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Unveiling the unknown: exploring Korean anonymous organ donors' post-donation outcomes

Chulhee Kang[1]✉, Hyelim Hong[1] & Chanmi Kim[1]

Despite increasing global interest in anonymous organ donation, empirical research remains limited, particularly outside North America and Europe. In South Korea, anonymous donors—who provide organs without personal ties to recipients—represent a rare and underexamined population due to limited accessibility and confidentiality. This study addresses this gap by investigating post-donation outcomes among 200 Korean anonymous organ donors, the largest such cohort to date. Using survey data collected with the assistance of the Korean Organ Donor Program, we examined donors' demographic characteristics, motivations, and donation experiences. A Gaussian Mixture Model (GMM) was employed to classify post-donation experiences, resulting in three distinct clusters: highly enriched (47%), moderately enriched (41%), and scarcely enriched (12%) positive outcomes. Multinomial logistic regression analysis identified key predictors associated with outcome profiles. Being female, reporting good subjective health, and prioritizing self-esteem were linked to highly enriched experiences, while self-employment was associated with more limited positive outcomes. Additionally, strong family support and thorough pre-donation deliberation emerged as significant predictors of favorable post-donation experiences. The results suggest that while many donors report meaningful psychological and social benefits, such positive outcomes are not uniformly experienced. A substantial minority of donors reported less favorable outcomes, indicating the presence of emotional or contextual challenges that may complicate the donor experience. These findings point to the importance of avoiding overly idealized assumptions about post-donation benefits and instead recognizing the diverse trajectories donors may follow. The study contributes new cultural and empirical insights to the field of organ donation and highlights the need for supportive interventions—including psychosocial counseling and structured follow-up—for donors at greater risk of adverse experiences.

[1] Yonsei University, Seoul, Republic of Korea. ✉email: chulheekang@yonsei.ac.kr

Introduction

Over the past decade, the number of individuals awaiting organ transplants in South Korea has steadily increased, while the number of available donors has not kept pace (Korean Network for Organ Sharing 2023). Hesitancy toward organ donation may stem from an innate drive to protect one's own well-being. Additionally, cultural beliefs, such as the Confucian principle emphasizing filial piety and bodily integrity—e.g., "One's body, including hair and skin, is inherited from one's parents and must not be harmed"—may influence attitudes toward donation. However, the growing gap between organ demand and supply highlights the urgent need for alternative strategies beyond living-related donation to help address the shortage. One such approach is anonymous organ donation, in which donors provide organs to recipients with whom they have no biological or personal connection (Lim et al. 2022). These donations may help alleviate shortages of organs, such as livers and kidneys, and expand access for patients who lack the option of a living-related donor.

Organ donation is often described as "the gift of life," capable of transforming and saving the recipient's life (Gill and Lowes 2008). It is regarded as a noble and selfless act that challenges the fundamental human instinct for self-preservation (Kang et al. 2022). Despite growing public and scholarly interest in anonymous organ donation, research on this topic remains very limited. Most existing studies have been conducted in North America and Europe, with a predominant focus on White participants (Humar et al. 2022; Pronk et al. 2023; Zuchowski et al. 2021). Research in other regions is scarce. In South Korea, only one qualitative study, involving 12 kidney donors, has examined donors' characteristics, motivations, experiences, and outcomes (Kang et al. 2022). These gaps in the literature highlight the need to expand research on anonymous organ donation by incorporating perspectives from diverse populations in understudied regions and exploring new related topics.

Existing research predominantly highlights the positive outcomes of anonymous donation (Jacobs et al. 2015). Similar to Andreoni's (1990) "warm-glow theory," which explains the internal rewards of altruistic behavior, studies find that donors frequently report a greater sense of life meaning, enhanced self-esteem, and other generally positive post-donation experiences (Kang et al. 2022; Kurleto et al. 2020; Reichman et al. 2010; Wadström et al. 2019). In addition to these psychological benefits, health risks to donors have been largely mitigated, with no observed negative impact on lifespan or the development of related conditions like chronic kidney disease (CKD) (Lentine and Patel 2012). However, some studies (Kang et al. 2022; Pronk et al. 2023) have identified potential psychosocial challenges, including concerns about the donor's health and stress in personal relationships. Physical complications, such as persistent pain and fatigue, have also been reported (Pronk et al. 2023). Despite these insights, existing research may not fully capture the complete range of post-donation outcomes, as it primarily emphasizes positive impacts while insufficiently exploring potential negative effects.

