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Role of Psychological Resilience on Emotional Health in Kidney and Liver Transplant Recipients

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Study Design A
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Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

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Background: Psychological resilience is an increasingly recognized important protective factor for emotional health after solid organ transplantation; however, its role in the early post-transplant period is insufficiently explored. This study examined the role of psychological resilience in emotional health among kidney and liver transplant recipients, using a cross-sectional indirect-effect model.

Material/Methods: A cross-sectional, multicenter study was conducted at 4 transplant centers in Poland. Adult kidney and liver transplant recipients were assessed the day before hospital discharge after transplantation (mean hospital stay: 19.62 days). The study included 117 participants (68.4% kidney and 31.6% liver transplant recipients). Perceived social support was assessed with the Multidimensional Scale of Perceived Social Support (MSPSS), psychological resilience with the Psychological Resilience Scale (SPP-25), and overall emotional distress with the Hospital Anxiety and Depression Scale (HADS). Cross-sectional mediation analyses tested an indirect-effect model with MSPSS as the independent variable (X), SPP-25 as the mediator (M), and emotional distress measured by the HADS as the outcome variable (Y).

Results: Participants reported moderate to high psychological resilience and high perceived social support, particularly from family and significant others, along with low to moderate emotional distress. Mediation analyses showed associations between perceived social support and emotional distress were statistically significant only as indirect effects mediated by psychological resilience.

Conclusions: In the early post-transplant period, psychological resilience is statistically associated with emotional health and may serve as an important mediator linking perceived social support to lower levels of emotional distress. These findings are consistent with a theoretical indirect-effect model and underscore the need for longitudinal studies to clarify temporal relationships in psychological adaptation after transplantation.

Keywords: Anxiety • Cross-Sectional Studies • Depression • Resilience, Psychological • Social Support • Transplantation

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Introduction

Mood disorders, including anxiety and depressive symptoms, are common psychosocial problems after solid organ transplantation and are consistently linked to poorer quality of life, reduced treatment adherence, and worse clinical outcomes, including lower overall survival [1-4]. Consequently, psychosocial factors have attracted increasing attention as integral components of comprehensive post-transplant care [5,6]. These factors influence emotional functioning, health-related behaviors, and patients' capacity to adapt to long-term treatment demands.

Previous studies report substantial variability in the prevalence of anxiety and depression after transplantation. Anxiety has been observed in 12.5% to 50% of kidney transplant recipients and in 10% to 23% of liver transplant recipients [2,7-10]. Depressive symptoms occur in approximately 10% to 75% of kidney transplant recipients, depending on methodology, population, and time since transplantation, and in about 30% of liver transplant recipients [8,9,11-13]. These findings underscore the clinical relevance of identifying psychosocial resources linked to better emotional adjustment after transplantation.

Social support is widely recognized as an important protective factor in the post-transplant period, with positive associations with quality of life and psychosocial adaptation [14]. Prior research indicates that social support may reduce emotional distress either directly or indirectly by buffering disease-related uncertainty and treatment-related stress [5,15,16]. In liver transplant recipients with alcohol-related disease, family support has also been linked to lower rates of relapse and emotional symptoms, suggesting complex relationships between social resources and mental health [9].

Another psychosocial construct increasingly examined in transplantation research is psychological resilience. According to the American Psychological Association, resilience refers to "the process and outcome of successfully adapting to difficult or challenging life experiences" [17] and reflects an individual's capacity to cope with adversity [18]. Lower resilience has been associated with poorer mental well-being, reduced quality of life, worse postoperative outcomes, and increased healthcare utilization [19-27]. In transplant populations, higher resilience has been linked to better adherence, fewer psychological symptoms, and more effective functioning [28]. Importantly, previous studies suggest that resilience-related constructs may play an intermediate or moderating role in the relationship between social support and emotional outcomes after transplantation [5,29-32].

Despite growing evidence of the importance of social support and resilience, few studies have examined these constructs alongside anxiety and depression within a single analytical

framework. Moreover, cross-sectional studies directly testing resilience as an intermediate factor linking perceived social support to emotional distress in transplant recipients remain limited. Grounded in Hobfoll's conservation of resources theory [33], which conceptualizes social support as a key external resource that supports the development of internal resources such as resilience, this study aimed to examine whether psychological resilience is statistically associated with the relationship between perceived social support and symptoms of anxiety and depression among kidney and liver transplant recipients in the early post-transplant period.

