

Psychological profiles of excluded living liver donor candidates

An observational study

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Abstract

Living donor liver transplantation has advantages over deceased organ liver transplantation. However, the living liver donor candidates must be carefully assessed before surgery. Candidates may be excluded for various reasons. The purpose of this study was to evaluate the psychological profiles of excluded living liver donor candidates according to the reason for exclusion.

A descriptive and cross-sectional study was conducted. Donor candidates were invited to participate if they were at least 20 years of age, related biologically or by marriage to the recipient (within 5 degrees), and had undergone living donor evaluation. Among the 338 participants recruited from August 2013 to December 2015, 116 were excluded for the following reasons: a medical condition ($n=35$), failure to be chosen ($n=63$), or withdrawal from the selection process ($n=18$). The psychological profiles of these 3 exclusion groups were evaluated.

There were no significant group differences in age, sex, education level, religion, marital status, and consanguinity ($P > .05$). The *withdrawal* group had fewer recipients with an hepatitis B virus infection than did the other groups ($\chi^2=9.28$, $P=.01$). Additionally, compared with the *unchosen* group, the *withdrawal* group had lower intimacy with the recipient ($F=5.32$, $P=.006$) and higher ambivalence ($F=5.53$, $P=.005$). In terms of family relationship parameters, the *withdrawal* group had lower family cohesion than the *medical condition* and *unchosen* groups ($F=4.44$, $P=.01$), lower family expressiveness than the *medical condition* group ($F=3.76$, $P=.03$), and higher family conflict than the *medical condition* and *unchosen* groups ($F=7.05$, $P=.001$). The *withdrawal* group also had lower emotional social support than the *medical condition* group ($F=3.55$, $P=.03$). There were no significant group difference in motivation, expectations, donation-related concerns, informational social support, value social support, instrumental social support, and health-related quality of life.

The living donor candidates who withdrew from the selection process had obvious ambivalence, poorer family relationships, and insufficient emotional social support. The transplantation team should respect the autonomy of the candidate's decision and mitigate the impact of the donation decision on living liver donor candidates.

Abbreviations: LDLT = living donor liver transplantation, MCS = mental component summary, MOS SF-36 = Medical Outcome Survey, 36-items, PCS = physical component summary.

Keywords: ambivalence, living donor liver transplantation, psychological health, quality of life

1. Introduction

Living donor liver transplantation (LDLT) is accepted worldwide as a common practice for patients with end-stage liver disease, especially in Asia.^[1-4] LDLT has several advantages over deceased organ liver transplantation, with equivalent outcomes for recipients; however, LDLT can potentially have a negative

impact on a healthy donor, resulting in an ethical dilemma.^[5-8] Therefore, candidate living liver donors must undergo a structured and thorough selection process. A complete donor workup should include assessment of demographic data and medical history, laboratory tests and examinations, and also psychosocial assessment. Donor candidates should have a good

Editor: Chun Gao.

Funding: The present report was based on a study (entitled: Relationships and predictors of decision making, family relationship, and quality of life of living liver donors: a longitudinal study) funded by the Ministry of Science and Technology of Taiwan (Fund Number: MOST NSC102-2628-B182-020-MY3, NMRPD1C1113; MOST NSC106-2314-B182-007-MY2, NMRPD1G1271-2).

The authors have no conflicts of interest.

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Medicine (2018) 97:52(e13898)

Received: 12 August 2018 / Received in final form: 16 October 2018 / Accepted: 6 December 2018

<http://dx.doi.org/10.1097/MD.0000000000013898>

understanding of the morbidity and mortality of living liver donation and confirm their voluntary participation, with the absence of coercion, before the donation decision is made via consultations with a transplant coordinator, social worker, psychiatrist, or donor advocate staff member.^[9–12] Furthermore, the reasons for exclusion from the selection process should be recorded and analyzed to further improve donor quality of care.^[3]

There are several reasons for excluding donor candidates, including a medical condition, withdrawal of consent, availability of better donors, recipient death, recipient recovery, or the selection of deceased donor liver transplantation.^[3] Additionally, donor candidates may be excluded for psychosocial reasons, such as high anxiety and ambivalence, insufficient support, perceived coercion, and a history of a mental disorder.^[11,13] Numerous studies have reported psychosocial differences between excluded and actual donors. For example, excluded living liver donor candidates have been shown to have significantly higher ambivalence and lower family support than in actual living liver donors.^[14] Furthermore, donor candidates who withdrew from the evaluation process have been shown to have a lower mental quality of life than that in actual donors.^[15] Additionally, actual living donors seem to receive more support from family,^[16] and have a better mental quality of life than potential donors.^[17]

