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ORIGINAL ARTICLE

Psychiatric and psychosocial characteristics of pediatric transplantation candidates-evaluation scale

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Abstract

Introduction: This study aimed to standardize psychiatric assessments for organ transplant candidates by developing a semi-structured interview tool to ensure consistent evaluations and protective measures.

Methods: The study included 34 pediatric solid organ transplant candidates: 8 pre-school, 10 pre-adolescent, and 16 adolescent patients. All participants were evaluated independently by two clinicians. The Psychiatric and Psychosocial Characteristics of Pediatric Transplantation Candidates–Evaluation Scale (PPCPT-ES), the Satisfaction with Life Scale for Children, and the Hope in Children Scale were administered to all patients. Item analysis and internal consistency reliability analyses were conducted separately for both raters across the 18 items of the PPCPT-ES.

Results: Four items were excluded from the analysis: three due to item–total score correlation values below 0.20 and one due to lack of significance in the interrater consistency analysis. For the remaining 14 items, item–total score correlation values ranged from 0.29 to 0.72 for rater 1 and from 0.25 to 0.70 for rater 2. The internal consistency reliability coefficient (Cronbach's alpha) was 0.86 for both raters.

Discussion and Conclusion: These findings suggest that the PPCPT-ES demonstrates good internal consistency and measures a homogeneous construct as a continuous variable, supporting its potential utility in the standardized psychiatric assessment of pediatric organ transplant candidates.

Keywords: Multidisciplinary, pediatric, psychiatry, scale, transplantation.

Transplantation is a multidisciplinary treatment involving the transfer of living cells or tissues from a donor to a recipient, allowing them to function in the new host [1].

The pre-transplant period poses stressors for young transplant patients, involving physical and psychosocial challenges stemming from chronic illness. These include concerns about functional loss due to health status, dependency on others for daily tasks, worries about suitability for transplantation, prolonged waiting periods, and fears about survival until the transplant. The primary aim of pre-transplant psychosocial assessment is to identify physiological or psychosocial traits that could adversely impact post-transplant outcomes [2]. In pre-transplant psychiatric assessment for children and adolescents, various

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factors influencing transplantation success—including psychosocial status, psychiatric history, medication use, substance history, cognitive abilities, and understanding of transplantation processes—are thoroughly examined [3-6].

Following eligibility for transplantation, the transition from waiting to transplantation is a mixed experience for patients and their families, encompassing moments of joy alongside anxiety, fear, and stress due to entering a new phase [7]. Hospitalization procedures, transplantation-related processes, medical interventions, and intensive care stays can be emotionally challenging for both patients and their families [6]. Anxiety disorders are the most prevalent psychopathologies observed during this phase [8]. Child and Adolescent Psychiatry plays a crucial role in providing psychosocial support, assessing psychiatric conditions, arranging necessary treatments for identified psychopathologies, and monitoring mental changes resulting from organic causes.

Psychiatric challenges may persist post-transplant in pediatric and adolescent cases. A 2005 study with 104 transplant patients reported that 30.7% exhibited posttraumatic stress disorder symptoms [9]. A 2022 study reported a 9.2% prevalence of posttraumatic stress disorder [10]. A 2011 study found that mental health problems can persist for years after pediatric kidney transplantation, negatively affecting recipients' quality of life [11]. Similarly, a 2020 article highlighted depression, anxiety, developmental delays, and learning difficulties in young kidney transplant recipients [11]. A study comparing liver transplant patients with healthy controls revealed more emotional and behavioral problems in the transplant group [12]. Pediatric heart and lung transplant patients may also experience depressive symptoms, anxiety, behavioral challenges, and somatic complaints during adaptation to the disease and its treatment [13].

In the literature, standardized pre-transplant psychosocial risk assessment tools have been deemed valuable for enhancing transplant success when combined with tailored multidisciplinary interventions introduced early in the transplantation process [14]. Assessment instruments such as the Stanford Integrated Psychosocial Assessment for Transplantation (SIPAT), Structured Interview for Renal Transplantation (SIRT), Transplant Evaluation Rating Scale (TERS), and Psychosocial Assessment of Candidates for Transplantation (PACT) are primarily applicable to adult patients [15-18].

