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The role of attachment and parental bonding in the psychosocial assessment of transplant candidates: a cross-sectional study



Maria Luisa Pistorio^{1*†}, Concetta De Pasquale^{2†}, Massimiliano Veroux³, Gioia Bottesi⁴, Umberto Granziol⁴, Anna Panzeri⁴, Martina Maria Giambra¹, Alessia Giaguinta¹ and Pierfrancesco Veroux¹

Abstract

Background Kidney transplant involves profound psychological, relational, and social changes for both the patients and their family context. Occasionally, the family or social support can be deemed "dysfunctional" as it fails to fully comprehend the patient's needs and requirements. Attachment style, which pertains to the motivation to seek proximity and care in relationships with caregivers, has a significative role in the social support system for transplant, therapeutic adherence, and maintenance of the transplanted organ.

We sought to assess attachment styles among patients awaiting transplantation using psychosocial measures in order to study their impact on psychopathology, guality of life, and transplant eligibility.

Methods Eighty-five patients with chronic kidney disease awaiting transplantation were recruited at the Italian Transplant Center and were administered the Stanford Integrated Psychosocial Assessment for Transplantation (SIPAT), the Attachment Style Questionnaire (ASQ), the Parental Bonding Instrument (PBI), the Short Form Health Survey-36 (SF-36), and the Middlesex Hospital Questionnaire (MHQ). Measures were entered in blocks in a stepwise multiple regression.

Results The SIPAT score was significantly associated with key psycho-physical constructs. SIPAT was negatively predicted by maternal care (β = -.35, p = .001), secure attachment (i.e., confidence) (β = -.23, p = .029), and general physical health (β = -.25, p = .016) – which could be considered protective factors for transplant suitability. Conversely, anxiety symptoms were positively associated with SIPAT (β = .32, p = .001) and may serve as a risk factor for post-transplant issues.

Conclusions These findings highlight that in the evaluation of kidney transplant candidates, greater attention should be paid to parental bonding, adult attachment, and psychopathological symptoms, as these factors may play a key role as protective or risk factors for post-transplant issues. A timely assessment of these constructs may improve the evaluation of psychosocial suitability for transplantation, as well as allow the provision of targeted psychotherapeutic interventions to enhance the acceptance and management of illness in patients awaiting kidney transplants.

[†]Maria Luisa Pistorio and Concetta De Pasquale contributed equally to this work and share first authorship

*Correspondence: Maria Luisa Pistorio marialuisa.pistorio@unict.it Full list of author information is available at the end of the article



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Keywords Clinical psychology, Psychosocial suitability, Attachment, Kidney transplant, Parental bonding, Psychopathology

Introduction

Kidney transplant is an established treatment for endstage renal disease, allowing most patients to return to a satisfactory quality of life. Conversely, transplantation can generate potential risks for the patient's psychological balance as it requires the patient to mobilize all biopsychosocial resources during the process of adaptation to the new foreign organ [29]. This may lead to an alteration of self-representation and identity, with possible risks of psychopathology and/or mental disorders such as posttraumatic stress disorder, adjustment disorder, and psychosomatic disorders [25].

A psychological profile can be extremely important in the phase preceding the transplant for several reasons, related both to the emotional and mental preparation of the patient, and to the management of psychological challenges that may emerge during the transplant process itself, such as the "traumatic" discovery that the transplant may not provide a good "restitutio ad integrum" of one's physical balance, with the onset of depressive dynamics, difficulty in accepting the post-transplant therapeutic program, and consequent poor functioning of the graft.

Psychosocial risk assessment before a transplant is essential to identify potential psychological vulnerability factors that could compromise the patient's well-being during the pre- and post-operative process. An organ transplant, in fact, involves not only a major medical intervention, but also a significant impact on the psychological and emotional life of the person, with risks of developing psychopathologies such as anxiety, depression, or post-traumatic stress disorders [38]. An accurate psychosocial assessment helps identify risk factors that may interfere with the management of the transplant process. These may include: History of pre-existing psychological disorders; Patients with a history of depression, anxiety, or personality disorders may be more vulnerable to psychological distress during the prolonged and stressful wait for a transplant and the subsequent recovery, Insufficient social support: the lack of a family or social support network can increase the risk of loneliness and emotional isolation during the long waiting process and after the transplant [9], Pre-operative stress: uncertainty regarding the outcome of the procedure, the fear of rejection or complications, and changes in quality of life can create anxiety and psychological discomfort. A targeted psychosocial assessment before the transplant allows for the anticipation of potential psychological risks and the implementation of preventive or supportive interventions to mitigate the negative consequences on mental health, thus improving the overall outcome of the procedure and the patient's quality of life.

Therefore, a kidney transplant is a serious event that involves profound psychological, relational, and social changes for both the patient and his family context. The family plays a crucial role, offering emotional support, serving as a valuable resource, and becoming a trusted ally in the process. Recognizing the significant support role that family plays for patients awaiting a transplant is essential; indeed, family members frequently shoulder the emotional burden that the patient is unable to manage.

