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Psychological Factors of Quality of Life in Renal Transplant Recipients: A Longitudinal Study of Bi-Directional Relationships

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Improved Quality of life (QoL) encompassing clinical and psychological aspects is the goal of research in solid organ transplantation. Assessment of treatment efficacy is based on subjective evaluations of actual health status, physical functioning, life satisfaction and psychological wellbeing in this population. A longitudinal study was carried out to test bi-directional relationships between psychological factors and QoL in renal transplant recipients (RTRs) over a period of two years. The psychological aspects included their perceived health status, life orientation (optimism), depression, and conscientiousness. The aim was to analyze the extent to which psychological factors influence QoL and the directionality of the influence. The preliminary analysis revealed that overall psychological factors significantly correlate with QoL. The findings of cross lagged analysis yielded a mixed pattern of relationships at waves 1, 2 and 3 indicating the existence of bi-directionality of the relationships between QoL and the psychological factors. A reciprocal relationship between depression and QoL was found whereas QoL predicted perceived health status and optimism at wave 3. Conscientiousness did not correlate with QoL across waves. The findings provide insights into the role of psychological factors in identifying a pattern of overtime. The study highlights the role of psychological factors in QoL of RTRs and suggests their monitoring and inclusion in the post-transplant management.

Keywords. Psychological factors, quality of life, renal transplant recipients

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Renal Replacement therapy is a treatment modality with a high success rate. It improves QoL of patients with end-stage renal disease. The marked improvements in QoL and health status are not similar globally and despite advancements in anti-rejection medications, the possibility and risk of graft loss remains as a constant threat to the recipients (Kostro et al., 2016). Although transplants provide freedom from regular dialysis and dietary restrictions, there are newer challenges for the recipients to adapt and comply with on a lifelong basis. These may include complying with a regular follow-up schedule, medication adherence, avoidance of infection risk, and the possible need for hemodialysis due to acute and chronic rejection (Lonning et al., 2018). There is consensus about not only adding years to life but also life to years, therefore, satisfaction with QoL post-transplant has been a major focus of research in solid organ transplantation (Gibbons et al., 2021). Studies have consistently found that RTRs report a higher QoL as compared to those on dialysis as a treatment option (Bender et al., 2018).

Assessment of QoL can facilitate the provision of quality care and treatment, timely diagnosis, better prognosis, and effective management. Although transplantation improves physical and mental health, research has found a multitude of psychological factors affecting QoL. Life after a transplant resembles a new chronic condition, marked with uncertainty about the future with an impact on life adaptation (Schulz & Kroencke, 2015). Although recipients develop coping skills to meet the challenges of self-care, they still fear the loss of the new organ and a possible return to dialysis therapy. Despite marked improvement in physical health, they need to accept, adjust and cope with a chronic condition even after successful transplantation. Therefore, health outcomes may vary due to different environmental or psychological influences (Lønning et al., 2018).

Transplantation requires both physical and psychological adjustment. The initial phase involves excitement on regaining health, appetite, sleep, unrestricted fluid intake and freedom from the painful experience of dialysis (Zimmermann et al., 2016). The psychological response to transplantation reflects the subtle and complex cognitive, emotional and behavioral process after transplantation. They enjoy freedom from dialysis dependence, dietary restriction and loss of workdays due to regular dialysis. Sometimes recipients may overestimate the benefits of a successful kidney transplant, both in terms of predictions of life after treatment, and in their perceptions of QoL before the transplant (Smith et al., 2008). RTRs may feel happiness, gratitude and hopefulness but at the same time there can be

feelings of guilt for depriving an individual of his or her body organ in case of a living donor (Howell et al., 2017).

Recipients experience less psychological burden as compared to the preoperative phase. However, they have to alter their life styles. Living as a transplant recipient, they need to accept, adapt and develop coping skills to meet the challenges post-transplant. Ideally, adaptation to newer lifestyles involves a reevaluation and reprioritization of life goals and a focus on more positive consequences, for example, personal growth (Richard et al., 2020). In case of poorer readjustment, recipients tend to have a lower QoL and psychiatric disorders (Schulz & Kroencke, 2015). There is extensive evidence of the higher prevalence rates of mood and anxiety disorders being the most common psychological disorders among recipients before and after transplantation (Heinrich & Marcangelo, 2009). A considerable literature confirms prevalence of depression in cases before and after kidney transplantation (Chilcot et al., 2014). Psychiatric symptoms, such as anxiety and depression, can be a consequence of transplantation, associated with poorer QoL (Tucker et al., 2019). Since depression and anxiety after kidney transplantation are associated with poor clinical outcomes, therefore, screening of vulnerable recipients is essential for referral to specialized mental health services (Wu et al., 2019).

