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***Research Article** (Open Access)*

GLOMERULAR FILTRATION RATE, COPING STRATEGIES, AND WELL-BEING IN KIDNEY TRANSPLANT RECIPIENTS

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ABSTRACT
Adaptive coping strategies play a crucial role in maintaining psychological well-being among individuals with chronic illnesses, including kidney transplant patients. This study investigates the relationship between adaptive coping strategies and psychological well-being among 60 post-kidney transplant patients (28 men and 32 women) aged 20–80 years, with varied marital statuses. Data were collected using the Adaptive Coping Strategies Scale (AKU), Ryff's Psychological Well-Being Scale (RPWBS), and a Personal Data Schedule. The AKU scale assessed participants' use of adaptive coping mechanisms such as social support, information-seeking, and positive reinterpretation, while the RPWBS measured psychological well-being across six domains, including autonomy, environmental mastery, and purpose in life. Participants completed the instruments under standardized conditions, and data were analyzed using AMOS software to identify patterns and correlations. Results revealed significant associations between specific adaptive coping strategies and higher psychological well-being. Coping strategies such as positive reinterpretation and social support were particularly influential in enhancing psychological well-being. The findings emphasize the need for targeted interventions to promote effective coping strategies in clinical settings, contributing to improved post-transplant outcomes.

Keywords: *Adaptive Coping Strategies, Psychological Well-Being, Kidney Transplant, Ryff's Psychological Well-Being Scale, AMOS Analysis*

INTRODUCTION
An individual's emotional well-being is fundamental to their overall health, enabling them to surmount challenges and achieve life aspirations (Sheldon & Lyubomirsky, 2006). For patients, particularly those undergoing medical treatments like kidney transplantation, emotional well-being offers significant supplementary benefits, such as facilitating recovery, fostering positive behaviors, and improving life satisfaction (Winefield *et al.,* 2012). Psychological well-being, encompassing emotional stability, functionality, and adaptability, is critical in coping with life's challenges (Keyes *et al.,* 2002). Adaptive coping, the process of managing stress effectively by addressing stressors, evaluating situations logically, and altering negative emotional responses, becomes particularly vital in contexts like kidney transplantation (Lazarus, 1993). The rise in kidney transplant cases across all age groups has highlighted unique challenges faced by recipients. These include financial strain, adjustments to life post-surgery, and the potential onset or exacerbation of mental health disorders, such as depression (Chida & Steptoe, 2008). The first-year post-transplantation is especially critical, as mood disturbances linked to medication, including immunosuppressants, are common, and adherence to treatment regimens directly impacts morbidity and mortality rates (Taylor, 2006). While transplantation generally improves quality of life compared to non-transplanted patients, it often falls short of the psychological well-being experienced by the healthy general population (Roothman *et al.,* 2003). Coping mechanisms play a pivotal role in this context. Effective coping involves cognitive, emotional, and behavioral strategies aimed at managing stress (Brannon & Feist, 2009). Adaptive coping strategies, such as positive

thinking, relaxation, and problem-solving, are associated with better psychological health and fewer somatic complaints (Compas *et al.,* 2006; Peres & Lucchetti, 2010). Conversely, maladaptive coping strategies, such as avoidance or catastrophizing, often exacerbate psychological distress and diminish quality of life. Religious coping strategies, including seeking spiritual support, can also influence emotional well-being positively or negatively, depending on past experiences and current perceptions (Ano & Vasconcelles, 2005). The hypothalamic-pituitary-adrenal (HPA) axis plays a critical role in stress regulation, influencing mood, immunity, and overall psychological stability (Guyton & Hall, 2021). The autonomic nervous system also contributes significantly to adaptive responses during stressful events by regulating cardiovascular and respiratory functions, which are essential for maintaining homeostasis during recovery (Sherwood, 2016). Psychological well-being is influenced by an interplay of personality traits, past experiences, and daily interactions, which can either enhance or diminish emotional health (Lazarus, 1993). For renal transplant recipients, maintaining psychological well-being amidst significant post-surgical challenges is crucial. Research indicates that improved psychological well-being is linked to reduced mortality rates and better survival outcomes for transplant patients (Chida & Steptoe, 2008). However, social and environmental factors, such as reduced participation in social activities and societal perceptions, further complicate recovery and adjustment processes (Winefield *et al.,* 2012). Studies on stress adaptation in animals, particularly those exposed to significant environmental changes, have highlighted the role of adaptive coping mechanisms in survival and recovery. For example, fish exposed to environmental toxins demonstrate behavioral changes to cope with stressors, which parallels the adaptive mechanisms observed in humans undergoing chronic stress or medical challenges (Evans *et al.,* 2005). Such comparative physiology studies underscore the universality of coping mechanisms and their importance in promoting overall well-being. Given the critical importance of psychological well-being and effective coping strategies for renal transplant recipients, this study seeks to explore the relationship between adaptive coping mechanisms, glomerular filtration rate, and psychological well-being. By understanding these factors, the study aims to develop targeted interventions to improve the quality of life and emotional health of this vulnerable population. The objective of this study is to examine whether glomerular filtration rate and adaptive coping strategies predict psychological well-being among renal transplant recipients.