In Italy, psychosocial assessment for kidney transplant candidates is a crucial process that aims to ensure that the patient is adequately prepared for the surgery and subsequent recovery. This process involves a multidisciplinary team, including physicians, psychologists and psychiatrists, and focuses on different psychological, emotional, social and behavioral aspects. Psychosocial assessment focuses on several relevant factors:

- Psychological stability: The presence of psychiatric disorders, such as depression, anxiety or personality disorders, can compromise the success of the transplant. Mental health is therefore carefully monitored, with the aim of ensuring that the patient is emotionally ready for the surgery [49].
- Adherence to treatment: Adherence to post-operative therapies is crucial. Psychosocial assessment investigates the patient's motivation to follow therapeutic indications, such as immunosuppressive therapy, which is crucial to avoid transplant rejection.
- Family and social support: The quality and availability of social support is a fundamental part of the evaluation process. Individuals with a strong support network are more likely to recover and adapt later after transplantation. Social support is a central aspect of psychosocial evaluation. Its quality and availability are considered to be crucial to the success of transplantation. The evaluation of this support is done through different tools and methods:
- Direct interviews: Interviews with the patient and family members allow direct information to be collected about the social support network. The psychosocial team explores the quality of emotional,

practical and, if necessary, financial support that the patient can expect to receive.

- Psychological questionnaires and scales: Specific instruments, such as the Social Support Questionnaire or the Multidimensional Scale of Perceived Social Support (MSPSS), are used to measure the patient's perception of the availability of support from family, friends and the community.
- Indirect observation: The psychosocial team can observe family and social dynamics, monitoring interactions and relationships to understand how support is actually provided to the patient (Martín-Rodríguez et al., 2015).

In the interviews conducted to prepare patients for transplant waiting lists, it is crucial to acknowledge that the patient is not navigating the process alone. Therefore, it is fundamental to assess the availability and effectiveness of the patient's social support system. If the support system is adequate, it is more likely to contribute to the patient's overall well-being both before and after the transplant. Occasionally, although the family or social support network is physically present for the patient, it can be deemed "dysfunctional" as it fails to fully comprehend the patient's needs and requirements.

Assessing the presence or absence of adequate social support can be achieved by studying attachment, which pertains to the motivation to seek proximity and care in relationships with caregivers. According to attachment theory, all individuals possess an inherent biological inclination to form emotional bonds with their caregivers. These attachment relationships significantly impact subsequent developmental paths.

Attachment styles refer to the ways in which individuals form emotional bonds and how they respond in interpersonal relationships. There are four main attachment styles identified in psychological theory:

Secure Attachment: People with this style are comfortable with intimacy and closeness in relationships. They trust their ability to handle difficulties and their relationships, showing a healthy balance between independence and dependence (Bowlby, 1969).

Anxious Attachment: Individuals with an anxious attachment style tend to worry about the availability and affection of others. They may display insecurity and a constant need for reassurance, fearing rejection or abandonment (Ainsworth et al., 1978).

Avoidant Attachment: People with avoidant attachment often distance themselves from emotional intimacy, valuing independence highly. They may seem detached or indifferent to the emotions of others, preferring not to rely on others or expose their feelings (Mikulincer & Shaver, 2016).

Disorganized Attachment: This style is marked by contradictory behaviors, where the person may desire intimacy but simultaneously fear it or avoid it. It is often associated with traumatic or neglectful early life experiences (Bowlby, 1969).

These attachment styles deeply influence interpersonal relationships and can manifest in different ways across childhood and adulthood.

Several studies have demonstrated that having a secure attachment is associated with improved emotional regulation, effective stress management, healthier and more trusting interpersonal relationships in adulthood, as well as greater confidence in life and the acceptance of chronic diseases [1–3, 16, 46, 57].

Parental bonding and attachment style can profoundly influence how an individual relates to others and seeks social support in stressful situations, such as in the context of a serious illness or transplant. The social support system is influenced by how an individual perceives the availability and reliability of others. Individuals with a secure attachment, characterized by a good trusting relationship with primary caregivers during childhood, tend to have a more stable and functional social support network and are more likely to actively utilize social resources when needed.

Parental bonding and attachment style can profoundly influence how an individual relates to others and seeks social support in stressful situations, such as in the context of a serious illness or transplant. The social support system is influenced by how an individual perceives the availability and reliability of others. Individuals with secure attachment, characterized by a good trusting relationship with primary caregivers during childhood, tend to have a more stable and functional social support network and are more likely to actively utilize social resources when needed.

A patient with secure attachment or high maternal care might score lower also because the evaluation of the effectiveness of social support is based on the idea that such individuals have a more solid and self-sufficient support network. This happens for several reasons:

- Flexibility in social relationships: Individuals with secure attachment tend to be more capable of adapting to relational dynamics and seeking support when necessary [47].
- Emotional resilience: The patient with secure attachment is likely better able to face difficulties with greater psychological resilience. Emotional self-efficacy, stemming from a good parental bond,

reduces the need to resort to social support in an extreme way, leading the patient to perceive their support system as sufficiently functional and not overly dependent [35].

Balanced management of support: Secure attachment also involves the ability to regulate internal and external resources in a balanced way. Such individuals may have a realistic and healthy view of their social network, neither idealizing nor devaluing the support they receive, but using it in a balanced and appropriate way. This translates into a positive evaluation of the functionality of social support in the SIPAT, with generally lower scores compared to those who have difficulty obtaining support [47], Ainsworth, 1979).