The Pediatric Transplant Rating Instrument (P-TRI) is a 17-item scale developed to evaluate psychosocial risk factors for adverse prognosis after solid organ transplantation [19]. The Turkish version of the P-TRI has demonstrated good psychometric properties for pediatric kidney transplant recipients. To our knowledge, no comprehensive psychosocial assessment tool exists for pediatric solid organ transplant candidates in Türkiye, aside from the Turkish adaptation of the P-TRI for kidney transplant candidates.

Highlights

- PPCPT-ES is a comprehensive scale originally consisting of 18 items that address common psychosocial risk domains
- PPCPT-ES demonstrated strong psychometric properties, including high internal consistency and inter-rater reliability
- PPCPT-ES has potential utility for predicting treatment compliance in pediatric transplant candidates prior to surgery

The primary aim of psychiatric evaluation in pediatric organ transplantation is to select suitable recipients and donors, inform and support patients and families, detect mental health issues in the pre-transplant, transplant, and post-transplant phases, provide early intervention to prevent organ rejection, and enhance the individual's adaptation and quality of life. Varied global guidelines on psychiatric disorders as contraindications highlight the need for individualized, multifactorial evaluations, recognizing potential differences in processes and outcomes. Some studies categorize the presence of psychiatric disorders as either definite contraindications (e.g., dementia, acute psychosis, drug or alcohol dependence, highly unstable borderline personality disorder, IQ <70) or relative contraindications (e.g., therapeutic incompatibility, personality disorders, depression, anxiety disorders, lack of motivation for the procedure). Others argue that a psychiatric disorder alone does not necessarily constitute a contraindication to organ transplantation. Emphasis has therefore been placed on the importance of individualized, multifactorial evaluations, acknowledging potential variations in processes and transplant success on a case-by-case basis [20-24].

Given the numerous factors influencing both short- and long-term transplantation outcomes, pre-transplant risk assessment is crucial. Standardized assessment tools in pediatric populations are believed to aid in identifying risks, guiding psychosocial support, and predicting outcomes, thereby facilitating appropriate interventions.

This study aimed to standardize psychiatric evaluation for pediatric organ transplant candidates by determining their biological, individual, familial, social, and economic

challenges; identifying existing psychopathologies; and providing appropriate pharmacological and psychosocial support. The study further sought to identify patients at risk of psychiatric and psychological difficulties during the transplantation process and post-transplant period, and to develop a semi-structured interview tool to standardize psychiatric evaluation and implement necessary protective measures.

Materials and Methods

This study was approved by the Ege University Faculty Of Medicine University Medical Research Ethics Committee (Approval No: 22-1T/11, Date: 14.01.2022) and conducted between January 2022 and August 2023 in the Department of Child and Adolescent Psychiatry, Ege University Faculty of Medicine Hospital. The study focused on scale development using correlational methods to examine relationships between scale items.

The research was carried out as part of the multidisciplinary team working in the pre-transplant, transplant, and post-transplant phases, and specifically included solid organ transplant patients followed at the Department of Child and Adolescent Psychiatry, Ege University. The study was supervised by a permanent faculty member. All procedures were conducted in accordance with the principles of the Declaration of Helsinki.

Sample Group

The study included all transplant candidates aged 0–18 who were referred to the Department of Pediatric and Adolescent Psychiatry for pre-transplant psychiatric evaluation. Informed consent was obtained from both candidates and their parents prior to participation. Psychiatric interviews were conducted either at the bedside in patient rooms or in psychiatric outpatient clinics, depending on the clinical condition and age of the transplant candidates. Age-appropriate one-on-one sessions were held with the candidates and their parents.

A consultant psychiatrist used a semi-structured interview tool based on DSM-5 criteria for psychiatric diagnoses and scored items on the Evaluating Psychiatric and Psychosocial Characteristics of Pediatric Transplantation Candidates Interview Form. Two expert assessors were present during the interviews, with one conducting the interview and the other independently scoring on a separate PPCPT-ES form. Given the rarity of pediatric solid organ transplant candidates, no a priori power analysis was performed. Instead, all eligible cases referred to the department for psychiatric consultation over a one-year period were included, consistent with approaches used in prior psychosocial instrument development studies involving pediatric transplant populations.

Inter-rater reliability—assessing agreement between raters—was a central focus in this scale development study. The PPCPT-ES items were scored on a continuous scale (0–10), with the last four items reverse-scored. Inter-rater reliability was determined using the intraclass correlation coefficient (ICC), ranging from 0 to 1. High ICC values indicated strong agreement between raters, whereas values near zero suggested a lack of agreement [25, 26]. Each participant was evaluated by two consultant psychiatrists, generating multiple measurements. Average agreement values were calculated by assessing consistency across these measurements [27].

