

Evaluation of Psychosocial Outcomes of Living Liver Donors in Liver Transplantation

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Cite this article as: Sarigöl Ordin Y, Harmancı Seren AK, Karayurt Ö, et al. Evaluation of psychosocial outcomes of living liver donors in liver transplantation. *Turk J Gastroenterol.* 2022;33(4):346-355.

ABSTRACT

Background: The purpose of this study was to evaluate the risk factors affecting psychosocial outcomes of living liver donors after liver transplantations.

Methods: This was a descriptive, cross-sectional study. The sample consisted of living liver donors followed by 2 liver transplantation centers in 2 private hospitals in 2 different provinces, between August 2017 and October 2019. All the living liver donors were contacted without a time frame after donation and all the participants were evaluated once. The Beck Depression Scale, SF-36, General Self-Efficacy Scale, and Perceived Available Support Scale were used to collect data. The t-test, Kruskal-Wallis test, Mann-Whitney U-test, and Pearson correlation analysis were used for data analysis.

Results: The mean age of the patients was 34.31 ± 8.22 years. There was a positive, weak correlation between age and physical function. Gender, marital status, financial status, and education levels significantly affected physical components, social function, vitality, depression, and self-efficacy scores. High depression levels negatively affected the physical component, self-efficacy, and social support scores of the living liver donors. High self-efficacy positively affected social support.

Conclusion: The study revealed that gender, marital status, employment status, and education levels were associated with psychosocial outcomes. The financial status was the main factor affecting each psychosocial variable. Financial status needs to be assessed in detail before and after the operation.

Keywords: Living donor liver transplantation, living liver donor, nursing, psychosocial outcome, quality of life

INTRODUCTION

It is stated in the literature that all organ transplantations performed meet only 10% of the existing organ needs in the world.¹ Transplant professionals have been struggling against the organ shortage problem on a global scale. The Declaration of Istanbul, signed by many countries, suggests that policymakers, healthcare managers, and transplantation professionals focus on developing programs based on the utilization of organs from deceased donors. It also underlines the critical points that should be considered in living donation processes for the countries having difficulties in increasing the number of deceased donors.²

Since the rate of deceased donors in Turkey is low, the cases of end-stage organ failure and the need for transplantation operations have been increasing, as in many

countries. Turkey had the highest number of living donors in the world, with 53.03 living donors per million people in 2019. It also had the second-highest living liver transplantations (16.37 per million people) performed, after South Korea.³ The psychosocial status of the living donors must be assessed, which is as important as the assessment of medical risks and consequences. Most of the available data on psychosocial outcomes of living liver donors (LLDs) was obtained from studies performed in Western countries and developed countries.

The World Health Organization, The Declaration of Istanbul, The European Union Directives, The Organ Procurement and Transplantation Network, and other international regulators recommend monitoring and recording of the medical and psychosocial outcomes of living donor

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Received: March 22, 2021 Accepted: July 13, 2021 Available Online Date: February 17, 2022

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DOI: 10.5152/tjg.2022.21262

transplantations.^{2,4-6} The psychosocial outcomes of the donors consist of various parameters such as psychological, social, employment, and family status. It seems that various medical and psychosocial complications among liver donors after donation need to be reported.⁷

Four projects related to transplantations from living donors have been carried out with the European Commission Research Support in Europe. The European Living Donor project (The EULID) contributed to creation of a European consensus to set standards and make recommendations about legal, ethical, and other aspects of living donation. The project provided standards to ensure the health and safety of living donors. Therefore, a summary of consensus about legislation, ethics, protection of the donors and registration was presented in the EULID project.⁸ The Living Organ Donation in Europe (EULOD) project promoted living donation throughout the European region to increase organ availability. The project also developed tools to use for improving the quality and safety of living organ donations. Medical screening of donors was similar, but criteria for donor acceptance varied in different centers, few absolute contraindications for donation existed, the reimbursement policies diverged, and most of the donors did not receive reimbursement for their income loss during recovery.⁹ The European Living Donor Psychosocial Follow-up (ELIPSY) project evaluated current psychosocial living donor assessment/follow-up practices in European transplant centers. The ELIPSY project revealed that only 9 out of 62 centers in European countries performed psychosocial assessment of living donors.¹⁰ The conceptual framework and results of the ELIPSY project are very important for our study content. Lastly, Living Donor Observatory (LIDOBS) focuses on living donors, and its members are transplant coordinators, nephrologists, hepatologists, transplant surgeons, and other physicians and/or nurses involved in transplant programs. All of them are working actively in living donor programs.¹¹