Some authors investigated the association between attachment style, mental health, and quality of life in recipients who had undergone kidney transplants and in organ transplant candidates. A study by Calia et al., [11] showed that kidney transplant recipients who exhibited avoidant attachment had a significantly better perception of their own general health than recipients with anxious or secure attachment; however, they had a worse perception regarding role limitations due to emotional problems, compared to patients with anxious attachment. The results of a study by De Pasquale et al. [22, 23] showed, in kidney transplant candidates, that secure attachment style positively correlated with good general health, good mental health, and mental component scale. Secure attachment was also significantly positively associated with mental health.

In this framework, family and social support are vital for therapeutic adherence and maintenance of the transplanted organ [29, 44, 63, 64].

To date, despite the well-recognized role of psychosocial factors in the process of adaptation to chronic illness, the association of attachment styles, parental bonding, and psychological symptoms need further investigation in kidney transplant candidates.

Therefore, the present preliminary study focused on a sample of kidney transplant candidates to:

- explore the bivariate relation between maternal and paternal bonding styles, adult attachment, and the risk of post-transplant issues as measured by the SIPAT;
- 2) explore how the risk of post-transplant issues as measured by the SIPAT can be simultaneously influenced by a combination of factors: parental bonding, adult attachment, general physical health, general mental health, and psychopathological symptoms.

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Methods

Procedure

Participants with chronic kidney disease and awaiting a kidney transplant were recruited at an Italian Transplant Center between April 2022 and September 2022. A psychiatrist, a psychologist, and two trainee psychologists evaluated the sample administering the measures upon first visit to the transplant clinic.

The selection was based on the following inclusion criteria: age greater than 18 years, being affected by chronic renal failure, and being evaluated for a deceased donor kidney transplant. The exclusion criteria were the following: low level of education (<5 years), psychiatric diagnoses, such as Alzheimer's disease, mental retardation, other cognitive disorders, and taking psychotropic drugs (antipsychotics and/or antidepressants), as they could compromise the ability to understand the items.

All participants in our study obtained a SIPAT score of 20 or more (good and excellent candidate). Therefore, all patients were included in the transplant waiting list.

Prior to their involvement, participants were fully informed about the study objectives and procedures, and they provided their written informed consent. Participants voluntarily enrolled in this cross-sectional study. No compensation was offered for their participation.

This study was approved by the local ethics committee (Comitato Etico "Catania 1" Approval Code: 48,908; Approval Date: 22/12/2020) and adhered to the ethical guidelines established by the Italian Psychological Association and the principles outlined in the 1964 Declaration of Helsinki, as well as its subsequent revisions.

Measures

The following measurement tools were administered.

The Stanford Integrated Psychosocial Assessment for Transplantation (SIPAT; [45] is a comprehensive tool comprising 18 psychosocial factors found to be predictive of transplant outcomes. Items are grouped into 4 domains evaluating (1) patient's readiness level and illness management, eg. "1) Good Understanding: The patient & support system generally understand the cause(s) and course of the illness process and how it influences the patient's current health status"; (2) social support system level of readiness, eg. "2) Good: Various individuals (e.g., minimum of two people) have been identified and are actively engaged in the patient's care. A back-up system, albeit limited, seems feasible and generally appropriate"; (3) psychological stability and psychopathology, eg. "2) Mild Psychopathology - Present or history of mild psychopathology (e.g., adjustment disorder, uncomplicated bereavement). Usually, a self-limited problem without significant negative impact on the patient's level of functioning. No psychiatric hospitalization was needed. No History of suicidal intent or attempt(s)"; and (4) lifestyle and effect of substance use, eg. "2) No Problematic Alcohol Use: The patient consumed minimal amounts of alcohol, in a socially acceptable pattern, with no evidence of detrimental effects to familial, social/legal, medical aspects of life (i.e., no abuse). There is no history of blackouts or withdrawal".

Some items are weighted differently because of evidence suggesting that some psychosocial variables are more predictive of clinical outcomes and nonadherence than others. The overall risk severity score varies between 0 and 120: the higher the score, the greater the risk for both post-transplant medical and psychosocial complications [45]. The total SIPAT score reflects a comprehensive evaluation of psychosocial suitability for transplantation, considering both psychopathological and contextual factors. As a hetero-evaluative tool, it provides an objective and standardized measure of the patient's situation from an external perspective.

The Italian version of the SIPAT [10] showed good inter-rater reliability and predictability of the final transplant listing recommendation (i.e., listing vs. deferral).

The Attachment Style Questionnaire (ASQ; [33]) is a self-administered questionnaire, which investigates the dimensions of adult attachment and the differences in styles. It consists of 40 items and uses a 6-point scale (from 1=totally disagree to 6=totally agree). It is composed of five scales which are: confidence (F1), discomfort with closeness (F2), need for approval (F3), concern with relationships (F4), and relationships as secondary (F5). According to the four-prototype models proposed by Bartholomew and Horowitz (1991), the five factors correspond to the following attachment styles: secure (F1),avoidant (F2); preoccupied (F3), fearful (F4); and dismissing (F5).

The Italian version of the questionnaire showed adequate internal consistency for all five scales (Cronbach's α coefficients between 0.76 and 0.84) [34]. Also, with regard to our sample of hemodialysis patients, the five scales of the ASQ questionnaire showed good reliability (α =0.81).

