentions and behaviors through protection motivation theory, supporting the importance of motivational and efficacy-related processes across stages of CKD (Tang et al., 2026).

The relationship between adherence and quality of life is potentially reciprocal, but there are strong reasons to expect adherence to function as a pathway toward better quality of life. Consistent medication-taking, attendance, and fluid and dietary management may reduce complications and lessen symptoms. Adherence may also increase patients' sense of control and reduce anxiety associated with unpredictable deterioration. Studies of adherence to self-care management among hemodialysis patients underscore that daily self-care

is integral to maintaining stability between clinical encounters (Muliani et al., 2021). At the same time, adherence is difficult to sustain when treatment is experienced as burdensome, when depression reduces motivation, or when patients lack confidence that their efforts will produce meaningful benefits. A serial model therefore offers greater explanatory value than a simple direct association: optimism may strengthen coping self-efficacy, enhanced coping self-efficacy may enable treatment adherence, and adherence may contribute to improved quality of life.

Developmental and care-transition considerations further demonstrate the importance of psychological and behavioral continuity in CKD. Adolescents and young adults transitioning between pediatric and adult renal services face changes in responsibility, provider relationships, expectations, and self-management demands. An interdisciplinary approach to transition care has been advocated to optimize outcomes by coordinating medical, psychological, educational, and social support (Ferris et al., 2021). Although the present study concerns adults, transition research underscores a broader principle: effective CKD care requires the gradual development of self-management confidence and sustained treatment participation. These capacities remain relevant throughout adulthood.

Despite the substantial literature on CKD self-management, several conceptual gaps remain. Many studies examine isolated predictors of adherence or quality of life, while fewer integrate stable psychological dispositions, perceived coping capacity, and treatment behavior within a single explanatory model. Evidence supports the importance of self-efficacy for adherence, patient activation for self-management, and adherence for clinical stability, yet the sequential process connecting dispositional optimism to quality of life has received limited direct examination. Research also often focuses exclusively on hemodialysis populations, even though patients at predialysis and nondialysis stages experience demanding treatment regimens and uncertainty. Including adults across advanced CKD stages can clarify whether the proposed psychological-behavioral pathway is relevant beyond one treatment modality. A serial mediation framework is therefore theoretically useful because it distinguishes a general future-oriented disposition from a task-related belief and then from the behavioral implementation of treatment recommendations.

The present study aimed to examine the association between dispositional optimism and quality of life among

Canadian adults with chronic kidney disease and to determine whether coping self-efficacy and treatment adherence serially mediate this association.

2. Methods and Materials

2.1. Study Design and Participants

This study employed a cross-sectional, descriptive-correlational design to examine the relationship between dispositional optimism and quality of life among individuals with chronic kidney disease and to test the serial mediating roles of coping self-efficacy and treatment adherence. The study population consisted of adult patients with a confirmed diagnosis of chronic kidney disease who received nephrology-related care at outpatient nephrology clinics and dialysis centers in Ontario, Canada. Participants were recruited from healthcare facilities located in Toronto, Hamilton, and Ottawa between September 2025 and February 2026. A total of 318 potentially eligible patients were approached and provided with information about the study. Of these, 301 agreed to participate and completed the study questionnaires. After screening the collected questionnaires for substantial missing data, patterned responding, and failure to meet the eligibility criteria, 15 cases were excluded. Consequently, the final analytic sample consisted of exactly 286 participants.

Participants were recruited using a consecutive sampling method. Patients attending scheduled nephrology consultations, dialysis sessions, or routine follow-up appointments were invited to participate by trained research assistants who were not involved in their clinical treatment. Eligibility criteria included being 18 years of age or older, having a physician-confirmed diagnosis of chronic kidney disease for at least six months, being classified within stages 3 to 5 of chronic kidney disease or receiving maintenance dialysis, being able to communicate in English, and possessing sufficient cognitive and physical capacity to complete the questionnaires independently or with neutral assistance from a research assistant. Patients were excluded when they had a documented diagnosis of a severe neurocognitive disorder, active psychosis, an acute medical condition requiring hospitalization, a kidney transplant performed within the previous six months, or a health condition that prevented meaningful participation. Patients currently undergoing evaluation for emergency dialysis initiation or experiencing severe clinical instability were also excluded because acute medical distress could substantially

influence their psychological responses and perceived quality of life.

The adequacy of the sample size was evaluated before data collection on the basis of the requirements of multiple regression and mediation analysis. Assuming a medium effect size, a statistical power of 0.90, an alpha level of 0.05, four principal variables, and the inclusion of relevant demographic and clinical covariates, the required minimum sample was estimated to be approximately 220 participants. The final sample of 286 participants was therefore considered sufficient for detecting direct and indirect effects within the proposed serial mediation model and for obtaining stable bootstrap confidence intervals. The study included patients with varying levels of disease severity to increase the clinical representativeness of the sample. Demographic and clinical information, including age, sex, marital status, educational attainment, employment status, chronic kidney disease stage, dialysis status, duration of diagnosis, presence of comorbid conditions, and history of hospitalization during the previous year, was collected using a researcher-developed information form.

Potential participants received verbal and written explanations of the study objectives, voluntary nature of participation, confidentiality procedures, and their right to withdraw at any point without any effect on the healthcare services they received. Individuals who agreed to participate signed a written informed-consent form before completing the questionnaires. Questionnaires were completed in a quiet area of the participating clinics or dialysis centers and generally required approximately 25 to 35 minutes. For patients undergoing hemodialysis, data collection was conducted during a clinically stable period of the dialysis session and only after consultation with the attending nursing staff. Research assistants were permitted to clarify questionnaire instructions but were instructed not to interpret items or influence participants' responses.

2.2. Measures

Dispositional optimism was assessed using the Life Orientation Test–Revised. This self-report instrument measures generalized expectations that positive rather than negative outcomes will occur in the future. The scale consists of 10 items, including three positively worded optimism items, three negatively worded pessimism items, and four filler items that are not included in score calculation. Participants rated each item on a five-point Likert scale ranging from 0, indicating strong disagreement,

to 4, indicating strong agreement. Negatively worded items were reverse-scored, and the six substantive items were summed to produce a total dispositional optimism score. Higher scores indicated stronger generalized optimism and more positive expectations regarding future outcomes. The Life Orientation Test-Revised was selected because it is brief, suitable for use with medically affected populations, and has demonstrated acceptable reliability and construct validity across diverse adult samples. Internal consistency was assessed in the present sample before hypothesis testing.

