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The Mediating Role of Death Anxiety in the Relationship between Quality of Life and Some Symptoms of Psychological Disorders among Liver Donors

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The current study aims to identify the mediating role of death anxiety in the relationship between quality of life and some symptoms of psychological disorders among liver donors. It also investigates gender and marital status differences in death anxiety, quality of life, and symptoms of psychological disorders among liver donors. The study sample consisted of 33 liver donors from Al-Rajhi Liver Hospital in Assiut Governorate, Arab Republic of Egypt. The participants' ages ranged from 30 to 42 years (M = 36.82 years; SD = 2.973). The results showed that death anxiety

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plays a significant mediating role in the relationship between quality of life and symptoms of psychological disorders. Full mediation was found in the case of anxiety and somatic symptoms, while the direct effect of quality of life disappeared after introducing death anxiety as a mediator. This indicates that the effect is entirely indirect through death anxiety. In contrast, partial mediation was found in the cases of depression and reactive sensitivity, as the direct effect of quality of life persisted alongside the effect through death anxiety. This suggests that depression and reactive sensitivity may be influenced by multiple factors and are not limited to death anxiety. The results also revealed that female donors are more susceptible to depression, anxiety, and death anxiety, whereas male donors rated their quality of life higher than females. Moreover, marital status was not found to be a significant factor influencing depression, anxiety, quality of life, or death anxiety.

Keywords: Death Anxiety, Quality of Life, Liver Donors

Introduction

The donation of the liver or other human organs is considered legally permissible pursuant to the provisions of Egyptian Law No. 5 of 2010 concerning the regulation of human organ transplantation. Liver donation, or organ donation in general, is a humanitarian act that supports the lives of others. However, it can be a psychologically exhausting experience for some individuals and may cause the donor complex psychological effects that go beyond the medical procedure itself. These effects may include deeper thoughts and emotions related to life and death.

Liver transplant surgeries involving living donors have witnessed notable fluctuations over the years due to the influence of various factors. These surgeries reached a peak in 2001, with a recorded 524 donations. However, the death of one donor, which received widespread media coverage, led to a significant decline in donation rates, with the number of surgeries in the United States dropping to only 219 by 2009. Over time, the numbers gradually began to rise again, reaching 345 surgeries in 2016. (Kasiske et al., 2017). In 2021, a total of 34,694 liver transplants were performed worldwide, marking a significant increase in the number of procedures during that period. (Terrault et al., 2023). Although liver transplantation is the best available method for saving a patient's life, one of the main factors causing anxiety for donors is the fear of death. (Demir & Saritaş, 2022). Death anxiety is an internal sense of fear and unease triggered by thoughts of death, whether one's own death or the death of others. It is often associated with an individual's perception of the unknown after death. It can take the form of distressing internal emotions and, in some cases, it can become a chronic and excessive condition that interferes with psychological and physical well-being. (Iverach et al., 2014; Lu et al., 2024). "Death anxiety is one of the causes of stress among liver donors and can negatively affect their psychological state and its quality, in addition to other factors related to liver diseases that may weaken their

coping mechanisms (Bülbüloğlu & Demir, 2021; Teixeira et al., 2016). The impact of death anxiety is not limited to the individual's quality of life; it may also be a risk factor in the development of certain psychological disorders such as generalized anxiety, depression, and panic disorder (Iverach et al., 2014). Anxiety and depression are among the distressing symptoms faced by liver donors. Post-operative anxiety has been observed in 2.6% to 4.9% of the cases (Thuluvath et al., 2021; Tseng et al., 2023). Furthermore, the results of previous studies have shown that living liver donors experience high levels of depression and anxiety, influenced by factors such as serious post-operative complications and the recipient's health condition (Fan et al., 2023). Depression rates may range from 0–34%, and anxiety from 0–51.5% (Ong et al., 2021). Terror Management Theory suggests that when an individual has unconscious thoughts related to death, coupled with the instinct for self-preservation, this leads to a profound existential conflict, creating a form of existential anxiety referred to as "terror" (Wang et al., 2023). Modern Cognitive-Behavioral Theory also indicates that individuals who use cognitive avoidance strategies may prevent psychological problems in the short term, but this leads to emotional disorders in the long term (Rayatpisheh et al., 2023), thereby increasing the risk of developing various psychological disorders (MacDougall & Farreras, 2016). Existential Theory also emphasizes that death anxiety forms the foundation for various psychological disorders and significantly affects mental health and psychological disorders (Al Boukhary et al., 2024).

On the other hand, quality of life plays an important role in understanding the impact of donation on the donor's daily life. Quality of life refers to an individual's perception of his/her position in life within the context of his/her culture and value systems in relation to his/her goals, expectations, standards, and interests. (Puciato et al., 2023). Some studies have reported that donors whose recipients die after the transplant experience feelings of guilt, which leads to a decline in their psychological well-being (Kousoulas et al., 2011). Other studies have found differences in the quality of life of liver donors following the donation surgery. (Butt et al., 2018; Hsieh et al., 2010; Shi et al., 2020). Furthermore, other studies haves indicated that donation can be a positive experience for donors and have beneficial effects on the relationship between the donor and the recipient, and that living donors rarely regret their donation decision. (Sevmis et al., 2007; Trotter et al., 2001) Although some studies have pointed out that organ donation can be a positive experience associated with self-esteem and self-respect, other studies have shown negative psychological effects, such as lower quality of life and symptoms of psychological disorders such as anxiety and depression among some donors. This discrepancy in findings suggests the presence of mediating

factors or influencing variables that may help explain this diff discrepancy. This highlights the need to examine death anxiety as a mediating variable in the relationship between quality of life and some psychological disorders.

Research Objectives

This research aims at studying the mediating role of death anxiety in the relationship between quality of life and some symptoms of psychological disorders among liver donors. It also seeks to identify the differences in death anxiety, quality of life, and symptoms of psychological disorders according to the variables of gender and marital status among liver donors. To achieve the research objectives, the following hypotheses have been formulated:

1. The Mediating Role of Death Anxiety in the Relationship Between Quality of Life and Symptoms of psychological disorders
2. There are statistically significant differences between males and females in the study variables (depression, anxiety, symptoms, sensitivity, quality of life dimensions, and death anxiety dimensions) at the 0.05 significance level.
3. "Quality of life, death anxiety, and Symptoms of psychological disorders differ among study sample members according to marital status.