The *Parental Bonding Instrument* (PBI; [51]) is an instrument that measures two distinct dimensions: care and overprotectiveness, both maternal and paternal. It is a self-administered questionnaire, consisting of 25 items (12 items for 'care' and 13 items for 'overprotection') on a 4-point Likert scale (from 0=unlikely to 4=very likely). The PBI has been found to have good reliability and validity based on several studies. In the original study, the PBI possessed good internal consistency and re-test reliability [51]. The Italian version of the PBI demonstrated the ability to discriminate between patients and controls and

showed a high internal consistency (Scinto et al., 2011). Also, concerning our sample of hemodialysis patients, the PBI showed good reliability ($\alpha = 0.85$).

The Short Form Health Survey-36 (SF-36) [5] is a questionnaire that allows to evaluate the general health and emotional state through 36 items. It features eight scaled scores that correspond to the weighted sums of the questions in their section. The eight sections are vitality (VT), physical functioning (PF), bodily pain (BP), general health perceptions (GH), physical role functioning (PR), emotional role functioning (ER), social role functioning (SR), and mental health (MH). Furthermore, the SF-36 evaluates two global indices related to physical health and emotional health: the Physical Component Scale (PCS) and Mental Component Scale (MCS). The validity and reliability of SF-36 have been confirmed in patients with chronic kidney disease and kidney transplant recipients [25, 37, 54]. Also, in our sample of hemodialysis patients, the SF-36 showed good reliability ($\alpha = 0.89$).

The Middlesex Hospital Questionnaire (MHQ) [20] is a brief self-rating inventory purporting to measure aspects of six distinct categories of psychoneurosis and affective status. It intended to measure the severity of the symptoms or behavior being explored. It examines six specific symptoms, namely: fluctuating anxiety (ANX), phobic anxiety (PHOB), obsessive-compulsive traits (OBS), somatic symptoms (SOM), depressive symptoms (DEP), and hysteria (HY). The MHQ is composed of 48 items, of which a dichotomous part, which is represented by "yes/no, 0/2" answers, and another part evaluated on a three-level scale of frequency (0 = never, 1 = sometimes,2=often). The MHQ is a self-report questionnaire, meaning it is completed directly by the patient. As a selfreport tool, the MHQ reflects the patient's subjective perception of their symptoms and emotional states.

The MHQ has been found to be a reliable instrument and also valid as a profile measure both in the original and Italian versions [19, 20, 66]. Also, concerning our sample of hemodialysis patients the MHQ showed good reliability ($\alpha = 0.91$).

Statistical analysis

The R statistical software [55] was used to compute all the analyses.

Correlations

As a preliminary step, a Spearman correlation matrix was estimated to explore the bivariate undirected relations among variables.

Stepwise multiple linear regression with blocks

To further explore how multiple variables can simultaneously influence the SIPAT total score, a stepwise multiple linear regression with blocks was used, with both the backward and forward methods. The dependent variable was the total score of the SIPAT – measuring the risk of future post-transplant issues. The independent predictor variables were consecutively entered in blocks, as described: block 1) the 4 PBI scales (maternal care, maternal overprotection, father care, father overprotection); block 2) the 5 adult attachment scales of the ASQ; block 3) the physical health measured by the SF-36; block 4) the psychological variables consisting in the general mental health measured by the SF-36 and by the MHQ scales. The assumptions of linear models were tested and no violations emerged.

Results

Participants

The research sample was made up of 85 participants, 29 females, and 56 males, with an average age of 55.24 (SD=10.23). Additional details regarding the sociode-mographic and clinical characteristics of the sample are presented in Table 1. Table 2 shows descriptive statistics of the psychological variables in the sample.

Correlations

Bivariate linear correlation coefficients and their statistical significance were calculated and are reported below. Figure 1 shows the heatmap of the bivariate Spearman correlation coefficients (ρ), the blue color indicates a positive correlation, and the red color indicates a negative one. The intensity of the color indicates the strength of the correlation. Statistical significance and its level are also shown.

Results of the Spearman bivariate correlations show that the SIPAT total score had positive and statistically significant associations with: anxiety (ρ =0.39, p<0.001), depression (ρ =0.40, p<0.001), and somatization (ρ =0.35, p<0.01). Differently, the SIPAT was negatively and statistically significantly associated with: PBI maternal care (ρ =-0.28, p<0.05), PBI paternal care (ρ =-0.23, p<0.01), confidence (ρ =-0.28, p<0.01), physical health (ρ =-0.32, p<0.01), and mental health (ρ =-0.32, p<0.01).

Stepwise multiple regression with blocks

Table 3 reports the results of the stepwise multiple regression with blocks predicting the SIPAT total score. Both unstandardized (b) and standardized (β) coefficients are reported. Number of observations = 81

In the first block, only the parental bonding scales were included and only the 'maternal care' was retained in the model with a statistically significant negative effect on the total of the SIPAT (PBI maternal care: $\beta = -0.35$, p = 0.001). The model R² was 0.12.