Several studies with a cross-sectional prospective cohort and comparative design assessed the quality of LLDs in the short- and/or long-term after donation.¹²⁻¹⁴ Several other studies assessed depression symptoms and clinically diagnosed depression rates of living donors.^{7,14} However, there have not been any studies about self-efficacy and social support levels of LLDs.

Conceptual Framework

The psychosocial status during the organ donation process may be explained by the "gift exchange theory." The "gift

exchange theory" in the transplantation literature was first used to describe the process for deceased donor transplants.¹⁵ It was later utilized to describe the living donation process, especially to examine the psychosocial status of the donor and the recipient.¹⁶ The gift exchange theory consists of the steps "to give," "to receive," and "to give in return (to reciprocate)."¹⁵ The stage "to give" refers to the donor's decision-making for donation before transplantation. The stage "to receive" refers to the recipient's acceptance of the donor's organ donation and depends on the relationship between the donor and the recipient. The stage "to return (to reciprocate)" involves the process of giving back. According to the gift exchange theory, a person decides to give a gift in the first step. This refers to the "donor's decision-making process to donate" before donation. In the second step, the other person accepts the gift. This step corresponds to the "recipient's acceptance of the organ from a living donor" before transplantation in the organ donation process. In the next step, the gift-receiver reciprocates the gift. Therefore, the third step concerns the feelings of the recipient about the donor after transplantation in living donation. During this stage, the donor-recipient relationship may be strengthened, and a special bond between them can be formed. If recipients feel deficient in reciprocating, being thankful can change into distress.¹⁶ In addition, donors can have some expectations in return for their sacrifice and the special gift they have given. Their unfulfilled expectations can affect the relationship between donors and recipients and their psychosocial status.¹⁶ Since the study focused on the third step, "to return (to reciprocate)" in the gift exchange theory, only living donors were assessed after transplantation.

The postoperative psychosocial status of LLDs and the risk factors affecting psychosocial outcomes of living liver transplantations were explained based on the gift exchange theory in this study. The "to give in return (to reciprocate)" step of the theory was used to describe the psychosocial status of LLDs.

Aim

This study aimed to evaluate risk factors affecting psychosocial outcomes of LLDs after liver transplantations.

MATERIALS AND METHODS

Informed consent was obtained from all the participants prior to data collection. The Non-invasive Research Ethical Committee at Dokuz Eylul University (Date: 03.08.2017, Approval number: 2017/20-12, Field Number= 3504-GOA) approved the study protocol.

Design and Participants

This descriptive and cross-sectional study evaluated the psychosocial well-being of the LLDs during different time intervals elapsed after transplantation. The study used the valid and reliable self-report tools to assess the psychosocial well-being of the donors.

The sample consisted of LLDs who were registered and followed by 2 different liver transplantation centers in 2 different provinces (İstanbul and İzmir). In addition, donors whose routine follow-up was ongoing or who could be contacted with their contact information (mailing address, mail address, telephone number) and who were willing to take part in the study were included in the sample.

There are a limited number of studies investigating similar psychosocial factors and examining these factors with similar measurement tools. Ladner et al's¹⁷ study assessed the quality of life (SF-36) and predictors of living liver donation. The race and education of donors, health status of recipients, and time elapsing after donation (years) were found to affect the physical component score of SF-36 in Ladner et al's study. The education level, having the smallest odds ratio in Ladner et al's¹⁷ study, was used to calculate the sample size of the present study. In the calculation made in G Power 3.0.10 program, the sample size was found to be 104, based on the odds ratio of 0.531, type I error of 0.05, and type II error of 0.20. A total of 110 LLDs completed the questionnaires.

Instruments

A sociodemographic questionnaire, The Beck Depression Scale, SF-36, General Self-Efficacy Scale, and Perceived Available Support Scale were used to collect data.