Starting from 2013, all living donor candidates who underwent the evaluation process at our center were asked to participate in a prospective health-related quality-of-life survey. The psychological profiles and exclusion reasons for the excluded donor candidates were also evaluated. Both excluded and actual donors were involved with the recipient, who was a relative facing a major surgery (liver transplantation). However, no study has aimed to further analyze the psychological profiles of excluded donor candidates according to the exclusion reason, which would allow a better and more detailed understanding of the mental health status during the evaluation, and may help strengthen the quality of living donor care. In addition, the psychological health of the living organ donor includes not only emotional and psychiatric illness aspects, but also includes donation-related attitudes and perceptions, perceived social support, quality of family relationships, and overall well-being.^[18,19] Therefore, the purpose of the present study was to analyze the psychological profiles of excluded donor candidates according to the reason for exclusion.

2. Materials and methods

2.1. Patients

This descriptive and cross-sectional study was conducted at a medical center in northern Taiwan. Donor candidates were eligible to participate if they were at least 20 years of age, biologically related to the recipient or related through marriage (within 5 degrees, including in-laws), and had undergone living donor evaluation. The living liver donor evaluation procedure was based on regulations and laws, whereby a transplant coordinator reviewed the procedures and provided information regarding LDLT to the donor candidates. The first phase of the medical evaluation included a medical history, laboratory tests, liver function tests, and viral hepatitis B and C screening. The second phase of assessment included radiological examinations (eg, liver computer tomography, angiography), which were used to determine the donor candidate's physical health status. Donor candidates also consulted with a psychiatrist and social worker to confirm their voluntary and resource readiness.

When the candidate came to the clinic for candidacy assessment, they were approached by a trained research assistant and invited to participate in this study. Participants were informed of the purpose of the research and the process of data collection. If they agreed to participate, written consent was obtained. This study was approved by the Institutional Research Ethics Committee of the study hospital (Approval No. 102-1974B). Autonomy was assured by informing the participants that they could refuse to participate or withdraw from the study at any time with no penalty. Participants also were assured that the results of the study were for academic purposes only and that the members of the transplantation team would not have access to the raw data. A numerical code was used to replace the participant's name, thereby assuring confidentiality.

2.2. Procedure

After consent, participants were given a set of questionnaires (described in section 2.3), which were returned immediately after completion. After a period of approximately 1 month, the transplantation coordinator provided information regarding the final decision of the donation (eg, whether the candidate became an actual donor or not) and the reason for exclusion, as appropriate.

2.3. Questionnaires

The evaluated psychological profile included donation-related attitudes, donation-related concerns, family relationships, social support, and health-related quality of life, as assessed by the Donor Attitude Scale (section 2.3.1), Living Liver Donor Candidate Concerns Scale (section 2.3.2), Family Environment Scale (section 2.3.3), Social Support Scale (section 2.3.4), and Medical Outcome Survey (section 2.3.5). In addition, basic data were collected (section 2.3.6).

2.3.1. Donor attitude scale. The Donor Attitude Scale, developed by Dr Simmons et al, was used to measure ambivalence, motivation, and expectations regarding living organ donation.^[20,21] The first part of the questionnaire comprises a 7-item ambivalence subscale (sample item, "How difficult was it for you to decide to donate?"). For each item in the ambivalence subscale, 0 indicates no ambivalence and 1 indicates ambivalence. Thus, the total subscale score ranges from 0 to 7, with higher scores indicating a higher degree of ambivalence. The Chinese version of the ambivalence subscale was developed through translation, and permission for its use was obtained.^[22] The second part comprises a 10-item donation motivation subscale (sample items, "I am donating because I see myself as the kind of person who helps others" and "I am donating because my religious beliefs suggest that I should help others"). The response to each item indicates the level of agreement with the statement, ranging from 1 to 7, with 1 indicating strong disagreement and 7 indicating strong agreement. The total score for the subscale ranges from 10 to 70, with higher scores indicating higher donation motivation. The third part comprises a 9-item donation expectation subscale (sample items, "My family will express gratitude to me," "I will feel good inside," and "This will give a special meaning to my life"). The response to each item indicates the level of agreement with the statement, ranging from 1 to 10, with 1 indicating strong disagreement and 10 indicating strong agreement. The total subscale score ranges from 9 to 90, with higher scores indicating higher donation expectations. In the present study, the internal consistency, or reliability of the 3

subscales, as assessed by Cronbach α , was 0.71, 0.77, and 0.87, respectively.