Method and Procedures

Research Sample

The research sample involved 33 liver donors from Al-Rajhi Liver Hospital in Assiut Governorate, Arab Republic of Egypt. The ages of the participants ranged from 30 to 42 years, with a mean age of 36.8182 and a standard deviation of 2.973. Each donor was asked to consent to participate in the research before the application process began, after being given a description of the nature of the study.

Table (1) presents the descriptive statistics of the study sample:

Table 1

Descriptive Statistics of the Study Sample

Variable	Category	Frequency	Percentage	Valid %	Cumulative %
Gender	Male (1)	16	48.50%	48.50%	48.50%
	Female (2)	17	51.50%	51.50%	100.00%
	Total	33	100.00%	100.00%	
Marital Status	Single (1)	8	24.20%	24.20%	24.20%
	Married (2)	22	66.70%	66.70%	90.90%
	Divorced (3)	1	3.00%	3.00%	93.90%
	Widowed (4)	2	6.10%	6.10%	100.00%
	Total	33	100.00%	100.00%	

As shown in Table (1), the study sample was balanced in terms of gender, with males comprising 48.5% and females 51.5% of the participants, indicating an appropriate representation of both sexes in the study.

Regarding marital status, most participants were married (66.7%), followed by singles (24.2%). Divorced and widowed individuals constituted a smaller portion of the sample, at 3.0% and 6.1% respectively, suggesting a tendency toward family stability within the sample.

Study Tools

World Health Organization Quality of Life–BREF (WHOQOL-BREF)

This measure is used to obtain subjective perceptions of QoL (Skevington et al., 2004). Translated into Arabic by (Rayatpisheh et al., 2023).The WHOQOL-BREF includes four domains of QoL: physical capacity (seven items), psychological well-being (six items), social relationship (four items), and environment (nine items). All items are scored on a five-point Likert scale, with higher scores indicating better QoL The internal consistency of the Quality-of-Life Scale was assessed using Cronbach's alpha coefficient. The reliability coefficients for each subscale and the overall scale are presented in Table (2).

Table 2

Cronbach's Alpha Coefficients for the Quality-of-Life Scale

Dimension	Physical	Psychological	Environmental	Total Scale
Cronbach's Alpha	0.675	0.770	0.630	0.818

Cronbach's alpha was computed to evaluate the internal consistency of the items comprising each subscale of the Quality-of-Life Scale as well as the full scale.

The psychological domain yielded an alpha coefficient of 0.770, which is considered acceptable to good, indicating a satisfactory level of internal consistency among the items (Nunnally & Bernstein, 1994). The physical ($\alpha = 0.675$) environmental ($\alpha = 0.630$) subscales demonstrated marginal reliability, falling within the minimum acceptable range (Jr et al., 2010). The total scale showed a high reliability level ($\alpha = 0.818$), indicating strong overall internal consistency.

These results suggest that the Quality-of-Life Scale possesses acceptable reliability across its dimensions, with minor improvements recommended for the physical and environmental domains. The total scale, however, shows strong reliability and is suitable for research use.

The Arabic Scale of Death Anxiety Scale

Scale prepared by Ahmed Abdel Khalek and consisted of 20 items distributed across four dimensions: Preoccupation with Death, Fear of

Graves, Fear of Illness, Fear of Afterlife Responses are given based on a five-point Likert scale, where higher scores indicate higher levels of death anxiety. Cronbach's alpha was also used to evaluate the internal consistency of the Death Anxiety Scale. The coefficients for each subscale and the overall scale are reported in Table (3).

Table 3

Cronbach's Alpha Coefficients for the Death Anxiety Scale

Dimension	Preoccupation with Death	Fear of Graves	Fear of Afterlife	Fear of Illness	Total Scale
Cronbach's Alpha	0.656	0.924	0.603	0.821	0.906

The reliability analysis indicates the following:

1. The Fear of Graves yielded the highest internal consistency (α = 0.924), suggesting that the items strongly reflect a coherent conceptual construct.
2. The Fear of Illness subscale also demonstrated high reliability (α = 0.821), indicating strong item consistency.
3. The Preoccupation with Death dimension showed an alpha coefficient of 0.656, which is within acceptable limits, though some item revisions may enhance its reliability.
4. The Fear of Afterlife dimension recorded the lowest coefficient (α = 0.603), suggesting relatively weak internal consistency. A structural review or item refinement may be necessary to improve this dimension.
5. The overall scale reliability was excellent (α = 0.906), confirming that the scale is suitable for reliable use in psychological research.

The findings imply high overall reliability for the Death Anxiety Scale, with variability across subscales. Analytical refinement of weaker dimensions, especially the Fear of Afterlife, is recommended to strengthen measurement precision

Symptom Checklist 90 (SCL-90) (Derogatis, 1983)

Symptom Checklist 90 (SCL-90) is a 90-item self-report questionnaire designed to assess a broad range of psychological symptoms. Each item is rated on a 5-point Likert scale ranging from "not at all" to "extremely." While the SCL-90 includes nine subscales, this study focused on only four subscales: depression and anxiety, Sensitivity, Somatic Symptoms. Cronbach's alpha coefficients for the subscales of the Symptoms of psychological disorders Scale are displayed in Table (4).

Table 4

Cronbach's Alpha Coefficients for the Psychological Distress Scale

Dimension	Symptoms	Sensitivity	Anxiety	Depression
Cronbach's Alpha	0.797	0.806	0.902	0.834

The internal consistency estimates for this scale indicate the following:

1. The Anxiety subscale showed the highest reliability ($\alpha = 0.902$), indicating very strong item cohesion.
2. The Depression dimension also presented good reliability ($\alpha = 0.834$), supporting its adequacy for assessing this domain.
3. The Sensitivity subscale demonstrated good internal consistency ($\alpha = 0.806$).
4. The Symptoms subscale recorded an alpha of 0.797, which is close to the threshold for strong reliability and is deemed sufficient for research purposes.

Overall, these results indicate that the four subscales of the Psychological Distress Scale possess acceptable to excellent reliability. The consistency of the items within each domain supports the scale's validity for assessing psychological disorders, with no immediate need for revision or refinement

Statistical Analysis

The collected data were analyzed using R software, employing various statistical packages including *psych* (Epskamp et al., 2019; Jorgensen et al., 2021; Revelle, 2020; Rosseel, 2012), all within the R statistical environment. Additionally, SPSS version 26 was used for analyzing educational and social science data. The statistical methods applied included computing means and standard deviations, Pearson correlation coefficients, and Cronbach's alpha for reliability estimation. Furthermore, Structural Equation Modeling (SEM) was conducted to test the proposed mediation model.