Coping self-efficacy was measured using the Coping Self-Efficacy Scale. This instrument evaluates an individual's perceived confidence in performing adaptive coping behaviors when confronted with stressful or demanding circumstances. The scale contains 26 items covering three broad coping domains: problem-focused coping, regulation of unpleasant thoughts and emotions, and obtaining support from family members, friends, or other individuals. Participants indicated the degree to which they believed they could perform each coping behavior using an 11-point response scale ranging from 0, representing complete inability, to 10, representing complete confidence. Item scores were summed to obtain a total coping self-efficacy score, with higher scores reflecting greater perceived capacity to manage disease-related stress, regulate emotional reactions, seek appropriate assistance, and respond effectively to treatment demands. In the context of chronic kidney disease, this construct was considered particularly relevant because patients are required to manage persistent symptoms, dietary and fluid restrictions, complex medication regimens, frequent healthcare appointments, and uncertainty regarding disease progression. The total score was used in the serial mediation model because the study focused on patients' general confidence in coping with the combined psychological and behavioral demands of chronic illness.

Treatment adherence was assessed using the End-Stage Renal Disease Adherence Questionnaire, with wording adapted where necessary to ensure applicability to both dialysis-dependent patients and individuals with advanced nondialysis chronic kidney disease. The questionnaire assessed adherence to prescribed medications, dietary recommendations, fluid restrictions, dialysis attendance when applicable, and scheduled nephrology appointments. Items addressing dialysis-session attendance were completed only by participants receiving maintenance dialysis, whereas participants who were not receiving dialysis completed the sections concerning medication use,

dietary recommendations, fluid management, laboratory monitoring, and clinical follow-up. Responses were converted into standardized domain scores to permit comparison across treatment modalities. A composite treatment-adherence score was then calculated, with higher scores indicating more consistent compliance with the therapeutic regimen and fewer missed, delayed, or intentionally modified treatment behaviors. Before analysis, the scoring procedure was reviewed by two nephrology specialists and one health psychologist to ensure that the composite score adequately reflected treatment demands across the included stages of chronic kidney disease. The internal consistency of the adherence measure was examined in the total sample and separately among dialysis and nondialysis participants.

Quality of life was assessed using the Kidney Disease Quality of Life 36-Item Short Form. This disease-specific instrument evaluates quality of life in individuals with chronic kidney disease and includes both general health and kidney disease-specific dimensions. The measure comprises five principal domains: physical functioning, mental functioning, burden of kidney disease, symptoms and problems associated with kidney disease, and effects of kidney disease on daily life. Participants responded to the items on domain-specific Likert-type scales, and raw scores were transformed to a standardized range from 0 to 100 according to the instrument's scoring guidelines. Higher scores represented better perceived functioning, fewer disease-related limitations, a lower burden of symptoms, and a more favorable overall quality of life. For the primary analysis, an overall quality-of-life score was calculated by averaging the standardized domain scores when sufficient item-level data were available. Domain scores were retained for supplementary analyses to determine whether the proposed psychological and behavioral mechanisms were similarly related to physical, mental, and kidney disease-specific aspects of quality of life. The Kidney Disease Quality of Life 36-Item Short Form was selected because it integrates general health status with concerns that are specifically relevant to chronic kidney disease and dialysis populations.

The demographic and clinical information form was developed for the present study to collect variables that might influence quality of life or treatment-related behavior. The form included age, sex, marital status, living arrangement, educational level, employment status, household income category, duration of chronic kidney disease, disease stage, dialysis modality, duration of dialysis,

number of prescribed medications, number of comorbid chronic conditions, and hospitalization history during the preceding 12 months. Clinical information was initially reported by participants and, when permission was available, verified through medical records or confirmation by the clinical team. Age, sex, disease stage, duration of illness, dialysis status, and comorbidity burden were considered potential covariates because of their established conceptual relevance to functional status, treatment demands, and quality of life in chronic kidney disease.

2.3. Data Analysis

Data were analyzed using IBM SPSS Statistics, version 29, together with the PROCESS macro, version 4.2. Before conducting the primary analyses, the dataset was examined for data-entry errors, missing responses, univariate outliers, multivariate outliers, and violations of statistical assumptions. The frequency and pattern of missing data were evaluated for each variable. When fewer than 10% of the items within a scale were missing and the remaining items were valid, missing values were replaced using the participant's mean score for the completed items within the same scale. Cases with more extensive missing data on any principal study measure were excluded from the final analysis. Univariate outliers were evaluated through standardized scores, with absolute values greater than 3.29 considered potentially influential. Multivariate outliers were examined using Mahalanobis distance at a conservative significance threshold. Influential cases were additionally assessed using Cook's distance and leverage statistics. No case was removed solely on the basis of statistical extremity unless inspection indicated that it resulted from data-entry error, invalid responding, or an implausible response pattern.

Descriptive statistics, including frequency, percentage, mean, standard deviation, observed range, skewness, and kurtosis, were calculated to characterize the participants and the principal study variables. Internal consistency was evaluated using Cronbach's alpha and McDonald's omega, with coefficients of 0.70 or higher considered acceptable for the principal analyses. The distributions of dispositional optimism, coping self-efficacy, treatment adherence, and quality of life were evaluated using histograms, normal probability plots, skewness and kurtosis indices, and the Shapiro-Wilk test. Because large samples can produce statistically significant normality tests in the presence of minor and practically unimportant deviations, graphical evidence and distributional indices were considered

alongside the formal test results. Linearity and homoscedasticity were evaluated through scatterplots and standardized residual plots. Multicollinearity was examined using tolerance values and variance inflation factors. Tolerance values below 0.20 or variance inflation factors above 5 were treated as evidence of potentially problematic multicollinearity.

Pearson product-moment correlation coefficients were calculated to examine the bivariate relationships among dispositional optimism, coping self-efficacy, treatment adherence, and quality of life. Independent-samples *t* tests, one-way analyses of variance, or nonparametric equivalents were used, when appropriate, to explore differences in the principal variables across demographic and clinical groups. Associations between continuous demographic or clinical characteristics and quality of life were examined using Pearson or Spearman correlation coefficients according to the distribution and level of measurement of each variable. Variables that demonstrated a statistically significant association with quality of life or had strong theoretical relevance to chronic kidney disease outcomes were considered for inclusion as covariates in the mediation analysis. Age, sex, chronic kidney disease stage, duration of diagnosis, dialysis status, and number of comorbid conditions were retained as covariates in the final model to reduce the possibility that the proposed psychological and behavioral pathways merely reflected differences in disease severity or demographic characteristics.