MATERIALS AND METHODS

Participants

This descriptive study included 60 post-kidney transplant patients (28 men and 32 women) aged between 20 and 80 years. Participants were selected purposively to ensure representation of various demographic characteristics. Among the participants, 53 were married, six were single, and one was divorced. All participants provided informed consent, and the study was conducted following ethical guidelines to maintain confidentiality and anonymity of the data (American Psychological Association [APA], 2010).

Measures

The study employed three standardized instruments:

Adaptive Coping Strategies Scale (AKU)

The Adaptive Coping Strategies Scale (AKU), derived from the German translation of "Adaptive Coping with Disease," was used to assess coping strategies among patients with chronic illnesses. This scale identifies specific adaptive strategies, such as creating favorable conditions, seeking information, obtaining medical support, religious and social support, demonstrating initiative, and positive reinterpretation of the disease. The theoretical foundation of this instrument is based on Rotter's (1966) and Levenson's (1972) work on loci of health control, which emphasize internal and external control over health outcomes.

Reliability: Internal consistency estimates range from weak ($\alpha = .63$) to very good ($\alpha = .92$) (Rotter, 1966; Levenson, 1972).

Validity: The scale demonstrates adequate validity in evaluating adaptive coping strategies for chronic illnesses (Levenson, 1972).

Ryff's Psychological Well-Being Scale (RPWBS)

Ryff's Psychological Well-Being Scale (RPWBS), developed by Ryff (1989), was used to measure psychological well-being across six domains: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. The long form consists of 42 items rated on a 6-point Likert scale (1 = strongly disagree to 6 = strongly agree).

Reliability: Test-retest reliability coefficient is 0.82, indicating strong consistency (Ryff, 1989).

Validity: The scale correlates positively with measures of life satisfaction (r = 0.47), happiness (r = 0.58), and self-esteem (r = 0.46), confirming its validity (Ryff, 1989).

Personal Data Schedule

A personal data schedule was developed to collect demographic and background information such as age, gender, marital status, and transplant details. This schedule provided essential contextual information to interpret the results appropriately.

Procedure

The study was conducted in a clinical setting, and ethical approval was obtained from the institutional review board. After obtaining informed consent, participants were briefed about the study's objectives and procedures. They were assured that their responses would remain confidential and be used solely for research purposes. Participants were asked to complete the Personal Data Schedule first, followed by the AKU and RPWBS scales. Clear instructions were provided for each scale, and participants could seek clarifications if needed. Adequate time was given for them to complete the scales in a non-stressful environment. Before collecting the response sheets, omissions and incomplete responses were checked, and participants were encouraged to rectify them if necessary.

Statistical Analysis

Data were analyzed using AMOS (Analysis of Moment Structures) software. Descriptive statistics, correlations, and structural equation modeling (SEM) were employed to examine relationships among coping strategies, psychological well-being, and demographic variables. Results are presented in the subsequent sections.

RESULT AND DISCUSSION

The data obtained from the kidney transplants were analysed using AMOS software and the obtained results are given below.