Results

Testing the Mediating Role of Death Anxiety in the Relationship Between Quality of Life and Symptoms of psychological disorders

To test the mediating role of death anxiety in the relationship between quality of life and, Symptoms of psychological disorders the researcher followed several analytical steps.

Descriptive Statistics of Study Variables

Descriptive statistics were computed for the main study variables among a sample of 33 participants, including the sub dimensions of quality of life, death anxiety, and Symptoms of psychological disorders. These

statistics encompassed the mean, standard deviation, median, range, standard error, and the skewness and kurtosis coefficients, aiming to explore the distributional characteristics of the data.

1. Quality of Life: The highest mean score was observed in the environmental domain (M = 21.85), followed by the physical (M = 14.46) and psychological (M = 13.97) dimensions. The environmental domain showed a relatively negative skewness (skew = -1.03), indicating a clustering of responses at the higher end, with near-normal kurtosis. This suggests that participants perceived a relatively good level of quality of life, particularly in terms of their surrounding environment.
2. Death Anxiety: The Fear of Graves dimension recorded the highest mean (M = 24.18), reflecting a heightened psychological preoccupation with this specific facet of death anxiety. The Preoccupation with Death dimension had the lowest mean (M = 9.82), with an almost symmetric distribution (skew = -0.02), indicating balanced responses around this domain.
3. Symptoms of psychological disorders: The Depression subscale recorded the highest mean (M = 37.33), followed closely by the Symptoms subscale (M = 37.06), suggesting notable levels of distress among the participants, especially regarding depressive feelings and somatic/psychological symptoms. The Sensitivity dimension showed a relatively high positive skew (skew = 0.85), indicating the presence of participants with unusually elevated sensitivity levels.

Table 4

Descriptive Statistics for Quality of Life, Death Anxiety, and Symptoms of Psychological Disorders

Variable	Mean	SD	Median	Range	Skewness	Kurtosis	SE
Quality of Life Dimensions							
Physical	14.46	3.15	14	11	0.19	-1.11	0.55
Psychological	13.97	4.16	15	14	-0.15	-1.38	0.72
Environmental	21.85	3.48	22	14	-1.03	0.55	0.61
Total Quality of Life	16.76	2.83	16.67	10.33	-0.30	-0.99	0.49
Death Anxiety Dimensions							
Preoccupation with Death	9.82	2.73	10	10	-0.02	-0.77	0.48
Fear of Graves	24.18	8.63	25	29	0.00	-1.09	1.50
Fear of Illness	20.88	2.61	21	10	-0.34	-0.87	0.45
Fear of Afterlife	14.24	4.37	13	14	-0.32	-0.96	0.76
Total Death Anxiety	17.28	3.62	17.25	13.25	0.18	-0.76	0.63

Symptoms of psychological disorders							
Depression	37.33	10.07	39	40	-0.42	-0.62	1.75
Anxiety	26.70	9.97	30	37	-0.63	-0.64	1.74
Symptoms	37.06	5.96	37	25	-0.29	-0.42	1.04
Sensitivity	26.82	4.69	26	21	0.85	0.65	0.82

Importantly, the kurtosis values across nearly all variables were either negative or close to zero, implying the absence of heavy tails in the data distribution. This supports the suitability of applying further statistical procedures such as regression, analysis of variance (ANOVA), or structural equation modeling (SEM).

Correlation Analysis Among Study Variables

To examine the statistical relationships among the key variables in the study, the researcher conducted a correlational analysis to test the associations between the independent variable (Quality of Life), the mediating variable (Death Anxiety), and the dependent variable (Symptoms of psychological disorders).

A Pearson correlation matrix was used to assess the direction and strength of the relationships among the constructs. This method is appropriate given the scale level and the approximately normal distribution of the data, as indicated by the descriptive statistics. Figure (1) presents the correlation matrix among the study variables.

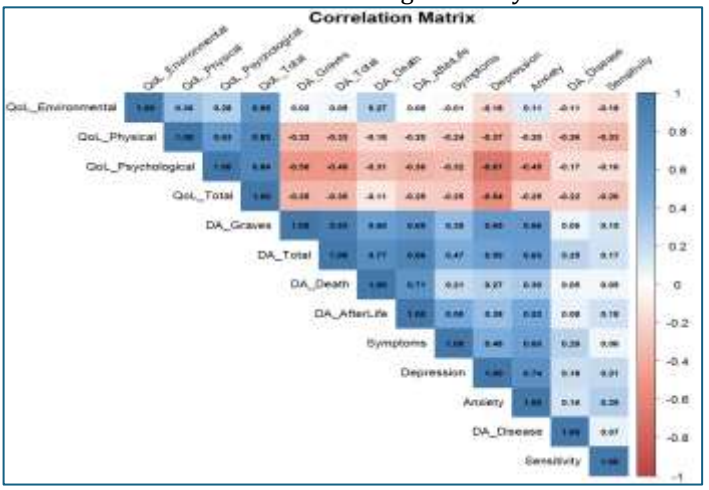

Figure 1: Correlation Matrix Among Study Variables

Figure (1) illustrates the correlation matrix representing the statistical relationships among the study's core variables: the three dimensions of Quality of Life (Physical, Psychological, and Environmental), the four

dimensions of Death Anxiety (Preoccupation with Death, Fear of Graves, Fear of Illness, and Fear of Afterlife), and the four components of Symptoms of psychological disorders (Depression, Anxiety, Symptoms, and Sensitivity).

The correlation matrix reveals several noteworthy patterns:

1. Strong positive correlations were found among the dimensions of Quality of Life. For instance, the Physical dimension was moderately correlated with the psychological dimension *(r = .53)* and weakly correlated with the Environmental dimension *(r = .36)*. The Psychological dimension showed a very strong correlation with the Environmental dimension *(r = .83)*. These results reflect the interconnectedness of these domains in shaping overall quality of life.
2. Regarding Death Anxiety, the matrix indicated very strong internal correlations, especially between Preoccupation with Death and Fear of Graves *(r = .93)*. Other dimensions also exhibited moderate to strong positive associations, suggesting a high level of internal coherence in the construct of death anxiety as a unified psychological factor.
3. Moderate negative correlations were observed between Quality of Life and Death Anxiety dimensions. For example, the psychological domain of Quality of Life was negatively correlated with Preoccupation with Death *(r = –.50)* and Fear of Graves *(r = –.49)*. The Physical dimension also showed weaker negative correlations with death anxiety components.
4. The components of Symptoms of psychological disorders demonstrated strong positive intercorrelations, especially between Depression and Symptoms *(r = .60)*, and between Depression and Anxiety *(r = .74)*. These components also showed moderate negative correlations with Quality of Life and positive correlations (ranging from weak to moderate) with dimensions of Death Anxiety. These findings support the theoretical model that postulates death anxiety and psychological distress as significant negative predictors of quality of life.