The Sociodemographic Questionnaire

It is composed of questions about sociodemographic characteristics, relationship with the recipient, health status of the recipient after transplantation, and clinical characteristics (time after the operation, body mass index, liver lobe, amount of liver, hospitalization time, complications, and chronic diseases) of the LLDs.

The Beck Depression Inventory

The Beck Depression Inventory (BDI) was developed by Beck¹⁸ in 1961. It was adapted into Turkish by Hisli¹⁹ in 1989. It is a 21-item self-report scale to assess the presence and severity of depression symptoms.¹⁹ Each item is scored on a 4-point Likert scale. The total score ranges from 0 to 63.

Higher scores indicate more severe depression. A score of 17 or higher is suggestive of the presence of depression. The internal consistency coefficient of the BDI was 0.98 in the Turkish population.¹⁹ It was 0.88 in this study.

The 36-Item Short Form Health Survey

The 36-item Short Form Health Survey (SF-36) is composed of 35 items and 8 subscales titled physical functioning (10 items), physical role (4 items), bodily pain (2 items), vitality (4 items), general health (5 items), social functioning (2 items), emotional role (3 items), and mental health (5 items). The possible range of scores for each subscale is 0-100. The subscales can be categorized into 2 constructs: the physical component summary score (PCS) and the mental component summary score (MCS). Cronbach's alpha was 0.73-0.76 for the original scale²⁰ and 0.75-0.76 for its Turkish version.²¹ The calculated component summary health score for SF-36 varies. Cronbach's alpha for the instrument was 0.82-0.88 in the present study.

General Self-Efficacy Scale

Sherer et al²² (1982) developed the original 23-item and 2-factor structure of the scale. The factors were general self-efficacy (Cronbach's alpha = 0.86) and social self-efficacy (Cronbach's alpha = 0.71). The original scale was converted to a 5-point Likert scale. In the present study, the 5-point Likert form was used. For example, responses to questions such as "How well does it define you?" range from "not at all" to "very well." The total scale score ranges from 17 to 85, and higher scores indicate a stronger belief in one's self-efficacy. Yıldırım and İlhan²³ adapted the scale into Turkish. Cronbach's alpha was 0.80 in the present study.

The Perceived Available Support Scale

The Perceived Available Support Scale is one of the dimensions of the Berlin Social Support Scales, developed by Schulz and Schwarzer.²⁴ It consists of 2 subscales, namely the emotional and instrumental (a total of 8 items). The scale requires a 4-point Likert type response ranging from "no-fit" (1) to "fit-completely" (4). The total scale score ranges from 8 to 32, and higher scores mean availability of more support. Kapıkıran and Acun Kapıkıran²⁵ adapted it into Turkish. Cronbach's alpha for the scale and its subscales was reported to range between 0.80 and 0.88. Cronbach's alpha found in the present study ranged from 0.90 to 0.94.

Data Collection

Medical data were obtained from medical records of the transplantation centers. Routine follow-up of the living

donors are performed in the centers. The donors were contacted through face to face interviews, via mail/ electronic mail, and the recipients. Data were collected between August 2017 and October 2019.

Statistical Analysis

Data were analyzed with the Statistical Package for Social Sciences (SPSS), version 23.0 software (IBM Corp.; Armonk, NY, USA). Descriptive statistics (mean, standard deviation, and percentage), the t-test, Mann-Whitney U-test, Kruskal-Wallis test, and Pearson correlation analysis were used. Bonferroni correction analysis was performed as further analysis to identify the group from which the difference originated.

RESULTS

The mean age of the recipients was 34.31 ± 8.22 years and the mean age of the donors was 31.08 ± 7.35 years (Table 1). Only 5 recipients (4.55%) were deceased. The mean time interval after the operation was 3.24 ± 3.05 years (range = 0-14). Body mass index of the donors was 24.99 ± 3.36 (range = 17.78-32.95). The right lobe was removed in 90 donors (81.81%). The amount of liver was 630.93 ± 84.52 g (range = 139.00-1050.00). The mean postoperative hospital stay was 7 days (range = 4-130). Postoperative complications developed in 14 donors (12.72%) and only 9 donors (8.18%) had a chronic disease.

