

# Psychosomatic interactions in kidney transplantation: role of personality dimensions in mental health-related quality of life

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## Abstract

**Background and aims:** The increase in innovative and personalized medicine solutions in kidney surgery can improve patients' chances of survival; however, during the transplantation process, patients are exposed to many psychological challenges. This study aimed to evaluate the role and impact of personality dimensions on the behaviour of waiting-list patients towards the post-surgery adaptation process.

**Method:** The participants were 113 out-patients aged 18–70 years (mean age 54.7 years, SD ± 9.9) who had received a kidney transplant at least 3 years prior to the study.

**Results:** The results of the study revealed that personality dimensions can predict mental health-related quality of life after kidney transplantation; in particular, the dimensions play an important role in patients' behavioural ability to manage their quality of life both during end-stage renal disease and after kidney transplantation. Psychological distress and anxiety were associated with a low level of the conscientiousness dimension, while a high level of the openness dimension was associated with a high level of psychological distress and stress. In addition, body self-perception was associated with personality dimensions.

**Conclusion:** Personality dimensions were found to predict behavioural reactions when emotional traits and body self-perception for each patient were combined; clinical psychologists could apply personalized intervention by modeling the treatments step by step and mitigating the negative effects of the whole kidney transplantation disease, thus helping the individual to adapt to a new life.

**Keywords:** clinical psychology, emotional traits, end-stage renal disease, kidney transplantation, personality, psychosomatic

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## Introduction

Kidney transplantation (KT) represents a recovering phase for patients affected by end-stage renal disease (ESRD). The increase in innovative and personalized medicine solutions in kidney surgery can improve patients' chances of survival; however, during the transplantation process, patients are exposed to many psychological challenges.<sup>1–3</sup> Schmajuk *et al.*<sup>4</sup> point out that patients with ESRD have a high prevalence of psychological concerns.

The most common mental disease symptoms are depressive disorders, cognitive signs, sleep disorders, and psychosis. Negative psychological effects are detectable for the whole kidney disease (ESRD, KT) and related mental health in post-treatment.<sup>5</sup> King-Wing Ma and Kam-Tao La's review<sup>6</sup> highlighted the influence of a wide range of somatic symptoms in renal disease negatively affecting occupational and social activities. In particular, they found that the combination of psychological



distress and physical disturbance can significantly reduce the quality of life (QoL) of patients, leading to depression. King-Wing Ma and Kam-Tao Li<sup>6</sup> (2016: 644) recommend the provision of non-pharmacological treatment as well as psychotherapy, counselling, cognitive therapy in ESRD-associated dialysis treatment ‘in order to individualize the treatment and optimize clinical outcomes’ (p.644). Tsai *et al.*<sup>7</sup> reviewed prospective and retrospective studies aimed at investigating the efficiency of dialysis *versus* conservative management for better QoL for ESRD patients: they found a positive effect of both treatments. However, they found that dialysis has a greater impact on mental health-related QoL, whereas the effect of conservative management is related to physical health-related QoL. Based on this finding, King-Wing Ma and Kam-Tao Li<sup>6</sup> recommend a patient-centred approach to identify high-risk patients for mental disorders. According to Khodman and Wellish’s study,<sup>8</sup> very few studies have focused on the effects of the waiting period for transplantation; taking clinical practice into account. Authors found that the waiting list period is very stressful for patients and is affected by several variables: (a) the preoperative stage/waiting period differs greatly depending on the health status of the individual; (b) the variability of the physical status of patients provides evidence of psychological distress levels; (c) emotional and personality traits can play a role in the patient’s ability to cope with the whole transplantation process; (d) psychological attachment and personal affective history can model the ability to adapt to a hospital setting. In addition, the research suggested that future studies should be based on clinical intervention using an evidence-based approach.<sup>8</sup>

This present study was conducted to analyse the predictive and protective factors in waiting-list patients’ process of mental health-related adaptation to renal in order to integrate personalized treatment using a patient-centered approach, prioritizing psychosomatic evidence.