Structural Model Estimation

Based on the results of normality testing, the Maximum Likelihood Estimation with Robust Standard Errors (MLR) method was selected for estimating the structural model. This decision was guided by evidence of multivariate non-normality, as indicated by the Henze–Zirkler's test *(HZ = 132, p < .001)*, which confirmed that the sample deviated significantly from a multivariate normal distribution. The MLR estimator is recommended in

such cases due to its robustness against violations of normality (Yuan & Bentler, 2000).

Further support for this choice came from the Anderson–Darling test, which showed that several variables did not meet the assumption of univariate normality at α = .05. Specifically, non-normal distributions were detected in:

1. Anxiety *(p = .047)*
2. Sensitivity *(p = .042)*
3. Psychological Quality of Life *(p = .045)*
4. Environmental Quality of Life *(p = .008)*
5. Fear of Afterlife *(p = .027)*

These deviations further justify the use of MLR estimation. In contrast, other variables such as Depression, Somatic Symptoms, Preoccupation with Death, and Total Death Anxiety demonstrated acceptable levels of normality.

Figure (2) presents the structural model that illustrates the relationships between Quality of Life, Death Anxiety, and Psychological Distress.

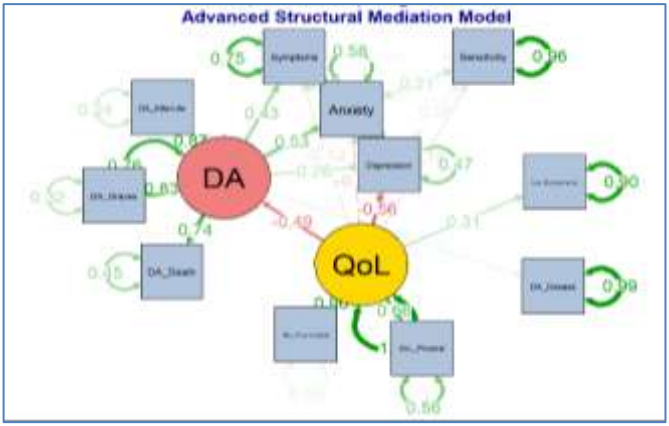

Figure 2: Structural Model of the Relationships Between Quality of Life, Death Anxiety, and Symptoms of psychological disorders

Figure (2) presents a structural mediation model developed using Structural Equation Modeling (SEM) to examine the mediating role of Death Anxiety (DA) in the relationship between Quality of Life (QoL) and several psychological outcome variables, including Depression, Anxiety, Psychological Symptoms, and Sensitivity. This model enables simultaneous analysis of both direct and indirect effects among the latent and observed variables.

Path A: Relationship Between Quality of Life and Death Anxiety

The results indicate a significant negative relationship between QoL and DA, with a path coefficient of β = –0.49. This finding suggests that higher perceived quality of life is associated with lower levels of death anxiety. This supports theoretical perspectives that posit a strong life satisfaction—encompassing physical, psychological, and environmental well-being—can act as a buffer against existential fears and anxiety related to death.

Path B: Effects of Death Anxiety on Symptoms of psychological Disorders Variables

The model shows statistically significant positive effects of death anxiety on most psychological outcomes:

1. Depression: β = 0.53 (moderate to strong effect), indicating that higher death anxiety is linked with increased depressive symptoms.
2. Anxiety: β = 0.58 (strong effect), suggesting that death anxiety is a major psychological risk factor.
3. Psychological Symptoms: β = 0.43 (moderate effect), reflecting the activating role of death anxiety on general psychological complaints.
4. Sensitivity: β = 0.04 (weak, likely nonsignificant), suggesting minimal influence of death anxiety on emotional hypersensitivity.

Path C′: Direct Effects of Quality of Life on Psychological Outcomes (Controlling for Death Anxiety)

After accounting for the mediating role of death anxiety, the direct effects of QoL on psychological outcomes remain negative, though notably reduced:

1. Depression: Direct effect β = –0.26 (partial mediation; total effect was β = –0.93).
2. Anxiety: Direct effect β = –0.12, suggesting that most of the effect is mediated through death anxiety.
3. Symptoms: Direct effect β = –0.16, again highlighting a strong indirect mediation path.
4. Sensitivity: Direct effect β = –0.10 (weak and nonsignificant), indicating minimal direct or mediated effects.

Latent Variable Construction and Factor Loadings

The latent construct of Death Anxiety (DA) was measured using four observed indicators: *Fear of Graves (DA_Graves)*, *Preoccupation with Death (DA_Death)*, *Fear of Afterlife (DA_AfterLife)*, and *Fear of Illness (DA_Disease)*. The factors were high, particularly for:

1. DA_Disease: λ = 0.99
2. DA_Graves: λ = 0.76

This indicates a strong representation of the DA latent variable.

The latent construct of Quality of Life (QoL) was modeled using three indicators: *Physical*, *Psychological*, and *Environmental*. The strongest loading was:

1. QoL_Physical: λ = 1.00
2. QoL_Environmental: λ = 0.90

These results suggest that physical and environmental dimensions are central in shaping overall perceptions of life quality.

Interpretation and Theoretical Implications

These findings provide robust support for the proposed theoretical model, where Death Anxiety serves as a central mediating mechanism through which QoL influences psychological health. The results underscore the importance of interventions targeting quality of life (e.g., enhancing physical health, emotional support, and environmental safety) to reduce death anxiety and thus indirectly mitigate symptoms of depression, anxiety, and Symptoms of psychological disorders.

The SEM results suggest that death anxiety is not only an outcome of poor life quality but also a driving psychological mechanism contributing to mental health deterioration. Addressing death anxiety may therefore be a critical component of comprehensive mental health promotion programs, especially among individuals with low perceived life quality.