This study seeks to provide a more comprehensive understanding of the diverse outcomes associated with anonymous organ donation. Utilizing the largest cohort of 200 anonymous donors in collaboration with the Korean Organ Donor Program, we employ a Gaussian Mixture Model (GMM)—a data-driven, probabilistic, and precise analytical method (Shakoor et al. 2021)—to classify post-donation outcomes. Additionally, we examine how specific demographic characteristics, motivations, and experiences influence different types of post-donation outcomes. By deepening the understanding of anonymous organ donation, this study not only stimulates new avenues for research but also informs future scholarly inquiries and offers practical implications for organ donation policies and practices.

Literature review

Warm glow theory and post-donation experiences. Andreoni's (1990) "warm-glow theory" provides a valuable framework for understanding the psychological benefits that anonymous organ donors experience following their donation. This theory posits that individuals derive utility not only from the public good their donation creates but also from the act of giving itself. This internal reward, termed the "warm glow," can help explain the positive post-donation outcomes often reported by donors.

In the context of anonymous organ donation, the warm glow effect may be particularly salient. Unlike directed donations, where donors can directly observe the impact on their recipient, anonymous donors must rely more heavily on the intrinsic satisfaction derived from their altruistic act. This aligns with Andreoni's (1990) concept of "impure altruism," where the donor's utility function includes both the public good (i.e., improved health outcomes for the recipient) and the private good of personal satisfaction derived from giving.

The warm glow theory can potentially explain several aspects of post-donation experiences reported in previous studies. First, the internal reward of warm glow may contribute to the increased self-esteem often reported by donors (Jacobs et al. 2015; Kang et al. 2022; Yu et al. 2019). Second, the satisfaction derived from the act of giving itself may enhance donors' sense of purpose and life meaning (Wadström et al. 2019; Yu et al. 2019). Third, the persistent positive feelings associated with warm glow could explain why many donors report no regrets about their decision (Reichman et al. 2010). Fourth, the positive reinforcement of warm glow may encourage donors to engage in further altruistic acts, explaining the expansion of positive influence noted in some studies (Kang et al. 2022).

It is important to recognize, however, that the warm-glow effect may vary among donors. Factors such as family support, thoughtful deliberation, post-donation health status, and individual characteristics may influence the intensity of the warm-glow experience and produce systematic variation in post-donation outcomes. Integrating warm-glow theory into the study of anonymous organ donation provides a valuable theoretical foundation for understanding the positive outcomes often observed, yet more comprehensive framework is needed to account for variability in donors' experiences. Future research should continue to examine the validity of the warm-glow effect in organ donors while further investigating its role and scope in shaping post-donation outcomes.

Demographic and other characteristics of anonymous organ donors. Research on the demographic and other characteristics of anonymous organ donors remains limited. Therefore, the following review summarizes previous studies on the characteristics of both general organ donors and anonymous organ donors. Several studies have examined the demographic characteristics of living kidney donors. The average age of living kidney donors is approximately 46 years, with a significant proportion being female. Women account for about 57–60% of all living kidney donors, particularly in living-related donations (Bellini et al. 2019). This trend appears consistently across various regions and studies. Additionally, the majority of living kidney donors are Caucasian, comprising approximately 60% of donors (Bellini et al. 2019). This demographic pattern suggests potential disparities in donor representation among different ethnic groups.

Studies specifically focusing on anonymous organ donors often lack detailed demographic data, such as gender, age, religion, and marital status. However, available evidence suggests that anonymous donors are more likely to be male, middle-aged, married, and religiously affiliated (Kurleto et al. 2020; Maple et al. 2014). Regarding gender, a statistical report by the Korean Organ Donor Program (2025) indicates that among 650 anonymous organ donations between 1991 and 2019, 67.5% were male and 32.5% were female. This gender distribution suggests that anonymous organ donors differ to some extent from living-related donors.