Patients in developing countries experience greater challenges due to a lack of availability and affordability of quality health care services for transplant recipients. There is a lack of psychological assessment and screening for vulnerable transplant population (Mallick et al., 2022). Therefore, timely identification and management of psychiatric co morbidities may improve sleep, marital, and sexual relationship and overall QoL (Richard et al., 2020). Although immunosuppressant medicines reduce chances of graft rejection, it does not eliminate fear of rejection as the major psychological stressor (Tucker et al., 2019). Research in psychoneuroimmunology has shown that multiple psychological factors, such as stress, anxiety and depression can negatively affect the immune system, which alludes to the potential effects of these factors in organ and tissue transplants. Despite recent advancements in immunosuppressant medication, rejection remains a distinct possibility which may occur at any time following the transplant (Muller et al., 2015). The above literature suggests that transplant teams need to incorporate screening, monitoring and management of psychological issues in treatment and follow-up protocols besides clinical and medical aspects.

Rationale

Kidney transplantation is a major surgical procedure that not only aims to restore physical health functioning of the recipient but also involves profound psychological consequences. A comprehensive assessment of psychological aspects including personality, life orientation, family and social support systems are significant issues not adequately considered. In fact these personal and social factors can influence the efficacy and longevity of the transplant and may directly affect the psychological wellbeing of the recipients. The present study aims to contribute extensive information to the existing literature about how psychological factors tend to influence self-reports of QoL after a successful kidney transplant. Research indicates that RTRs are a high-risk population both in terms of susceptibility to infections as well as physical and psychiatric disorders with adverse effects on the QoL and consequently the risk of graft rejection. Therefore, an adequate longitudinal psychological assessment is necessary, which allows a more in-depth knowledge of the recipients to identify, assess and manage vulnerable recipients with customized psychological interventions to improve graft longevity and overall QoL.

The broad aim of this study was to identify causal relationships between psychological factors and QoL over time. More specifically, the objectives of the study were to find how RTRs do with a healthy graft functioning perceives their QoL and what is the role of psychological factors in perceived QoL.

Hypotheses

1. Bidirectional relationship would exist between psychological factors (depression, perceived health status, life orientation, and conscientiousness) and QoL.
2. Depression is likely to be negatively associated whereas perceived health status, optimism (life orientation), and conscientiousness is likely to be positively associated with quality of life.

Method

Participants

This three-wave longitudinal study investigating QoL was conducted over a period of 15 months. The participants were recruited from renal clinics in Lahore, Pakistan using purposive sampling. The

sample size varied at the three points of assessment due to dropouts and new participants. To address the issue of sample attrition new participants were added to the samples that were then followed up on three occasions. This led to an effective sample size of 144 RTRs who had data for three time points. At time 1, *N* = (150), time 2, *N* = (147) and time 3, *N* = (144). The mean age of recipients was 33.33 years (ranging from 18 to 54 years). These recipients had a post-transplant time ranging from 6 months to 10 years (Mean = 2.8 years, *SD* = 1.5) and with normal graft functioning.

Inclusion Criteria

Adult RTRs are currently on a schedule of regular follow-up appointments, without any comorbidity (existing physical or mental disorders, and no more than one previous transplant were selected for the study. Only those participants were recruited in the sample who had a healthy graft functioning (as indicated by follow-up monitoring of renal function tests and were on similar medication group, as well as having a minimum basic formal schooling equivalent to primary school level. The purpose of including recipients with healthy graft functioning was to compare QoL and the contribution of psychological factors in a homogenous group. Having other illnesses would make it difficult to attribute any problems directly to having a transplant. Keeping physical health constant, the extent of influence of demographic and psychological factors in making them less or more satisfied could be seen. Moreover, being a longitudinal study, it would have shown if changes in graft functions i.e. deterioration in the kidney, or development of side effects occur over a period of time.