The study aimed to evaluate the role of personality dimensions and their impact on the behaviour of waiting-list patients towards the post-surgery adaptation process. Our scope was to examine the modeling of the emotional pattern of patients in the preoperative phase of KT in order to identify the subjective protective as well as predictive factors to support patients better. Moreover, our

study was an in-depth investigation into the psychosomatic interactions in the renal disease.

## Methods and materials

### Participants

Participants in this study were 113 out-patients aged 18–70 years (mean age 54.7 years, SD ± 9.9) who were living in central Italy and had received a KT at least 3 years prior to the study. The gender distribution of the sample reflects the epidemiology of chronic renal failure, which is higher in males ( $F=41$ , mean age 55.7, SD ± 9.7;  $M=72$  mean age 54.2, SD ± 10). The exclusion criteria were transplantation of an organ other than the kidney, premorbid depression and/or anxiety, alcohol or substance abuse, no previous history of rejection, and no previous history of a physical disease.

The participants were approached to participate in the study at the General Surgery and Transplantation Division (Director Prof. F. Pisani) and Internal Medicine Division (Director Prof. C. Ferri) of S. Salvatore Hospital in L’Aquila (Italy).

We contacted 115 suitable patients, 113 of whom provided written informed consent. Two patients did not agree to participate in the experimental protocol. One was not interested in participating, while the other one had problems with sense organs. The demographic characteristics of the participants are presented in Table 1.

Participants were eligible for enrolment in the study if they were diagnosed with chronic kidney disease (CKD) and had undergone KT surgery.

Inclusion criteria were as follows: (a) 18–70 years old (b) diagnosis of CKD, and (c) KT. Exclusion criteria were: (a) comorbidity for secondary diseases and (b) psychiatric and neurological disorders previous to CKD diagnosis.

### Procedure

Medical staff in the General Surgery and Organ Transplants Division (Director: Prof. Pisani) identified eligible patients, who were then enrolled during a scheduled follow-up by medical protocol. Informed consent was obtained at the time of enrolment. Trained clinical psychologists (blinded

**Table 1.** Demographic characteristics of the sample.

<b>Gender</b>	<b>Female (n=41)</b>	<b>Male (n=72)</b>	<b>Sample (N=113)</b>
Age	X (mean age) 55.7 SD ± 9.7	X (mean age) 54.2 SD ± 10	X (mean age) 54.7 SD ± 9.9
<b>Education</b>			
No high school (%)	57	43	46
High school (%)	35	48	43.4
Undergraduate (%)	7.5	12.5	11
<b>Marital status</b>			
Married/living with partner (%)	65.5	71	72
Single (%)	13	20	17
Divorced/widowed (%)	15	10	12
<b>Occupation</b>			
Unemployed (%)	25	66	40
Employed (%)	22	37	31
Self employed (%)	5	10	8
Retired (%)	8	30	22
<b>GFR stage</b>			
Stage 1 (%)	5	9	8
Stage 2 (%)	42	21	29
Stage 3 (%)	15	20	18
Stage 3b (%)	15	37	29
Stage 4 (%)	18	12.5	15
Stage 5 (%)	5	3	4
<b>Waiting list group</b>			
Brief waiting (>5years) (%)	36.5	63.5	55.8
Long waiting (<5years) (%)	36	64	44.2

GFR, glomerular filtration rate.

to the objectives of the study) conducted the psychological evaluations in a quiet, dedicated room. The evaluations lasted 20 min. Participants completed the measures during their scheduled follow-up. Data were collected anonymously. All of the participants were recruited after KT, in times that covered an interval between 1 and 3 years from the surgical intervention.

## Measures

### Sociodemographic variables

Demographic and clinical data were collected. Demographics were detected by self-reports during clinical interview: age and life living (e.g. having children, being employed, marital status) related to the time of transplantation and the

waiting time for the transplantation. Then, clinical data were detected from medical records (current stage of glomerulonephritis, creatinine levels, and the type of dialysis performed). All data were merged in one database for elaboration data.