Table 1	Clinical and sociodemographic characteristics of the
sample	

Variable	Levels	%/mean(SD)
Sex	Female	34.12
	Male	65.88
Occupation	Worker	45.88
	Housekeeper	15.29
	Unemployed	9.41
	Retired	29.41
Marital Status	Married	58.52
	Widowed	5.88
	Divorced	11.76
	Living with a partner	5.88
	Single	17.65
Education	Elementary license	3.53
	Middle school license	49.41
	High school license	36.47
	Degree	10.59
Type of dialysis	Hemodialysis	77.06
	Peritoneal	18.24
	None	4.7
Previously transplanted	No	68.24
	Yes	31.76
Age	Range (22–72)	55.24 (10.23)
Education years	Range (5–20)	10.87 (3.52)
Years of disease	Range (1–47)	17.79 (12.62)
Months of dialysis	Rage (0–192)	40.92 (43.41)

In the second block, the scales of the adult attachment styles – measured by the ASQ—were added. The results show that, among the retained variables, 'maternal care' (β =-0.27, p=0.012) remains statistically significant, and also the adult attachment dimension of 'confidence' (β =-0.23, p=0.029) has a statistically significant negative effect on the SIPAT total score. Among adult attachment styles, "need for approval" was also retained in the model with a positive—but not statistically significant—effect on the SIPAT total score (β =0.19, p=0.072). The model R² was 0.21.

In the third block, "mental health" and 'physical health' from the SF-36 were added to the model. Results show that, despite various variables being retained in the model because of their relevance, the only variable with a statistically significant association with the SIPAT is 'physical health' with a negative effect (β =-0.25, p=0.016). The model R² was 0.30.

In the fourth and final block, the scales about the mental health from the SF-36 and the psychopathological symptoms scales of the MHQ were added (i.e., anxiety, depression, somatic, phobic, obsessive–compulsive, hysteric). Results show that 'maternal care' (β =-0.26),

	Females (<i>n</i> = 29)	Males (n = 56)	Total (N = 85)
SIPAT total, Mean (SD)	15.14 (4.64)	11.75 (3.71)	12.88 (4.33)
PBI			
Mother care, Mean (SD)	25.10 (8.54)	28.91 (7.90)	27.61 (8.28)
Mother over-prot., Mean (SD)	15.14 (6.72)	10.88 (6.19)	12.33 (6.66)
Father care, Mean (SD)	26.41 (7.44)	26.70 (8.98)	26.60 (8.44)
Father over-prot, Mean (SD)	14.07 (7.30)	10.43 (7.32)	11.67 (7.48)
ASQ			
Confidence, Mean (SD)	40.03 (6.81)	41.70 (6.66)	41.13 (6.72)
Discomfort w. closen., Mean (SD)	40.10 (7.26)	40.12 (8.36)	40.12 (7.96)
Need approv., Mean (SD)	18.86 (6.89)	17.43 (7.13)	17.92 (7.04)
Concern w. relat., Mean (SD)	24.55 (8.27)	22.38 (7.88)	23.13 (8.04)
Relat. second., Mean (SD)	20.38 (9.00)	20.36 (8.63)	20.36 (8.71)
Secure Attachment, n (%)	14 (48.3%)	31 (56.4%)	45 (53.6%)
not secure, n (%)	15 (51.7%)	24 (43.6%)	39 (46.4%)
SF-36 Physical Health, Mean (SD)	42.62 (9.14)	45.37 (9.33)	44.41 (9.30)
SF-36 Mental Health Mean (SD)	47.83 (8.51)	51.72 (8.24)	50.36 (8.49)
MHQ			
Anxiety Mean (SD)	4.69 (3.50)	2.27 (1.70)	3.09 (2.70)
Depression Mean (SD)	4.83 (2.66)	3.12 (2.62)	3.71 (2.74)
Somatic Mean (SD)	5.21 (2.72)	3.62 (2.73)	4.16 (2.81)
Phobic Mean (SD)	3.86 (2.82)	2.32 (1.90)	2.85 (2.36)
Obsessive Mean (SD)	4.79 (3.10)	4.18 (2.45)	4.39 (2.69)
Hysteric Mean (SD)	2.28 (2.31)	2.57 (2.27)	2.47 (2.28)

 Table 2
 Descriptive statistics of the psychological variables in the sample

'confidence' (β =-0.20), and physical health (β =-0.20) maintain their statistically significant negative association with the SIPAT total score. Among the psychopathological symptoms, only 'anxiety' had a statistically significant positive effect (β =0.32, p=0.001) on the SIPAT total score. The R² of the final model was 0.33.

To summarize the findings, the correlations indicated that SIPAT total score was positively associated with free-floating anxiety, depression, somatization, and social support, while being negatively associated with maternal care (PBI), paternal care (PBI), confidence, physical health, and mental health. Regression analysis revealed that SIPAT scores were negatively predicted by maternal care, confidence, and physical health, and positively predicted by free-floating anxiety, collectively explaining 33% of the variance. This analysis contributes to the exploration of the risk and protective factors associated with SIPAT.

Discussion

The present research study aimed to explore how the risk of post-transplant issues, as measured by the Stanford Integrated Psychosocial Assessment for Transplantation (SIPAT), is associated with a combination of protective and risk factors, including parental bonding styles, adult attachment, physical health, mental health, and psychopathological symptoms. Findings highlighted significant associations between these factors and transplant outcomes, offering insights into the psychosocial dynamics of kidney transplant candidates.