Factors that Affect Psychosocial Status of Living Donors

The mean BDI score was 6.37 (min-max = 0-38), and 11.8% of the donors had a score of 17 or higher. A positive, weak correlation was found between age and physical function (r = 0.195, P < .05). There was no significant correlation between donation age and scale scores. The donors living in the city of İzmir had a higher mean mental health score than those living in the city of İstanbul (t = 2.051, P = .043). The PCS and social function scores were lower in the females than in the males (t = 2.604, P = .010; t = 2.468, P = .015 respectively). Depression and vitality scores of the females were higher than those of the males (z = 1.993, P = .049; t = 2.344, P = .021 respectively). Depression and "starting" subscale of self-efficacy scores were higher in the married donors than in the single ones (z = 2.169, P = .033; t = 2.113, P = .037 respectively). The "starting" subscale of self-efficacy scores were lower in the donors graduating from primary school than in those graduating from high school (KW =

Table 1. Sociodemographic and Clinical Characteristics of the Living Donors (n = 110)

Variables	Categories	
	Mean ± Standard Deviation	
Age	34.31 ± 8.22	
Donor age	31.08 ± 7.35	
Gender	Female	n = 52, % = 47.27
	Male	58, 52.73
Marital status	Married	79, 71.82
	Unmarried	31, 28.18
Education level	≤Primary school	18, 16.37
	Secondary school	61, 55.45
	University	31, 28.18
Employment type	Full-time	63, 57.27
	Part-time	6, 5.45
	Retired	6, 5.45
	Unemployed	35, 31.83
Financial status (monthly income) (n = 110)	≤\$500	52, 42.27
	≥\$501	58, 52.73
Postop change in financial status (n = 106)	No change	85, 80.19
	Worse	21, 19.81
Preoperative relationship with recipient (n = 97)	Special relationship	56, 57.73
	Close relationship	14, 14.43
	Normal relationship	18, 18.56
	Feel indebted	2, 2.06
	Other	7, 7.22
Relative	Yes	97, 88.18
	No	13, 11.82
Relationship (n = 97)	Mother	25, 22.73
	Father	33, 30.00
	Son	18, 16.36
	Daughter	7, 6.36
	Sister	7, 6.36
	Brother	9, 8.18
	Grandmother	1, 0.91
	Uncle	5, 4.55
	Aunt	2, 1.82
	Niece	1, 0.91
Unrelated (n = 13)	Cousin	2, 1.82
	Partner-couple	5, 38.46
	Friend	2, 15.39
	Other (Brother in law: 3, mother in law: 1, any other relative: 1)	6, 46.15

7.170, $P = .028$). Employment status was categorized into 3 groups: full-time, part-time-retired, and unemployed, in the comparison analyses. The physical function of the donors who work full-time was higher than that of the unemployed ones ($KW = 8.737$, $P = .013$). The mental health scores of the unemployed donors were higher than those of the donors in the part time-retired group ($KW = 9.255$, $P = .010$). The instrumental social support and perceived social support scores of the mothers were lower than the scores of the fathers ($KW = 15.664$, $P = .004$; $KW = 13.062$, $P = .011$) (Table 2). A weak positive correlation was found between the time after operation and the mental role/general health scores ($r = .204$, $P = .043$; $r = 0.213$, $P = .034$, respectively).

Financial status was the main factor affecting many psychosocial variables. The monthly income of the donors affected depression ($z = 3.024$, $P = .002$), physical function ($t = 2.453$, $P = .016$), body pain ($t = 3.819$, $P < .001$), social function ($t = 3.029$, $P = .003$), and mental role ($z = 2.036$, $P = .042$) subscales of SF-36 and the starting subscale of general self-efficacy ($t = 2.953$, $P = .004$) (Table 3). Moreover, the worsening of the financial status after the operation affected scores for depression, all subscales of SF-36 except general health, and the "starting" subscale of the general self-efficacy scale ($P < .05$) (Table 4). Only the vitality was affected positively by lower monthly income ($t = 2.165$, $P = .034$) and the worsening of the financial status after the operation ($t = 6.612$, $P < .001$). There was no significant difference in the social support levels of the donors in terms of financial status ($P < .05$).