#### *Glomerular filtration rate (GFR)*

Estimated GFR is the best test to measure the level of kidney function and determine the stage of kidney disease (National Kidney Foundation). Based on the GFR, progressive renal failure (or CKD) has been divided into five different stages of severity, in order of increasing severity: stage 1 (kidney damage with normal kidney function at 90% or higher of kidney function); stage 2 (kidney damage with mild loss of kidney function at 60–89% of kidney function); stage 3 (mild to moderate loss of kidney function, at 45–59% of kidney function); stage 3b (moderate to a severe loss of kidney function, at 30–44% of kidney function); stage 4 (severe loss of kidney function, at 15–29% of kidney function); stage 5 (kidney failure, less than 15% of kidney function). This chronic renal failure staging system was applied by clinical staff to monitor both the physical and mental well-being of patients following KT; data were obtained from the participants' records.

#### *Psychological measurement*

The psychological battery was composed of three standardized measurements assessing emotional traits (depression, anxiety, stress, and psychological distress) and personality dimensions; each standardized test was applied by the Italian adaptation and validation. Also, an experimental test was carried out and applied to evaluate the body image self-perception.

*Depression Anxiety Stress Scales 21 (DASS-21)*<sup>9</sup>. The DASS-21 is a self-administered questionnaire that measures the degree of severity of the core symptoms of depression, anxiety, and stress. It is composed of 21 questions with responses on a four-point Likert-type scale.

*Psychological Distress Inventory*<sup>10</sup>. This self-administered questionnaire measures the impact of psychological distress and related therapies. It is composed of 13 questions, and responses are indicated on a five-point Likert-type scale. The

standard score estimates the presence/absence of psychological distress to measure global distress. This test was administered only to the participating group. The inventory demonstrated good reliability ( $\alpha = 0.86$ ).

*Big Five Inventory-10 (BFI-10) Italian version*<sup>11</sup>. This self-administered questionnaire measures the five personality dimensions (agreeableness, conscientiousness, emotional stability, extroversion, and openness). It is composed of 10 questions with responses on a five-point Likert-type scale. 'Agreeableness' describes an individual's tendency to put the needs of others before their own. People with a low level of agreeableness are primarily concerned with serving their own interests. Highly agreeable people are nice, cooperative, and accommodating. 'conscientiousness' describes a person's tendency to be persistent and determined in achieving their goals. People with a high level of conscientiousness tend to work hard to carry out their plans, while people who are low on this trait tend to change course and get distracted easily. 'Emotional stability' describes an individual's response to stress. People with poor emotional stability are susceptible to anxiety, depression, anger, and other negative emotions when subjected to stressful conditions. People with a high level of emotional stability resist stress and tend not to experience many negative emotions; 'extroversion' refers to the degree of pleasure experienced through social relationships. A high score indicates a person who is sociable, talkative, open to others, optimistic; on the contrary, a low score is typical in reserved, sober, not euphoric, quiet people; 'openness' refers to openness to creativity, non-conformism, and originality. Low scores indicate closure to experience, conformity, and lack of creativity.

Body Self-Perception Questionnaire (BSP-q) is an *ad-hoc* experimental questionnaire aimed at evaluating body image perception based on three domains: (1) consequences of clinical treatment on body image [treatment consequences on body image (TCBI)]; (2) well-being in social interaction [social wellness (SW)]; and (3) well-being in the body [physical feeling (PF)]. It consists of 15 items with a four-point response scale. The BSP-q was applied in a previous pilot study composed of a sample of 30 transplantation patients (those patients were not included in the present study). The internal reliability of the scale was good ( $\alpha = 0.91$ ).

### Procedure

Medical staff identified eligible patients, who were then enrolled during scheduled follow-ups. Written informed consent was obtained at the time of enrollment. Trained clinical psychologists (blinded to the objectives of the study) conducted the psychological evaluations in a quiet, dedicated room. The evaluations lasted 20 min. All participants were recruited after KT, 1–3 years from the time of the intervention. Data were collected anonymously.

