



Self-management and Related Psychosocial Variables Among Renal Transplant Patients

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ABSTRACT

Objective. To explore the influential factors of kidney transplant patients' self-management, especially psychosocial variables.

Study Design. This was a cross-sectional study.

Methods. Questionnaires were administered to patients with the assistance of our team members to gather sociodemographic information, medical characteristics, self-management, social support, depression, and flourishing.

Results. The study included 483 patients, 64.4% of whom were male. The score index of the total self-management scale was 81.95% and the "social psychology" dimension had the lowest index, at 75.63%. Higher scores for flourishing, shorter length of post-renal transplantation, more social support, lower body mass index, being female, and being employed were proved to be determinants of better self-management, and flourishing was identified as having the greatest influence. Some other indicators were also related to patients' self-management, particularly age, residence, income, hypertension, renal function, and depression.

Conclusion. The overall self-management of KT patients was middling, and the status of psychology management was not optimistic. This emphasized the importance of psychological intervention. For further exploration, flourishing was identified as contributing to better self-management, which implied that strengthening this factor could be another method of improving self-management, except that involves enhancing of social support and reducing depression. Age was also found to have differing degrees of influence on KT patients' self-management, which implies that younger patients should receive more support in self-management.

KIDNEY transplantation (KT) is considered the best treatment for patients with end-stage renal disease because of its superior effect on patients' mortality and quality of life compared to other therapies [1,2]. However, KT recipients face the problems because of the side effects of immunosuppression, the likelihood of immune rejection, and other issues, which could induce a series of negative effects on patients' physical and psychological health [3]. Psychological factors such as stressors and depression could also lead to immune system disorders by provoking the release of pituitary and adrenal hormones [4] that exacerbate patients' immune system conditions. Thus, KT outcomes relate not only to immunosuppressive factors but also to non-immunosuppressive factors such as psychology,

nonadherence, and post-transplantation chronic kidney disease [5]. Therefore, particular importance is usually placed on the post-discharge self-management of KT patients.

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Self-management [6] was defined as “the tasks that individuals must undertake to live with one or more chronic conditions, including having the confidence to deal with medical management, role management and emotional management of their conditions,” which is also called self-care in some research [7]. For KT recipients, self-management was undoubtedly a simple and effective method to achieve graft survival and it could even influence the life span of grafts and patients. For example, the high prevalence (81%-86%) of chronic allograft nephropathy could be limited depending on recipients' self-care activities [7]. Diametrically, noncompliance behaviors in self-management could be the third leading cause of graft loss [8]. Self-management is thus particularly important for KT recipients and transplant recipients have to adhere to a complex and ongoing self-management regimen for a long time [7].

While many researchers have identified factors influencing KT patients' self-management, such as sex, age, career, and complications [9–11] and focused on the behavior management in previous studies, emotional management has not been adequately explored. The “psychological” factors influencing self-management could make a difference according to Bandura's self-efficacy theory, a frequently used theoretical basis of KT patients' self-management [9,12]. Furthermore, transplantation and life-long treatment could cause a variety of physical and psychological impairments (eg, depression, anxiety) that might have a negative impact on quality of life and reduce patients' ability to cope effectively [13,14]. Thus, the psychology of KT patients should receive more attention for its important role in patients' self-management. For example, KT recipients with depression were found to have lower medication adherence [15].

However, although many psychological outcomes have manifested with the increasing success rate of living renal transplantation, a limited number of researchers have focused on negative emotions, including depression, sense of guilt, and somatization rather than protective mental factors after KT [15–17]. In this study, some influencing factors of KT patients' self-management in previous study are overturned and some new psychology indicators are proved to be determinants. Thus, the self-management of KT patients should receive more attention again and be considered a special case compared to other common chronic diseases.

MATERIALS AND METHODS

Participants

Four hundred eighty-five renal transplant patients were recruited as outpatients between March and May 2018 and 438 valid questionnaires were collected. The inclusion criteria were: 1. being aged 18 years or older; 2. having received a successful KT more than 3 months previously and not currently receiving dialysis therapy; 3. could communicate in Chinese; and 4. agreed to participate in the study. The exclusion criteria included patients who had been clinically diagnosed major psychiatric disorder, cognitive impairment, comorbid terminal illness, or were clinically unstable.