A moderate, negative correlation was found between depression and PCS/self-efficacy/social support scores of the donors ($r = -0.490$, $P < .001$; $r = -0.473$, $P < .001$; $r = -0.439$, $P < .001$, respectively). A weak, positive relation was found between self-efficacy and social support scores ($r = 0.250$, $P = .008$). However, no significant correlation was detected between other psychosocial factors ($P > .05$) (Table 5).

DISCUSSION

This study focused on the "to give in return (to reciprocate)" step of the gift exchange theory to explore the psychosocial status of LLDs. Organ donation is a special and non-refundable gift given to the recipients by organ donors. If the "to give in return" process is not managed carefully, donors and recipients may be affected negatively.

In the present study, most of the donors were in the long-term stage after donation. Previous studies reported that PCS declined in a short time after donation; then, the scores increased over time.^{7,12,26} Understandably, donation would influence the physical domain and general health of LLDs in the early stage after donation.¹⁴ Donors often experience physical symptoms related to surgery (wound pain, fatigue, diarrhea, problems with inadequate nutrient intake, etc.), which affect their well-being in the short-term after donation. The MCS scores were reported to be stable over time after donation, which is consistent with the results of the present study.^{7,12,26}

In the current study, younger age was negatively associated with the quality of life (QOL), which is congruent with the results of previous studies.^{7,13,27,28} Also, younger age was a risk factor in the development of psychiatric morbidity among living donors.²⁹ The younger age group's daily life was burdensome due to their postoperative physical condition and physical appearance.²⁸ The QOL of young donors may be lower because they need to return to work and have greater family roles.

This study revealed that female gender was negatively associated with lower physical function, social function, PCS, and depression. It was reported in the literature that MCS was significantly lower in female LLDs.^{27,28,30} The female gender was a factor in the development of psychiatric morbidity.^{29,30} Although it was expected that married donors could have more social support and decreased depression levels based on previous studies,^{27,28} the depression symptoms of the married donors were worse in this study. The study showed that the social support for mother donors was lower than it was for fathers. This can be explained by expectations from married female donors (mother, daughter, sister, and niece) to continue to fulfill their responsibilities in their homes after the operation. Traditionally, housework, childcare, and patient care are considered predominantly women's responsibilities in Turkish culture. Although both the donor and recipient were affected by the operation, the fact that a living donor was a female meant that the person responsible for the care and housework was affected. The high level of depression in female and married donors may be due to these socio-cultural burdens on women.

The low education level is a risk factor for self-efficacy of LLDs, and high depression levels affect self-efficacy negatively, while high social support has a positive effect, and LLDs experience increased self-esteem, empowerment, and community awareness.^{16,31} In previous studies, the low education level was reported to be a risk factor based

Table 2. The Psychosocial Status of Living Donors According to Sociodemographic Variables