### Study design and statistical analysis

We conducted an observational study to evaluate the emotional traits, body self-perception, and personality dimensions in KT patients to empower the reinforcement of the psychosomatic approach. Descriptive statistics were calculated for baseline characteristics and outcome measures. One-way analysis of variance (ANOVA) and analysis of covariance were conducted to detect the statistical significance of the overall differences between examined psychological variables and the waiting list condition. Pearson's correlation was applied to verify the relationship between personality dimensions and emotional traits.

Statistical analyses were performed using SPSS Statistics 22.0. According to the previous study by Gill<sup>12</sup> a sample size of 22 patients was estimated in order to provide a 95% confidence interval (CI), a power of 80%, and  $\alpha$ -value = 0.05, taking account of an expected percentage of losses around 50% of patients. Sample size calculation was performed by using NCSS-PASS software.

### Results

Of the recruited patients, 99% (113 out of 115) took part in the psychological evaluations, whereas two participants refused to sign informed consent. Descriptive analyses based on sociodemographic characteristics showed no difference among all the variables (gender, education, marital status, and occupation); thus, our sample was homogeneous.

First, we wanted to evaluate the impact of the waiting list condition (from the time of diagnosis to the time of the KT) on emotional traits after treatment. Participants were divided into two groups based on the time of the surgery intervention (KT) as follows: (a) the brief waiting (BW) list (>5 years), composed of 63 patients (55.8%), and (b) the long waiting (LW) list (<5 years), composed of 49

**Table 2.** Raw scores of psychological testing by waiting list condition.

Tests	BW	LW
	X (mean of scores) $\pm$ SD	X (mean of scores) $\pm$ SD
Emotional traits		
PDI	25.8 $\pm$ 8.6	23.4 $\pm$ 7.2
DASS-21		
Depression	8.5 $\pm$ 10.1	5.9 $\pm$ 6.6
Anxiety	9.5 $\pm$ 9.4	7.5 $\pm$ 7.8
Stress	12.4 $\pm$ 10.04	9.8 $\pm$ 8.2
Body self- perception		
BSP-q		
TCBI	3.2 $\pm$ 2.8	2.8 $\pm$ 2.6
SW	4.2 $\pm$ 2.9	3.9 $\pm$ 2.7
PF	6.2 $\pm$ 2.6	5.5 $\pm$ 2.6
TOT	13.7 $\pm$ 6.8	12.3 $\pm$ 6.4

BW, brief waiting; LW, long waiting.

BSP-q, Body Self-Perception Questionnaire; BW, brief waiting; DASS-21, Depression Anxiety Stress Scales 21; LW, long waiting; PDI, Psychological Distress Inventory; PF, physical feeling; SW, social wellness; TCBI, treatment consequences on body image; TOT, total, .

patients (44.2%). Table 2 shows the raw scores by waiting list condition.

An ANOVA  $4 \times 2$  [four emotional traits (psychological distress, depression, anxiety, stress)  $\times$  2 (BW, LW)] showed no significant differences in interaction effect between groups. Then, we examined the effect of the waiting list condition on body self-perception (BSP-q indexes). We divided the participants into three levels (low, moderate, and high) for each dimension (agreeableness, conscientiousness, emotional stability, extroversion, and openness) of BFI-10 (Table 3) and the waiting list conditions (BW, LW). The statistical analysis showed no significant difference in the distribution per dimension.

An ANOVA  $3 \times 2$  [3 (TCBI, SW, PF)  $\times$  2 (BW, LW)] showed no significant differences between groups. Even the statistical analyses comparing the emotional traits and body image perception indexes

**Table 3.** Raw scores of BFI-10 distributed by five labels: agreeableness, conscientiousness, emotional stability, extroversion, openness.