Material and Methods

Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki (2013 revision). Ethical approval was obtained from the Local Bioethics Committee (approval No. AKB/7/2025). Participation in the study was voluntary and anonymous. All participants provided informed consent before inclusion.

Study Design and Setting

This cross-sectional analytical study was conducted at 4 university clinical hospitals in Poland, all of which are accredited and authorized to perform solid-organ transplantation. The participating centers included 1 in southern Poland, 1 in central Poland, and 2 in northern Poland. All centers operate within a centralized national transplantation system and adhere to uniform nationwide accreditation, organizational, and quality standards, ensuring comparability of medical, nursing, and psychosocial care.

Participants

The study included 117 adult solid organ transplant recipients, with 80 kidney transplant recipients (68.4%) and 37 liver transplant recipients (31.6%), who were hospitalized between February and May 2025. A consecutive sampling strategy was used, which is appropriate for cross-sectional studies involving clinically specific and hard-to-access populations, such as transplant recipients. Sample adequacy was assessed based on sufficient variability, saturation, and compliance with recommendations for multivariate analyses requiring a minimum of 5 to 10 observations per analyzed variable. Of the 150 questionnaires distributed, 117 were completed and included in the final analysis.

Inclusion criteria were age 18 years or older, kidney or liver transplantation, ability to complete the questionnaire independently, and written informed consent. Only patients who were clinically

assessed as fully capable of completing the questionnaire independently were eligible for inclusion. The absence of acute psychiatric disorders, cognitive impairment, or clinically significant disturbances of consciousness—including hepatic encephalopathy in liver transplant recipients—was a prerequisite for participation and was verified by the attending physician or a qualified member of the transplant care team before data collection.

Data Collection Procedure

Data were collected in a hospital setting on the day before discharge. Participants completed the questionnaires independently, either on paper or electronically via a QR code, in the presence of a trained member of the research team or a transplant coordinator. The healthcare professional's role was limited to providing procedural and organizational support and did not involve influencing participants' responses. The presence of medical personnel also ensured confirmation of patients' full cognitive and psychological capacity to participate at the time of assessment.

Most participants ($n = 111$) completed the paper-based version of the questionnaire, while 6 chose the electronic format. Data from both sources were standardized using a unified coding protocol and entered into a single database. Double-entry verification confirmed data completeness and consistency.

Study Instruments

A diagnostic survey method was employed, using the following 3 standardized and validated self-report measures. (1) The Hospital Anxiety and Depression Scale (HADS): The HADS consists of 14 items, divided into 2 subscales: anxiety (HADS-A) and depression (HADS-D), each with 7 items. Responses are rated on a 4-point Likert scale from 0 to 3, yielding subscale scores of 0 to 21. Scores of 0 to 7 indicate no symptoms, 8 to 10 suggest possible anxiety or depressive disorder, and scores of 11 or higher indicate probable disorder. The Polish version of the HADS demonstrates good internal consistency (Cronbach's $\alpha = 0.83$ for HADS-A and 0.82 for HADS-D) and has confirmed validity in clinical and population studies [34]. (2) The Multidimensional Scale of Perceived Social Support (MSPSS): The MSPSS assesses perceived social support from 3 sources: family, friends, and significant others. Items are rated on a 7-point Likert scale, with higher scores indicating stronger perceived social support. The Polish version demonstrates excellent reliability (Cronbach's $\alpha = 0.93$ for the total scale and 0.90-0.92 for the subscales) and good construct validity [35]. (3) The Psychological Resilience Scale (SPP-25): The SPP-25 assesses psychological resilience, conceptualized as the capacity to cope with difficult situations. It consists of 25 items rated on a 5-point Likert scale (0-4). Higher scores indicate greater resilience. The total score can be converted to standardized

sten scores. The scale demonstrates good internal consistency (Cronbach's $\alpha = 0.89$) and construct validity [36].

The questionnaire was supplemented with socio-demographic and clinical variables used to characterize the study group (Table 1).