For age-specific assessments, the Satisfaction with Life Scale for Children and PPCPT-ES were administered to patients aged 8–13, the Hope in Children Scale and PPCPT-ES to those aged 8–16, and only the PPCPT-ES to patients younger than 8 years.

Assessment Tools

Satisfaction with Life Scale for Children

Developed by Gaderman, Reichl, and Zumbo, this tool is a valid and reliable measure of life satisfaction [28]. It consists of 5 items with a single-factor structure, each rated on a 5-point Likert scale. The scale is designed for children aged 8–13. It was adapted into Turkish by Altay and Ekşi [29].

Children's Hope Scale

The Hope in Children Scale was developed by Snyder et al. in 1997 [30]. The scale includes 6 items rated on a Likert scale. Scores are obtained by summing item responses, with a minimum of 6 and a maximum of 36. It is suitable for children aged 8–16. The Turkish adaptation was conducted by Atik and Kemer [31].

Evaluating Psychiatric and Psychosocial Characteristics of Pediatric Transplantation Candidates Interview Form

This form was created by child and adolescent psychiatry specialists and includes 4 main headings and 5 subheadings. It gathers information about the medical disease process, transplantation process, psychiatric evaluation, patient and parent substance use history, treatment compliance, family environment, financial and psychosocial support, relationships with the medical team, and the patient's cognitive capacity.

Psychiatric and Psychosocial Characteristics of Pediatric Transplantation Candidates–Evaluation Scale (PPCPT-ES)

The PPCPT-ES consists of 18 items created by child and adolescent psychiatry specialists. Items are scored on a 10-point scale (0 = not at all, 10 = very much). The last four items are reverse-scored.

Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL-T, Turkish DSM-5 Version)

This semi-structured interview schedule was updated by Kaufman et al. according to DSM-5 diagnostic criteria [32]. The Turkish version was adapted by Ünal et al. The first section includes an unstructured interview and questions about sociodemographic characteristics, presenting complaints, developmental history, and general functioning. The second section covers over 200 specific symptoms within the past two months and across the lifetime. The third section consists of diagnostic assessments designed to confirm DSM-5 diagnoses. Information from multiple sources is evaluated separately and then integrated with the clinician's observation notes [33].

Following all these assessments, psychiatric diagnoses and treatment plans were established in accordance with DSM-5 criteria, under the supervision of a faculty member. Patients' suitability for transplantation was also evaluated [34].

Statistical Evaluation

As part of the PPCPT-ES development study, reliability analyses were conducted to evaluate the psychometric properties of the data collected from the sample group. Interrater reliability analyses of the scale items, based on evaluations by two independent expert raters, were performed first. Since each scale item had a continuous variable structure, the intraclass correlation coefficient (ICC) was calculated. This allowed for the determination of both absolute agreement between raters for individual items and absolute agreement across the entire scale. Absolute agreement indicates that different raters assign the same or highly similar scores to the same subject.

In addition, further psychometric examinations were conducted, including exploratory factor analysis, comparisons of total scale scores with selected demographic variables, and descriptive statistics of the sample group.

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA). For comparisons of mean total scores obtained from participants, parametric tests such as two-way analysis of variance (ANOVA), independent samples t-test, and Pearson correlation coefficient were used under the assumptions of normal distribution and homogeneity of variances. When these assumptions were not met, non-parametric statistical methods were applied.

Results

Sociodemographic and Clinical Characteristics

The study included 34 transplant candidates: 10 kidney, 7 liver, 16 heart, and 1 lung transplant candidates. Among them, 21 were female (61.8%) and 13 were male (38.2%). Participants were distributed across age groups: 23.5% were in the preschool period, 29.4% (n=10) were aged 6–11, and 47.1% (n=16) were aged 12–18. Approximately half of the parents had completed only primary education (mothers 61.7%, fathers 44.1%). A lifetime psychiatric history was reported in 41.7% of patients, and 32.4% were actively experiencing psychiatric problems.

One-quarter of the families (n=8) were economically disadvantaged. About half of the patients (n=14) lived in a different city than the transplant center and relied either on another person's vehicle (17.6%) or on public transportation (29.4%) to access care. The majority of patients (79.4%) were informed about the transplantation process, while the preschool group and patients in intensive care (20.6%) were not. Among those informed, the information was predominantly provided by organ transplant nurses (88.8%) (Table 1 and Table 2).