2.3.2. Living liver donor candidate concerns scale. Donation-related concerns were measured by the Living Liver Donor Candidate Concerns Scale.^[23] The scale contains 31 items comprising 3 domains: physical concerns (17 items), financial concerns (7 items), and psychosocial concerns (7 items) (sample items, “I am concerned about the surgical wound and scar” and “I am concerned that I may lose my job after the surgery”). Responses are given on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The obtained score is divided by the possible total score for each aspect and then multiplied by 100. Thus, the transformed score of each aspect ranges from 0 to 100.^[23] Higher scores indicate higher levels of donation concern. In the present study, the internal consistency, or reliability, as assessed by Cronbach α , was as follows: physical concerns, 0.96; financial concerns, 0.95; and psychosocial concerns, 0.88.

2.3.3. Family environment scale. The Family Environment Scale, developed by Dr Moos and Moos,^[24] includes 10 subscales that assess 3 domains of the family environment, including relationships, personal growth, and system maintenance. We used 3 subscales from the family relationship domain (the family cohesion, family expressiveness, and family conflict subscales). The family cohesion subscale measures the degree of commitment and support among family members; the family expressiveness subscale measures the extent that family members can express their feelings directly; and the family conflict subscale measures the amount of openly expressed conflict among family members. There are 9 items in each subscale. The response to each item indicates whether the statement is true (1) or false (0), with the total subscale score ranging from 0 to 9. Higher scores on the family cohesion subscale indicate stronger relationships among family members. Higher scores on the family expressiveness subscale indicate that family members can express their emotions more directly. Higher scores on the family conflict subscale indicate that family members experience more family-related conflict and anger. The internal consistency, or reliability, as assessed by Cronbach α , was 0.71, 0.34, and 0.71, respectively.

2.3.4. Social support scale. Social support was measured by a self-report scale with 16 items that assess emotional support (4 items focusing on emotional interactions; eg, making someone feel love and joy), value support (4 items focusing on the provision of feedback; eg, affirmation of the support for one's values), instrumental support (4 items, focusing on the provision of practical assistance; eg, household help), and informational support (4 items focusing on the provision of teaching, counseling, and information).^[25] Responses are given on a 0 to 3-point Likert scale; the total score for each aspect ranges from 0 to 12, with higher scores indicating higher social support. Reliability and validity have been previously tested and confirmed.^[25] Cronbach α was 0.90, 0.89, 0.85, and 0.87, respectively, indicating acceptable internal consistency.

2.3.5. Medical outcome survey, 36-item health-related quality-of-life scale. The Medical Outcome Survey (MOS SF-36), Chinese version, was used to measure physical and psychological well-being.^[26] The 36-item instrument consists of 8 subscales: Physical Functioning, Role Physical, Bodily Pain, Vitality, General Perception of Health, Social Functioning, Role Emotional, and Mental Health. This scale is used worldwide and has good reliability and validity.^[27] The scores on the 8 subscales

can be combined into 2 dimensions: the Physical Component Summary (PCS) score, which indicates physical well-being; and the Mental Component Summary (MCS) score, which indicates psychological well-being. The summary scores range from 0 to 100, with higher scores indicating better physical/psychological well-being. In the present study, the PCS and MCS scores were analyzed.

2.3.6. Basic data. Basic data of the donor candidates were collected, including age, sex, marital status, education level, religion (yes or no), relationship to the recipient (spouse, child, sibling, and other relatives), and intimacy of the relationship with the recipient (0–4; 0 = not close at all, 1 = not very close, 2 = somewhat close, 3 = close, and 4 = very close). Data on the recipients' age, sex, and indication of transplantation were also collected.

2.4. Statistical analysis

Data were analyzed using SPSS software, Version 22.0 (IBM, New York, NY). Descriptive data, including means, standard deviations (SDs), frequencies, and percentages, were used to estimate the distribution of the data. Group differences were evaluated using 1-way analyses of variance (ANOVAs) for continuous variables, followed by pair-wise comparisons for significant results. Chi-square tests with Bonferroni correction were used to examine group differences in categorical variables. The statistical significance level was set at $P < .05$.

3. Results

During the period of recruitment (August 2013 to December 2015), 353 individuals met the inclusion criteria; however, 15 individuals declined to participate in the study (not interested, 5; busy schedule, 10). Of the 338 participants, 135 (39.9%) became actual donors and 203 (60.1%) did not. Of the 203 excluded donor candidates, 36.9% were excluded for recipient-related reasons, 57.1% were excluded for donor-related reasons, and 5.9% were excluded for unknown reasons (Fig. 1). To ensure the comparability of donor candidates, the data of 116 donor candidates who were excluded because of a medical condition, failure to be chosen (better available donor), or withdrawal from assessment were analyzed.