Ethical Considerations

This was a multi-center, cross-sectional study and ethical approval was obtained from the Institutional Review Boards (IRBs) of the Third Xiangya Hospital of Central South University (2018-S057). Every participant submitted written consent for participation before beginning.

Procedure

The study team comprised of 3 chief nurses, 4 nurses, 3 nursing postgraduates, and 4 assistant nursing students. All team members underwent a 2-day training course about the investigation plan and questionnaire items. The data were collected by field investigation. All questionnaires were filled in anonymously and each participant was allowed 30 to 45 minutes to finish the questionnaire. Assistance in reading was provided to patients with reading disabilities.

Measures

Independent Variables. Demographic data and general information were collected first, including sex, age, marital status, educational level and so on (Table 1). Body mass index (BMI) is equal to weight in kilograms divided by height in meters squared.

Depressive symptoms were measured using the Chinese version of the Self-Rating Depression Scale. Responses ranged from 1 (none or seldom) to 4 (most or constant), and 10 items of the 20 were reverse scored. The raw score was a sum of the scores from the 20 items, which was multiplied by 1.25 to yield the standard score [18]. A higher score corresponded to more severe depressive symptoms.

Social support was measured using the Social Support Self-Rating Scale [19] (SSRS) with 10 items in 3 dimensions: subjective support (4 items, scores range: 8–32), objective support (3 items, scores range: 1–22), and support-seeking behavior (3 items, scores range: 3–12).

Self-perceived success was measured using the Flourishing Scale (FS) with 8 items. It provides a single psychological well-being score originally designed by Diener [20]. The simplified Chinese version of FS was proved by Tang and Duan [21]. Each item has 7 answer choices, from 1 (strongly disagree) to 7 (strongly agree). A high score represents a person with greater psychological well-being. The FS has been shown to have adequate reliability for Chinese adults [21].

Dependent Variables. Self-management was measured using the Renal Transplant Recipients Self-management Scale developed by Zhuang et al in 2007 [9], which is used to assess renal transplant recipients' self-management according to the 28 items of 4 dimensions, including diet, treatment, activity, and social psychology. Respondents indicated to what extent they pay attention to matters on a scale from 1 (a lot) to 4 (not at all). Higher scores indicate better self-management and a score index up to 80% was considered to reflect a high level of self-management, while 60%-80% were considered to represent a middle level and below 60% a low level. In this study, the Cronbach's α index ranged from 0.78 to 0.94 in the Chinese transplantation population. The total score and average item score in each dimension were used as the outcome measures.

Statistical Analysis. Descriptive statistics methods were used in describing the general information and the average of variables in this study, including the mean, standard deviation, percentage, extrema, and frequency number. The independent samples *t*-test and least significant difference pairwise analysis were used to test the difference of self-management among participants with different characteristics. Pearson correlations were used to test associations between continuous variables. Multiple linear

Table 1. General Information of Participants (N = 438)

| Characteristics | n (%) | Characteristics | n (%) |
|-----------------------------|------------|---|------------|
| Sex | | Family monthly income per month (RMB) | |
| Male | 282 (64.4) | <1000 | 62 (14.2) |
| Female | 156 (35.6) | 1000–4000 | 219 (50.0) |
| Age (y) | | 4000–7000 | 95 (21.7) |
| 18–44 | 266 (60.7) | 7000–10,000 | 35 (8.0) |
| 45–59 | 144 (32.9) | >10,000 | 27 (6.2) |
| ≥60 | 28 (6.4) | Proportion of reimbursement for hospital stay | |
| Marriage | | <50% | 193 (44.1) |
| Married | 334 (76.3) | ≥50% | 245 (55.9) |
| Widowed/divorced | 27 (6.2) | Length of post-renal transplantation period | |
| Single | 77 (17.6) | <6 months | 100 (22.8) |
| Education level | | 6–12 months | 62 (14.2) |
| Middle school or below | 107 (24.4) | 1–5 years | 144 (32.9) |
| High school | 133 (30.4) | >5 years | 132 (30.1) |
| Technical school or college | 188 (42.9) | Length of hospital stay weeks after renal transplantation | |
| Master's degree or above | 10 (2.3) | <2 | 31 (7.1) |
| Career | | 2~3 | 100 (22.8) |
| Employed | 235 (53.7) | 3~4 | 137 (31.3) |
| Farmer | 94 (21.5) | 4~5 | 98 (22.4) |
| Unemployed | 48 (11) | >5 | 72 (16.4) |
| Others | 61 (13.9) | Comorbidity | |
| BMI | | Hypertension | 338 (77.2) |
| <18.5 | 61 (13.9) | Non-hypertension | 100 (22.8) |
| 18.5–24.9 | 317 (72.4) | Kidney function | |
| ≥25 | 60 (13.7) | Normal | 364 (83.1) |
| Residence | | Not normal | 74 (16.9) |
| City | 237 (54.1) | | |
| Suburb | 52 (11.9) | | |
| Countryside | 149 (34) | | |