Reliability Analysis

Inter-Rater Consistency

The inter-rater reliability of PPCPT-ES scores was evaluated using the ICC method with ratings from two expert assessors. Intra-class correlation values were initially calculated separately for each of the 18 items. Reliability coefficients, based on the two-way random effects model, indicated statistically significant agreement between raters for all 18 items. Average consistency values ranged from 0.41 to 0.94 for intraclass correlation and from 0.26 to 0.88 for single measurements. Cronbach's alpha values were also within this range.

According to established criteria, intraclass correlation values are classified as poor when $r < 0.40$, moderate when $r = 0.40–0.59$, good when $r = 0.60–0.74$, and excellent when $r > 0.75$ [35]. Based on the total PPCPT-ES scores, the ICC was 0.97 for the average measurement and 0.88 for the single measurement. However, item 12 yielded an insignificant F value (Table 3).

Table 1. Sociodemographic and Clinical Characteristics

Feature	Variable	n	%
Gender			
	Female	21	61,8
	Male	13	38,2
Age			
	0-5	8	23,5
	6-11	10	29,4
	12-18	16	47,1
Mother's Education Level			
	Primary education	21	61,7
	High school	4	11,7
	University	9	26,4
Father's education Level			
	Primary education	15	44,1
	High school	11	32,3
	University	8	22,8
Number of Children to be Cared for by the Mother			
	1	8	23,5
	2	14	41,2
	3	6	17,6
	4+	6	17,7
Economic Inefficiency			
	Yes	8	23,5
	No	24	70,6
Active Psychiatric Illness			
	Yes	11	32,4
	No	23	67,6
Lifetime Psychiatric Illness			
	Yes	14	41,7
	No	20	58,8
Location of the Family in relation to the Transplant Center			
	Urban	14	41,2
	Rural	20	58,8
Transportation to the Treatment Center			
	Own vehicle	18	52,9
	Other's vehicle	6	17,6
	Public transfer	10	29,4

Table 2. Sociodemographic and Clinical Characteristics

	n	%
Planned Organ Transplant		
Kidney	10	29,4
Liver	7	20,6
Heart	16	47,1
Lung	1	2,9
Organ Donor Type		
Live	11	36,7
Cadaver	19	63,3
Additional Chronic Disease		
Yes	8	23,5
No	26	76,5
Patient's Knowledge about the Transplantation Process before Consultation		
Yes	27	79,4
No	7	20,6
Information Source on the Transfer Process		
Organ Transplant Nurse	24	88,8
Internet	2	7,4
Physician	1	3,7
Risk Factors to Disrupt Adaptation to the Transplant Process		
Multiple Complex Drug Use	2	8,6
Active Psychiatric Illness	11	47,8
Cost of Treatment	1	4,3
Difficulty in Access to Treatment Center	3	13,0
İntellectual Disability	6	26,0

Internal Consistency

Item-total correlations and internal consistency reliability analyses were performed separately for both raters across the 18 PPCPT-ES items. Although Cronbach's alpha coefficients for both raters were adequate, the item-total correlations for items 4 (the family's motivation for transplantation), 7 (the patient's current substance use), 12 (the family's cooperation with the treatment team), and 14 (the patient's cooperation with the school) were below 0.20. Furthermore, item 12 was insignificant in inter-rater consistency analysis. These four items were therefore excluded.

For the remaining 14 items, item-total correlations ranged from 0.29 to 0.72 for rater 1 and from 0.25 to 0.70 for rater 2. Cronbach's alpha for both raters was 0.86, indicating high internal consistency. These findings suggest that the PPCPT-ES measures a homogeneous construct as a continuous variable and can be reliably applied (Table 4).

To further examine agreement, an independent samples t-test was conducted on the mean scores of the two raters across the 14 retained items. No statistically significant difference was observed ($t = -0.264$, $df = 64$, $p = 0.792$). This confirms that the two raters provided consistent evaluations, supporting the homogeneity of the scale.