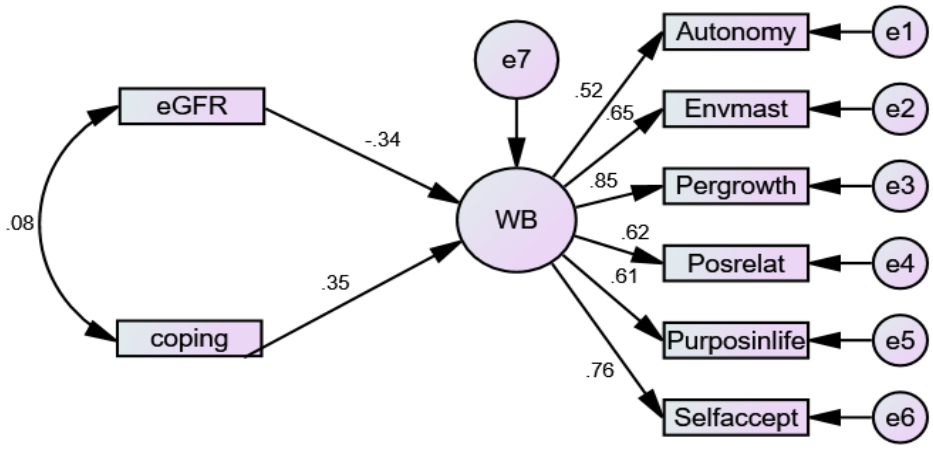

Fig. 1. AMOS output showing that GFR and coping as the significant predictors of wellbeing

Table 1: Showing the standardized and unstandardized beta in the model

DV		Predictors	B	S.E.	β
WB	<---	eGFR	-0.044	0.019	-0.336*
WB	<---	Coping	0.043	0.018	0.35*
Autonomy	<---		1		0.516**
Environmental mastery	<---		1.254	0.361	0.65**
Personal growth	<---	Well being	2.066	0.527	0.846**
Positive relations	<---		1.781	0.528	0.617**
Purpose in life	<---		1.245	0.37	0.614**
Self-acceptance	<---		1.977	0.527	0.756**

**p < .05; **p < .01*

Chi- square value indicate that the model fit is significant at 0.05 level. The GFI (0.917), CFI (0.962) and RMSEA (.065) values are found to be reliable. Autonomy (0.35, P<0.05), Autonomy (0.516, P<0.01), Environmental mastery (0.65, P<0.01), Personal growth (0.846, P<0.01), Positive relations (0.617, P<0.01), Purpose in life ((0.614, P<0.01) and Self-acceptance (0.756, P<0.01) are found to be significant predictors of wellbeing among kidney transplants. The results from the AMOS model (Fig 1) indicate that both estimated Glomerular Filtration Rate (eGFR) and coping significantly predict well-being (WB) in kidney transplant recipients. The standardized beta coefficients reveal that coping (β = 0.35, p < 0.05) and eGFR (β = -0.336, p < 0.05) are significant predictors of well-being. The negative coefficient for eGFR suggests that as eGFR decreases, well-being decreases, while effective coping mechanisms contribute positively to well-being. The model also included several well-being dimensions, which were assessed as part of a latent construct. Table 1 shows Autonomy (β = 0.516, p < 0.01), environmental mastery (β = 0.65, p < 0.01), personal growth (β = 0.846, p < 0.01), positive relations (β = 0.617, p < 0.01), purpose in life (β = 0.614, p < 0.01), and self-acceptance (β = 0.756, p < 0.01) were found to be significant predictors of well-being. Overall, the goodness of fit indices (GFI = 0.917, CFI = 0.962, RMSEA = 0.065) indicate that the model provides a good fit to the data. The chi-square test confirmed that the model fit is statistically significant (p < 0.05).

The findings of this study are consistent with previous research suggesting that both physiological factors (such as kidney function, represented by eGFR) and psychological factors (such as coping strategies) are crucial in predicting well-being among individuals with chronic illnesses, particularly kidney transplant recipients. The negative association between eGFR and well-being is supported by studies showing that poor kidney function is associated with lower quality of life in kidney transplant recipients (Kaplan *et al.,* 2006). As kidney function deteriorates, individuals may experience physical symptoms, fatigue, and other health-related problems, which negatively affect their psychological and emotional well-being (Hedayati *et al.,* 2009). Coping, on the other hand, plays a critical role in enhancing well-being. Effective coping strategies have been found to buffer the psychological distress associated with chronic illness, including kidney disease (Garcia *et al.,* 2007). This is in line with the positive relationship between coping and well-being found in this study, where individuals who employed more adaptive coping strategies reported higher levels of well-being. The dimensions of well-being (autonomy, environmental mastery, personal growth, positive relations, purpose in life, and self-acceptance) identified in the study are all significant predictors of overall well-being. These findings are in line with the eudaimonic model of well-being, which emphasizes the importance of personal growth, purpose, and self-acceptance in leading a fulfilling life (Ryff, 1989). Furthermore, the significance of autonomy and environmental mastery aligns with prior work showing that individuals who feel in control of their lives and their environment report higher quality of life (Schalock *et al.,* 2002).