Variables	Psychosocial Variables	Categories	Mean \pm SD	z/t/KW	P
Center	Mental health	Center I (n = 68)	32.82 \pm 16.26	2.051	.043*
		Center II (n = 42)	26.19 \pm 16.84		
Gender	Depression	Female (n = 52)	7.92 \pm 8.74	1.993	.049*
		Male (n = 58)	4.98 \pm 6.41		
	Vitality subscale of SF-36	Female (n = 52)	42.02 \pm 20.13	2.344	.021*
		Male (n = 58)	33.02 \pm 20.09		
	Social function subscale of SF-36	Female (n = 52)	67.55 \pm 24.16	2.468	.015*
		Male (n = 58)	78.02 \pm 20.32		
PCS	Female (n = 52)	48.18 \pm 8.94	2.604	.010**	
	Male (n = 58)	52.48 \pm 8.33			
Marital status	Depression	Married (n = 79)	7.92 \pm 8.74	2.169	.033*
		Unmarried (n = 31)	4.98 \pm 6.41		
	Starting subscale of GSE	Married (n = 79)	42.02 \pm 20.13	2.113	.037*
		Unmarried (n = 31)	33.02 \pm 20.09		
Education	Starting subscale of GSE	\leq Primary school ^a (n = 18)	33.33 \pm 10.60	7.170	.028* a<c
		Secondary school ^b (n = 61)	38.03 \pm 6.50		
		\geq High school ^c (n = 31)	40.35 \pm 4.59		
Employment type	Physical function subscale of SF-36	Full time (n = 63)	82.06 \pm 19.17	8.737	.013** a>c
		Part time-retired (n = 12)	83.57 \pm 16.51		
		Unemployed (n = 35)	71.57 \pm 18.89		
	Mental health subscale of SF-36	Full-time (n = 63)	29.71 \pm 16.63	9.255	.010** b<c
		Part-time-retired (n = 10)	17.60 \pm 15.11		
		Unemployed (n = 35)	34.29 \pm 15.74		
Relatives	Instrumental support	Mother ^a (n = 23)	10.70 (3.02)	15.664	.004 a<b
		Father ^b (n = 28)	13.68 (2.21)		
		Son or Daughter ^c (n = 15)	11.73 (2.74)		
		Other relative ^d (n = 17)	12.00 (3.45)		
		Unrelated ^e (n = 13)	11.15 (3.26)		
	Perceived social support	Mother ^a (n = 23)	21.61 (4.73)	13.062	.011 a<b
		Father ^b (n = 28)	26.79 (4.24)		
		Son or Daughter ^c (n = 15)	22.80 (5.89)		
		Other relative ^d (n = 17)	24.71 (6.63)		
		Unrelated ^e (n = 13)	21.92 (6.26)		

PCS, physical component summary; GSE, general self-efficacy. * $P < .05$, ** $P < .01$.

on MCS.^{17,30} Self-efficacy is expected to be higher in high-school graduates.²³ Therefore, considering that the level of self-efficacy is lower in donors with low education levels, it is recommended that donors are provided with more comprehensive education and participate in their own healthcare behavior decisions. Healthcare professionals

should be attentive to pre-donation informed consent and post-donation care instruction in donors with low education levels.¹⁷

Living donors need physical care after the operation and psychosocial support to cope with psychosocial

Table 3. The Psychosocial Status of Living Liver Donors According to Financial Status

Variables	Depression, n ± SD	SF-36					Starting Subscale of GSE
		Physical Function	Bodily Pain	Vitality	Social Function	Mental Role	
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
≤\$500 (n = 52)	8.57 ± 8.81	75.00 ± 19.64	63.32 ± 22.96	43.58 ± 21.56	69.58 ± 23.83	54.72 ± 42.41	35.91 ± 8.40
≥\$501 (n = 58)	2.92 ± 3.24	86.04 ± 14.82	84.29 ± 20.79	32.50 ± 19.00	82.81 ± 14.19	75.00 ± 35.78	40.13 ± 4.13
Test and P values	z = 3.024; P = .002**	t = 2.453; P = .016*	t = 3.819; P < .001***	t = 2.165; P = .034*	t = 3.029; P = .003*	z = 2.036; P = .042*	t = 2.953; P = .004**

GSE, general self-efficacy. *P < .05, **P < .01, ***P < .001.

problems. LLDs were reported to feel a lack of emotional support.¹⁶ It is stated in the literature that social support levels of living donors are important variables in psychosocial evaluation.³² Studies examining the level of social support after donation could not be accessed. The level of social support of donors needs to be examined during the post-donation process.

Financial status was found to be the main risk factor for the psychosocial status of LLDs in the present study. However, it was surprising that worse financial status positively affected vitality. The SF-36 vitality subscale assesses the general level of energy/fatigue. Although it is expected that the QOL of donors with poor or deteriorating financial status will decrease, interestingly, it positively affected the vitality subscale in this study. Dew et al¹³ reported that between 7% and 60% of the donors experienced socioeconomic concerns (e.g., insurance difficulties, and financial expenditures). They stated that socioeconomic concerns caused psychological and physical concerns.¹³ Fifteen to 37% of the donors in Dew et al's⁷ study and 44% of the donors in DiMartini et al's³³ study had financial difficulties due to donation. It has been stated in the literature that donors experienced out-of-pocket LLD expenses (i.e., lost wages, transportation, housing, food expenses, and child/family care costs) and major financial problems.^{7,33} Donation-related financial costs were reported to affect MCS of donors.³⁰ Employment is an important issue in terms of financial status. In the present study, 42.27% of the donors had an income under \$500, and those were the donors who did not have a full-time job. Post-donation employment rates were reported to be between 48% and 95%.¹³ Previous studies have shown that some donors become unemployed after donation^{13,14} and that donors who have a job do not have a sufficient income to cover the extra costs incurred after the operation. Because