Abbreviations: BMI, body mass index; RMB, renminbi.

regression analyses was conducted, respectively, to assess the association between independent variables and self-management scores. Using a stepwise procedure, only significant independent variables were entered to obtain the last model.

RESULTS

The Sociodemographic and Medical Characteristics of Participants

Four hundred thirty-eight patients completed the questionnaire. The patients' general information is reported in [Table 1](#), including the sociodemographic and medical characteristics.

Self-management Scores of Participants. The scores of the 4 dimensions were calculated separately. The average score of the total scale was 91.78 with 81.95% score index. Among the 4 dimensions, "treatment" had the highest score index, while the "psychology" had the lowest. Both "diet" and "psychology" had lower score indexes compared to the total scale. Other details, including the maximum and minimum scores, are shown in [Table 2](#).

Difference of Self-management Among Participants With Different Demographic and Medical Characteristic. Significant differences were found in patients with different demographic and medical indexes, including sex, age, career, income, residence, BMI, length of post-renal transplantation period,

hypertension, and renal function. Specifically, female patients achieved better self-management, except in the "treatment" dimension ($P < .05$). Older patients had better "activity" management scores ($P < .05$). Employed patients had better self-management scores than those who were unemployed ($P < .05$). Patients living in rural areas achieved better "diet" scores than city residents ($P = .007$), and lower "activity" scores were found for lower-income patients ($P < .05$). As for medical indexes, all of the 4 indexes (BMI, length of post-renal transplantation period, hypertension and renal function) were found to make differences in patients' "treatment" management. Other details are shown in [Tables 3](#) and [4](#).

Table 2. Self-management Scores of Renal Transplant Recipients (N = 438)

| Item | Maximum | Minimum | Average (SD) | Score Index (%) |
|------------|---------|---------|--------------|-----------------|
| Total | 112 | 32 | 91.78 (9.79) | 81.95 |
| Diet | 36 | 11 | 29.48 (4.05) | 81.89 |
| Treatment | 40 | 10 | 33.69 (3.85) | 84.23 |
| Activity | 20 | 6 | 16.50 (2.13) | 82.5 |
| Psychology | 16 | 5 | 12.10 (1.92) | 75.63 |

Score index = (actual scores/potential maximum score) × 100%.
Abbreviation: SD, standard deviation.

Table 3. Self-management Scores of Participants With Different Characteristics (N = 438)

| Characteristics | Self-management Scores Mean (SD) | | | | |
|------------------|----------------------------------|-------------------|-------------------|-------------------|-------------------|
| | Diet | Treatment | Activity | Psychology | Total |
| Sex | | | | | |
| Male | 28.91 (4.32) | 33.45 (4.00) | 16.30 (2.19) | 11.94 (1.86) | 90.61 (10.53) |
| Female | 30.52 (3.29) | 34.12 (3.52) | 16.87 (1.96) | 12.40 (2.00) | 93.90 (7.90) |
| <i>P</i> | .000 [‡] | .085 | .008 [†] | .017 [*] | .001 [‡] |
| Comorbidity | | | | | |
| Hypertension | 30.05 (4.21) | 34.69 (3.42) | 16.92 (2.08) | 12.65 (1.95) | 94.31 (9.37) |
| Non-hypertension | 29.32 (4.00) | 33.39 (3.92) | 16.38 (2.13) | 11.94 (1.88) | 91.03 (9.80) |
| <i>P</i> | .112 | .003 [‡] | .025 [*] | .001 [‡] | .003 [‡] |
| Kidney function | | | | | |
| Not normal | 28.68 (4.51) | 32.53 (4.82) | 15.92 (2.50) | 11.54 (2.34) | 88.66 (11.90) |
| Normal | 29.65 (3.94) | 33.93 (3.58) | 16.62 (2.02) | 12.22 (1.80) | 92.41 (9.20) |
| <i>P</i> | .06 | .004 [‡] | .009 [†] | .006 [†] | .003 [‡] |