Exclusion Criteria

RTRs who were older than 60 years of age, with any other co-existing transplant (e.g. liver, heart or lung), or pregnant, were excluded from the sample.

The demographic characteristics of the sample are shown in Table 1.

For the purpose of the analyses the recipients who were currently living with their spouses or engaged were considered to be ‘in a relationship’ and those who were separated, widowed, divorced, or never married were considered single due to low representation of separated, widowed and divorcees. Most recipients were highly educated, with a high number of professionally qualified people and currently employed. Clinical and medical characteristics of the RTRs

included donor of transplant, post-transplant time and duration of dialysis. 52.1% of the RTRs received kidney from unrelated donor. Post-transplant time ranged from 6 months to 5 years or above. Majority (77%) of the study participants' post-transplant time was 1-4 years, and duration of dialysis less than 6 months.

Table 1: *Demographic Characteristics of Renal Transplant Recipients*

	Wave 1		Wave 2		Wave 3	
Demographics	*N*	*%*	*N*	*%*	*N*	*%*
Gender						
Men	99	66.0%	100	66.7%	94	64.0%
Women	48	32.0%	49	32.7%	47	32.0%
Marital Status						
In a Relationship	69	46.0%	80	53.3%	77	51.3%
Single	75	50.0%	67	44.7%	67	44.7%
Education Level						
School level only	35	24.3%	35	24.3%	35	23.8%
Graduate	43	29.9%	43	29.9%	43	29.3%
Post graduate	66	45.8%	68	45.8%	69	46.9%
Work Status						
Working	92	64.3%	94	64.3%	95	64.6%
Not Working	51	35.7%	52	35.7%	52	35.4%
Home Location						
Rural	84	58.7%	86	58.7%	87	59.2%
Urban	59	41.3%	60	41.3%	60	40.8%
Family System						
Joint	37	25.2%	35	23.8%	110	74.0%
Nuclear	110	74.8%	108	73.5%	37	25.2%
Monthly Income						
< PKR 100k	8	5.6%	8	5.6%	8	5.4%
101k - 200k	78	54.2%	78	54.2%	78	53.1%
Above 200k	58	40.3%	60	40.3%	61	41.5%

Note. PKR = Pakistani Rupees.

Measures

The following measures were used to assess the study constructs.

Quality of Life Index-Kidney Transplant Version

QoL Index (Ferrans & Powers, 1992) consists of 35 items with two parts: the first measures satisfaction with various aspects of life and the second measures their importance. Scores are calculated for overall QoL and in four domains: health and functioning, psychological/spiritual, social and economic, and family. Items that

are rated as more important have a greater impact on scores than those of lesser importance. Satisfaction is rated from 1 = very dissatisfied to 6 = very satisfied and importance is rated from 1 = very unimportant to 6 = very important. Scores are calculated by weighting each satisfaction response with its paired importance response. Overall (total) scores are calculated with a possible range of 0-35 and higher scores indicating better reported QoL. Cronbach's alphas are reported to be ranging from .73 to .99 (Ferrans & Powers, 1992; Wu et al., 2019).

Conscientiousness Scale

This is a 9-item scale taken from the Big Five Inventory (Benet-Martínez & John, 1998). Personality traits influence disease-specific QoL. The response scale is 1 = *disagree strongly*, 2 = *disagree a little*, 3 = *neither agree nor disagree*, 4 = *agree a little*, 5 = *agree strongly*. It is scored by adding up the ratings (after reversing where indicated) and dividing by the number of items responded to (i.e., the mean rating). The scores on the scale range between 1-5 with higher scores indicating higher conscientiousness. Previous studies (Concetta et al., 2020; McAbee & Oswald, 2013) have reported coefficient alphas ranging from .75 - .90, and test-retest correlations of .70 - .80.

Life Orientation Test-Revised

The Life Orientation Test-Revised (LOT-R) was developed to assess individual differences in dispositional optimism versus pessimism (Scheier et al., 1986). The LOT-R is a 10-item measure with four filler items, three positively worded items, and three reverse-coded items. Respondents indicate their degree of agreement with statements using a 5-point response scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Negatively worded items are reversed, and a single score is obtained ranging between 10-50 and higher scores indicating optimism. Cronbach's alpha for the total score on a 10-item scale is estimated at .82 (Fallon et al., 1997).