The present investigation highlights the importance of adaptive coping strategies as critical predictors of psychological well-being in renal transplant recipients. Adaptive coping mechanisms not only help individuals navigate the challenges of transplantation but also contribute to overall well-being, even when physiological factors, such as reduced glomerular filtration rate (GFR), present additional complexities. Luo *et al.*, (2023)

demonstrated that social support indirectly enhances self-efficacy and reduces perceived tension, both of which significantly contribute to subjective well-being. Similarly, Yaman and Ilmas (2017) found that increased perceived social support alleviates negative emotions such as anxiety and depression in transplant recipients. These findings suggest that social support, as an essential component of coping, plays a pivotal role in improving mental health outcomes.

Interestingly, Maguire *et al.*, (2020) emphasize that transplant recipients often rely heavily on family for emotional and social support, which aligns with the broader theme of positive life evaluations contributing to well-being. While these psychological benefits are clear, the findings regarding GFR and its relationship with well-being present a nuanced picture. Contrary to traditional assumptions, an increase in GFR was inversely correlated with psychological well-being, suggesting that external factors, such as medication side effects, economic constraints, or fear of disease progression, may play an outsized role in shaping psychological health. This complexity echoes the findings of Heeres *et al.*, (2017), who noted that mental health impairments are more severe in individuals with comorbid conditions, certain demographic characteristics, or lifestyle factors such as smoking and obesity.

The study further underscores the necessity of addressing both psychological and physiological dimensions to achieve balanced psychological well-being in transplant recipients. As noted, adaptive coping strategies are indispensable in mitigating the psychological distress associated with challenging circumstances. These strategies include enhancing family supportiveness, engaging in psychological consultations, and seeking assistance during adversities. Such findings are consistent with prior research indicating that robust coping mechanisms can buffer the negative impact of chronic illness on mental health (Heinonen *et al.*, 2018; Thong *et al.*, 2020).

Support groups emerged as another critical intervention to aid transplant recipients. By fostering community and shared experiences, these groups provide a safe space for individuals to discuss common challenges, exchange coping strategies, and develop resilience (Coates *et al.*, 2021). Group-based interventions have been shown to enhance psychological well-being through improved emotional support and the development of adaptive coping mechanisms (van der Molen *et al.*, 2022).

From a clinical perspective, the findings advocate for integrating psychological interventions into standard care for renal transplant recipients. Training in coping skills, personalized care plans, and regular mental health assessments are essential components of a comprehensive care strategy. This aligns with the recommendations of recent studies emphasizing the importance of psychological support in chronic disease management (Tomaschewski-Barlem *et al.*, 2019; Sharif *et al.*, 2022).

The implications for future research are significant. Longitudinal studies are needed to explore the durability of coping strategies over time and to identify specific mechanisms that underpin the coping-well-being relationship. Additionally, research should investigate the influence of socio-economic, cultural, and demographic factors on coping efficacy to inform tailored interventions. By addressing these gaps, healthcare providers can develop more effective programs to support transplant recipients in maintaining or enhancing their psychological well-being.

CONCLUSION

This study highlights the critical importance of adaptive coping strategies in promoting the psychological well-being of renal transplant recipients. Even when physiological challenges like low GFR are present, effective coping mechanisms contribute significantly to improved mental health. Social support, particularly from family and support groups, emerged as a key factor in mitigating psychological distress and fostering resilience. Integrating psychological interventions, such as coping skills training and personalized care plans, into routine clinical practice is essential for supporting transplant recipients. Future research should focus on the long-term effects of adaptive coping strategies and explore ways to optimize their implementation for diverse patient populations.

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