Anonymous donors also tend to have a history of altruistic behavior, including participation in blood donation, volunteer work, and financial contributions to charitable causes (Kang et al. 2022; Maple et al. 2014; Wadström et al. 2019). A study by Kurleto et al. (2020) found that anonymous kidney donors in Israel exhibited moderately high levels of altruism, with a median score of 51 on 80-poing instrument. Among these donors, family and religious beliefs were the most significant values, suggesting that personal values and altruistic tendencies play a key role in the decision to donate.

The differences between living-related and anonymous organ donors indicate diversity in demographic and other characteristics among donor populations. This variability underscores the need for continuous and comprehensive studies to better understand the full spectrum of anonymous organ donors.

Different types of motivation. Across various studies, the primary motivation for living organ donors, including anonymous donors, is often altruism, which is defined as the desire to help another person without expecting personal gain. For example, Lennerling et al. (2004) found that the strongest motivation for kidney donation was the donor's wish to help others. Similarly, non-directed donors, who donate to unknown recipients, frequently identify altruism as a key driving factor. However, transplant professionals sometimes view this altruistic motivation with skepticism, especially in cases where the donor and recipient have no personal relationship, as this raises questions about the donor's underlying motives (Organ Procurement and Transplantation Network 2015).

Anonymous organ donors, who donate organs to strangers, exhibit a range of motivations. Kang et al. (2022) report that these motivations can be classified into two categories: universally observed motivations and those shaped by cultural characteristics. Universal motivations (Balliet et al. 2019; Goldaracena et al. 2019; Kang et al. 2022; Kurleto et al. 2020; Wadström et al. 2019) include four key factors: a sense of responsibility to help others, empathy for those in need, religious beliefs, and a desire to give back to society. In addition to these universal motivations, culturally specific factors influence organ donation in specific contexts. In Korea, for instance, one notable example is the belief in receiving blessings as a result of donation. This motivation reflects not only a desire to help the recipient but also the expectation that the donor and his or her family will receive blessings in return (Kang et al. 2022). This culturally specific motivation underscores the influence of cultural beliefs and practices on donation decisions.

The motivations for anonymous organ donation are multifaceted, encompassing both universal and culturally specific factors. Altruism remains a central motivation, but cultural beliefs and personal values also play significant roles. Further research is needed to better understand the diverse motivations of anonymous organ donors across different cultural contexts.

Experience of family support and thoughtful deliberation. Living organ donation is a complex process that involves careful consideration by potential donors and their families. Research has consistently highlighted the importance of family support and thoughtful deliberation in living organ donation decisions and outcomes.

Several studies have examined the role of family in living organ donation, highlighting its significant influence on both decision-making and post-donation experiences. Franklin and Crombie (2003) found that family dynamics and relationships play a crucial role in the decision-making process for potential living kidney donors. Similarly, Gill and Lowes (2008) identified spousal support as a key factor in positive psychosocial outcomes, with donors who felt supported by their spouses reporting lower anxiety and greater satisfaction with their decision. However, family support is not always present. Yu et al. (2019) reported that hematopoietic stem-cell donors frequently faced challenges due to family disagreements during both the decision-making and donation process. Likewise, a lack of family support has been associated with an increased risk of poor psychosocial outcomes following donation (Dew et al. 2017).

Beyond the decision-making phase, family dynamics also play a critical role in the experiences of anonymous organ donors. Humar et al. (2022) conducted a qualitative study examining how donation affected relationships among anonymous liver donors' families. While many families expressed pride and positive attitudes toward the donation, some exhibited negative emotions such as fear or anger, highlighting the complexity of family dynamics. Similarly, Pronk et al. (2023) found that some anonymous kidney donors experienced strained relationships due to family opposition. Conversely, family support has consistently served as a source of strength for donors throughout the anonymous organ donation process (Kang et al. 2022), underscoring its crucial role in both decision-making and overall donation experiences.

The process of thoughtful deliberation in living organ donation is essential, yet it has received limited attention in research. Simmons et al. (1977) found that living kidney donors typically undergo a prolonged period of consideration and information-seeking before making their decision. Gill and Lowes (2008) emphasized the importance of providing donors with comprehensive information about transplantation, along with sufficient time and support to ensure informed decision-making. Given the complexity of organ donation, it is essential for potential donors to engage in a deliberate decision-making process that upholds the principles of informed consent.