Statistical Analysis

Statistical analyses were conducted using IBM SPSS Statistics (version 28) for data preparation and descriptive statistics. Quantitative variables are summarized using means, medians, and minimum and maximum values. Cross-sectional mediation (indirecteffect) analysis was performed using IBM SPSS Statistics (version 28) with the PROCESS macro (version 4.2) developed by Hayes [37]. Model 4 of the PROCESS macro was applied to test an indirecteffect model in which perceived social support measured by the MSPSS was specified as the independent variable (X), psychological resilience measured by the SPP25 as the mediator (M), and emotional distress as the outcome variable (Y). For the purposes of mediation analysis, emotional distress was operationalized as an overall index measured by the HADS, reflecting the combined severity of depressive and anxiety symptoms (conceptual model presented in Figure 1). Indirect effects were estimated using a bootstrapping procedure with 5000 resamples and biascorrected 95% confidence intervals. An indirect effect was considered statistically significant when the confidence interval did not include zero. No covariates were included in the mediation models. The analyses were conducted using raw summed questionnaire scores without centering or standardization of variables prior to analysis. Unstandardized regression coefficients (B) were generated directly by the PROCESS macro, whereas standardized coefficients (β) were calculated additionally to facilitate interpretation of effect sizes across model paths. Additionally, separate model fit statistics were calculated and reported for each regression equation included in the mediation analysis. Specifically, F statistics, degrees of freedom (df), multiple correlation coefficients (R), and coefficients of determination (R^2) were provided separately for the mediator model (SPP-25), the outcome model (HADS), and the total effect model. No missing data were identified in the final dataset. Therefore, no imputation procedures or missing-data corrections were required at either the item or scale level. All mediation and regression analyses were conducted on the same finalized analytic dataset consisting of 117 participants ($N = 117$), ensuring comparability of coefficients across all reported paths and models.

Results

The study group included 117 transplant recipients, predominantly men (56.4%). The mean age was 47.64 years (SD 13.57),

Table 1. Characteristics of the research group (N = 117).

Variables	n	%	Mean (SD) / median	Range
Sex				
Female	50	42.7		
Male	66	56.4		
Other	1	0.9		
Age (years)			47.64 (13.57) / 48.00	20.00-78.00
Education				
Primary	4	3.4		
Lower-secondary	0	0.0		
Vocational	17	14.5		
Secondary	53	45.3		
Tertiary	43	36.8		
Place of residence				
Country	48	41.0		
City of 20 000-50 000 inhabitants	20	17.1		
City of 51 000-100 000 inhabitants	9	7.7		
City of 101 000-500 000 inhabitants	9	7.7		
City of 201 000-500 000 inhabitants	6	5.1		
City over 500 000 inhabitants	25	21.4		
Professional status				
Pupil/student	3	2.6		
Employed	66	56.4		
Unemployed	9	7.7		
Retired	20	17.1		
Occupational pension	19	16.2		
Duration of hospitalization (days)			19.62 (11.49) / 16.00	5.00-74.00
Increased length of hospitalization due to complications				
Yes	41	35.0		
No	76	65.0		
Transplanted organ				
Kidney	80	68.4		
Liver	37	31.6		
Number of transplantation				
First	102	87.2		
Second	15	12.8		

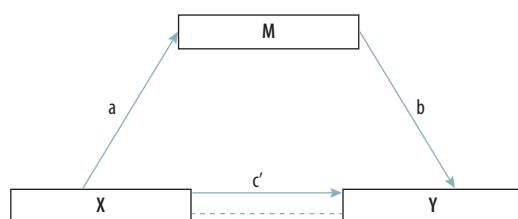


Figure 1. Conceptual mediation model. Notes: X, social support; M, psychological resilience; Y, feeling of depression/anxiety; path a, effect of social support on psychological resilience; path b, effect of psychological resilience on depression/anxiety symptoms; c', effect of social support on feeling of depression/anxiety.

with a median of 48 years (range 20-78). Most participants were kidney transplant recipients (68.4%), and 87.2% underwent transplantation for the first time. The mean length of hospital stay was 19.62 days (SD 11.49), with a median of 16 days (range 5-74). Prolonged hospitalization due to complications was reported in 35% of participants. The sociodemographic and clinical characteristics of the sample are presented in **Table 1**.

Descriptive statistics for psychological resilience (SPP-25), perceived social support (MSPSS), and the HADS subscales

are summarized in **Table 2**. The mean SPP-25 total score was 79.94 (median 81; range 45-100). Among SPP-25 dimensions, the highest mean score was observed for openness to new experiences and sense of humor (mean 16.94; median 17), and the lowest mean score for optimistic attitude and ability to mobilize in difficult situations (mean 15.03; median 16). Perceived social support was high (MSPSS total: mean 76.07; median 80; range 14-84), with the highest ratings reported for support from significant others (mean 26.25; median 28) and family (mean 25.76; median 28). Mean scores on HADS subscales were 5.70 for anxiety (median 5; range 2-14) and 5.03 for depression (median 5; range 0-15). Distributional indices (skewness and kurtosis) are provided in **Table 2**. These indices were used for descriptive purposes only and did not influence the choice of statistical procedures.