Beck Depression Inventory

Beck Depression Inventory-II (BDI-II; Beck et al., 1996) is a 21-question multiple-choice self-report inventory, a widely used instrument for measuring depression. Each item is rated on a scale from 0 to 3. The responses on each dimension are summed and a total

score is obtained. The cut offs used are 0-13 = minimal depression; 14-19 = mild depression; 20-28 = moderate depression; and 29-63 = severe depression. Higher total scores indicate more severe depressive symptoms. It has a high test–retest reliability (r = .93), suggesting that it is not overly sensitive to daily variations in mood. The test also has high internal consistency at α = .91 (Beck et al., 1996).

Medical Information Sheet

Information about the recipient's medical history was taken from the medical records. The data included the approximate date of onset of early stages of renal failure; the duration of end-stage renal disease (ESRD), dialysis modality (hemodialysis/peritoneal or both) before transplant and duration of dialysis, (duration of being on hemodialysis) and time since transplant.

Demographic Information Sheet

This included information related to recipient's personal, familial/marital, educational and occupational life. (age, gender, marital status, birth order, family system, family background, educational level, occupation, monthly family income, number of dependents, family system and family background.

Procedure

This three-time longitudinal study investigating QoL was conducted over a period of 15 months. The schedule was as follows: baseline assessment, Time 1, Time 2 assessment was conducted after 6 months followed by a gap of 1 year for Time 3 assessment. The post-transplant period ranged from 6 months onwards. The participants were recruited as referrals from physicians in renal out-patient units of private and government hospitals in Lahore (Pakistan). The assessments were conducted when they visited for their follow up sessions at the clinic individually, in the absence of family members. No time limit was set for the assessment session and participants were made to feel comfortable in responding to the questionnaires. The assessment for each participant was done in two or three sessions, depending on individual requirement and circumstances. Demographic and medical information was obtained from their medical records, to follow side effects and their renal

functioning to confirm a healthy graft and monitor complications or co-morbidities. The same set of assessment measures were conducted in all three times, measuring the recipients' QoL, perceived health status, life orientations, depression, and conscientiousness.

The professional ethical codes and standards as set for conducting research by APA were followed. Informed consent was obtained from the participants. They were free to withdraw from the study at any time with no penalty, and decline to answer any of the questions. Permission to recruit participants was sought prior to data collection from the administrations of hospitals, nephrology units and private clinics. Questionnaires with public access (not copyrighted) and permission for research were used. The medical condition of the participant was taken into consideration before administering the questionnaires. Confidentiality and data protection rules were followed. Participants were assured that the information they provide would be kept confidential

Results

Path analysis was used to investigate causal relationships between psychological factors influencing recipients' overall satisfaction with their QoL after a renal transplant. Longitudinal data from participants over a period of 15 months was used to model lagged and cross-lagged paths over three wave points of assessment after transplant, with a baseline, followed by an interval of six months (wave 1) and one year (wave 2). Causal relationships might be inferred using cross lagged designs in which variables are measured at least twice over time. When we need to compare the correlations between one set of variables with that between a second overlapping set of variables in a longitudinal data comprising the same set of participants, a cross lagged panel correlation analysis is used. This design involves analysis of reciprocal relationships between two or more variables that are measured at each of the points in time. Applying it to the present study, the comparison is made by analyzing the correlation between, QoL at wave 1 and, say, depression measured at wave 2, verses depression measured at wave 1 and QoL at wave 2 controlling for the autocorrelations between variables and the correlations between QoL and depression at each wave point. There are three points of assessment, so it will also involve correlations between QoL wave 2 and depression wave 3 and vice versa as well. The aim is to estimate and test the strength of the relationship between the two sets of variables and determine causal priority to compare non overlapping variables.

Descriptive statistics were calculated for QoL and psychological factors on all three waves of measurement. The psychological aspects of the recipients included their PHS (perceived health status), life orientation (optimism), depression, and conscientiousness. Finally, a cross-lagged correlation analyses were run to find the directionality of the relationships between QoL and psychological measures over time. The following Table shows descriptive characteristics of the QoL index at three waves.