BFI-10	BW		LW	
	X (mean of scores)	SD	X (mean of scores)	SD
Agreeableness				
High	9.33	±0.70	9.06	±0.88
Moderate	6.13	±0.77	6.00	±0.75
Low	3.18	±0.87	3.41	±0.79
Conscientiousness				
High	8.94	±0.82	9.25	±0.88
Moderate	6.09	±0.74	6.33	±0.75
Low	3.00	±0.14	3.00	±0.70
Emotional stability				
High	8.44	±0.52	9.00	±0.92
Moderate	5.90	±0.68	6.16	±0.65
Low	3.06	±0.79	3.38	±0.76
Extroversion				
High	9.50	±0.53	8.80	±0.94
Moderate	6.00	±0.68	5.75	±0.83
Low	3.36	±0.67	3.14	±0.89
Openness				
High	8.60	±0.81	8.75	±0.77
Moderate	6.26	±0.68	5.81	±0.69
Low	3.00	±0.81	3.44	±0.52

BFI-10, Big Five Inventory-10; BW, brief waiting; LW, long waiting.

by creatinine levels (abnormal; normal) as well as GFR staging showed no significant differences. Our data analysis showed that the emotional traits after KT were not significantly and directly related to the time of being on the waiting list.

Then, we conducted a multivariate analysis of variance (MANOVA)  $4 \times 3 \times 2$  to compare emotional traits [4 (BFI index); 3 levels (high, moderate, and low); and waiting list (2: BW, LW)]. Statistical analyses were conducted for each index and the results showed that the conscientiousness index

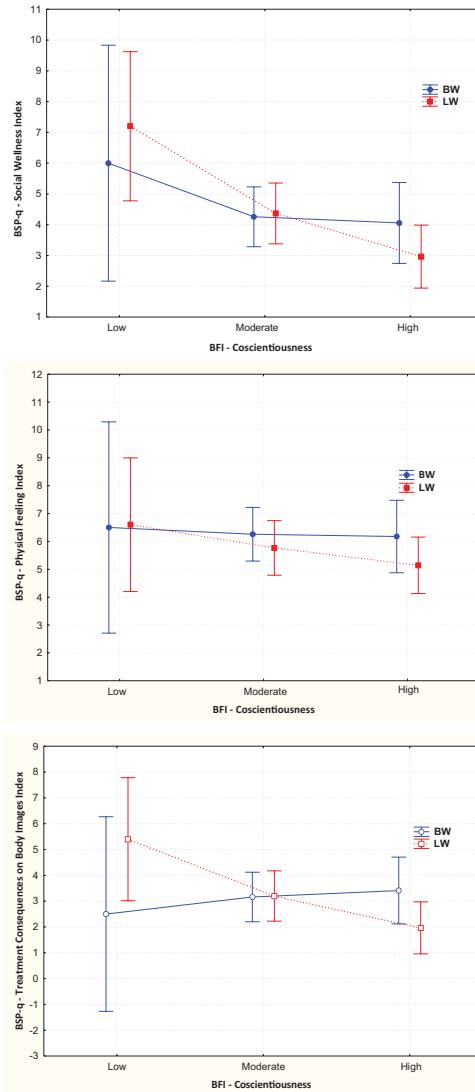
had a significant difference in psychological distress [ $F(107, 2)=5.3; p=0.001$ ], depression [ $F(107, 2)=3.9; p=0.02$ ], anxiety [ $F(107, 2)=5.0; p=0.001$ ], and stress [ $F(107, 2)=3.5; p=0.03$ ]. There was a significant interaction between conscientiousness and the waiting list condition in all emotional traits: psychological distress [ $F(107, 2)=4.3; p=0.01$ ], depression [ $F(107, 2)=5.0; p=0.001$ ], anxiety [ $F(107, 2)=3.7; p=0.02$ ], stress [ $F(107, 2)=3.3; p=0.03$ ]. Openness showed a significant difference in depression [ $F(107, 2)=3.1; p=0.04$ ]. No significant differences were found in

the agreeableness, emotional stability, and extroversion indexes.

Subsequently, a MANOVA  $3 \times 3 \times 2$  was executed to analyse the relationships among the body self-perception indexes (3: TCBI, SW, PF), BFI index [3 levels (high, moderate, and low)], and waiting list (2: BW, LW). The results showed significant differences between conscientiousness levels in SW [ $F(107, 2) = 5.3; p = 0.006$ ]. No significant interaction effect was found. In Figure 1 the performance of patients are reported by waiting list and BFI categorizations.