Perceived social support (MSPSS) was positively associated with psychological resilience (SPP-25) (path a: $B = 0.3150$, $SE = 0.1037$, $\beta = 0.2726$, $P = 0.0029$), and this model explained 7.4% of the variance in resilience ($R^2 = 0.074$). Psychological resilience was negatively associated with emotional distress operationalized as the overall HADS score (path b: $B = -0.2165$, $SE = 0.0314$, $\beta = -0.5425$, $P < 0.001$).

The model, including perceived social support and resilience, explained 34.5% of the variance in the HADS outcome ($R^2 = 0.345$).

Table 2. Descriptive analyses of the SPP-25, HADS, and MSPSS questionnaires.

Variable	Mean	Median	SD	A	K	Min	Max
SPP-25 overall result	79.94	81.00	13.38	-0.59	-0.17	45.00	100.00
– Perseverance and determination in action	16.26	16.00	2.81	-0.66	0.39	7.00	20.00
– Openness to new experiences and a sense of humor	16.94	17.00	2.66	-1.03	0.99	8.00	20.00
– Personal coping skills and tolerance of negative emotions	15.82	16.00	2.99	-0.49	-0.47	9.00	20.00
– Tolerance for failure and treating life as a challenge	15.88	16.00	2.91	-0.46	-0.58	8.00	20.00
– Optimistic attitude to life and ability to mobilize in difficult situations	15.03	16.00	3.41	-0.73	0.47	4.00	20.00
HADS – depression	5.03	5.00	3.38	0.71	0.33	0.00	15.00
HADS – anxiety	5.70	5.00	2.34	1.00	1.13	2.00	14.00
MSPSS – overall score	76.07	80.00	11.58	-2.64	8.90	14.00	84.00
– Friends	24.06	26.00	5.88	-2.06	4.06	4.00	28.00
– Family	25.76	28.00	3.92	-2.77	8.82	6.00	28.00
– Significant others	26.25	28.00	3.62	-3.43	15.07	4.00	28.00

Abbreviations: HADS, Hospital Anxiety and Depression Scale; MSPSS, Multidimensional Scale of Perceived Social Support; SPP-25, Resilience Measurement Scale; SD, standard deviation; K, kurtosis; A, skewness; Min, minimum value; Max, maximum value.

Table 3. Results of the mediation analysis: relationships between MSPSS, SPP-25, and HADS.

Path	Relationship	B	SE(B)	t	p	95% CI B	β
Model for mediator (SPP-25): $F = 9.224$, $df = 1, 115$, $P = 0.003$, $R = 0.273$, $R^2 = 0.074$							
a	MSPSS $\rightarrow$ SPP-25	0.3150	0.1037	3.0380	0.0029	[0.1096; 0.5203]	0.2726
Model for outcome (HADS): $F = 30.067$, $df = 2, 114$, $P < 0.001$, $R = 0.588$, $R^2 = 0.345$							
b	SPP-25 $\rightarrow$ HADS	-0.2165	0.0314	-6.8881	< 0.001	[-0.2788; -0.1542]	-0.5425
c'	MSPSS $\rightarrow$ HADS (direct)	-0.0563	0.0363	-1.5498	0.1240	[-0.1282; 0.0157]	-0.1221
Total effect model: $F = 9.039$, $df = 1, 115$, $P = 0.003$, $R = 0.270$, $R^2 = 0.073$							
c	MSPSS $\rightarrow$ HADS (total)	-0.1245	0.0414	-3.0064	0.0032	[-0.2065; -0.0425]	-0.2699
ab	MSPSS $\rightarrow$ SPP-25 $\rightarrow$ HADS	-0.0682	0.0295	—	—	[-0.1316; -0.0140]	-0.1479

Abbreviations: B, regression coefficients (unstandardized); β , regression coefficients (standardized); SE, standard error; t and p, statistics for direct effects and paths a/b and significance; CI, confidence intervals for indirect effects, determined by bootstrap method (5000 samples); F, model F statistic; df, degrees of freedom; P, significance level; R, multiple correlation coefficient; R^2 , coefficient of determination; HADS, Hospital Anxiety and Depression Scale; MSPSS, Multidimensional Scale of Perceived Social Support; SPP-25, Resilience Measurement Scale.