A key finding was the positive association between trust in relationships, maternal/parental care (assessed with the Attachment Style Questionnaire, ASQ), and both the availability of the social support system (a SIPAT item) and the SIPAT total score. This suggests that individuals with secure attachment and positive maternal care are more likely to have a robust social support network, which plays a critical role in patient care and transplant outcomes. Secure attachment, maternal care, and general physical health emerged as tentative protective factors, as revealed by stepwise multiple regression analyses. These factors contribute to better emotional resilience and the ability to manage the challenges associated with chronic kidney disease and transplantation.

The study also underscored the importance of emotional role functionality in facilitating therapeutic relationships and ensuring therapeutic adherence. Adequate emotional role functioning fosters hope and may improve post-transplant outcomes. Conversely, high levels of somatization were significantly associated with poor

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	Moth	er care	er over tath	ar care	er over confi	dence Disc	heed heed	appron	ern w.	-Secon	Nent Nent	al Hearth	orth Dept	255 Som	atic phot	obse obse	ssive Hyst	stic soc.	Supp.	SUPP.
Mother care		42***	.34**	25*	.32**	.03	11	.07	14	.07	.19	12	25*	33**	.12	.18	.15	27*	08	28*
Mother over-prot.	42***		03	.44***	30**	05	.10	.06	.13	.01	15	.23*	.19	.24*	.03	.09	.13	.11	.15	.19
Father care	.34**	03		26*	.25*	23*	01	.07	01	03	.24*	01	10	35**	07	.12	.00	26*	25*	23*
Father over-prot	25*	.44***	26*		31**	.07	02	14	.19	06	10	.08	.13	.16	05	02	03	04	.07	.06
Confidence	.32**	30**	.25*	31**		14	06	05	13	.09	.37***	14	28*	33**	.07	.12	01	27*	27*	28*
Discomfort w. closen.	.03	05	23*	.07	14		.26*	.31**	.27*	01	16	.16	.33**	.14	.15	.11	.10	13	.05	.13
Need approv.	11	.10	01	02	06	.26*		.35**	.11	04	12	.25*	.12	.18	.25*	.08	.18	.11	.17	.19
Concern w. relat.	.07	.06	.07	14	05	.31**	.35**		14	.07	14	.42***	.37***	.19	.33**	.17	.22*	.01	15	.14
Relat. second.	14	.13	01	.19	13	.27*	.11	14		.06	28*	.16	.10	.07	24*	.02	11	.01	.02	.01
Physical Health	.07	.01	03	06	.09	01	04	.07	.06		09	17	14	24*	18	10	.04	10	.04	32**
Mental Health	.19	15	.24*	10	.37***	16	12	14	28*	09		44***	45***	36***	05	.01	01	15	16	32**
Anxiety	12	.23*	01	.08	14	.16	.25*	.42***	.16	17	44***		.60***	.47***	.42***	.35**	.31**	.12	07	.39***
Depression	25*	.19	10	.13	28*	.33**	.12	.37***	.10	14	45***	.60***		.35**	.34**	.26*	.17	.10	02	.40***
Somatic	33**	.24*	35**	.16	33**	.14	.18	.19	.07	24*	36***	.47***	.35**		.25*	.05	.19	.24*	.07	.35**
Phobic	.12	.03	07	05	.07	.15	.25*	.33**	24*	18	05	.42***	.34**	.25*		.32**	.22	.06	.10	.22*
Obsessive	.18	.09	.12	02	.12	.11	.08	.17	.02	10	.01	.35**	.26*	.05	.32**		.29**	05	14	.11
Hysteric	.15	.13	.00	03	01	.10	.18	.22*	11	.04	01	.31**	.17	.19	.22	.29**		11	.07	.10
Soc. Supp. Availab.	27*	.11	26*	04	27*	13	.11	.01	.01	10	15	.12	.10	.24*	.06	05	11		.55***	.65***
Soc. Supp. Func.	08	.15	25*	.07	27*	.05	.17	15	.02	.04	16	07	02	.07	.10	14	.07	.55***		.46***
SIPAT	28*	.19	23*	.06	28*	.13	.19	.14	.01	32**	32**	.39***	.40***	.35**	.22*	.11	.10	.65***	.46***	

\$

Fig. 1 Heatmap of the bivariate Spearman correlations. Note: SIPAT = total score of the Stanford Integrated Psychosocial Assessment for Transplantation. *=p < .05; **=p < .01; ***=p < .001

social support availability and lower transplant eligibility, aligning with previous literature [25, 27, 28]. This highlights the need for timely identification and treatment of psychopathological symptoms, particularly somatization, in transplant candidates.

Anxiety symptoms were identified as a risk factor for post-transplant issues. Patients with chronic kidney disease often experience heightened alertness and apprehension due to the unpredictable nature of transplant outcomes, which can manifest as free-floating anxiety. Untreated anxiety adversely affects quality of life and may undermine adherence to post-transplant therapeutic measures. A recent study found that 50.5% of chronic kidney disease patients exhibited anxiety symptoms, with a negative correlation between anxiety scores and glomerular filtration rate, a key indicator of kidney function [22, 23]. This suggests that anxiety not only impacts psychological well-being but also has clinical implications for organ functionality. Effective treatment, including psychotherapy and pharmacotherapy where necessary, is essential to mitigate these risks [61].