Table 2: *Total Scores on the QoL Index at Wave 1, 2 & 3*

QoL Scores	*N*	Minimum	Maximum	*M*	*SD*
QoL Wave 1	150	12.08	35.00	23.71	3.45
QoL Wave 2	147	16.41	29.35	23.74	2.62
QoL Wave 3	144	17.50	29.31	24.98	2.35

The results across all three waves over a period of 15 months indicated that most recipients were satisfied with their QoL after renal transplant as indicated by their mean scores on QoL Index. Scores on the QoL index range from 0-35 and all the mean scores were well above the scale midpoint of 18. The pattern of mean scores shows a slight increase over time.

Pearson correlations between QoL and psychological measures were calculated to find if both sets of variables are associated with each other at each wave. Results are presented in Table 3. The negative correlations among QoL and depression levels show that depressed recipients tend to be less satisfied with their QoL or vice versa, across all three waves. The positive correlations among PHS, life orientation and conscientiousness and QoL indicate that recipients with a good perception of their health, optimistic attitude towards life and more conscientious tend to be more satisfied with their QoL at most times.

Table 3: *Correlations between Quality of Life and Psychological Factors at Wave 1, 2 & 3*

	Variables	Dep-1	Dep-2	Dep-3	PHS-1	PHS-2	PHS-3	LOT-1	LOT-2	LOT-3	CS-1	CS-2	CS-3
1	QoL W-1	-.689**	-.242**	-.379**	.423**	.134	.170*	.596**	.304**	.365**	.081	.046	.031
2	QoL W-2	-.372**	-.532**	-.290**	.187*	.370**	.189*	.255**	.411**	.423**	.127	.273**	.279**
3	QoL W-3	-.336**	-.372**	-.538**	.141	.105	.331**	.234**	.248**	.219**	.024	.244**	.194*
4	Dep W-1	-	.529**	.445**	-.495**	-.341**	-.386**	-.625**	-.369**	-.400**	-.128	-.095	-.066
5	Dep W-2		-	.435**	-.453**	-.387**	-.449**	-.267**	-.527**	-.521**	-.110	-.239**	-.252**
6	Dep W-3			-	-.404**	-.072	-.451**	-.298**	-.269**	-.231**	.000	-.204*	-.149
7	PHS W-1				-	.380**	.410**	.341**	.241**	.333**	.026	-.016	.002
8	PHS W-2					-	.386**	.243**	.256**	.276**	.216*	.064	.136
9	PHS W-3						-	.153	.292**	.262**	.038	.018	.045
10	LOT W-1							-	.270**	.344**	.158	.151	.139
11	LOT W-2								-	.839**	.131	.223**	.244**
12	LOT W-3									-	.166	.225**	.223**

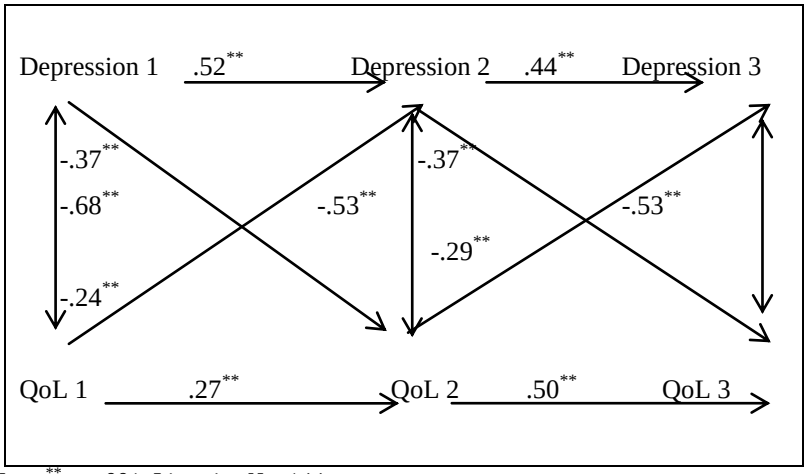
Note. Dep = Depression; QoL = Quality of Life; W = Wave.

**$p < .01$, *$p < .05$.

These significant associations do not clarify causation. For example, whether depressed recipients are less satisfied with QoL or those with a poor QoL tend to be depressed. Similarly, it is not known if RTRs with a higher QoL tend to be more optimistic or vice versa. To examine causal directions among these variables, the next step was to clarify causal priorities. Therefore, to assess the strength and causal priority of the above variables in affecting QoL or vice versa, a cross-lagged panel correlation design was used. With the psychological predictors, the Wilson and Cleary (1995) model assumes that there may be bi-directional relationships and, for example, things like depression might be the cause of low QoL but low QoL might also lead to depression. Given this, it is important to try and tease out the causal priority or the relationships. The aim is to estimate and test the strength of the relationship between the two sets of variables and determine causal priority using Hamaker et al. (2015) formula, to compare non-overlapping variables.