Model Fit Indices

The model demonstrated acceptable and satisfactory fit to the data, as evidenced by several fit indices:

1. Chi-square (χ^2) = 37.799, df = 33, p = .125→ Nonsignificant result indicates no substantial discrepancy between the hypothesized model and the observed data.
2. Comparative Fit Index (CFI) = 0.925→ Exceeds the minimum recommended threshold of 0.90 and approaches the ideal fit criterion of 0.95.
3. Tucker-Lewis Index (TLI) = 0.912→ Indicates good incremental fit relative to the null model.
4. Root Mean Square Error of Approximation (RMSEA) = 0.062→ Within the acceptable range (< 0.08), approaching good fit (< 0.06).
5. Standardized Root Mean Square Residual (SRMR) = 0.085→ Below the recommended maximum of 0.10, suggesting acceptable residual differences.

These indicators collectively confirm the validity and reliability of the proposed structural model. The convergence of both absolute and incremental fit indices supports confidence in the robustness of the model and the generalizability of the results.

The proposed SEM model offers a comprehensive explanation of how Quality of Life influences Symptoms of psychological disorders through the mediating role of Death Anxiety. The findings suggest that improving QoL not only has direct effects on mental health but also indirectly reduces distress by mitigating existential fears. These results align with psychological theories emphasizing the interplay between existential concerns and mental well-being and point to the need for multidimensional interventions that simultaneously enhance life satisfaction and address death-related anxiety as part of holistic mental health strategies.

Detailed Mediation Analysis: The Mediating Role of Death Anxiety

To further explore the mediating role of Death Anxiety (DA) in the relationship between Quality of Life (QoL) and various Symptoms of psychological disorders outcomes, a detailed mediation analysis was conducted using path analysis and bootstrap testing with 1000 resamples.

Table 5

Path Coefficients and Mediation Effects Through Death Anxiety

Dependent Variable	Path a (QoL → DA)	Path b (DA → DV)	Direct Effect c′	Total Effect c	Indirect Effect (a×b)	Mediation Ratio (%)
Depression	-0.4437*	1.2554*	-1.3713*	-1.9283*	-0.5570*	28.88
Anxiety	-0.4437*	1.7023*	-0.122	-0.8772*	-0.7552*	86.10
Somatic Symptoms	-0.4437*	0.7180*	-0.2112	-0.5297*	-0.3185*	60.14
Sensitivity	-0.4437*	0.1081	-0.3916*	-0.4396*	-0.048	10.92

*Note: Path a = QoL → DA; Path b = DA → Outcome; c′ = Direct Effect; c = Total Effect; $p < .05$

Table 6

Bootstrap Results for Indirect Effects Significance

Dependent Variable	Indirect Effect	Std. Error	95% CI (Bootstrap)	Significance
Depression	-0.557	0.3345	[-1.3284, -0.0399]	Significant*
Anxiety	-0.7552	0.3564	[-1.5555, -0.1414]	Significant*
Somatic Symptoms	-0.3185	0.1835	[-0.7444, -0.0205]	Significant*
Sensitivity	-0.048	0.0897	[-0.2245, 0.1499]	Not significant

Note: Bootstrap with 1000 samples; Significance based on CI excluding zero.

Interpretation of Mediation Paths

The common a path from QoL to DA was consistently significant across all models ($\beta = -0.4437$, $p < .05$), confirming that individuals with higher quality of life experience lower death anxiety.

In contrast, the b paths from DA to the dependent variables varied in magnitude:

1. The strongest effect of DA was on general anxiety ($\beta = 1.7023$, $p < .05$), followed by depression ($\beta = 1.2554$, $p < .05$), and somatic symptoms ($\beta = 0.7180$, $p < .05$).
2. The effect of DA on sensitivity was nonsignificant ($\beta = 0.1081$, $p > .05$), indicating limited relevance of existential concerns for this variable.

The direct effects (c′ paths) also showed variation:

1. QoL had a strong direct effect on depression ($\beta = -1.3713$, $p < .05$), and a moderate direct effect on sensitivity ($\beta = -0.3916$, $p < .05$).
2. However, no significant direct effects were found on general anxiety or somatic symptoms after including DA as a mediator, suggesting that death anxiety fully mediates these relationships.

Regarding indirect effects, the mediation ratios indicate:

1. Anxiety: Highest mediation (86.10%), suggesting that death anxiety is the primary pathway through which QoL affects anxiety.
2. Somatic symptoms: Moderate mediation (60.14%), highlighting the psychosomatic influence of existential fears.
3. Depression: Partial mediation (28.88%), implying that both direct and mediated effects are relevant.
4. Sensitivity: Weak and nonsignificant mediation (10.92%), indicating minimal indirect influence.

Bootstrap confidence intervals confirmed that the indirect effects for depression, anxiety, and somatic symptoms were statistically significant, as their 95% CIs did not include zero. Conversely, the CI for sensitivity spanned zero, confirming the absence of a significant mediation effect.

Theoretical and Clinical Implications

These results indicate distinct mediation mechanisms across various forms of psychological distress:

1. Anxiety symptoms appear to be most influenced by existential concerns, which aligns with theoretical frameworks positioning death anxiety as a core component of anxiety disorders (Iverach et al., 2014).
2. Somatic complaints also reflect sensitivity to death-related fears, consistent with existential-psychosomatic theories.
3. Depression, however, maintains a strong direct relationship with QoL, suggesting that life dissatisfaction influences mood independently of existential concerns.
4. Sensitivity seems more influenced by interpersonal and social variables, rather than existential dimensions.

From a clinical standpoint, these findings suggest that targeted interventions addressing death anxiety may be especially beneficial for individuals suffering from generalized anxiety and somatization, whereas depression may require a broader, multi-pathway approach that also enhances overall QoL. The nonsignificant mediation in sensitivity also supports the development of tailored interventions focused on social support, emotional regulation, and personal boundaries, rather than existential fear resolution

Verification of the Second Hypothesis

The second hypothesis states: "There are statistically significant differences between males and females in the study variables (depression, anxiety, symptoms, sensitivity, quality of life dimensions, and death anxiety dimensions) at the 0.05 significance level."

The researcher tested this hypothesis using the Mann-Whitney U test, which is a non-parametric test suitable for small samples or those that do not conform to normal distribution, as previously confirmed through normality test results. Comparisons were made between the mean ranks of males and females for each variable separately. Table (7) presents the results of this test.