Correlation Analysis

Pearson correlations were calculated between PPCPT-ES total scores and scores from the Hope in Children Scale and the Satisfaction with Life Scale for Children. Total scores

Table 3. Inter-rater intraclass correlation consistency values of psychiatric and psychosocial characteristics of pediatric transplantation candidates-evaluation scale (PPCPT-ES)

Item No	Cronbach Alpha	Intraclass Correlation Single measurement	Intraclass Correlation Averaging measurement	F	Sd_1	Sd_2
1	.939	.883	.938	16.160***	32	32
2	.715	.556	.715	3.504***	32	32
3	.923	.857	.923	12.948***	32	32
4	.515	.347	.515	2.063 *	32	32
5	.814	.687	.814	5.383***	32	32
6	.847	.734	.847	6.518***	32	32
7	.730	.575	.730	3.706***	32	32
8	.831	.711	.831	5.913***	32	32
9	.820	.694	.820	5.547***	32	32
10	.790	.653	.790	4.758***	32	32
11	.902	.822	.902	10.236***	32	32
12	.415	.262	.415	1.708 a.d	32	32
13	.513	.345	.513	2.055*	32	32
14	.866	.763	.866	7.457***	32	32
15	.796	.660	.796	4.890***	32	32
16	.812	.683	.812	5.308***	32	32
17	.815	.688	.815	5.416***	32	32
18	.790	.653	.790	4.757***	31	31
Total	.89	.80	.89	8.959***	32	32

P***<.001; p*<,05; a.d= not significant.

from both raters were derived for the 14 retained items.

Results indicated a positive, moderate correlation between transplantation suitability scores from rater 2 and hope scores ($r = 0.58$, $p < 0.01$). Hope scores also showed a strong, positive correlation with life satisfaction ($r = 0.72$, $p < 0.001$). Moreover, a strong correlation was found between the suitability scores of rater 1 and rater 2 ($r = 0.80$, $p < 0.001$). These findings suggest that higher transplantation suitability is associated with greater hope, which in turn is linked to higher life satisfaction (Table 5).

Differences by Age Group and Transplant Type

A two-way ANOVA (2 × 3 design) was conducted to examine differences in PPCPT-ES total scores by age group (0–11 years vs. 12–18 years) and transplant type (kidney, liver, heart). PPCPT-ES scores were averaged across the two raters.

Results revealed a significant interaction effect between age and transplant type ($F(2,32) = 14.386$, $p < 0.001$, $\eta^2 = 0.525$). A significant main effect was also found for transplant type ($F(2,32) = 6.894$, $p < 0.001$, $\eta^2 = 0.347$), whereas the main effect of age was not significant ($F(1,32) = 3.491$, $p > 0.05$, $\eta^2 = 0.118$). Although post-hoc comparisons did not reveal significant pairwise differences, the interaction effect explained 52% of the variance.

Mean PPCPT-ES scores were as follows:

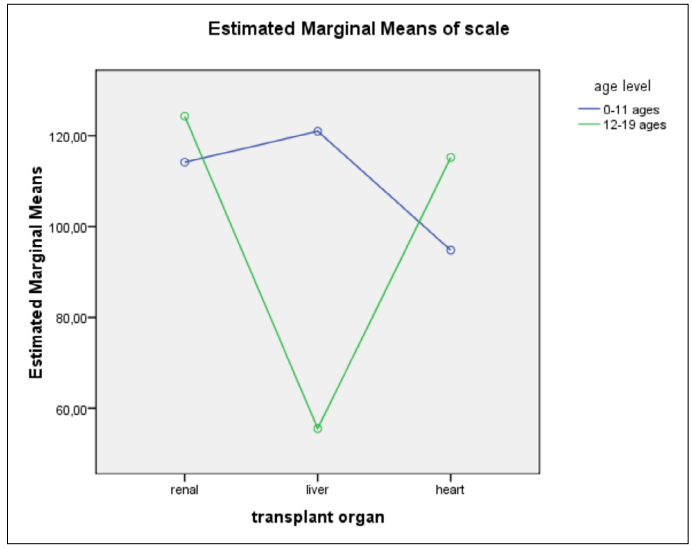

Fig. 1. Mean PPCPT-ES total scores by age group (0–11 years, 12–18 years) and type of transplantation (kidney, liver, heart).

Kidney transplantation: 114.17 (SD = 5.45) for ages 0–11; 124.33 (SD = 7.71) for ages 12–18.

Liver transplantation: 121.00 (SD = 5.45) for ages 0–11; 55.00 (SD = 13.35) for ages 12–18

Heart transplantation: 94.00 (SD = 5.97) for ages 0–11; 115.23 (SD = 4.03) for ages 12–18 (Fig. 1).