A cross-lagged analysis was done to clarify if being depressed makes the recipients become dissatisfied with their QoL or if it is QoL that tends to make them depressed. The results showed that there are significant negative correlations between depression and QoL, suggesting that lower levels of depression increase QoL. Depression levels are positively correlated at waves 1 and 2 (r = .529, p < .001) and also at waves 2 and 3 (r = .435, p < .001).

Figure 1: *Cross Lagged Correlations Analysis of Depression & QoL*



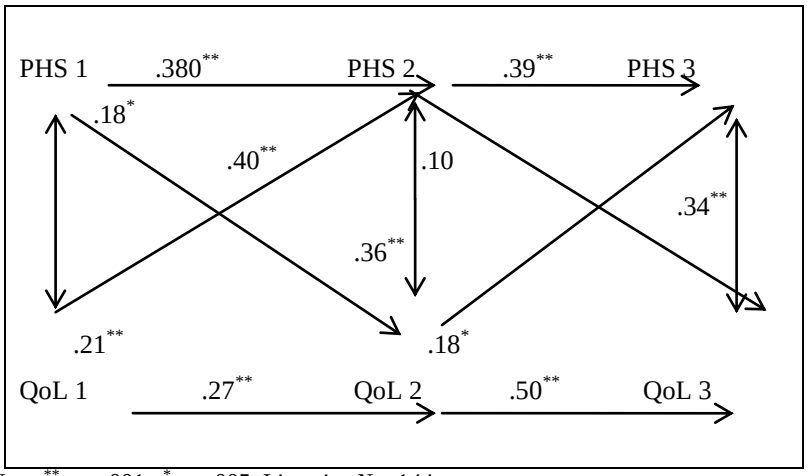
Note. **p < .001, List wise N = 144.

The CLCs among QoL and depression at waves 1 and 2 indicate that the two sets of correlations did not differ (z = -0.20, p = 0.83) Similarly a non-significant difference was found between these

dependent correlations among QoL and depression at wave 2 and 3, (z = 1.91, p = 0.05), suggesting that no causal priority can be determined between depression or QoL over wave. It cannot be established whether being depressed makes people less satisfied with their QoL or vice versa. It is clear however that QoL and depression are quite strongly related to one another even if it is not possible to say that one is unambiguously caused by the other.

A cross-lagged correlation was carried out to find if perceived health status affects QoL or it's their QoL that influences their health perceptions.

Figure 2: *Cross Lagged Correlations Among PHS & QoL*

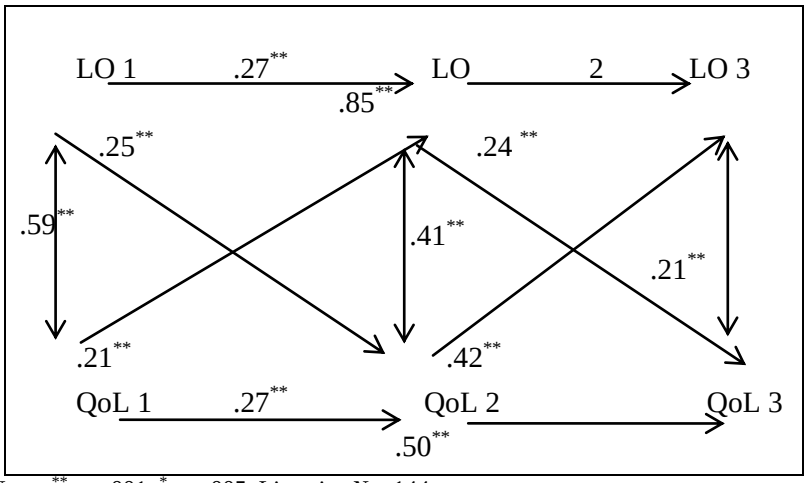


Note. ** p < .001, * p < .005, List wise N = 144.