Attachment style, a global construct reflecting an individual's attitudes and behaviors in significant relationships, emerged as a critical factor in transplant outcomes. Bowlby's Attachment Theory (1969) posits that early experiences with attachment figures shape adult behavior and emotional responses. Secure attachment, characterized by confidence in relationships and the ability to

Table 3 Results of the stepwise multiple regression with blocks predicting the SIPAT total score

Block 1: parental b	onding											
	unstandardized			standardized	standardized							
	b	se	95%CI	β	std se	std. 95%Cl	р					
(Intercept)	18.04	1.61	14.84 - 21.25	0	0.1	-0.21 - 0.21	<.001					
PBI M care	-0.19 **	0.06	-0.300.08	-0.35**	0.11	-0.560.14	.001					
R ² / R ² adj	0. 124 / 0.113											
Blocks 1 & 2: paren	ntal bonding & adult	t attachment										
	unstandardized			standardized	standardized							
	b	se	95%CI	β	std se	std. 95%Cl	р					
(Intercept)	21.26	3.23	14.83 - 27.69	0	0.1	-0.20 - 0.20	<.001					
PBI M care	-0.14 *	0.06	-0.250.03	-0.27*	0.11	-0.480.06	.012					
confidence	-0.16 *	0.07	-0.300.02	-0.23*	0.1	-0.440.02	.029					
Need approv	0.11	0.06	-0.01 - 0.24	0.19	0.1	-0.02 - 0.39	.072					
R ² / R ² adj	0.209 / 0.178											
Blocks 1, 2 & 3: par	ental bonding, adu	lt attachment &	& physical and mental l	health								
	unstandardized			standardized								
	b	se	95%CI	β	std se	std. 95%Cl	р					
(Intercept)	26.62	4.22	18.22 - 35.02	0	0.1	-0.19 - 0.19	<.001					
PBI M care	-0.09	0.06	-0.22 - 0.03	-0.17	0.12	-0.41 - 0.06	.151					
PBI M over-prot	0.12	0.08	-0.04 - 0.28	0.18	0.12	-0.06 - 0.43	.146 .138 .09					
PBI P care	-0.09	0.06	-0.20 - 0.03	-0.17	0.11	-0.40 - 0.06						
PBI P over-prot	-0.12	0.07	-0.25 - 0.02	-0.2	0.12	-0.44 - 0.03						
Confidence	-0.14	0.07	-0.28 - 0.01	-0.2	0.11	-0.41 - 0.01	.061					
Need approv	0.1	0.06	-0.02 - 0.22	0.16	0.1	-0.04 - 0.36	.107					
Physical health	-0.12 *	0.05	-0.210.02	-0.25*	0.1	-0.450.05	.016					
R ² / R ² adj	0. 296 / 0.228											
Blocks 1, 2, 3 & 4: p	oarental bonding, ad	dult attachmen	t, physical health & ps	ychological condit	ion							
	unstandardized			standardized								
	b	se	95%CI	β	std se	std. 95%Cl	р					
(Intercept)	24.75	3.3	18.19 - 31.32	0	0.09	-0.19 - 0.19	<.001					
PBI M care	-0.14 **	0.05	-0.240.03	-0.26**	0.1	-0.460.07	.009					
Confidence	-0.13 *	0.07	-0.260.00	-0.2*	0.1	-0.390.00	.045					
Physical health	-0.09 *	0.04	-0.180.00	-0.2*	0.1	-0.390.01	.04					
Anxiety	0.52 **	0.15	0.21 – 0.82	0.32**	0.09	0.13 – 0.51	.001					
R ² / R ² adj	0. 325 / 0.289											

SIPAT Stanford Integrated Psychosocial Assessment for Transplantation, b unstandardized coefficient, se standard error, 95%CI confidence interval at the 95% level, β standardized coefficient, std standardized, PBI parental bonding instrument, p p-value, R^2 r squared, adj adjusted

* *p* < 0.05; ** *p* < 0.01; *** *p* < 0.001

seek support, is associated with balanced use of social resources and greater emotional resilience. Patients with secure attachment and positive maternal care are more likely to perceive their support network as reliable, which enhances their ability to manage the psychological and physical challenges of chronic illness [47]. Conversely, insecure attachment is linked to emotional rigidity, difficulties in social relationships, and maladaptive responses to chronic disease, underscoring the importance of assessing attachment in transplant candidates [22, 23, 36].

Maternal care also plays a pivotal role in the psyche-body connection, particularly in chronic illness. Individuals who received sufficient maternal care in childhood are more likely to have positive expectations of support and are adept at both offering and receiving help, thereby reinforcing their relationships [36]. In contrast, insufficient maternal care can compromise relationship quality and exacerbate the challenges of managing chronic illness [58]. Research has shown that sensitive and responsive caregiving fosters a sense of safety and trust, enabling children to develop adaptive coping mechanisms (van IJzendoorn & Sagi-Schwartz, 2008). This early foundation of emotional security may translate into healthier behaviors and stronger interpersonal connections later in life, both of which can enhance a patient's readiness for complex medical procedures such as transplantation. A longitudinal study by Rutter et al. (2006) found that individuals who experienced consistent maternal care during childhood were less likely to suffer from anxiety and depression in adulthood, conditions that could otherwise compromise their suitability for transplant surgery.