The mean age of the participants was 33.4 years (SD 8.87). Most participants were female (57.8%), single (51.7%), had a college level of education (61.2%), and were an adult child attempting to donate to a parent (75.9%). There were no significant differences in the basic demographic data among the 3 exclusion groups (ie, *medical condition*, *unchosen*, and *withdrawal* groups), with the exception of age. The mean age of the *medical condition* group was older than that of the *unchosen* group ($P < .05$; Table 1). Similarly, the recipients' data did not significantly differ among the 3 exclusion groups, with the exception of a hepatitis B virus (HBV) infection. The *withdrawal* group had fewer HBV infected recipients compared to the other groups ($\chi^2 = 9.28$, $P = .01$; Table 1).

There were significant group differences in the psychological profiles, specifically in terms of the intimacy with the recipient, ambivalence, family relationship, and emotional social support. The pair-wise comparisons revealed that intimacy was lower in the *withdrawal* group (mean 2.83) than in the *unchosen* group (mean 3.49; $P = .006$) and ambivalence was higher in the *withdrawal* group (mean 5.61) than in the *unchosen* group

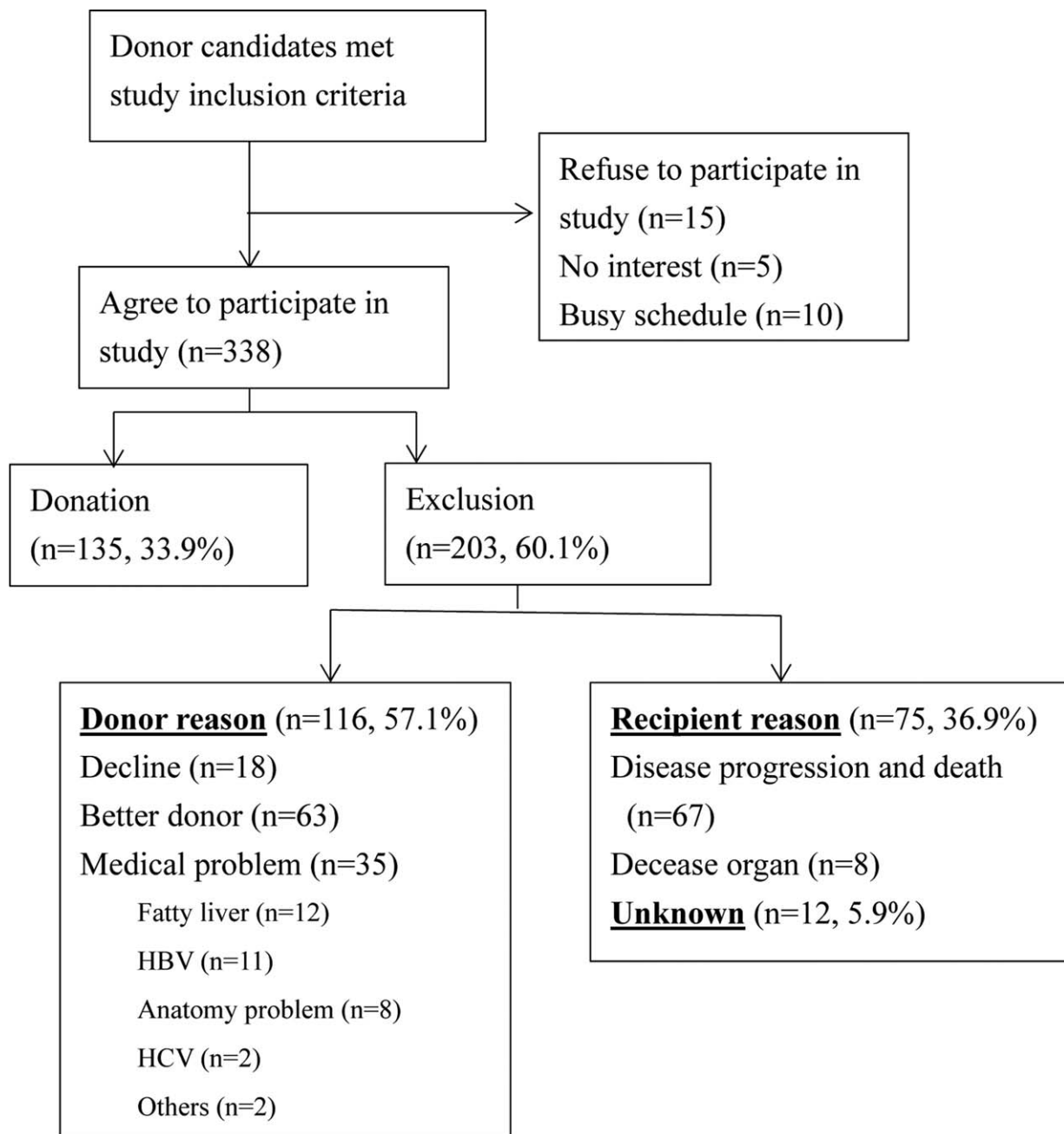


Figure 1. Reasons for exclusion from living liver donation.