**P* < .05.†*P* < .01.‡*P* < .005.

Influence of BMI, Sex, Career and Three Psychology Indexes at Self-management. A significant association was found between the total self-management scores and all of the 3 psychosocial indicators in 2 or more dimensions, including depression, social support, and well-being (Table 5). Further multiple linear regression analysis showed that self-management scores were significantly influenced by well-being (Std β = 0.268, *P* < .001), length of post-renal transplantation (Std β = 0.238, *P* < .001), SSRS (Std β = 0.212, *P* < .001), BMI (Std β = 0.169, *P* < .001), sex (Std β = 0.092, *P* < .001), and career (Std β = 0.089, *P* < .001). This model explained 27.1% of the variance in self-management (*F* = 28.04, *P* < .001) (Table 5).

DISCUSSION

Factors influencing the self-management of KT patients have been explored by many researchers. In this study some differences were found using the 4-dimensions scale for kidney transplant patients. First, we found that self-management of KT patients tends to improve with age, unlike the results of Zhuang et al [9], who reported that patients aged 40 to 50 years had the best self-management. The same conclusion was reached that the patients with the worst self-management were among the younger groups in these two studies conducted in China, indicating that the difference of the variation trend might due to differences in how the age groups were defined. However, the very opposite results were obtained when compared to previous studies of patients with other common chronic diseases. For example, Korpershoek et al and Bos-Touwen et al [22,23] found that younger patients tended to have better self-management abilities than older people. Thus, medical staff should not predict the self-management level of a KT patient according to previous experience in clinical work, and special care must be taken with younger patients. Secondly, patients' depression failed to enter the regression equation to forecast self-

management but only correlated with it, which was very different from previous studies of KT patients and patients with other chronic diseases [22,23]. This might be because of the different assessment tools used in this study, which were aimed at KT patients rather than being generic scales fit for all the patients with chronic diseases. Besides, medical factors including length of post-renal transplantation, BMI, complication hypertension, and kidney function were also found to influence the self-management of KT recipients, which was supported by previous studies [9,11,22].

In this study, we found that the self-management of kidney transplant recipients were at a high level overall, although the psychology dimension obtained the worst result at a middle level. Well-being and social support were identified to have positive effect on the improvement of self-management. Flourishing was proved to explain 26.8% of the variation of self-management, which accounted for the largest proportion among all of above indexes. Flourishing is a combination of emotional well-being, psychological well-being, and social well-being; in China it is considered to be relationship-focused well-being because of cultural differences with Western countries [21,24–26]. That is, the KT patients in China with strong flourishing scores have better emotional experience, psychological status, and especially social relationships, including patients' purpose/meaning, positive relationships, engagement, social contribution, competence, self-respect, and optimism, according to the items in FS and the meaning of flourishing [27]. Thus, we deduced that patients with higher flourishing scores have stronger psychological motivation and external catalysts, which drove them to make more efforts to promote their conditions and form good self-management behavior after KT. For example, a higher score on the item "I lead a purposeful and meaningful life" reflected a higher degree of the pursuit of life as an inner factor and "my social relationships are supportive and rewarding" reflected the condition of patients' social

Table 4. Self-management Scores of Participants With Different Characteristics (N = 438)