Finally, we conducted a Pearson's correlation analysis between personality dimensions (agreeableness, conscientiousness, emotional stability, extroversion, openness) and emotional traits (psychological distress, depression, anxiety, and stress) to verify whether the post-surgery emotional condition depends on personality.

Then, we analysed whether personality dimensions could have affected the emotional and body self-perception indexes. Pearson's correlation analysis (Table 4) showed that the agreeableness index negatively correlated with PF ( $r = -0.196; p = 0.01$ ); conscientiousness index correlated negatively with psychological distress ( $r = -0.239; p = 0.005$ ), anxiety ( $r = -0.219; p = 0.01$ ), SW ( $r = -0.220; p = 0.01$ ), and TCBI ( $r = -0.213; p = 0.01$ ); extroversion index negatively correlated with PF ( $r = -0.203; p = 0.01$ ) and SW ( $r = -0.212; p = 0.01$ ); openness index positively correlated with psychological distress ( $r = 0.173; p = 0.03$ ) and stress ( $r = 0.157; p = 0.04$ ); finally, no significant correlations were found in the emotional stability index. However, considering significant correlations between personality traits and examined emotional dimensions, we conducted a linear regression to evaluate the predictive effect. Taking into account BFI traits, significant effect for anxiety by conscientiousness index [ $R^2 = 0.15$ ; Root-Mean-Square Error (RMSE) = 7.89; CI (-3.01, 0.003)], as well as emotional stability [ $R^2 = 0.15$ ; RMSE = 7.89; CI (2.18, 0.03)]; depression by agreeableness [ $R^2 = 0.19$ ; RMSE = 7.54; CI (-2.58, 0.01)]; conscientiousness [ $R^2 = 0.19$ ; RMSE = 7.54; CI (2.53, 0.01)]; openness [ $R^2 = 0.19$ ; RMSE = 7.54; CI (-2.49, 0.01)]; then stress by agreeableness [ $R^2 = 0.18$ ; RMSE = 8.25; CI (-2.09, 0.03)]; conscientiousness [ $R^2 = 0.18$ ; RMSE = 8.25; CI (2.45, 0.01)]; emotional stability [ $R^2 = 0.18$ ; RMSE = 8.25; CI (1.99, 0.04)]; openness [ $R^2 = 0.18$ ; RMSE = 8.25;



**Figure 1.** Representation of BSP-q indexes by waiting list and BFI categorization.  
BFI-10, Big Five Inventory; BSP-q, Body Self-Perception Questionnaire; BW, brief waiting; LW, long waiting.

CI (-2.25, 0.02)]; psychological distress by agreeableness [ $R^2 = 0.17$ ; RMSE = 7.17; CI (-2.07, 0.04)]; conscientiousness [ $R^2 = 0.17$ ; RMSE = 7.17; CI (3.05, 0.002)], openness [ $R^2 = 0.17$ ; RMSE = 7.17; CI (-2.00, 0.04)]. In regard to the body self-perception indexes, the SW pattern showed a significant effect by conscientiousness [ $R^2 = 0.17$ ; RMSE = 2.55; CI (2.99, 0.003)].

## Discussion

The results of this study showed that the personality dimensions can predict mental health-related QoL after KT. In particular, the dimensions play an important role in the behavioural characteristics to

**Table 4.** Pearson correlation analysis between personality dimensions and emotional traits.

BFI		PDI	DASS depression	DASS anxiety	DASS stress	BSP-q physical feeling	BSP-q social wellness	BSP-q treatment consequences on body images
Agreeableness	<i>r</i>	0.101	0.151	0.084	0.191*	-0.196*	0.070	-0.057
	<i>p</i>	0.143	0.056	0.189	0.022	0.019	0.232	0.274
Conscientiousness	<i>r</i>	-0.239**	-0.147	-0.219**	-0.153	-0.096	-0.220**	-0.213*
	<i>p</i>	0.005	0.060	0.010	0.053	0.156	0.010	0.012
Emotional stability	<i>r</i>	-0.120	-0.099	-0.151	-0.114	-0.129	-0.041	-0.124
	<i>p</i>	0.104	0.149	0.056	0.115	0.086	0.333	0.096
Extroversion	<i>r</i>	-0.070	-0.146	-0.052	-0.088	-0.203*	-0.212*	-0.051
	<i>p</i>	0.229	0.061	0.292	0.177	0.016	0.012	0.296
Openness	<i>r</i>	0.173*	0.147	0.123	0.157*	0.054	-0.066	-0.090
	<i>p</i>	0.034	0.061	0.098	0.049	0.285	0.245	0.172

\**p* < 0.05.\*\**p* < 0.001.