(mean 3.92; $P=.005$). Among the family relationship assessments, family cohesion was lower in the *withdrawal* group than in the *medical condition* and *unchosen* groups ($F=4.44$, $P=.01$), family expressiveness was lower in the *withdrawal* group than in the *medical condition* group ($F=3.76$, $P=.03$), and family conflict was higher in the *withdrawal* group than in the *medical condition* and *unchosen* groups ($F=7.05$, $P=.001$). Additionally, emotional social support was lower in the *withdrawal* group than in the *medical condition* group ($F=3.55$, $P=.03$). In contrast, there were no significant differences in motivation, expectations, donation-related concerns, informational social support, value social support, instrumental social support, and health-related quality of life among the 3 exclusion groups ($P>.05$; Table 2).

To understand the impact of the sex relationship combination on the psychological profiles, the excluded donor candidates were sex-matched with the corresponding recipients. In child candidate-to-parent recipient relationships ($n=86$), 14 were daughter to mother (the *FF* group), 31 were daughter to father (the *FM* group), 14 were son to mother (the *MF* group), and 27 were son to father (the *MM* group). In spouse relationships ($n=11$), all were wife to husband. In sibling relationships ($n=10$), 3 were brother to brother, 6 were sister to brother, and 1 was brother to sister. In other relationships ($n=9$), 1 was niece to aunt, 4 were niece to uncle, 1 was nephew to aunt, 2 were father to son, and 1 was cousin to cousin. There was no significant association between the sex combination group and relationships ($P=.40$) (data are not shown). Considering that there were enough

Table 1**The basic data of excluded living liver donor candidates (n = 116).**

Variables	Class	Total, n (%)	Medical condition (n=35), n (%)	Withdrawal (n=18), n (%)	Unchosen (n=63), n (%)	χ^2/P or <i>FIP</i>
Donor candidates demographic data						
Age (y) (mean [SD])		33.4 (8.87)	36.5 (10.13)	33.3 (7.24)	31.8 (8.21)	3.25/.04*
Sex	Female	67 (57.8)	18 (51.4)	14 (77.8)	35 (55.6)	3.66/.16
	Male	49 (42.2)	17 (48.6)	4 (22.2)	28 (44.4)	
Religion	No	53 (46.9)	11 (33.3)	10 (55.6)	32 (51.6)	3.53/.17
	Yes	60 (53.1)	22 (66.7)	8 (44.4)	30 (48.4)	
Marriage	Single	60 (51.7)	15 (42.9)	8 (44.4)	37 (58.7)	2.72/.26
	Married	56 (48.3)	20 (57.1)	10 (55.6)	26 (41.3)	
Education	Primary	8 (6.9)	3 (8.6)	1 (5.6)	4 (6.3)	5.76/.22
	High	37 (31.9)	16 (45.7)	6 (33.3)	15 (23.8)	
	College	71 (61.2)	16 (45.7)	11 (61.1)	44 (69.8)	
Sanguinity	Spouse	11 (9.5)	4 (11.4)	2 (11.1)	5 (7.9)	10.85/.21
	Parent	2 (1.7)	2 (5.7)	0	0	
	Children	86 (74.1)	21 (60)	14 (77.8)	51 (81.0)	
	Sibling	9 (7.8)	5 (14.3)	0	4 (6.3)	
	Other relative	8 (6.9)	3 (8.6)	2 (11.1)	3 (2.6)	
Correspond recipients data						
Age (y) (mean [SD])		54.97 (8.68)	52.74 (9.11)	56 (9.26)	55.9 (8.18)	1.66/.19
Sex	Female	31 (26.7)	7 (20)	6 (33.3)	18 (28.6)	1.32/.52
	Male	85 (73.3)	28 (80)	12 (66.7)	45 (71.4)	
HBV	No	60 (51.7)	12 (34.3)	14 (77.8)	34 (54.0)	9.28/.01
	Yes	56 (48.3)	23 (65.7)	4 (22.2)	29 (46.0)	
HCV	No	80 (69)	26 (74.3)	12 (66.7)	42 (66.7)	0.66/.72
	Yes	36 (31)	9 (25.7)	6 (33.3)	21 (33.3)	
HCC	No	67 (57.8)	22 (62.9)	10 (55.6)	35 (55.6)	0.53/.77
	Yes	49 (42.2)	13 (37.1)	8 (44.4)	28 (44.4)	
Alcohol	No	89 (76.7)	27 (77.1)	10 (55.6)	52 (82.5)	5.71/.06
	Yes	27 (23.3)	8 (22.9)	8 (44.4)	11 (17.5)	

HBV=hepatitis B virus, HCC=hepatocellular carcinoma, HCV=hepatitis C virus.