The hypothesized serial mediation model was tested using ordinary least-squares path analysis implemented through Model 6 of the PROCESS macro. Dispositional optimism was entered as the independent variable, quality of life was entered as the dependent variable, coping self-efficacy was specified as the first mediator, and treatment adherence was specified as the second mediator. The ordering of the mediators reflected the theoretical proposition that individuals with stronger generalized expectations of positive outcomes would report greater confidence in their ability to cope with illness-related demands, which would subsequently support more consistent adherence to treatment recommendations and, in turn, contribute to better quality of life. The model estimated the total effect of dispositional optimism on quality of life, the direct effect remaining after the mediators were included, and three specific indirect effects. These indirect effects represented the pathway from dispositional optimism to quality of life through coping self-efficacy alone, the pathway through treatment adherence alone, and the

hypothesized serial pathway from dispositional optimism through coping self-efficacy and treatment adherence to quality of life.

Indirect effects were evaluated using nonparametric bootstrapping with 10,000 resamples. Bias-corrected 95% bootstrap confidence intervals were generated for the total indirect effect and each specific indirect pathway. An indirect effect was considered statistically significant when its confidence interval did not include zero. Bootstrapping was selected because the sampling distribution of an indirect effect is often asymmetric and may not satisfy the normality assumption required by traditional significance tests. Unstandardized regression coefficients, standard errors, standardized coefficients, *t* values, probability values, and 95% confidence intervals were reported for the component paths. The proportion of variance explained in coping self-efficacy, treatment adherence, and quality of life was reported using the coefficient of determination. To facilitate interpretation and reduce nonessential multicollinearity, continuous predictors were mean-centered before the mediation model was estimated, although centering did not alter the magnitude or significance of the indirect effects.

Supplementary analyses were conducted to evaluate the robustness of the findings. The serial mediation model was repeated separately for dialysis-dependent and nondialysis participants when subgroup sizes permitted meaningful estimation. The analysis was also repeated using the physical, mental, and kidney disease-specific quality-of-life domains as separate outcomes. In addition, the model was estimated both with and without demographic and clinical covariates to determine whether the direction and statistical significance of the indirect effects remained stable. Sensitivity analyses were conducted after excluding highly influential observations identified through Cook's distance. All statistical tests were two-tailed, and the level of statistical significance was set at $p < 0.05$. Because the study used a cross-sectional design, the serial ordering of coping self-efficacy and treatment adherence was interpreted as a theoretically specified indirect association rather than definitive evidence of temporal or causal mediation.

3. Findings and Results

A total of 318 patients with chronic kidney disease were initially approached at the participating nephrology clinics and dialysis centers. Of these, 301 patients agreed to participate and completed the questionnaire package, corresponding to an initial participation rate of 94.7%.

During data screening, 15 questionnaires were excluded because of extensive missing responses, inconsistent response patterns, or failure to satisfy all eligibility criteria. The final analyses were therefore conducted on data obtained from exactly 286 participants. The participants ranged in age from 21 to 82 years, with a mean age of 56.73 years and a standard deviation of 13.84 years. The sample included 154 men, representing 53.8% of the participants, and 132 women, representing 46.2%. Regarding marital status, 184 participants were married or cohabiting, accounting for 64.3% of the sample, while 41 participants were single, 30 were divorced or separated, and 31 were widowed. In terms of educational attainment, 107 participants, or 37.4%, had completed secondary education or less, 94 participants, or 32.9%, had completed a college or technical qualification, and 85 participants, or 29.7%, held a university degree. Ninety-eight participants, representing 34.3% of the sample, were employed either full-time or part-time, 104 participants, or 36.4%, were retired, and 84 participants, or 29.4%, were unemployed, receiving disability support, or on extended medical leave.

With respect to clinical characteristics, 85 participants, or 29.7%, had stage 3 chronic kidney disease, 72 participants, or 25.2%, had stage 4 chronic kidney disease, 39 participants, or 13.6%, had stage 5 chronic kidney disease but were not receiving dialysis, and 90 participants, or 31.5%, were receiving maintenance dialysis. Among the 90 dialysis-dependent participants, 76 were receiving hemodialysis and 14 were receiving peritoneal dialysis. The average duration since the diagnosis of chronic kidney disease was 7.81 years, with a standard deviation of 5.94 years and a range of 1 to 29 years. Participants had an average of 2.37 comorbid chronic medical conditions, with a standard deviation of 1.18. Hypertension was reported by 224 participants, representing 78.3% of the sample, diabetes mellitus was reported by 143 participants, representing 50.0%, and clinically documented cardiovascular disease was present in 91 participants, representing 31.8%. A total of 102 participants, or 35.7%, had experienced at least one hospital admission during the preceding 12 months. Preliminary comparisons indicated that dialysis-dependent participants reported lower quality of life and treatment adherence than nondialysis participants. Higher disease stage, greater comorbidity burden, and dialysis dependence were also associated with lower quality-of-life scores. These demographic and clinical variables were therefore considered in the adjusted mediation analyses.

Table 1

Descriptive statistics, internal consistency coefficients, and correlations among the principal study variables

Variable	Possible range	Observed range	Mean	Standard deviation	Cronbach's alpha	McDonald's omega	Skewness	Kurtosis	1	2	3	4
1. Dispositional optimism	0–24	3–24	14.62	4.37	.84	.85	–0.16	–0.52	—			
2. Coping self-efficacy	0–260	42–250	157.84	42.16	.94	.95	–0.24	–0.36	.58***	—		
3. Treatment adherence	0–100	31–98	72.48	14.31	.88	.89	–0.41	–0.11	.43***	.51***	—	
4. Quality of life	0–100	18.67–94.33	59.36	16.82	.93	.94	–0.18	–0.47				—

As presented in Table 1, the participants obtained a mean dispositional optimism score of 14.62, indicating a moderate level of generalized positive expectations regarding future outcomes. The average coping self-efficacy score was 157.84, suggesting substantial variability in participants' perceived capacity to manage illness-related demands, regulate distressing thoughts and emotions, use problem-focused coping strategies, and obtain support when needed. The mean treatment-adherence score was 72.48, indicating that although adherence was generally favorable, a meaningful proportion of participants reported difficulty consistently following medication, dietary, fluid-management, dialysis, or clinical follow-up recommendations. The mean quality-of-life score was 59.36, reflecting moderate impairment in physical, psychological, and kidney disease-specific functioning. Skewness and kurtosis values were within acceptable limits for all principal variables, and visual inspection of histograms and normal probability plots did not indicate substantial departures from normality. Cronbach's alpha coefficients ranged from .84 to .94, while McDonald's omega coefficients ranged from .85 to .95, demonstrating satisfactory to excellent internal consistency for all measures.