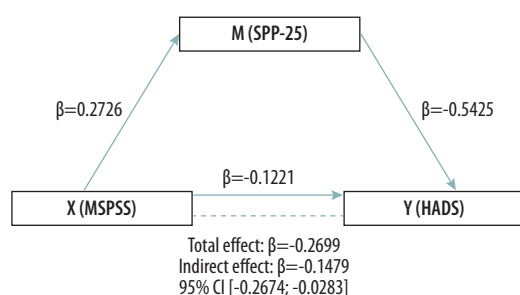


Figure 2. Cross-sectional indirect-effect (mediation) model (PROCESS Model 4). Notes: X (MSPSS), social support (Multidimensional Scale of Perceived Social Support); M (SPP-25), psychological resilience (Psychological Resilience Scale); Y (HADS), feeling of depression/anxiety (Hospital Anxiety and Depression Scale); β , standardized regression coefficients; CI, confidence intervals for indirect effects.

Model-level statistics confirmed the overall significance of this regression model ($F = 30.067$, $df = 2, 114$, $P < 0.001$).

The direct effect of MSPSS on the HADS outcome after accounting for the mediator was not statistically significant (path c': $B = -0.0563$, $SE = 0.0363$, $\beta = -0.1221$, $P = 0.1240$), whereas the total effect remained statistically significant (path c: $B = -0.1245$, $SE = 0.0414$, $\beta = -0.2699$, $P = 0.0032$).

The bootstrapped indirect effect (ab) was statistically significant ($B = -0.0682$, 95% CI [-0.1316; -0.0140]), indicating a statistically significant indirect association between perceived

social support and emotional distress via psychological resilience in this cross-sectional sample.

The mediation model and standardized path coefficients are presented in **Table 3** and illustrated in **Figure 2**.

Discussion

In the studied group, immediately after transplantation, we observed high psychological resilience (with a predominance of openness and humor), high social support (especially from significant others and family), and low levels of anxiety and depression at the group level. Conversely, Bülbüloğlu and Demir [38] reported different results, analyzing only liver recipients and indicating that psychological resilience in this group was only moderate, while their perceived social support was low. The resource profile observed in our study aligns with the latest narrative review, which emphasizes the key role of resilience and social support in post-transplant adaptation and recommends their systematic assessment both before and after transplantation. Moreover, our results place the level of psychological resilience close to the reference values for the general population reported for the Connor-Davidson Resilience Scale (about 80 points) [39], reinforcing the idea that strong adaptive resources are already available during the peri-discharge period and may represent potential targets for future intervention development. Consistent findings in kidney recipients are presented in the latest scoping review, which indicates that higher resilience is associated with better mental health, greater adherence, and less fragility, and its elements can be modified through exercise programs and interventions

aimed at strengthening psychological resilience [28]. At the same time, comparative data suggest that after kidney transplantation, the burden of depression is usually lower than in dialysis therapy, which is consistent with the low to moderate severity of these symptoms observed in our study [40]. Finally, reviews and reports from clinical practice emphasize that early involvement of psychologists and psychiatrists in transplant care promotes adherence, quality of life, and reduction of complications, which corresponds with our observation of high resources and low distress as an optimal time to potentially strengthen psychological resilience and reinforce social support [41,42].

The present study focused on protective factors supporting adaptation after kidney and liver transplantation, especially social support and psychological resilience as processes associated with lower levels of depression and anxiety. Protective factors are individual and contextual resources that limit the impact of stressors, support coping, and reduce the risk of mental disorders, including post-traumatic stress disorder (PTSD). These include, among others, perceived support and psychological resilience, understood as a complex construct involving emotion regulation, active coping, positive reappraisal, and a sense of control [18]. The literature indicates that these factors more often act as mediators rather than direct inhibitors of symptoms: in heart transplant recipients, coping strategies mediate the relationship between support and depression [5,15], and in liver transplant recipients, family support reduces risky behaviors by decreasing anxiety-depressive symptoms [9]. Reviews emphasize the importance of systematic assessment of resilience and support in modern models of care for organ recipients [43,44].