In summary, significant differences in psychiatric suitability

Table 4. Internal consistency reliability analysis values of psychiatric and psychosocial characteristics of pediatric transplantation candidates-evaluation scale (PPCPT-ES)

ITEMS	1st rater			2nd rater		
	Avg. N=33	S N=33	Item Total Score cor. N=33	Avg. N=32	S N=32	Item Total Score cor. N=32
1. Patient's level of knowledge about the transplant process	5.91	3.59	.58	6.06	3.57	.61
2. The level of knowledge of the patient's family about the transplantation process	7.85	2.05	.39	7.97	1.84	.42
3. Patient's willingness/motivation level for organ transplantation	7.12	3.39	.56	7.31	2.96	.67
4. Patient's level of communication with the treatment team	7.85	2.61	.69	7.72	2.40	.62
5. Patient's level of cooperation with the treatment team	8.39	2.16	.58	8.34	2.30	.69
6. The level of economic and logistical support needed by the patient's family	7.94	1.80	.26	7.12	2.21	.46
7. The level of support of the patient by close family members	8.48	1.68	.29	7.84	2.06	.64
8. Social support level of the patient	7.73	2.07	.66	7.94	1.92	.67
9. Patient's level of trust in the transplant and surgical team	8.21	2.47	.49	8.00	2.44	.26
10. The level of trust of the patient's family in the transplant and surgical team	8.94	1.01	.29	8.78	1.29	.25
11. The level of risk factors that may impair the patient's current compliance with treatment	8.09	2.55	.72	7.88	2.69	.49
12. The level of negative impact of the patient's current psychiatric symptoms on transplantation	8.85	2.00	.69	8.59	1.81	.60
13. Risk level of family conflict with the treatment team in case of a possible complication after transplantation	8.12	1.95	.64	8.53	1.87	.70
14. Level of conflict between caregivers/parents	8.73	1.42	.41	8.84	1.94	.29
Cronbach's Alpha for the whole test		0.86			0.86	

Table 5. Correlation, average and standard deviation values between psychiatric and psychosocial characteristics of pediatric transplantation candidates-evaluation scale (PPCPT-ES) total scores and hope and life satisfaction scales

	Ort. (S)	Median	Skewness value	Kurtosis value	Shapiro Wilk	1.	2.	3.	4.
1.Evaluation-1 Total score	112.2 (19.1)	116	-1,21	1,29	,005	1.00	.80***	.36	.15
2. Evaluation-2 Total score	110.9 (19.4)	115	-1,19	1,35	0,010		1.00	.58**	.30
3. Hope scale Total score	25.3 (6.2)	27	-,524	-,231	,169			1.00	.72***
4. Life satisfaction scale Total score	16.4 (5.4)	16	-0071	-,909	,250				1.00

P***<.001; p**<.01; 1: Assessment-1 Total score; 2: Assessment-2 Total score; 3: Hope scale total score; 4: Life satisfaction scale total score.

for transplantation were observed across transplant types and age groups, with a particularly strong interaction effect, highlighting the importance of considering both variables simultaneously when evaluating candidates.

Discussion

In this study, a comprehensive measurement tool was developed to standardize the psychosocial assessment process for transplant candidates, reduce prejudice, and identify the common strengths and weaknesses of patients and their families that may influence post-transplant treatment outcomes.

Non-adherence to immunosuppressive treatment is one of the most important causes of long-term mortality after organ transplantation [36]. Standardized pre-evaluation and follow-up enable early interventions before non-adherence occurs. Moreover, the development of organ-specific and culturally appropriate scales would enhance

the identification of at-risk pediatric patients. Key factors assessed include the child's and family's understanding of the transplantation process, psychiatric status, compliance with medical treatment and immunosuppressive therapies, readiness to assume post-transplant responsibilities, cognitive performance, family financial resources, and coping mechanisms. If a psychiatric history exists, the risk of exacerbation or relapse should also be considered. The pharmacokinetics and pharmacodynamics of psychotropic drugs in the context of organ failure must be evaluated when planning treatment. In addition to the psychiatric side effects of immunosuppressive therapy, possible post-transplant psychiatric disorders should be identified and managed. The use of psychotropic drugs in the post-transplant period requires careful attention to drug interactions [22].

A study conducted in Türkiye with 59 pediatric transplant patients between 2012 and 2015 found high rates of psychiatric disorders before transplantation, ranging from 60% to 69.4% among heart, kidney, and liver transplant candidates [37]. In our study, active psychiatric illness was observed in 32.4% of patients, and 41.7% reported a lifetime history of psychiatric illness.