The correlation analysis provided initial support for the hypothesized relationships among the study variables.

Dispositional optimism was positively and significantly correlated with coping self-efficacy, $r = .58$, $p < .001$, indicating that participants who held stronger positive expectations about the future also reported greater confidence in managing the psychological and practical demands of chronic kidney disease. Dispositional optimism was also positively associated with treatment adherence, $r = .43$, $p < .001$, and quality of life, $r = .49$, $p < .001$. Coping self-efficacy demonstrated a significant positive relationship with treatment adherence, $r = .51$, $p < .001$, suggesting that greater confidence in one's coping capacities was accompanied by more consistent engagement with prescribed treatment behaviors. Coping self-efficacy was also strongly and positively related to quality of life, $r = .57$, $p < .001$. Treatment adherence was positively associated with quality of life, $r = .53$, $p < .001$, indicating that participants who reported greater consistency in following treatment recommendations tended to experience better physical, emotional, and disease-specific functioning. The magnitude and direction of these correlations were consistent with the proposed serial mediation model, while all correlation coefficients remained below levels commonly considered indicative of problematic multicollinearity.

Table 2

Ordinary least-squares regression coefficients for the component equations of the serial mediation model

Outcome and predictor	B	SE	Standardized β	t	p	95% CI for B
Outcome: Coping self-efficacy						
Dispositional optimism	5.18	0.43	.536	12.05	<.001	[4.33, 6.03]
Age	–0.16	0.10	–.052	–1.60	.111	[–0.36, 0.04]
Sex	2.74	3.65	.030	0.75	.453	[–4.44, 9.92]
Chronic kidney disease stage	–3.61	1.56	–.108	–2.31	.021	[–6.68, –0.54]
Duration of diagnosis	–0.29	0.24	–.041	–1.21	.228	[–0.76, 0.18]
Dialysis status	–6.84	3.89	–.081	–1.76	.080	[–14.50, 0.82]

Number of comorbid conditions	-2.44	1.36	-.071	-1.79	.074	[-5.12, 0.24]
Model statistics	R ² = .374; F(7, 278) = 23.71, p < .001					
Outcome: Treatment adherence						
Dispositional optimism	0.62	0.18	.189	3.44	.001	[0.27, 0.97]
Coping self-efficacy	0.12	0.02	.354	6.00	<.001	[0.08, 0.16]
Age	-0.05	0.03	-.048	-1.67	.096	[-0.11, 0.01]
Sex	1.18	1.17	.039	1.01	.314	[-1.12, 3.48]
Chronic kidney disease stage	-1.42	0.52	-.100	-2.73	.007	[-2.44, -0.40]
Duration of diagnosis	-0.08	0.08	-.033	-1.00	.318	[-0.24, 0.08]
Dialysis status	-3.12	1.31	-.103	-2.38	.018	[-5.70, -0.54]
Number of comorbid conditions	-1.04	0.45	-.086	-2.31	.022	[-1.93, -0.15]
Model statistics	R ² = .408; F(8, 277) = 23.86, p < .001					
Outcome: Quality of life						
Dispositional optimism	0.74	0.18	.192	4.11	<.001	[0.39, 1.09]
Coping self-efficacy	0.10	0.02	.251	5.00	<.001	[0.06, 0.14]
Treatment adherence	0.35	0.06	.298	5.83	<.001	[0.23, 0.47]
Age	-0.08	0.04	-.066	-2.00	.047	[-0.16, -0.001]
Sex	1.62	1.33	.047	1.22	.224	[-1.00, 4.24]
Chronic kidney disease stage	-1.86	0.61	-.112	-3.05	.003	[-3.06, -0.66]
Duration of diagnosis	-0.12	0.09	-.043	-1.33	.184	[-0.30, 0.06]
Dialysis status	-4.58	1.51	-.127	-3.03	.003	[-7.55, -1.61]
Number of comorbid conditions	-1.36	0.52	-.095	-2.62	.009	[-2.38, -0.34]
Model statistics	R ² = .512; F(9, 276) = 32.17, p < .001					

The regression results presented in Table 2 demonstrated that dispositional optimism was a strong positive predictor of coping self-efficacy after controlling for age, sex, chronic kidney disease stage, duration of diagnosis, dialysis status, and number of comorbid conditions. Each one-point increase in dispositional optimism was associated with a 5.18-point increase in coping self-efficacy, $B = 5.18$, $SE = 0.43$, $\beta = .536$, $t = 12.05$, $p < .001$. The model explained 37.4% of the variance in coping self-efficacy, $F(7, 278) = 23.71$, $p < .001$. Chronic kidney disease stage was independently and negatively related to coping self-efficacy, indicating that participants with more advanced disease tended to report less confidence in their ability to manage illness-related demands. Dialysis status and comorbidity burden also showed negative associations with coping self-efficacy, although these coefficients did not reach the conventional significance threshold in this equation.

In the second regression equation, both dispositional optimism and coping self-efficacy significantly predicted treatment adherence. Dispositional optimism retained a positive association with treatment adherence after coping self-efficacy and the clinical covariates were entered, $B = 0.62$, $SE = 0.18$, $\beta = .189$, $t = 3.44$, $p = .001$. Coping self-efficacy was also a significant positive predictor of treatment adherence, $B = 0.12$, $SE = 0.02$, $\beta = .354$, $t = 6.00$, $p < .001$. Accordingly, a 10-point increase in coping self-efficacy corresponded to an estimated 1.20-point increase in treatment adherence when the other variables were held

constant. More advanced chronic kidney disease, dialysis dependence, and a greater number of comorbid conditions were independently associated with lower treatment adherence. The complete equation explained 40.8% of the variance in adherence, $F(8, 277) = 23.86$, $p < .001$.