The CLCs showed no significant difference among QoL and PHS correlations at waves 1 and 2 (z = -1.73, p = 0.08) however, when QoL and PHS at waves 2 and 3 were analyzed, the results showed a significant difference in the opposite direction (z = 2.33, p = 0.01) indicating that the correlation between QoL2 and PHS3 is stronger than the relationship between PHS2 and QoL3. This indicates that RTRs more satisfied with their QoL tend to have a better perception of their health. However, we cannot claim whether QoL always influences how recipients perceive their health status due to an inconsistent pattern at waves 1 and 2 where the data suggest the relationship is working in the opposite direction.

Optimism and QoL were tested for causal priority. The associations among QoL and optimism were explored (See Figure 3).

Figure 3: *Cross Lagged Correlations Among Life Orientation & QoL*



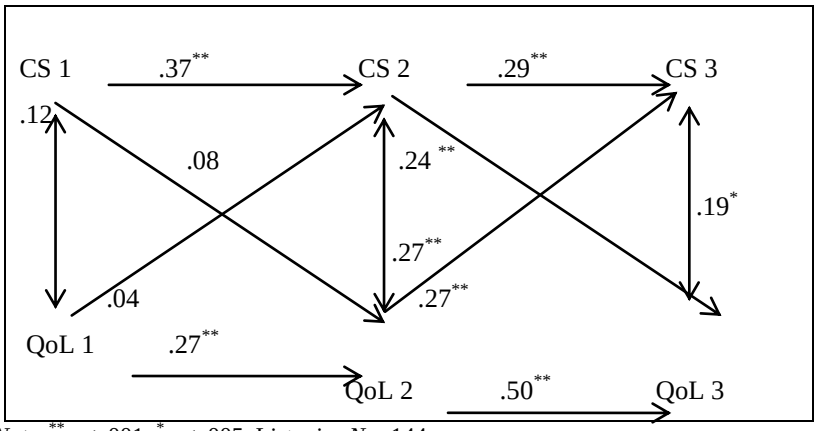
Note. $^{**}p < .001$, $^{*}p < .005$, List wise $N = 144$.

The above CLCs do not show any significant difference in correlations among QoL and Optimism at wave 1 and 2 (z = 0.65, p = 0.51) making it unclear whether it's the level of optimism that makes them less or more satisfied with QoL or increased QoL makes them more optimistic. However, at wave 2 and 3, the causal flow is from QoL to optimism. (z = 2.12, p = 0.03), indicating that a more satisfied QoL makes them more optimistic.

Conscientiousness was examined as a personality trait to find its association with QoL. The purpose was to find if more conscientious recipients tend to report increased QoL or vice versa though, given that conscientiousness is conceptualized as a stable trait there is an expectation that the direction is from conscientiousness to QoL.

QoL and conscientiousness did not correlate at wave 1 and 2 and therefore it doesn't make sense to find any causal relationships among these. Even though, some significant positive correlations are found at wave 2 and 3, which comes as a surprise, but no causal priority could be determined (z = 0.33, p = .26), suggesting that this specific personality trait does not influence or modify recipients' level of QoL.

Figure 4: *Cross Lagged Correlations Among Conscientiousness & QoL*



Note. $^{**}p < .001$, $^{*}p < .005$, List wise $N = 144$.

Discussion

The cross lagged correlations did not find any causal relationship between depression and QoL, so it cannot be determined whether depressed recipients become less satisfied QoL or those less satisfied with their QoL tend to become depressed. The concepts of depression and subjective QoL seem to be overlapping in their contents. Depression is an affective state with potential environmental, biological and psychological causes. Similarly, subjective QoL is an individual's perception of overall life, physical and mental well-being. Satisfaction and depression both have the emotive component in common and can be a cause or outcome of individual experiences and perceptions of life and due this similar nature of both concepts, a distinct causal priority couldn't be found.

It seemed that satisfaction with QoL varied due to differences in personality type, life orientation, perceptions and experiences during the phases of loss of native kidney and transplantation. The differences in experiences with health care, family, social and occupational relationships, and expectations of transplant outcomes, determined their depression and perceived QoL. It can be said that being depressed or less satisfied with QoL both are determined by individual personality types, belief systems and life experiences. Both depression and QoL satisfaction can be a consequence of these factors. The study determined a causal priority among QoL and optimism at some point, though not for most variables. QoL satisfaction influenced recipients' life orientation, reflecting that those who are more satisfied with their present QoL tend to be more

optimistic about their future as well. There were no clear patterns of causal direction for other variables, such as PHS, despite there being, in the case of Conscientiousness, an expectation that this would be causally prior to QoL being conceived of as a relatively stable trait.