Family dynamics and caregiver coping styles have also been shown to influence transplant outcomes. One study of pediatric heart transplant patients found that family functioning in the first two years post-transplant was significantly related to treatment adherence [38]. Another study investigating coping strategies in caregivers of adolescent heart transplant (HTx) recipients and HTx candidates using left ventricular assist devices (LVAD) reported that optimistic and confident coping strategies were associated with fewer internalizing symptoms and higher quality of life in adolescents [39]. Consistently, our findings showed that higher suitability for transplantation was associated with increased levels of hope, which in turn contributed to greater life satisfaction.

Strong risk factors for non-adherence after kidney transplantation include prior history of non-adherence and adolescence or young adulthood. Additional risk factors with consistent but smaller effects include minority race/ethnicity, poor social support, and poor perceived health. In pediatric patients, parental distress and psychological functioning also play a crucial role [40]. Low socioeconomic status has been independently associated with poor graft outcomes in pediatric kidney transplantation [41].

Several scales have been developed to systematize psychosocial assessment prior to solid organ transplantation in adults. These include the Edmonton Symptom Rating System, Stanford Integrated Psychosocial Assessment of Transplantation (SIPAT), Structured Interview for Kidney Transplantation (SIRT), Transplant Evaluation Rating Scale (TERS), Psychosocial Assessment of Transplantation Candidates (PACT), and INTERMED. For pediatric patients, the Stanford Pediatric Psychosocial Transplantation Tool is under development. To date, the Pediatric Transplant Rating Instrument (P-TRI) remains the only validated tool for psychosocial assessment in pediatric transplantation [19]. The Turkish version of the P-TRI has shown good psychometric validity in pediatric kidney transplant recipients, distinguishing between "risky" and "risk-free" candidates in pre-transplant assessment [36].

The PPCPT-ES, developed in this study, is a 14-item semi-structured interview tool designed to assess psychosocial risk domains in pediatric transplant candidates. Information was obtained through direct interviews with candidates and families, supplemented by medical records and input from the transplant team. Items were derived from a review of the literature on pediatric psychosocial risk factors, particularly those linked to treatment adherence. The scale was intended to support the standardized identification of psychosocial vulnerabilities that could compromise post-transplant outcomes.

Unlike adult-oriented instruments, our scale incorporates a developmental perspective for children with chronic illness and emphasizes family-related factors that influence outcomes. Importantly, the PPCPT-ES does not employ cut-off scores to predict clinical outcomes. Instead, it highlights specific areas of concern that can be addressed with pre- or post-transplant interventions. By systematically identifying psychosocial vulnerabilities, the tool provides the transplant team with comprehensive insights into potential barriers to adherence and supports the design of targeted psychosocial interventions. Although numerous studies have explored associations between psychosocial risk factors and treatment outcomes, clear causal links between psychosocial characteristics and graft survival remain limited [19]. Consequently, no weighting system was applied to individual subscales or items.

Correlation analyses further demonstrated that higher transplantation suitability scores were positively associated with greater hope, and that higher levels of hope correlated with greater life satisfaction. Taken together, these results indicate that psychosocial suitability for transplantation

may contribute to improved well-being and quality of life in pediatric patients. The high internal consistency reliability of the PPCPT-ES (Cronbach's alpha = 0.86) underscores the tool's robustness as a standardized measure.

Overall, this study provides promising evidence for the use of PPCPT-ES in identifying psychosocial vulnerabilities and predicting treatment compliance in pediatric organ transplant candidates.

Limitations

This study has several limitations. First, all patients in the sample were deemed eligible for transplantation. Therefore, the study could only assess post-transplant outcomes in relation to overall lower scale scores, limiting generalizability. Second, the absence of scale scores specific to each transplant organ group is another restriction. Third, the study lacked post-transplant follow-up data. To address this, we plan to continue monitoring the sample and collect data at 3, 5, and 10 years to further evaluate the utility of the tool.

Finally, the scale was administered by only two observers. While this is not a major limitation, it should be noted that the inclusion of more raters could further enhance the accuracy of inter-rater reliability assessments.

Ethics Committee Approval: This study was approved by the Ethics Committee of Ege University Faculty of Medicine (Approval No: 22-1T/11, Date: 14.01.2022).

Peer-review: Externally peer-reviewed.

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