In the final regression equation, dispositional optimism, coping self-efficacy, and treatment adherence each made a significant independent contribution to quality of life. Dispositional optimism remained positively associated with quality of life after both mediators and all demographic and clinical covariates were controlled, $B = 0.74$, $SE = 0.18$, $\beta = .192$, $t = 4.11$, $p < .001$. Coping self-efficacy was positively associated with quality of life, $B = 0.10$, $SE = 0.02$, $\beta = .251$, $t = 5.00$, $p < .001$, while treatment adherence demonstrated the largest standardized association with quality of life in the final equation, $B = 0.35$, $SE = 0.06$, $\beta = .298$, $t = 5.83$, $p < .001$. Thus, a 10-point increase in treatment adherence was associated with an estimated 3.50-point improvement in quality of life after the other predictors were held constant. Older age, more advanced disease stage, dialysis dependence, and greater comorbidity burden were independently associated with poorer quality of life. The final model accounted for 51.2% of the variance in quality of life, $F(9, 276) = 32.17$, $p < .001$, indicating that the combined psychological, behavioral, demographic, and clinical variables explained a substantial proportion of individual differences in participants' quality of life.

Table 3

Total, direct, and bootstrap indirect effects of dispositional optimism on quality of life

Effect pathway	Effect estimate	Bootstrapped SE	Standardized effect	Lower 95% CI	Upper 95% CI
Total effect of dispositional optimism on quality of life	1.69	0.20	.439	1.30	2.08
Direct effect of dispositional optimism on quality of life	0.74	0.18	.192	0.39	1.09
Total indirect effect	0.95	0.14	.247	0.69	1.24
Optimism → coping self-efficacy → quality of life	0.52	0.12	.135	0.30	0.76
Optimism → treatment adherence → quality of life	0.22	0.07	.057	0.09	0.38
Optimism → coping self-efficacy → treatment adherence → quality of life	0.22	0.06	.055	0.12	0.34

As shown in Table 3, the total effect of dispositional optimism on quality of life was positive and statistically significant, $B = 1.69$, $SE = 0.20$, standardized effect = .439, 95% CI [1.30, 2.08]. This result indicated that, before the mediating variables were entered, each one-point increase in dispositional optimism was associated with an estimated 1.69-point increase in quality of life after adjustment for the demographic and clinical covariates. When coping self-efficacy and treatment adherence were included in the model, the direct effect of dispositional optimism decreased to $B = 0.74$, $SE = 0.18$, standardized effect = .192, 95% CI [0.39, 1.09], but remained statistically significant. The reduction in the coefficient from the total effect to the direct effect indicated partial rather than complete mediation.

The total indirect effect of dispositional optimism on quality of life through coping self-efficacy and treatment adherence was 0.95, with a 95% bootstrap confidence interval ranging from 0.69 to 1.24. Because this confidence interval did not contain zero, the combined indirect association was statistically significant. Approximately 56.2% of the adjusted total association between dispositional optimism and quality of life was accounted for by the proposed mediating processes. The first specific indirect pathway, from dispositional optimism to quality of life through coping self-efficacy alone, was significant, indirect effect = 0.52, bootstrapped $SE = 0.12$, 95% CI [0.30, 0.76]. This was the largest specific indirect effect and suggested

that optimistic individuals tended to experience better quality of life partly because they perceived themselves as more capable of managing disease-related stress and treatment demands.

The second specific indirect pathway, operating through treatment adherence alone, was also statistically significant, indirect effect = 0.22, bootstrapped $SE = 0.07$, 95% CI [0.09, 0.38]. This finding indicated that optimism was associated with more consistent treatment adherence, which was subsequently associated with better quality of life, independently of the pathway involving coping self-efficacy. Most importantly, the hypothesized serial indirect pathway from dispositional optimism to coping self-efficacy, from coping self-efficacy to treatment adherence, and from treatment adherence to quality of life was statistically significant, indirect effect = 0.22, bootstrapped $SE = 0.06$, standardized indirect effect = .055, 95% CI [0.12, 0.34]. Therefore, participants with higher dispositional optimism tended to report stronger coping self-efficacy; stronger coping self-efficacy was associated with greater adherence to prescribed treatment; and greater adherence was, in turn, associated with better quality of life. The persistence of a significant direct effect indicated that coping self-efficacy and treatment adherence explained a substantial, but not exhaustive, portion of the relationship between optimism and quality of life.

Table 4

Supplementary and sensitivity analyses of the serial indirect association between dispositional optimism and quality of life through coping self-efficacy and treatment adherence

Analysis	Sample size	Serial indirect effect	Bootstrapped SE	Lower 95% CI	Upper 95% CI	Result
Primary adjusted model	286	0.218	0.056	0.118	0.339	Significant
Unadjusted model	286	0.246	0.061	0.139	0.374	Significant
Complete-item cases only	271	0.224	0.059	0.119	0.349	Significant
Influential observations excluded	279	0.216	0.055	0.117	0.334	Significant
Dialysis-dependent participants	90	0.184	0.067	0.071	0.330	Significant
Nondialysis participants	196	0.227	0.061	0.126	0.359	Significant
Physical quality-of-life outcome	286	0.171	0.052	0.081	0.291	Significant
Mental quality-of-life outcome	286	0.241	0.064	0.129	0.378	Significant
Kidney disease-specific quality-of-life outcome	286	0.226	0.061	0.117	0.357	Significant

The supplementary and sensitivity analyses presented in Table 4 demonstrated that the principal serial indirect association was stable across alternative analytic specifications. In the unadjusted model, the serial indirect effect was 0.246, with a 95% bootstrap confidence interval of [0.139, 0.374]. After demographic and clinical covariates were included, the serial indirect effect remained significant at 0.218, 95% CI [0.118, 0.339], indicating that the proposed pathway was not attributable solely to differences in age, sex, disease stage, illness duration, dialysis status, or comorbidity burden. The serial indirect effect also remained significant when the analysis was restricted to the 271 participants with complete item-level data and no within-scale replacement of missing values, indirect effect = 0.224, 95% CI [0.119, 0.349]. Similarly, excluding seven observations with comparatively high influence statistics did not materially alter the result, indirect effect = 0.216, 95% CI [0.117, 0.334]. These findings suggested that the primary result was not driven by the missing-data procedure or by a small number of statistically influential cases.