* Medical condition group older than the unchosen group.

Table 2**The psychological profiles of excluded living liver donor candidates (n = 116).**

	Total Mean (SD)	Medical condition (n=35) Mean (SD)	Withdrawal (n=18) Mean (SD)	Unchosen (n=63) Mean (SD)	<i>FIP</i>
Intimacy	3.35 (0.78)	3.35 (0.73)	2.83 (0.71)	3.49 (0.78)	5.32/.006*
Donation attitude					
Ambivalence	4.36 (1.99)	4.49 (1.99)	5.61 (1.29)	3.92 (2.02)	5.53/.005†
Motivation	47.92 (9.07)	50.61 (8.46)	44.94 (10.34)	47.37 (8.78)	2.60/.08
Expectation	66.33 (14.77)	65.74 (17.34)	58.28 (12.32)	66.33 (14.77)	2.03/.14
Concerns					
Physical	52.23 (20.31)	53.08 (15.60)	57.97 (10.39)	50.08 (18.08)	1.69/.19
Financial	52.07 (20.31)	54.71 (20.30)	58.41 (17.07)	48.84 (20.82)	1.99/.14
Psychosocial	40.39 (17.47)	39.54 (18.91)	48.57 (9.75)	38.38 (18.02)	2.47/.09
Family relationship					
Cohesion	7.11 (1.88)	7.41 (1.18)	5.94 (2.43)	7.29 (1.91)	4.44/.01‡
Expressiveness	5.22 (1.71)	5.58 (1.31)	4.28 (1.63)	5.29 (1.85)	3.76/.03§
Conflict	2.41 (2.02)	1.73 (1.62)	3.83 (2.30)	2.36 (1.95)	7.05/.001
Social support					
Emotional	8.21 (3.14)	9.21 (3.08)	6.89 (2.72)	8.05 (3.15)	3.55/.03¶
Informational	6.23 (3.44)	6.33 (3.54)	5.06 (3.70)	6.51 (3.29)	1.28/.28
Value	7.13 (3.18)	7.56 (2.88)	5.94 (3.04)	7.24 (3.33)	1.62/.20
Instrumental	8.10 (3.27)	8.56 (3.05)	7.17 (3.33)	8.13 (3.36)	1.07/.35
Health-related quality of life					
MCS	44.06 (10.02)	46.82 (9.87)	39.72 (10.6)	43.78 (9.64)	2.97/.06
PCS	57.16 (6.24)	56.42 (7.07)	56.93 (6.25)	57.61 (5.83)	0.41/.67

MCS=mental component summary, PCS=physical component summary.

* Withdrawal < unchosen.

† Withdrawal > unchosen.

‡ Withdrawal < unchosen and withdrawal < medical condition.

§ Withdrawal < medical condition.

|| Withdrawal > unchosen and withdrawal > medical condition.

¶ Withdrawal < medical condition.

Table 3**Basic data of excluded living liver donor candidates by sex combination (child candidates to parent recipients) (n=86).**

Variables	Class	FF (n=14), n (%)	MM (n=27), n (%)	FM (n=31), n (%)	MF (n=14), n (%)	χ^2/P or <i>F/P</i>
Donor candidates demographic data						
Age (y) (mean [SD])		33.2 (6.94)	28.9 (5.44)	31.29 (6.34)	28.29 (5.43)	2.38/.08
Religion	No	2 (15.4)	9 (34.6)	18 (58.1)	10 (71.4)	11.70/.05
	Yes	11 (84.5)	17 (65.4)	13 (41.9)	4 (28.6)	
Marriage	Single	9 (64.3)	20 (74.1)	15 (48.4)	9 (64.3)	4.15/.25
	Married	5 (35.7)	7 (25.9)	16 (51.6)	5 (35.7)	
Education	Primary	1 (7.1)	1 (3.7)	2 (6.5)	0 (0)	7.05/.32
	High	1 (7.1)	11 (40.7)	7 (22.5)	3 (21.4)	
	College	12 (85.7)	15 (55.6)	22 (71.0)	11 (78.6)	
Correspond recipients data						
Age (y) (mean [SD])		61.1 (5.93)	56.9 (5.12)	58.7 (5.62)	54.9 (6.07)	3.31/.02*
HBV	No	11 (78.6)	16 (59.3)	14 (45.2)	10 (71.4)	5.58/.13
	Yes	3 (21.4)	11 (40.7)	17 (54.8)	4 (28.6)	
HCV	No	8 (57.1)	17 (63.0)	24 (77.4)	7 (50)	3.92/.27
	Yes	6 (42.9)	10 (37.0)	7 (22.6)	7 (50)	
HCC	No	10 (71.4)	17 (63.0)	11 (35.5)	9 (64.3)	7.46/.06
	Yes	4 (28.6)	10 (37.0)	20 (64.5)	5 (35.7)	
Alcohol	No	14 (100)	17 (63.0)	21 (67.7)	14 (100)	0.02/.91
	Yes	0 (0)	10 (37.0)	10 (32.3)	0 (0)	

FF= daughter to mother, FM= daughter to father, HBV=hepatitis B virus, HCC=hepatocellular carcinoma, HCV=hepatitis C virus, MF=son to mother, MM=son to father.