Table 7

Results of Mann-Whitney U Test for Significance of Differences Between Mean Ranks of Males and Females in Study Variables

Variable	Gender	N	Mean	SD	Mean Rank	Sum of Ranks	Z Value & Significance
Depression	Male	16	30.75	8.51	10.59	169.5	-3.7
	Female	17	43.53	7.12	23.03	391.5	Significant at 0.01
Anxiety	Male	16	21.50	9.66	11.91	190.5	-2.94
	Female	17	31.59	7.67	21.79	370.5	Significant at 0.01
Symptoms	Male	16	35.19	5.64	14.38	230	-1.516
	Female	17	38.82	5.87	19.47	331	Not significant
Sensitivity	Male	16	25.19	2.56	13.84	221.5	-1.828
	Female	17	28.35	5.72	19.97	339.5	Not significant
Physical	Male	16	15.56	3.16	20.25	324	-1.884
	Female	17	13.41	2.85	13.94	237	Not significant
Psychological	Male	16	16.81	3.33	23.63	378	-3.833
	Female	17	11.29	2.91	10.76	183	Significant at 0.01

Environmental	Male	16	22.19	3.31	17.91	286.5	-0.526 Not significant
	Female	17	21.53	3.71	16.15	274.5	
Total Quality of Life	Male	16	54.56	8.26	22.13	354	-2.967 Significant at 0.01
	Female	17	46.24	6.65	12.18	207	
Death Preoccupation	Male	16	8.81	2.81	13.97	223.5	-1.758 Not significant
	Female	17	10.76	2.36	19.85	337.5	
Fear of Graves	Male	16	18.13	6.31	9.84	157.5	-4.135 Significant at 0.01
	Female	17	29.88	6.36	23.74	403.5	
Fear of Diseases	Male	16	20.94	2.62	17.31	277	-0.182 Not significant
	Female	17	20.82	2.67	16.71	284	
Variable	Gender	N	Mean	SD	Mean Rank	Sum of Ranks	Z Value & Significance
Fear of Afterlife	Male	16	12.44	4.35	13.03	208.5	-2.301 Significant at 0.05
	Female	17	15.94	3.75	20.74	352.5	
Total Death Anxiety	Male	16	60.31	10.74	11.13	178	-3.389 Significant at 0.01
	Female	17	77.41	12.72	22.53	383	

The Mann-Whitney U test results in Table (7) revealed statistically significant differences at the 0.01 level between males and females in depression ($Z = -3.70$, $p < .01$), with females showing higher mean ranks (M rank = 23.03) compared to males (M rank = 10.59), indicating that females experience higher levels of depression. Similarly, significant differences were found in anxiety ($Z = -2.94$, $p < .01$) favoring females (M rank = 21.79 vs. 11.91 for males), reinforcing previous hypotheses that females are more susceptible to anxiety and negative emotions in situations related to existential or psychological threats (Nolen-Hoeksema, 2001).

Regarding physical symptoms and emotional sensitivity variables, no statistically significant differences were found between genders ($p > .05$), indicating similar levels of manifest symptoms in both genders, despite notable differences in internal psychological indicators such as anxiety and depression.

The results also revealed statistically significant differences in the psychological dimension of quality of life ($Z = -3.83$, $p < .01$), with males scoring higher levels (M rank = 23.63) compared to females (M rank = 10.76), suggesting that males perceive higher psychological well-being than females within the studied sample. Significant differences also

appeared in total quality of life favoring males ($Z = -2.97$, $p < .01$), reflecting a general gender effect on overall life evaluation.

Other dimensions such as physical and environmental showed no statistically significant differences, indicating relative balance between males and females in these two qualities of life domains.

The results demonstrated that females experience higher levels of total death anxiety ($Z = -3.39$, $p < .01$), as well as in fear of graves ($Z = -4.13$, $p < .01$) and fear of afterlife ($Z = -2.30$, $p < .05$). This indicates that existential threats related to death, graves, and afterlife affect females to a greater degree compared to males. Although death preoccupation and fear of diseases dimensions showed no significant differences, the general data trend suggests higher sensitivity among females toward death-related issues, supporting theoretical orientations regarding gender roles in interacting with existential threats (Neimeyer, 1998).

These results confirm the hypothesis of gender differences in several psychological and existential variables, with females appearing more affected by depression, anxiety, and death anxiety, while males showed higher levels of psychological quality of life. These potential differences are attributed to intertwined social, cultural, and psychological factors, such as socialization patterns, social expectations, and different emotional responses between genders. These findings are consistent with previous studies in the field and highlight the importance of considering gender as an influential factor in designing psychological and preventive interventions.

Verification of the Second Hypothesis

The second hypothesis states: "There are statistically significant differences between males and females in the study variables (depression, anxiety, symptoms, sensitivity, quality of life dimensions, and death anxiety dimensions) at the 0.05 significance level."

The researcher tested this hypothesis using the Mann-Whitney U test, which is a non-parametric test suitable for small samples or those that do not conform to normal distribution, as previously confirmed through normality test results. Comparisons were made between the mean ranks of males and females for each variable separately. Table (8) presents the results of this test.

Table 8

Results of Mann-Whitney U Test for Significance of Differences Between Mean Ranks of Males and Females in Study Variables

Variable	Gender	N	Mean	SD	Mean Rank	Sum of Ranks	Z Value & Significance
Depression	Male	16	30.75	8.51	10.59	169.5	-3.7
	Female	17	43.53	7.12	23.03	391.5	Significant at 0.01
Anxiety	Male	16	21.50	9.66	11.91	190.5	-2.94
	Female	17	31.59	7.67	21.79	370.5	Significant at 0.01
Symptoms	Male	16	35.19	5.64	14.38	230	-1.516
	Female	17	38.82	5.87	19.47	331	Not significant
Sensitivity	Male	16	25.19	2.56	13.84	221.5	-1.828
	Female	17	28.35	5.72	19.97	339.5	Not significant
Physical	Male	16	15.56	3.16	20.25	324	-1.884
	Female	17	13.41	2.85	13.94	237	Not significant
Psychological	Male	16	16.81	3.33	23.63	378	-3.833
	Female	17	11.29	2.91	10.76	183	Significant at 0.01
Environmental	Male	16	22.19	3.31	17.91	286.5	-0.526
	Female	17	21.53	3.71	16.15	274.5	Not significant
Total Quality of Life	Male	16	54.56	8.26	22.13	354	-2.967
	Female	17	46.24	6.65	12.18	207	Significant at 0.01
Death Preoccupation	Male	16	8.81	2.81	13.97	223.5	-1.758
	Female	17	10.76	2.36	19.85	337.5	Not significant
Fear of Graves	Male	16	18.13	6.31	9.84	157.5	-4.135
	Female	17	29.88	6.36	23.74	403.5	Significant at 0.01
Fear of Diseases	Male	16	20.94	2.62	17.31	277	-0.182
	Female	17	20.82	2.67	16.71	284	Not significant
Fear of Afterlife	Male	16	12.44	4.35	13.03	208.5	-2.301
	Female	17	15.94	3.75	20.74	352.5	Significant at 0.05
Total Death Anxiety	Male	16	60.31	10.74	11.13	178	-3.389
	Female	17	77.41	12.72	22.53	383	Significant at 0.01