| Self-management Scores | Independent Variables | Groups | | Mean Difference | P | |
|------------------------|-----------------------|----------|--------------------------------------|---------------------|----------------------|-------|
| Total scores | Age | 18-44 | 45-59 | -0.911 | .369 | |
| | | | ≥60 | -1.434 | .462 | |
| | Career | Employed | Farmer | | 0.634 | .589 |
| | | | Unemployed | | 6.514 [‡] | .000 |
| | | | Other | | 1.721 | .214 |
| | Income | <1000 | 1000-4000 | | -1.562 | .268 |
| | | | 4000-7000 | | -2.622 | .101 |
| | | | 7000-10,000 | | -3.779 | .068 |
| | | | >10,000 | | -3.102 | .170 |
| | Residence | City | Suburb | | -0.332 | .825 |
| | | | Rural area | | -1.565 | .127 |
| | | | Length of post-renal transplantation | <6 months | 6-12 months | 1.892 |
| | BMI | <18.5 | 1-5 years | | 4.954 [‡] | .000 |
| >5 years | | | | 7.516 [‡] | .000 | |
| 18.5-24.9 | | | | 3.978 [‡] | .000 | |
| Diet | Age | 18-44 | 45-59 | -0.234 | .578 | |
| | | | ≥60 | -0.9 | .264 | |
| | Career | Employed | Farmer | | -0.16 | .746 |
| | | | Unemployed | | 1.702 [†] | .008 |
| | | | Other | | 0.473 | .415 |
| | Income | <1000 | 1000-4000 | | -0.412 | .481 |
| | | | 4000-7000 | | -0.475 | .474 |
| | | | 7000-10,000 | | -0.48 | .577 |
| | | | >10,000 | | 0.659 | .482 |
| | Residence | city | Suburb | | -0.765 | .215 |
| | | | Rural area | | -1.143 ^{**} | .007 |
| | | | Length of post-renal transplantation | <6 months | 6-12 months | 0.951 |
| | BMI | <18.5 | 1-5 years | | 2.210 [‡] | .000 |
| >5 years | | | | 3.400 [‡] | .000 | |
| 18.5-24.9 | | | | 2.204 [‡] | .000 | |
| Treatment | Age | 18-44 | 45-59 | 0.149 | .708 | |
| | | | ≥60 | 0.56 | .465 | |
| | Career | Employed | Farmer | | 0.332 | .472 |
| | | | Unemployed | | 2.556 [‡] | .000 |
| | | | Other | | 0.257 | .636 |
| | Income | <1000 | 1000-4000 | | -0.762 | .167 |
| | | | 4000-7000 | | -1.357 [*] | .031 |
| | | | 7000-10,000 | | -1.781 [*] | .028 |
| | | | >10,000 | | -1.321 | .136 |
| | Residence | City | Suburb | | 0.152 | .797 |
| | | | Rural area | | -0.219 | .586 |
| | | | Length of post-renal transplantation | <6 months | 6-12 months | 0.355 |
| | BMI | <18.5 | 1-5 years | | 1.170 [*] | .016 |
| >5 years | | | | 2.640 [‡] | .000 | |
| 18.5-24.9 | | | | 1.069 [*] | .046 | |
| Activity | Age | 18-44 | 45-59 | -0.631 [*] | .004 | |
| | | | ≥60 | -0.906 [*] | .031 | |
| | Career | Employed | Farmer | | 0.436 | .085 |
| | | | Unemployed | | 1.581 [‡] | .000 |
| | | | Other | | 0.741 [*] | .013 |
| | Income | <1000 | 1000-4000 | | -0.761 [*] | .011 |
| | | | 4000-7000 | | -1.071 [‡] | .002 |
| | | | 7000-10,000 | | -1.583 [‡] | .000 |
| | | | >10,000 | | -1.910 [‡] | .000 |
| | Residence | City | Suburb | | 0.292 | .370 |
| | | | Rural area | | -0.041 | .855 |

Table 4. (continued)

| Self-management Scores | Independent Variables | Groups | | Mean Difference | P |
|--------------------------------------|--------------------------------------|-----------|-------------|--------------------|------|
| Psychology | Length of post-renal transplantation | <6 months | 6–12 months | 0.216 | .520 |
| | | | 1–5 years | 1.019 [‡] | .000 |
| | | | >5 years | 1.102 [‡] | .000 |
| | BMI | <18.5 | 18.5–24.9 | 0.584* | .047 |
| | | | ≥25 | 1.531 [‡] | .000 |
| | | | ≥60 | –0.196 | .324 |
| | Age | 18–44 | 45–59 | –0.188 | .622 |
| | | | Farmer | 0.026 | .913 |
| | | | Unemployed | 0.675* | .026 |
| | Career | Employed | Other | 0.25 | .364 |
| | | | 1000–4000 | 0.373 | .176 |
| | | | 4000–7000 | 0.28 | .369 |
| | Income | <1000 | 7000–10,000 | 0.065 | .871 |
| | | | >10,000 | –0.529 | .230 |
| | | | Suburb | –0.011 | .969 |
| | Residence | City | Rural area | –0.162 | .421 |
| | | | 6–12 months | 0.369 | .233 |
| | | | 1–5 years | 0.554* | .027 |
| Length of post-renal transplantation | <6 months | >5 years | 0.374 | .141 | |
| | | 18.5–24.9 | 0.121 | .652 | |
| | | ≥25 | 0.163 | .641 | |

Abbreviation: BMI, body mass index.