* FF group older than the MF group.

samples for statistical comparison of psychological profiles, only data for the child candidate-to-parent recipient relationships (n = 86) were compared. The result showed that the recipients were older in the FF group than in the MF group (61.1 vs 54.9; $P = .02$). The FF group had less family cohesion than the FM and MF group (5.35 vs 7.25; 5.35 vs 7.71; $P = .007$), less family expressiveness than the MF group (4.08 vs 6.14; $P = .007$), more family conflict than the MF group (4.21 vs 1.21; $P = .002$), and

less emotional support than the MF group (6.0 vs 9.93; $P = .02$) (Tables 3 and 4).

We also analyze the difference of psychological profiles between 56 *unchosen* candidates and 49 corresponding competitors (ie, the actual selected donor) for the same recipients. Results showed that there was no significant difference of psychological profiles and basic data between the *unchosen* candidates and their corresponding competitors (data are not shown).

Table 4**The psychological profiles of excluded living liver donor candidates by sex combination (child candidates to parent recipients) (n=86).**

	FF (n=14) Mean (SD)	MM (n=27) Mean (SD)	FM (n=31) Mean (SD)	MF (n=14) Mean (SD)	<i>F/P</i>
Intimacy	3.29 (0.73)	3.22 (0.85)	3.23 (0.92)	3.64 (0.63)	2.37/.07
Donation attitude					
Ambivalence	5.21 (1.48)	4.08 (2.21)	4.43 (1.92)	4.29 (1.86)	1.07/.36
Motivation	44.36 (8.29)	49.25 (9.67)	46.06 (9.16)	49.61 (10.09)	1.31/.28
Expectation	57.92 (18.41)	69.03 (14.11)	61.64 (13.75)	70.46 (15.75)	2.76/.05
Concerns					
Physical	58.40 (14.08)	51.33 (16.39)	52.11 (15.19)	54.12 (18.91)	0.68/.57
Financial	61.43 (15.39)	56.40 (14.43)	51.43 (19.39)	47.35 (26.77)	1.65/.19
Psychosocial	48.35 (12.69)	39.63 (17.13)	42.03 (14.94)	35.82 (20.43)	1.41/.25
Family relationship					
Cohesion	5.35 (2.59)	7.03 (1.84)	7.25 (1.93)	7.71 (0.83)	4.32/.007*
Expressiveness	4.08 (1.32)	5.56 (1.45)	4.80 (2.02)	6.14 (1.56)	4.35/.007†
Conflict	4.21 (1.92)	2.55 (2.17)	2.83 (2.06)	1.21 (1.12)	5.56/.002‡
Social support					
Emotional	6.00 (3.88)	7.96 (3.47)	7.81 (2.87)	9.93 (2.43)	3.57/.02§
Informational	4.43 (3.01)	6.31 (3.51)	6.30 (4.04)	8.21 (2.72)	2.69/.05
Value	5.21 (3.94)	7.27 (3.08)	7.0 (3.29)	8.36 (2.68)	2.27/.09
Instrumental	5.93 (3.54)	8.23 (3.81)	8.06 (3.23)	9.07 (2.53)	2.26/.09
Health-related quality of life					
MCS	39.57 (10.08)	45.76 (8.89)	40.56 (10.99)	47.49 (8.20)	2.84/.05
PCS	54.30 (8.54)	55.09 (7.16)	57.67 (5.34)	59.27 (2.20)	2.26/.08

FF= daughter to mother, FM= daughter to father, MCS=mental component summary, MF=son to mother, MM=son to father, PCS=physical component summary.

* FF group less than the FM and MF group.

† FF group less than the MF group.

‡ FF group more than the MF group.

§ FF group less than the MF group.

4. Discussion

In the present study, we evaluated the psychological profile of donor candidates who were excluded for various reasons: a medical condition, failure to be chosen, or withdrawal from the selection process. We found that candidates in the *withdrawal* group reported lower intimacy with the recipient, higher ambivalence, lower family cohesion, lower family expressiveness, and higher family conflict than those in the *unchosen* and *medical condition* groups. The *withdrawal* group also had lower emotional social support than the *medical condition* group. Additionally, although the difference failed to reach significance, the *withdrawal* group had lower motivation and expectations; higher donation-related concerns; lower informational, value, and instrumental social support; and lower health-related quality of life than the other 2 groups. The daughter-to-mother combination group (*FF* group) also had lower family cohesion, family expressiveness, and emotional support than the son-to-mother group.