The Mann-Whitney U test results in Table (8) revealed statistically significant differences at the 0.01 level between males and females in depression ($Z = -3.70$, $p < .01$), with females showing higher mean ranks (M rank = 23.03) compared to males (M rank = 10.59), indicating that females experience higher levels of depression. Similarly, significant differences were found in anxiety ($Z = -2.94$, $p < .01$) favoring females (M

rank = 21.79 vs. 11.91 for males), reinforcing previous hypotheses that females are more susceptible to anxiety and negative emotions in situations related to existential or psychological threats (Nolen-Hoeksema, 2001).

Regarding physical symptoms and emotional sensitivity variables, no statistically significant differences were found between genders ($p > .05$), indicating similar levels of manifest symptoms in both genders, despite notable differences in internal psychological indicators such as anxiety and depression.

The results also revealed statistically significant differences in the psychological dimension of quality of life ($Z = -3.83$, $p < .01$), with males scoring higher levels (M rank = 23.63) compared to females (M rank = 10.76), suggesting that males perceive higher psychological well-being than females within the studied sample. Significant differences also appeared in total quality of life favoring males ($Z = -2.97$, $p < .01$), reflecting a general gender effect on overall life evaluation.

Other dimensions such as physical and environmental showed no statistically significant differences, indicating relative balance between males and females in these two qualities of life domains.

The results demonstrated that females experience higher levels of total death anxiety ($Z = -3.39$, $p < .01$), as well as in fear of graves ($Z = -4.13$, $p < .01$) and fear of afterlife ($Z = -2.30$, $p < .05$). This indicates that existential threats related to death, graves, and afterlife affect females to a greater degree compared to males. Although death preoccupation and fear of diseases dimensions showed no significant differences, the general data trend suggests higher sensitivity among females toward death-related issues, supporting theoretical orientations regarding gender roles in interacting with existential threats (Neimeyer, 1998).

These results confirm the hypothesis of gender differences in several psychological and existential variables, with females appearing more affected by depression, anxiety, and death anxiety, while males showed higher levels of psychological quality of life. These potential differences are attributed to intertwined social, cultural, and psychological factors, such as socialization patterns, social expectations, and different emotional responses between genders. These findings are consistent with previous studies in the field and highlight the importance of considering gender as an influential factor in designing psychological and preventive interventions.

Testing the Third Hypothesis

The fourth hypothesis states: "Quality of life, death anxiety, and Symptoms of psychological disorders differ among study sample members according to marital status."

The researcher tested this hypothesis using Kruskal-Walli's test, a non-parametric test used to compare more than two groups when the normal distribution assumption is not met. Participants were divided according to their marital status into single, married, divorced, and widowed. Table (9) shows the results of the Kruskal-Walli's test.

The Kruskal-Walli's test results in Table (9) showed that all studied variables did not differ significantly according to marital status, as all test values were not statistically significant ($p > 0.05$). This indicates that marital status (single, married, divorced, widowed) was not an influential factor in the level of depression, anxiety, psychological symptoms, interpersonal sensitivity, quality of life, or death anxiety among sample members.

Despite the presence of variations in mean ranks (for example, the elevation in mean depression ranks for divorced and widowed individuals), these variations were not sufficient to reach statistical significance. This may be attributed to the small size of some categories (such as divorced = 1, and widowed = 2), which may limit the statistical power necessary to detect differences.

From a psychological perspective, this result may be attributed to the fact that psychological effects related to quality of life and death anxiety do not depend solely on marital status, but are influenced by a combination of other factors such as family and social support, health status, religious faith, and personal coping resources (Taylor et al., 1997). Additionally, the small sample size for some categories limits the possibility of generalization.

Based on the Kruskal-Walli's test results, no statistically significant differences were found in Symptoms of psychological disorders, quality of life, or death anxiety according to marital status, suggesting that marital status alone may not constitute a decisive indicator for predicting these variables in the studied sample

Table 9

Results of Kruskal-Wallis Test for Significance of Differences in Symptoms of Psychological Disorders, Quality of Life, and Death Anxiety According to Marital Status

Variable	Marital Status	N	Mean	SD	Mean Rank	Kruskal-Wallis Test Value
Depression	Single	8	35.88	11.34	15.00	4.258
	Married	22	36.45	9.61	16.25	Not significant
	Divorced	1	47.00	-	28.00	-
	Widowed	2	48.00	7.07	27.75	-
Anxiety	Single	8	23.63	11.84	14.56	4.414
	Married	22	26.50	9.37	16.41	Not significant
	Divorced	1	37.00	-	29.50	-
	Widowed	2	36.00	0.00	27.00	-

Symptoms	Single	8	36.50	9.34	17.44	1.713
	Married	22	37.09	4.52	16.48	Not significant
	Divorced	1	44.00	-	29.00	-
	Widowed	2	35.50	6.36	15.00	-
Interpersonal Sensitivity	Single	8	26.50	4.93	17.81	1.115
	Married	22	27.00	4.98	16.70	Not significant
	Divorced	1	29.00	-	25.00	-
	Widowed	2	25.00	1.41	13.00	-
Physical Domain	Single	8	14.63	2.00	17.56	3.796
	Married	22	14.36	3.44	16.70	Not significant
	Divorced	1	10.00	-	2.50	-
	Widowed	2	17.00	2.83	25.25	-
Psychological Domain	Single	8	16.00	3.42	21.63	3.553
	Married	22	13.59	4.25	16.23	Not significant
	Divorced	1	10.00	-	7.50	-
	Widowed	2	12.00	5.66	11.75	-
Environmental Domain	Single	8	20.75	2.66	11.81	7.020
	Married	22	21.86	3.75	17.64	Not significant
	Divorced	1	22.00	-	15.50	-
	Widowed	2	26.00	0.00	31.50	-
Total Quality of Life	Single	8	51.38	5.93	17.94	1.843
	Married	22	49.82	9.40	16.61	Not significant
	Divorced	1	42.00	-	7.00	-
	Widowed	2	55.00	8.49	22.50	-
Death Preoccupation	Single	8	9.75	2.60	17.13	5.020
	Married	22	9.36	2.59	15.39	Not significant
	Divorced	1	14.00	-	31.00	-
	Widowed	2	13.00	2.83	27.25	-
Fear of Graves	Single	8	24.25	8.26	16.25	3.039
	Married	22	23.09	8.84	16.02	Not significant
	Divorced	1	34.00	-	28.00	-
	Widowed	2	31.00	7.07	25.25	-
Fear of Diseases	Single	8	19.63	3.02	12.75	2.110
	Married	22	21.27	2.43	18.34	Not significant
	Divorced	1	21.00	-	17.00	-
	Widowed	2	21.50	3.54	19.25	-
Fear of Afterlife	Single	8	14.88	3.56	17.81	1.766
	Married	22	13.64	4.69	15.82	Not statistically significant
	Divorced	1	18.00	-	24.00	-
	Widowed	2	16.50	4.95	23.25	-
Total Death Anxiety	Single	8	68.50	13.84	15.94	2.979
	Married	22	67.36	14.36	16.18	Not significant
	Divorced	1	87.00	-	29.50	-
	Widowed	2	82.00	18.38	24.00	-