Subgroup analyses further indicated that the serial indirect association was present among both dialysis-dependent and nondialysis participants. Among the 90 participants receiving maintenance dialysis, the serial indirect effect was 0.184, 95% CI [0.071, 0.330]. Among the 196 participants who were not receiving dialysis, the corresponding indirect effect was 0.227, 95% CI [0.126, 0.359]. Although the point estimate was slightly larger in the nondialysis group, the overlapping bootstrap confidence intervals did not provide evidence that the serial pathway differed substantially according to dialysis status. The serial indirect association was also significant when physical,

mental, and kidney disease-specific quality-of-life scores were analyzed separately. The indirect effect was 0.171 for physical quality of life, 0.241 for mental quality of life, and 0.226 for kidney disease-specific quality of life. The largest indirect estimate was observed for the mental quality-of-life outcome, suggesting that the combined pathway involving optimistic expectations, coping confidence, and adherence behavior may be particularly relevant to participants' emotional functioning and psychological well-being. Nevertheless, significant effects across all three domains indicated that the proposed serial process was associated with broad aspects of quality of life rather than with a single dimension of functioning.

Overall, the findings supported the hypothesized serial mediation model. Dispositional optimism was associated with better quality of life both directly and indirectly. The indirect findings indicated that higher optimism was associated with stronger coping self-efficacy, which was associated with better treatment adherence, and greater treatment adherence was subsequently associated with higher quality of life. Coping self-efficacy also independently mediated part of the association between optimism and quality of life, while treatment adherence independently accounted for an additional portion of the association. The persistence of these results after adjustment for major demographic and clinical characteristics, as well as across alternative samples and quality-of-life outcomes, provided evidence that coping self-efficacy and treatment adherence represented statistically meaningful mechanisms linking dispositional optimism with quality of life among Canadian adults living with chronic kidney disease.

Figure 1

Serial mediation model linking dispositional optimism to quality of life through coping self-efficacy and treatment adherence

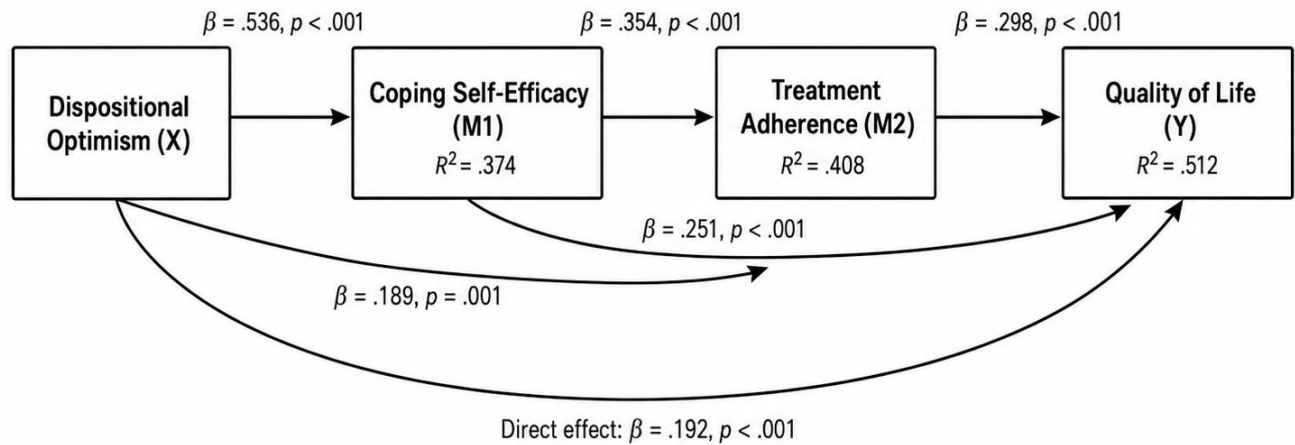


Figure 1 summarizes the standardized coefficients for the hypothesized serial mediation model. Dispositional optimism was positively associated with coping self-efficacy, $\beta = .536$, $p < .001$. Coping self-efficacy was positively associated with treatment adherence after dispositional optimism and the covariates were controlled, $\beta = .354$, $p < .001$. Treatment adherence was subsequently positively related to quality of life after dispositional optimism, coping self-efficacy, and the covariates were entered, $\beta = .298$, $p < .001$. Coping self-efficacy also retained a significant direct association with quality of life, $\beta = .251$, $p < .001$, while dispositional optimism retained a smaller but statistically significant direct association with quality of life, $\beta = .192$, $p < .001$. The pattern of standardized coefficients supported the proposed ordering of the variables and demonstrated that the association between optimism and quality of life operated through both a direct psychological pathway involving coping self-efficacy and a sequential psychological-behavioral pathway involving coping self-efficacy followed by treatment adherence.

4. Discussion and Conclusion

The present study examined the relationship between dispositional optimism and quality of life among Canadian adults with chronic kidney disease and tested whether coping self-efficacy and treatment adherence serially mediated this relationship. The findings supported the proposed model. Dispositional optimism was positively associated with coping self-efficacy, treatment adherence, and quality of life. Coping self-efficacy was positively related to both treatment

adherence and quality of life, while treatment adherence was independently associated with better quality of life. The total effect of dispositional optimism on quality of life was statistically significant, and the direct effect remained significant after the mediators were entered, indicating partial mediation. In addition, all three specific indirect pathways were significant: the pathway through coping self-efficacy alone, the pathway through treatment adherence alone, and the serial pathway through coping self-efficacy followed by treatment adherence. Collectively, the mediating processes explained more than half of the adjusted association between optimism and quality of life. The serial indirect effect also remained significant after demographic and clinical covariates were controlled and across dialysis-dependent and nondialysis subgroups, supporting the robustness of the proposed psychological-behavioral mechanism.

The positive association between dispositional optimism and quality of life is consistent with the proposition that generalized expectations regarding future outcomes influence how patients interpret and respond to the demands of chronic illness. Individuals with greater optimism may perceive CKD-related restrictions as difficult but manageable, maintain hope regarding treatment benefits, and remain more engaged in meaningful activities despite uncertainty. Personality characteristics and coping tendencies have been linked to adherence and adjustment across noncommunicable chronic diseases, suggesting that stable dispositions shape patients' responses to prolonged treatment demands (Manriquez-Robles et al., 2026). The

present findings extend this perspective to CKD by demonstrating that optimism was associated not only with treatment behavior but also with broader physical, psychological, and disease-specific quality of life. This result is particularly important because previous studies have shown that quality of life in CKD and hemodialysis populations is influenced by multiple clinical and psychosocial factors (Budhiana et al., 2022; D. et al., 2024). The present study indicates that optimism may represent one of the psychological resources that helps explain why patients with comparable levels of disease burden report different levels of well-being and functioning.