In the present study, approximately 15.5% of candidate donors withdrew from the selection process, reflecting a lower rate than that reported in a previous study.^[3] Although the *withdrawal* group comprised a relatively small proportion of potential donors, it had the worst psychological profiles of the evaluated groups. A previous study reported that nonvolunteer living liver donors or those who postpone the donation decision experience more emotional distress than do other types of donors.^[18] Furthermore, donors who have an inability to recognize and express their feelings may tend to postpone the donation decision.^[28] In general, donors who have undergone donation surgery can have both positive and negative feelings.^[15,21,29] However, poor family relationships and a lack of emotional social support may lead candidates to decide to withdraw from the assessment process.^[30] In an effort to reduce the psychological impacts of living organ donation, the transplantation team should respect the voluntary decision of candidates during the assessment process.^[31] In the present study, the decision to withdraw from assessment was respected.

More than half of the study participants met the physical health selection criteria, but were not selected for donation. Overall, these candidates had a good psychological profile relative to that in other exclusion groups and indicated their readiness for a donation surgery. According to regulations, living donors should be among the fifth-degree relatives of the recipient, including in-laws. More than 60% of the recipients in the present study had 2 candidates, with a maximum of 4 candidates. To save the recipient's life via liver transplantation, family members are often active and willing to participate in the selection process.^[19,30] This may lead to a large number of candidates not being selected.

One of the purposes of the donor selection process is to choose the best organ source to ensure a favorable outcome for the recipient. In the present study, approximately 30% of the excluded donor candidates were excluded because of a medical condition, mainly because of fatty liver, similar to that reported in a previous study.^[3] Diet habits resulting in the excessive intake of calories and high-fat foods may be associated with the prevalence of fatty liver. Severe fatty liver may also further harm the candidate's health. In terms of promoting health, it is important for the transplantation team to assist such candidates in reducing the problems of fatty liver (eg, establishing a weight reduction program).^[3]

Good social support and family relationships may work as a buffer to mitigate psychological distress before the donation surgery.^[13,30] Thus, providing social support and referrals for

family counseling during the evaluation are important. Through a multidiscipline collaboration, the transplantation team can provide more intricate care for donor candidates. Using validated psychological tools to measure the psychological profile of donor candidates is also suggested, as this would corroborate the candidacy assessment before the donation surgery. Validated tools can not only aid in understanding the psychological status of the donor candidates but also can aid healthcare professionals in identifying suitable donors.

This study showed that the psychological profiles of the daughter candidates were relatively poor. Candidates of the daughter-to-mother group had lower family cohesion, family expressiveness, emotional support, but higher family conflict than the son-to-mother group. The reasons for this may be rooted in the cultural inference. The son was usually regarded as the successor of the family and had sufficient resources and support. Muto^[30] found that female donors reported more change among the family members than male donors. This also may be because in the daughter candidate to mother recipient group, the recipients were relatively old in this study. Sex relationship combination was indeed an interesting topic and is worth investigating further with more samples.

The study has several limitations to note. First, data were collected from a single center; thus, the generalization of the results may be limited. Second, information about the emotional status of the candidate donors, such as anxiety or depression, was not included in this study. Despite this, the present study findings could aid in extending the scope and enriching the understanding of the psychological aspects of donor candidates. Third, the reliability of the family expressiveness subscale is low. The family expressiveness subscale was used to understand the communication and interaction among family members in the face of an important family event. It is recommended that a scale better related to family dynamics be used in future studies. In addition, the study sample is a small cohort. It is suggested that a larger-scale institutional study be conducted to validate the outcomes.

5. Conclusions

In summary, candidate donors who withdrew from the selection process had worse psychological profiles than did candidate donors who were excluded for other reasons, such as a medical condition. The study findings help understand the results of the assessment of living liver donor candidates and also provide an in-depth analysis of the psychological profiles of excluded living donor candidates. On the basis of the study findings, it is recommended that good, validated questionnaires be used to aid in the assessment of donors, including family dynamics and social support of the donation candidates, and to assess whether candidates have a person who could provide support and resources. It is also recommended that the transplantation team attempt to follow up with the donor candidates who withdraw from assessment to improve the overall donor quality of care, particularly in daughter-to-mother donations.

Acknowledgments

We would like to thank Professor Hsiu-Li Huang for recommendation of statistical analysis, and also we would like to thank Editage (www.editage.com) for English language editing.

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