lower-income and employment type (non-professional position) predicted burdensome donation costs, financial concerns should be evaluated in detail before donation.⁷ In Tukey, all donors are assessed by a psychiatrist before donation. The psychiatric examination does not involve a standard structured interview. It usually involves a psychopathological evaluation. There is no detailed investigation as to whether donors have financial support after donation, but this is not considered a contraindication. The present study showed that financial assessment is a very important component of the donor assessment process. All living donor candidates should be evaluated psychosocially with a structured, reliable, and validated tool before donation to determine if psychosocial variables affect after-donation outcomes.³⁴

This study has several limitations. First, a self-report survey method was used to collect data. This might have created a self-reporting bias. Second, although valid and reliable tools were used for data collection, these questionnaires had been developed and adapted in the samples consisting of the general population. The LLDs specific psychosocial assessment questionnaires could help to perform a comprehensive assessment of living donors. Third, the living donors were evaluated only once after transplantation, and the time elapsing after transplantation was different for each donor. In addition, since the participants were not evaluated before donation, a comparison between pre- and post-donation could not be made. For this reason, it can be recommended that longitudinal studies that allow the comparison of donors before and after donation should be performed. Fourth, the study had a cross-sectional design. A longitudinal study would be useful to explore psychosocial status after donation. Finally, filling the data collection tools was subject to voluntary basis, and the response rate among the donors was low. Those who did not respond could not

Table 4. The Psychosocial Status of Living Donors According to the Change in Financial Status After the Operation

	SF-36										Starting Subscale of GSE	Total GSE
	Depression	Physical Function	Physical Role	Bodily Pain	Vitality	Social Function	Mental Role	Mental Health	Mean ± SD	Mean ± SD		
No change/better (n = 85)	Mean ± SD 4.09 ± 4.57	Mean ± SD 83.41 ± 16.24	Mean ± SD 71.18 ± 36.09	Mean ± SD 75.41 ± 20.62	Mean ± SD 31.88 ± 17.15	Mean ± SD 80.29 ± 16.63	Mean ± SD 74.90 ± 35.97	Mean ± SD 42.10 ± 14.51	Mean ± SD 38.93 ± 6.73	Mean ± SD 68.13 ± 8.93		
Worse (n = 21)	Mean ± SD 15.43 ± 10.20	Mean ± SD 64.05 ± 20.16	Mean ± SD 32.14 ± 41.94	Mean ± SD 49.52 ± 25.98	Mean ± SD 59.29 ± 17.77	Mean ± SD 49.40 ± 23.21	Mean ± SD 33.33 ± 36.51	Mean ± SD 27.58 ± 15.82	Mean ± SD 33.86 ± 7.83	Mean ± SD 61.48 ± 10.57		
Test and P values	Z = 5.237; P < .001***	t = 4.656; P = .000***	t = 4.296; P = .000***	t = 4.884; P = .000***	t = 6.512; P < .001***	t = 7.009; P < .001***	z = 4.237; P < .001***	t = 3.825; P < .001***	t = 2.993; P = .003**	t = 2.946; P = .004**		

GSE, general self-efficacy. *P < .05, **P < .01, ***P < .001.

have answered because they had been more affected psychosocially. Therefore, a national living donor monitoring program involving psychosocial evaluation is needed.

Recommendations for Prevention of Negative Psychosocial Outcomes in Living Donors

Younger, female, single living-donor candidates and donors should be evaluated in detail in terms of psychosocial aspects before and after donation. All family members of these donors should be involved in the donation process and should be informed about all aspects of donation. The support needs of female donors during the recovery period and presence and sufficiency of someone to take care of them must be absolutely evaluated.