BFI, Big Five Inventory; BSP-q, Body Self-Perception Questionnaire; DASS, Depression Anxiety Stress Scales; PDI, Psychological Distress Inventory.

manage the QoL in ESRD and then in post KT. Psychological distress and anxiety is relevant when related to a low level of the conscientiousness dimension. In addition, a high level of the openness dimension can be associated with a high level of psychological distress and stress. Moreover, body self-perception correlates with personality dimensions. A high level of agreeableness is associated with a low level of body self-perception aspects (PF and SW). A high level of the conscientiousness dimension could predict difficulties in SW and a low feeling of adaptation to the treatment effects on body image. Last, high extroversion is associated with a low level of positive PF. Emotional stability seems not to be associated with KT fragility.

Taking to account Khoddam and Wellisch's study,<sup>8</sup> four key themes might affect the mental health of patients during the waiting period: (1) boredom, (2) frustration with delayed anxiety reduction/management (loss of control), (3) during prolonged hospitalization, long-term psychological difficulties merge with current issues; forced dependency attachment patterns are played out in the hospital context, and (4) guilt over role abandonment in the family and loss of roles outside the family. Khoddam and Wellisch<sup>8</sup> propose strategies for implementation based on cognitive behavioural therapy, acceptance

and commitment therapy, and interpersonal therapy. According to the authors, the preoperative/waiting period for KT is an intensive lifespan for patients exposed to a psychologically difficult time. Our finding exploits this perspective: so far, researchers have scientifically focused on the external impact on patients; our data suggest putting more focus on the internal aspects of patients in terms of the personality dimensions and their influence in dealing with the complexity of living with KT. In our opinion, the combination of internal and external factors affects patient life, thus compromising their QoL during the waiting period. Following Cukor's suggestions,<sup>2</sup> strategies for clinical intervention using the psychosomatic approach can be useful in laying the basis for the functional adaptive process to the present and future life to improve the patient's ability to have a positive personal perspective for a healthy and productive post-KT life.

There are several limitations in this study. First, there were differences of case numbers in the distribution criteria of participants for elaboration data (i.e. time of the surgery intervention, 63 versus 49 patients). Second, we did not include body image measurements, which cannot be avoided in most clinical studies. Third, the study used clinical and self-reported demographic data, so many important

clinical characteristics, such as patients' socioeconomic status, family function, and smoking status, were not available or not reliable.

## Conclusions

In conclusion, personality dimensions can predict the behavioural reactions by combining emotional traits and body self-perception for each patient. Personalized intervention could be applied by clinical psychologists modelling the treatments step by step and mitigating the negative effects of the whole KT disease and prompting the individual's adaptation to a new perspective on life. As suggested by King-Wing and Kam-Tao,<sup>6</sup> the patient-centred approach is important in clinical intervention, balancing internal and external factors influencing the mental health of patients and addressing the negative impact of KT on their QoL.

## Author contributions

FG and JR elaborated the investigation and methodology; FP, DL, and DP conducted data curation; CF worked the supervision and DDG conceptualized the study. All authors contributed to writing (review and editing) the manuscript.

## Conflict of interest statement

The authors declare that there is no conflict of interest.

## Ethics statement

This study was approved by the Institutional Review Board of the University of L'Aquila, Italy (Prot. No. 26656/2019) and by the S. Salvatore Hospital, L'Aquila (IT), from which participants were recruited. The study adhered to the Declaration of Helsinki (WMA, 2018).

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## Informed consent

All the participants provided written informed consent prior to participation.

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## Supplemental material

Supplemental material for this article is available online.

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