Discussion of the Results

The results revealed that death anxiety plays a significant mediating role in the relationship between quality of life and symptoms of psychological disorders. The mediation was full in the case of anxiety and somatic symptoms, where the direct effect of quality of life disappeared after introducing death anxiety as a mediator. This indicates that the

influence occurs entirely indirectly through death anxiety. However, in the case of depression and reactive sensitivity, partial mediation was found, where the direct effect of quality of life continued alongside the indirect effect through death anxiety. This means that depression and reactive sensitivity are influenced by various factors, not just death anxiety. These findings indicate that liver donors with lower quality of life experience increased fears related to death and physical deterioration following the donation procedure, which may manifest as somatic symptoms and anxiety. However, in the case of depression and reactive sensitivity, several overlapping factors are involved, making the relationship more complex and not solely attributable to death anxiety.

This is supported by studies Sherman et al. (2010), Ji et al. (2024), and Menzies et al. (2024), which confirmed that death anxiety mediates the relationship between quality of life and psychological disorders through its negative impact on quality of life. Some donors may experience psychological problems such as anxiety, depression, and reduced quality of life after donation (Gassas, 2022; Tong et al., 2013). Donors may also suffer from health-related anxiety due to the surgery and its consequences, which in turn affects their quality of life (Bozkurt et al., 2019; Reese et al., 2015). Donors' mood often deteriorates periodically after the surgery, with anxiety being one of the most serious problems they face. This anxiety may be related to their physical performance following donation, the health of the recipient, and the difficulty of resuming their previous social roles (Kowal et al., 2021). Some donors may feel regret and lower life satisfaction after donation, and these feelings may be intensified by death anxiety (Holscher et al., 2018). This is consistent with Terror Management Theory, which confirms that awareness of death causes fear and anxiety, leading individuals to engage in a wide range of defense mechanisms.

When these defense mechanisms fail, individuals become more psychologically vulnerable, leading to an increase in symptoms of psychological disorders (Mavrogiorgou et al., 2020). Therefore, death anxiety is positively correlated with many psychological symptoms, including depression, anxiety, hostility, and psychosis (Feng et al., 2021; Officer et al., 2024). Cognitive theories have also emphasized the significant impact of death anxiety on quality of life, as well as the role of cognitive and behavioral strategies in enhancing self-confidence and reinforcing a sense of meaning in life, which, in turn, reduces death anxiety and thereby alleviates symptoms of psychological disorders (Thiemann et al., 2015). This result may be attributed to certain cultural factors that link pain, illness, and death, which may activate death anxiety in the donor as a defensive mechanism, leading to a decline in quality of life and the emergence of some symptoms of psychological disorders, especially if the donor experiences post-operative complications, which may make the

donor experience feelings of loss of control and frustration if s/he does not receive adequate esteem and self-satisfaction. Therefore, it is recommended to conduct a comprehensive psychological assessment of the donor, including the incorporation of the evaluation of death anxiety prior to the surgical procedure into the medical protocols for liver donors, and provide donors with all information about the procedures, risks, and potential complications following donation.

The results of this research also showed that female donors are more vulnerable to depression, anxiety, and death anxiety, while male donors have higher quality of life compared to females. These differences reflect the impact of social, psychological, and cultural gender roles.

Some studies (Zhu et al., 2020; Nguyen et al., 2011) have reported that females tend to have higher levels of anxiety and depression compared to males, while males score higher in overall quality of life (Ellina et al., 2021). This may be attributed to the feminine nature and body image concerns often found among women, which can make them more sensitive to any physical changes—thereby increasing levels of depression and anxiety. Moreover, Arab women often have various responsibilities and social roles, which can create psychological pressure on them and lead to lower quality of life compared to men. In addition, men may score higher in quality of life due to masculine coping mechanisms in Eastern societies, which tend to minimize the expression of negative emotions in men when facing psychological problems. Men may also receive greater social support than women, as male donors are often perceived as strong individuals capable of bearing risks, whereas women may be seen as obligated to donate as part of their fundamental role as mothers or wives, particularly given that all donors in the present study are first-degree relatives. This is confirmed by studies (Katz-Greenberg & Shah, 2022), which found that women are more willing to donate organs during their lifetime due to their traditional caregiving roles within the family. This willingness is influenced by social and cultural expectations that compel women to prioritize the health and well-being of their family members.

The results also indicated that marital status was not a statistically significant factor influencing levels of depression, anxiety, quality of life, or death anxiety, despite the presence of some differences in mean scores, particularly between divorced and widowed participants. However, due to the small sample size, statistically significant differences could not be attained. Overall, the results of previous studies have shown inconsistent findings regarding the effect of marital status on symptoms of psychological disorders, with some studies reporting positive and others negative associations (de Moraes et al., 2023; Faruk et al., 2021; Zhu et al., 2023). This inconsistency may be due to the influence of other mediating factors, such as psychological support, economic status, and physical

health. In the current study, the absence of statistical significance may be attributed to the small sample size, which reduces the ability to detect real differences. It may also be due to the presence of stronger mediating variables that may have a more substantial role than marital status in influencing depression, anxiety, and quality of life.

Conclusion

Managing death anxiety through psychological and social support, along with providing appropriate information, is essential for improving psychological outcomes in living organ donors following organ donation

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