Subjective QoL being a multidimensional construct includes both physical and psychosocial domains, such as health functioning psychological and spiritual well-being, family relationships and therefore, it is difficult to establish if linear causal relationships among PHS, life orientation, conscientiousness and QoL exist. QoL may be an influence or be influenced by environmental and psychological factors but the sequence of this process is not straight forward to model. QoL as measured here refers to 'the level of satisfaction of transplant recipients, with their health, family and social life, social and economic condition and psychological/spiritual well-being'. It can be said that recipients' satisfaction can be influenced by how frequent and severe side effects they experience (PHS), their attitude towards life in general and their affective condition that can both be a consequence or cause of difference in QoL satisfaction. QoL satisfaction is in particular a perception making them feel less or more satisfied' so it can be both an outcome and causal factor for influencing the psychological well-being of individuals and the issues of precedence can be clarified only by analyzing individual explanations, descriptions and attributions relating to these overlapping constructs.

Keeping in view the findings of our study, it seems that QoL is not a particularly distinct construct. It seems that the psychological aspects cannot be considered as distinct causal factors because these also involve perceptions of four major domains of life measured as overall QoL. Thus, QoL satisfaction seems to be determined by how they perceive and feel about their health functioning, family and social relationships, financial and economic condition (amenities of life), and psychological well-being. The analysis of relationships and causal priorities clarified the subjective nature of QoL and showed an overlap with psychological constructs and terms used interchangeably in research, such as health-related QoL, health status, health perceptions. This study has provided an understanding about the complex and confusing nature of the QoL concept and shown that most psychological aspects are already encompassed in this broad and multidimensional concept. Different versions and concepts of QoL emerge mainly because of the differences in the population being studied. It depends on 'who is being asked and when' as most people do not evaluate their lives unless they are asked to do it.

Limitations and Suggestions

The cross-lagged correlation technique (CLC) for assessing causality from passive observational data has been criticized for being used to infer causation. CLC compares cross-correlations between variables across time points of measurement and attributes differences in correlations to causal effects. Some of the major areas of criticism include lack of a no-cause baseline, spurious effects of mediating variables, and obscuring effects of heterogeneous stabilities. However, it has been argued that CLC has some utility as an exploratory technique and can be considered for longitudinal data. Furthermore, if certain assumptions are specified and these assumptions are correct, valid inferences can be made from CLC. Lastly, some assumptions for CLC are not as stringent as implied by critics and CLC is robust to minor violations of assumptions. The study comprised of a restrictive group of recipients as we gathered data only from those with a healthy graft functioning, belonging to a relatively stable financial condition and with formal education that does not reflect how recipients who are not educated and experience post-transplant complications with financial difficulties tend to report their QoL. Restricting the data to a homogenous group does not allow variability which can be a possible limitation. Therefore, it is suggested that a diverse sociodemographic group of recipients can be studied to counter these limitations.

Implications

The longitudinal study facilitates an understanding and identification of the patterns and interactions between psychological factors and QoL. It provides a guideline to health care teams in considering psychological factors in developing the assessment and follow-up treatment protocols for transplant recipients. Timely identification of psychologically vulnerable recipients can increase the efficacy of renal transplantation in Pakistan. At present, the main focus of transplant teams involves clinical factors and general health indicators, therefore, this study provides a baseline for including psychological factors that may significantly affect not only the psychological wellbeing but health outcomes too.

Conclusion

QoL seems to differ among RTRs with diverse socio-demographics, suggesting consideration of these factors while providing psychological support. Psychological variables were found to be strongly correlated with perceived QoL. However, it seems that

QoL is a complex concept to be analyzed as a distinct and separate construct when considering a causal predominance, particularly with psychological factors. It is difficult to distinguish between the overlapping influences of these constructs on each other and clarify what causes what. We can see a reciprocal relationship between psychological factors and overall QoL. Measuring these constructs using different measurements will provide a clear picture or insight regarding the influential role of psychological factors on QoL among RTRs. Overall, the significant contribution of psychological factors in influencing life satisfaction is clearly reflected by the findings which needs to be considered as a part of treatment protocol for transplant recipients on follow-ups.

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