The direct association between optimism and quality of life remained significant after coping self-efficacy and treatment adherence were included, indicating that the influence of optimism was not fully explained by the proposed mediators. Optimistic individuals may experience fewer persistent negative expectations, greater emotional stability, and a stronger sense of purpose, all of which can improve perceived quality of life independently of adherence behavior. Psychological interventions designed to increase acceptance, values-based action, and adaptive responses to distress have shown potential for reducing depression among patients with CKD (Diéguez et al., 2025). Research concerning resilience during long-term hemodialysis similarly suggests that adaptive psychological resources help patients maintain functioning despite repeated medical stressors (García-Martínez et al., 2022). Optimism may contribute to these adaptive processes by enabling individuals to interpret setbacks as temporary and by sustaining effort when clinical improvements are gradual. Therefore, the remaining direct effect may reflect emotional, cognitive, relational, and existential pathways that were not explicitly represented in the present model.

A central finding was the strong positive association between dispositional optimism and coping self-efficacy. This finding suggests that patients who generally expect more favorable outcomes also have greater confidence in their ability to manage illness-related stress, regulate distressing emotions, solve practical problems, and seek appropriate support. Optimism may strengthen coping self-efficacy by encouraging patients to interpret treatment demands as challenges that can be addressed through sustained effort. In contrast, pessimistic expectations may weaken perceived control and increase avoidance. The observed relationship is consistent with evidence that self-efficacy is a major psychological mechanism in dialysis care and can help explain variation in adherence (Saguban et al.,

2025). It also accords with the broader conceptualization of self-management as a process involving emotional regulation, decision-making, symptom monitoring, and confidence in carrying out complex health behaviors (Susfolyanto et al., 2024). Accordingly, optimism may be beneficial not simply because it produces positive feelings, but because it strengthens the patient's belief that effective action is possible.

Coping self-efficacy also demonstrated a significant direct association with quality of life. Patients who believed they could manage CKD-related challenges reported better functioning and well-being even after treatment adherence and clinical characteristics were controlled. This finding may be explained by the broad scope of coping self-efficacy. Confidence in managing distress may reduce the perceived burden of symptoms, improve emotional regulation, support communication with healthcare professionals, and preserve participation in family and social roles. Research on self-care among hemodialysis patients has identified personal confidence, knowledge, support, and illness-related factors as important determinants of effective self-management (Izadi-Avanji et al., 2021). Recent systematic evidence has likewise demonstrated that self-care behaviors in hemodialysis populations depend on psychological and contextual capacities, rather than on medical instructions alone (Mehraeen et al., 2025). The present results therefore suggest that coping self-efficacy contributes to quality of life both by promoting adherence and through broader mechanisms of psychological adjustment.

The significant association between coping self-efficacy and treatment adherence further supported the proposed model. Patients with stronger confidence in their ability to handle CKD-related demands were more likely to report consistent medication use, dietary management, fluid restriction, dialysis attendance, and clinical follow-up. This result is theoretically plausible because CKD adherence requires repeated self-regulatory decisions in situations involving inconvenience, fatigue, thirst, dietary preferences, competing responsibilities, and emotional distress. Positive attitudes toward self-management have previously been associated with better dietary and fluid adherence among patients receiving hemodialysis (Mananawan & Rosa, 2022). Studies of self-care management have also emphasized that adherence must be enacted continuously between clinical encounters (Muliani et al., 2021). In addition, protection motivation research indicates that self-efficacy is closely related to patients' intentions to carry out dietary management (Li et al., 2025), while recent

comparisons of predialysis and dialysis-stage patients suggest that motivational and efficacy-related processes remain relevant across CKD stages (Tang et al., 2026). The present findings integrate these observations by identifying coping self-efficacy as a mechanism through which optimism may be translated into adherence.

Treatment adherence was independently and positively associated with quality of life. Participants who followed their treatment regimens more consistently reported better physical, mental, and kidney disease-specific functioning. Adherence may improve quality of life by reducing avoidable symptoms and complications, increasing physiological stability, and decreasing anxiety related to uncontrolled disease. Compliance with dietary and fluid restrictions is particularly important in dialysis populations because it may limit excessive interdialytic weight gain and reduce the burden of volume-related symptoms (Roni & Awaludin, 2023). Systematic evidence comparing adherence-enhancement interventions in CKD indicates that adherence can be improved through structured strategies and remains a clinically meaningful target (Ma et al., 2025). The management of hypertension and other frequent CKD comorbidities also depends on coordinated medication-taking, monitoring, and lifestyle behaviors (Elendu et al., 2024). Therefore, adherence may contribute to quality of life by supporting better control of both renal disease and associated conditions.

The direct indirect pathway through treatment adherence alone was also significant, indicating that optimism was associated with adherence even after coping self-efficacy was considered. Optimistic patients may attribute greater value to treatment, expect more favorable consequences from sustained participation, and interpret short-term burdens as acceptable in light of future benefits. Health beliefs have been shown to influence medication-taking behavior in individuals with mild to moderate CKD (Hui, 2023). In addition, delays in seeking care or engaging with clinical services may arise from low perceived urgency, avoidance, uncertainty, or competing demands (Zheng et al., 2024). Optimism may counteract some of these barriers by reinforcing the belief that timely and sustained engagement can produce meaningful benefits. However, optimism that is not grounded in realistic appraisal could theoretically lead to underestimation of risk. The present findings suggest that, in this sample, optimism functioned adaptively and was associated with stronger rather than weaker adherence.

The most important result was the statistically significant serial indirect pathway from dispositional optimism to

coping self-efficacy, from coping self-efficacy to treatment adherence, and from treatment adherence to quality of life. This finding provides a more detailed explanation of how a broad personality disposition may influence a major patient-reported health outcome. Optimism appears to support confidence in managing CKD; coping confidence, in turn, facilitates the performance of required treatment behaviors; and greater adherence contributes to better quality of life. This sequence is consistent with patient activation theory, which emphasizes that effective self-management depends on knowledge, skills, confidence, and motivation (Lightfoot et al., 2022). Systematic review and meta-analytic evidence concerning patient activation interventions also supports the value of strengthening active participation in CKD care (Lunardi et al., 2023). The development of a disease-specific self-management engagement scale for hemodialysis patients further reflects the increasing recognition that engagement is a measurable and clinically relevant component of renal care (Wild et al., 2025). The present results suggest that optimism and coping self-efficacy may be important antecedents of such engagement.