*P < .05.

†P < .01.

‡P < .005.

support and how they felt about it. In a word, flourishing reflected the inner and outer driving factors of self-management, which promote patients’ psychology and behavior together.

Meanwhile, the importance of social relationship in the meaning of flourishing could also support the significant correlation between FS scores and SSRS scores in this study (Fig 1). Social support was also assessed using SSRS as an external promoting factors, of which the positive effect was identified in this study, in accordance with previous research [28,29]. It could be the result of the release of psychological and financial stress with the help of one’s social network [30,31]. More than 90% of the patients in this study were

younger than 60 years old and 60.7% were younger than 45 years old, a majority of whom had undertaken heavy social and family responsibilities. As a result, the support of others would also offer more information and supervision in the health improvement and enable these patients to improve their behavior and psychology management [28].

Three psychosociology indicators were analyzed in this study. While only social support and flourishing were found to be predictors of self-management, the relationship between social support, Self-Rating Depression Scale, and flourishing should not be ignored, as shown in Figure 1. That is, patients’ depression might also influence the self-management through its relationship with social support

Table 5. Association Between Self-management Scores and Other Psychology Indexes (N = 438)

| | Self-management (Total) | SDS (Standard Scores) | Social Support (Total) | Well-being |
|-------------------------|-------------------------|-----------------------|------------------------|------------|
| Self-management (total) | | | | |
| r | 1 | | | |
| P | | | | |
| SDS (standard scores) | | | | |
| r | –.164* | 1 | | |
| P | .001 | | | |
| Social support (total) | | | | |
| r | .302* | –.294* | 1 | |
| P | 0 | 0 | | |
| Well-being | | | | |
| r | .330* | –.313* | .236* | 1 |
| P | 0 | 0 | 0 | |

Abbreviation: SDS, Self-Rating Depression Scale.

*P < .01.

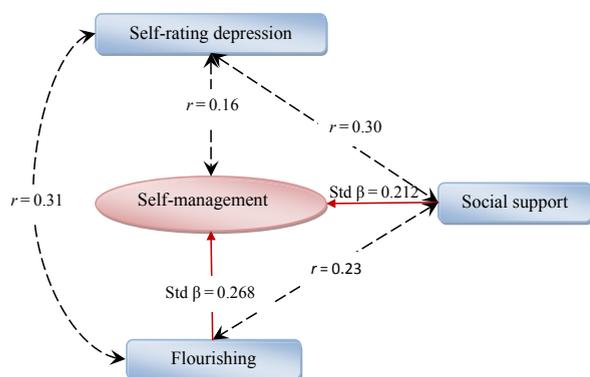


Fig 1. The association between self-management and 3 psychosocial indexes. “ \longleftrightarrow ” refers to the correlation and “ \rightarrow ” refers to the regression relation between the 2 indexes, which were proven to be statistically significant in this study.

and flourishing. We can therefore predict a patient’s self-management level according his or her social support and flourishing status and improve it by means of interventions related to the psychology statuses mentioned above, regardless of the uncertain causal relationship. Specifically, well-being as measured by FS could be considered a forecasting and screening tool as well as a guidance intervention for KT patients because of it is comprehensive, accurate, and can be used in assessing and improving patients’ psychology and social behavior related to self-management.

This study mainly contributes to the identification of patients at psychological risk for inadequate self-management, which is essential to target and tailor individualized self-management interventions. Unlike previous studies, we emphasized the psychological factors of risk and protection, including well-being, social support, and depression, which are easy for caregivers to assess and intervene in, unlike unmodifiable ones such as age and sex [32]. Our findings implied that improvement should be achieved in 2 directions, strengthening protective factors and weakening of risk factors, aiming at psychological conditions. It is important that three psychology indexes were included in this study: Well-being aimed at the Chinese population was first proved to be a determinant in KT patients’ self-management and to have a significant relationship with 2 other indicators, depression and social support (implying that a new commitment to improving patients’ well-being would also promote self-management), which could be explored in the future. We also found the influence of age to be very different from that reported in previous studies, implying that there might be other unknown special characteristics of KT patients not explored before now. Finally, we must admit as a limitation of this study that selection bias may have influenced our results, both because of the self-selected nature of the participants and the exclusion criteria.

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