Our results are consistent with this theoretical framework: the association between perceived social support and emotional distress appears to operate indirectly through psychological resilience. It is not about the amount of support, but about its translation into adaptive resources. Kidney recipients with higher anxiety and depression also have worse clinical parameters (higher creatinine levels, lower hemoglobin values) and lower quality of life, which indicates the multidimensional benefits of interventions that strengthen resilience [2]. Liver transplant recipients in the early post-transplant period with lower resilience and higher intensity of pain and anxiety-depressive symptoms are at increased risk of PTSD [32]. Social support reduces disease uncertainty and cognitive burden, creating conditions for maintaining adaptive strategies [2,5,15].

We observed that the pattern of results suggests that the association between social support and symptoms of depression and anxiety is consistent with an indirect relationship through psychological resilience. In clinical practice, this may suggest that resilience could be considered an important area

of psychosocial care, with social support serving as a contextual resource that supports this process. This interpretation aligns with data from other populations: after heart transplantation, coping strategies mediate the relationship between support and depression, and in liver transplantation, family support reduces the risk of alcohol relapse by decreasing depression and anxiety [5,9].

In clinical practice, the focus may shift from merely the presence of support to qualitative work on psychological resilience—regulatory skills and agency in coping with biological and organizational stress. The best way to capture this is through combined measurement of support, resilience, and symptoms of anxiety and depression, which helps to identify the missing link between the support network and mental state. Strengthening adaptive resources may be associated with lower levels of anxiety and depression and with improved quality of life, with psychological resilience playing a particularly important role. Nikoogoftar and Shahina [45] demonstrated that resilience training in kidney transplant patients enhances self-efficacy, promotes independence, and improves social functioning, which translates into a better overall health status for this group. Similarly, Tomaszek et al [46] indicate that psychological resilience may be a predictor of post-traumatic growth in kidney recipients from living donors and deceased donors.

Overall, our results are consistent with the concept of structured psychosocial follow-up after transplantation, including regular assessment of social support, resilience, and symptoms of depression and anxiety, as well as the potential value of referring recipients to brief resilience-building interventions (eg, cognitive behavioral therapy, acceptance and commitment therapy, or positive reappraisal training). This approach aligns with the latest narrative reviews [43,44]. For liver transplantation, additional practical insights are provided by data from the intensive care unit: lower resilience and higher pain intensity, anxiety, and depressive symptoms increase the risk of PTSD [32]. Our findings emphasize the importance of the 2023 guidelines, which recommend psychosocial assessment before and after transplantation and the ongoing involvement of mental health professionals in the care of organ recipients [44].

In summary, supporting a social support network appears to be beneficial, especially when it is connected to building resilience, a factor statistically associated with lower levels of anxiety and depression. A practical consequence is monitoring support, resilience, anxiety, and depression, as well as offering interventions that transform support into a lasting adaptive resource. The literature indicates a similar direction, although some studies mainly emphasized the supply of support; our data suggest that the greatest effect comes from translating support into the patient's skills and agency [5,9,32,43].

Limitations

The population was not formally stratified by transplant type before bootstrapping, and the subgroup sizes were not sufficient to conduct robust mediation analyses separately for liver and kidney transplant recipients. Therefore, the results should be interpreted cautiously as referring to the overall group of vascularized organ transplant recipients, rather than to a completely clinically homogeneous population.

The study was cross-sectional and was conducted just before discharge (average hospital stay: 19.62 days), which prevents assessment of the durability of the observed relationships. Self-report tools—the MSPSS, SPP-25, and HADS—are susceptible to reporting bias. The sample included 117 individuals from 4 centers, which improves external validity but limits representativeness. A full set of clinical covariates was not included, increasing the risk of overfitting. Mediation was tested simultaneously, and the observed indirect-effect pattern requires confirmation in longitudinal studies [37].

Conclusions

Psychological resilience was identified as a variable statistically associated with the relationship between social support and emotional distress, consistent with an indirect-effect model, in the early period after transplantation. From a clinical perspective, these findings suggest considering interventions

aimed at strengthening psychological resilience, which may represent an important direction for supporting adaptation after transplantation.

An integrated screening of psychosocial resources, including support and resilience, along with an assessment of the severity of anxiety and depression symptoms allows for early identification of patients who may benefit from targeted psychosocial support. Early development of adaptive resources may be associated with improved quality of life and adherence, which could contribute to clinical stability during the post-discharge period.

The proposed model offers a conceptual framework that may inform the future development of structured psychosocial assessment and intervention approaches in post-transplant care.

Informed Consent

Ethical approval was obtained from the Local Bioethics Committee (approval No. AKBE/7/2025). Participation in the study was voluntary and anonymous. All participants provided informed consent before inclusion.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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