The SIPAT evaluates various psychosocial dimensions, including emotional stability, social support, and compliance with medical recommendations (Smith et al., 2015). Securely attached individuals, due to their enhanced capacity for emotional regulation and effective communication, are better equipped to meet these criteria. Furthermore, maternal care influences not only attachment but also personality traits such as conscientiousness and agreeableness, which are associated with higher levels of treatment adherence and overall well-being (McCrae & Costa, 1997). These findings align with research emphasizing the interplay between psychosocial factors and health outcomes. For example, Cohen et al. (2015) revealed that strong social support systems, often rooted in early maternal bonds, buffer against the adverse effects of chronic illness and improve recovery prospects after invasive treatments. Similarly, Mikulincer and Shaver (2016) argue that individuals with secure attachment are more likely to seek help when needed and engage actively in self-care practices, qualities that are crucial for successful post-transplant rehabilitation.

The study emphasizes the importance of enhancing social support networks for transplant candidates, as social support and functioning are crucial for psychological and social well-being. Adequate social support in the pre-transplant phase is a key predictor of graft maintenance post-transplant [21, 64]. Integrating assessments of attachment and parental bonding, alongside the SIPAT, into clinical practice could provide a more comprehensive evaluation of psychosocial risk and suitability for transplantation. While the SIPAT effectively measures psychosocial risk factors, it does not specifically address early attachment experiences, which significantly influence resilience and stress management during the transplant process. A holistic approach that includes these dimensions could improve patient outcomes by identifying individuals who may benefit from targeted psychological interventions.

Despite its contributions, the study has several limitations, including a small sample size, reliance on selfreport measures subject to social desirability bias, and the absence of a control group. The cross-sectional design precludes causal conclusions, and the homogeneous sample (all participants had SIPAT scores \geq 20) limits generalizability to broader transplant candidate populations. Future longitudinal studies with larger, more diverse samples are needed to validate these findings and explore the independent contributions of the four SIPAT domains (social support, treatment adherence, psychopathology, and substance use). Additionally, investigating sex differences in transplant readiness could provide valuable insights.

In conclusion, the findings highlight the clinical relevance of assessing parental bonding, adult attachment, and psychopathological symptoms in kidney transplant candidates. Psychological interventions that address these factors can help patients navigate the transplant process with greater emotional and relational resilience, ultimately improving outcomes. Family support remains a vital component of this journey, reinforcing the importance of a holistic approach to transplant care.

Conclusions

An enhanced screening of psychological factors, including a thorough assessment of attachment, parental bonding, and social support, could significantly impact the care plans for transplant candidates. A deeper understanding of the patient's emotional and psychological resources would allow for personalized psychological and support interventions, optimizing the management of stress and free-floating anxiety, which are common during the critical period between being placed on the waiting list and receiving the transplant. Moreover, an accurate assessment of the quality of social support could guide the identification of functional family and social networks, which are essential for post-transplant recovery. By integrating these psychological tools into the selection process, it could increase the likelihood of being placed on the waiting list, while also improving the patient's psychological well-being and supporting longterm transplant success.

Abbreviations

- SIPAT Stanford Integrated Psychosocial Assessment for Transplantation
- ASQ Attachment Style Questionnaire
- PBI Parental Bonding Instrument
- SF-36 Short Form Health Survey 36
- VT Vitality
- PF Physical functioning
- BP Bodily pain
- GH General health
- PR Physical role functioning
- ER Emotional role functioning
- SR Social role functioning
- MH Mental health
- PCS Physical component scale
- MCS Mental component scale
- ANX Anxiety
- PHOB Phobic anxiety

- OBS Obsessive-compulsive traits
- SOM Somatic symptoms
- DEP Depressive symptoms
- HY Hysteria

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Authors' contributions

M.L.P. and C.D.P. conceived the study. A.G. and P.V. contributed to the design of the study research protocol. M.M.G. and M.V. performed data entry and data collection. A.P. and U.G. performed data statistical analysis and interpretation of the results. M.L.P. and C.D.P. contributed to the drafting of the manuscript. All authors reviewed the manuscript.

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Data availability

The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request. Data are located in controlled access data storage: https://drive.google.com/drive/folders/1BmcblSma0J2JJ7DnMDj95XLdi5IhTK-g.

Declarations

Ethics approval and consent to participate

The present study was carried out according to the declaration of Helsinki (World Medical Association, 2013). This study protocol was reviewed and approved by the ethics committee of the University Hospital of Catania, Italy, approval number 48908. Prior to inclusion in the study, we received written informed consent from all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Vascular Surgery and Organ Transplant Unit, Department of General Surgery and Medical-Surgical Specialties, University Hospital of Catania, Via Santa Sofia, 84, 95123 Catania, Italy. ²Vascular Surgery and Organ Transplant Unit, Department of Educational Science, University of Catania, Catania, Italy. ³Department of Surgical and Medical Sciences and Advanced Technologies, Organ Transplant Unit, University Hospital of Catania, Italy. ⁴Department of General Psychology, University of Padova, Padua, Italy.

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