- Self-efficacy status should be evaluated and the self-efficacy level of the donor should be improved after donation.
- Special attention should be paid to the education of donors with low education levels involving the donation process, risks, and post-donation care.
- Social support levels and social support resources should be evaluated before and after transplantation. Also, healthcare professionals should determine the support needs of living donors.
- Pre-transplantation financial status of the patients, conditions likely to create a risk after donation, and financial support needs of the donors should be determined. The patients and their families should be given detailed information about post-transplant conditions likely to affect their financial status and expenditures. Post-transplant financial status of donors and negative effects on their financial status must be absolutely questioned. In Turkey, liver transplantation from a living donor is completely paid for by the social security system. However, recipients can have some financial losses that are not compensated by the social security system, such as lost wages, transportation, housing, food expenses, and child/family care costs, and accommodation expenses of the donors living away from the city. It can be recommended that a new system that provides financial and logistic support for donors should be established in transplantation centers throughout Turkey, where the number of transplantations from living donors is very high.

CONCLUSION

The distress experienced during the data collection phase showed that donors might have negative experiences about the living donation process. The transplantation

Table 5. Correlations Between Depression, Quality of Life, Self-Efficacy, and Social Support

	Quality of Life PCS	Quality of Life MCS	Self-Efficacy	Social Support
Depression	$r = -0.490$ $P < .001^{**}$	$r = .067$ $P = .487$	$r = -0.473$ $P < .001^{**}$	$r = -0.439$ $P < .001^{**}$
Quality of life FSS			$r = 0.168$ $P = .079$	$r = 0.171$ $P = .074$
Quality of life MSS			$r = -0.176$ $P = .067$	$r = -0.020$ $P = .832$
Self-efficacy	$r = 0.168$ $P = .079$	$r = -0.176$ $P = .067$	-	$r = 0.250$ $P = .008^*$

PCS, physical component summary; MCS, mental component summary. * $P < .01$; ** $P < .001$.

centers had difficulties in follow-up of living donors. They need to have a strong follow-up program for living donors after the operations.

Female gender and unmarried marital status were associated with a higher depression level; gender and employment status were associated with the QOL; and unmarried marital status and low education levels were associated with lower self-efficacy of the living donors in this study. Only the donor-recipient relationship was associated with social support levels of the living donors. Worse financial status before and after transplantation mainly affected the psychosocial status of the living donors negatively. High depression levels had a negative relation with the physical component, self-efficacy, and social support levels of the living donors. High self-efficacy was positively related to social support. Financial status needs to be assessed in detail before and after the operation. Detailed information and counseling should be provided about the living donor process after the operation, affecting the financial situation. The "to give in return" step of organ donation according to the gift exchange theory needs to be managed carefully. Therefore, continuous monitoring and evaluation of the psychosocial status of living donors are important. A high-quality pre-donation psychosocial assessment should be made before donation for better psychosocial outcomes after donation. Further studies should be performed to develop well-structured and detailed psychosocial assessment tools for use in evaluating living donors.

Ethics Committee Approval: The protocol for the research project has been approved by the Dokuz Eylül University Non-invasive Research Ethics Board of the institution within which the work was undertaken. Ethical Committee Name: Dokuz Eylül University Non-invasive Research Ethics Board. Ethical approval number: 2017/20-12, Field Number: 3504-GOA. Ethical approval date: 03.08.2017.

Informed Consent: Written informed consent was obtained from the patients who agreed to take part in the study.

Peer Review: Externally peer-reviewed.

Author Contributions: Concept – Y.S.O., A.K.H.S., Ö.K.; Design – Y.S.O., A.K.H.S., Ö.K.; Materials – Y.S.O., A.K.H.S., Ö.K., M.K., C.A.B., Y.T.; Data Collection and/or Processing – G.A.K., M.K., C.A.B., Y.T.; Analysis and/or Interpretation – Y.S.O., A.K.H.S.; Literature Search – Y.S.O., A.K.H.S., Ö.K.; Writing Manuscript – Y.S.O., A.K.H.S.; Critical Review – Ö.K., C.A.B., M.K.

Acknowledgment: The authors would like to thank the patients who voluntarily participated in the study.

Declaration of Interests: The authors have no conflict of interest to declare.

Funding: This study was funded by International Transplant Nurses Society (2017 ITNS Research Grant Award).

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