The serial mediation result also helps explain why educational interventions are unlikely to be sufficient when they focus exclusively on information. Patients may understand recommendations yet still feel unable to carry them out under real-life conditions. Health literacy is essential for self-management because patients must obtain, interpret, and apply health information (Gaag et al., 2021). Teach-back methods can improve the clarity and retention of CKD education by verifying that patients understand the information provided (Jagodage et al., 2023). Systematic evidence concerning self-management training in hemodialysis populations indicates that structured education may support behavioral and clinical outcomes (Bağrıaçık & Dikmen, 2023). However, the present findings imply that educational interventions may be more effective when they also strengthen coping confidence and reinforce patients' expectations that their actions can meaningfully affect health outcomes. Psychoeducational programs used for other demanding treatment regimens similarly show the value of integrating knowledge with psychological preparation and behavioral support (Zanaboni et al., 2023).

Qualitative studies provide further context for the observed pathways. Patients with CKD encounter psychosocial barriers to healthy behavior, including emotional distress, social pressures, difficulty integrating recommendations into daily routines, and doubts regarding feasibility (Cardol et al., 2022). Other qualitative evidence

has identified informational, interpersonal, motivational, and structural barriers to CKD self-management (Schrauben et al., 2022). These barriers may weaken both coping self-efficacy and adherence. For example, a patient who lacks social support, experiences treatment fatigue, or cannot reconcile dietary recommendations with family routines may gradually lose confidence and disengage from treatment. The present serial model suggests that dispositional optimism may offer some protection against this process, but it cannot eliminate structural barriers. Psychological resources should therefore be understood as operating within social and healthcare contexts rather than as substitutes for accessible services and individualized support.

The stability of the serial indirect effect across dialysis-dependent and nondialysis participants is also noteworthy. Although dialysis introduces particularly intensive treatment demands, predialysis patients must likewise manage medications, diet, blood pressure, laboratory monitoring, and uncertainty regarding progression. The comparable pattern across subgroups suggests that the proposed mechanism may operate throughout advanced CKD rather than only after dialysis initiation. Research has increasingly emphasized self-management intentions and behaviors across predialysis and dialysis stages (Tang et al., 2026). The need for continuity is also evident in interdisciplinary approaches to adolescents and young adults transitioning between pediatric and adult CKD services, where the gradual development of responsibility and self-management capacity is considered essential (Ferris et al., 2021). These findings support the view that coping self-efficacy and adherence should be strengthened before, during, and after major transitions in treatment.

The significant serial effects across physical, mental, and kidney disease-specific quality-of-life outcomes further indicated that the model was not limited to a single dimension of functioning. The comparatively larger effect for mental quality of life may reflect the particularly close relationship between optimism, coping confidence, emotional regulation, and psychological well-being. Nevertheless, significant pathways for physical and disease-specific quality of life suggest that psychological and behavioral processes may also influence symptom management, functional participation, and perceived disease burden. Digital counseling programs developed for CKD provide one possible method for delivering sustained behavioral and psychological support outside routine appointments (Ong et al., 2022). Such approaches may be

particularly valuable for reinforcing coping strategies, monitoring adherence challenges, and maintaining engagement between visits. The current findings therefore support a multidimensional model in which psychological disposition, self-regulatory confidence, and treatment behavior jointly contribute to how patients experience life with CKD.

Several limitations should be considered when interpreting the findings. The cross-sectional design does not establish temporal or causal relationships among dispositional optimism, coping self-efficacy, treatment adherence, and quality of life, even though the ordering of the variables was theoretically specified. Treatment adherence was primarily measured through self-report and may therefore have been affected by recall error or socially desirable responding. The sample was recruited from selected clinical centers in Ontario and included only patients able to complete English-language questionnaires, which may limit generalizability to other Canadian provinces, rural populations, culturally and linguistically diverse groups, and patients with severe cognitive or clinical instability. The inclusion of dialysis and nondialysis patients increased clinical breadth but also introduced heterogeneity in treatment demands. Although important demographic and clinical covariates were controlled, unmeasured factors such as income, transportation, caregiver support, symptom severity, health literacy, depression, and healthcare accessibility may have influenced the observed associations. Finally, dispositional optimism was treated as a stable individual characteristic, and the study did not distinguish realistic optimism from potentially unrealistic expectations.

Future studies should use longitudinal designs to examine whether optimism predicts later changes in coping self-efficacy, adherence, and quality of life and whether these relationships are reciprocal over time. Randomized interventions could determine whether strengthening coping self-efficacy or realistic optimism produces measurable improvements in objectively assessed adherence and patient-reported outcomes. Future research should combine self-report measures with pharmacy refill data, electronic medication monitoring, dialysis attendance records, interdialytic weight gain, laboratory indicators, and clinician ratings. Larger multicenter samples should be recruited across Canadian provinces and should include French-speaking patients, Indigenous communities, immigrant populations, rural residents, and patients at earlier stages of CKD. Further studies should evaluate depression, social support, health literacy, patient activation, financial strain,

treatment burden, and access to care as additional mediators or moderators. It would also be valuable to compare alternative models, including reciprocal pathways in which adherence and improved quality of life subsequently strengthen coping confidence and optimism.

Renal care teams should assess optimism, coping confidence, and adherence barriers as part of routine patient-centered care rather than focusing exclusively on laboratory values and medical complications. Patients reporting low confidence or pessimistic expectations may benefit from individualized counseling that combines realistic hope, problem-solving, emotional regulation, goal setting, and rehearsal of specific self-management behaviors. Education should be delivered in accessible language, verified through teach-back, and adapted to each patient's treatment stage, cultural context, health literacy, and daily responsibilities. Adherence support should avoid blame and instead identify practical barriers involving medication complexity, transportation, dietary affordability, treatment fatigue, family routines, or emotional distress. Multidisciplinary programs involving nephrologists, nurses, dietitians, pharmacists, psychologists, and social workers may be especially effective. Digital reminders, remote counseling, peer support, and periodic monitoring of coping self-efficacy could also be incorporated into follow-up care to help patients translate positive expectations into sustained treatment behavior and improved quality of life.

Authors' Contributions

Authors contributed equally to this article.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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