This need for thoughtful deliberation is equally important in anonymous organ donation. Shaw and Bell (2014) highlights the significance of a cooling-off period, which provides anonymous organ donors with sufficient time to reflect on their decision. Although some anonymous organ donors have reported discomfort due to the lengthy and demanding medical procedures required before donation (Kang et al. 2022), this extended evaluation period ensures that donors have adequate time to carefully consider their choice (Wadström et al. 2019). Considering the complexity of the donation process and existing research discussions, further investigation is needed to fully understand the crucial role of thoughtful deliberation in shaping the overall donation experience.

In both living and anonymous organ donation, involving families before and after donation, as well as allowing sufficient time and opportunity for donor deliberation, are crucial factors. Further research on the impact of family support and the deliberation process could improve understanding of post-donation outcomes and help develop more effective support systems for donors.

The literature review highlights several important research priorities. First, comprehensive studies with large sample sizes are

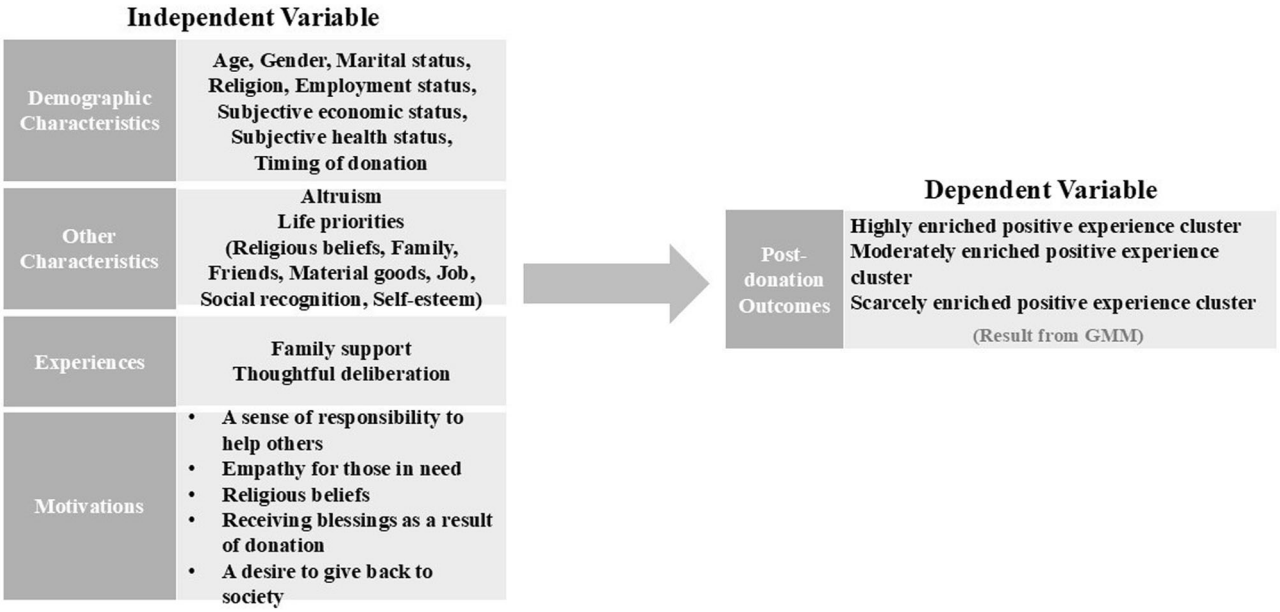

Fig. 1 Research model illustrating the influencing variables of post-donation outcomes. The model outlines key independent variables—demographic characteristics, other individual characteristics, prior experiences, and motivations—that influence post-donation outcomes, which were classified into three experience clusters using Gaussian Mixture Model (GMM) analysis.

needed to examine the experiences of anonymous organ donors across diverse cultural and regional contexts. Second, research should consider a broader range of post-donation outcomes, extending beyond positive experiences. Lastly, it is essential to investigate the factors influencing donors' post-donation outcomes, including their characteristics, motivations, and support experiences, as these aspects remain relatively unexplored. Addressing these research gaps will significantly enhance our understanding of anonymous organ donation.

Research method

Research questions and model. This study seeks to address critical gaps in organ donation research, focusing specifically on anonymous organ donors in Korea. By analyzing post-donation outcomes as well as the characteristics, motivations, and experiences of donors, this research aims to provide valuable knowledge and insights related to anonymous organ donation. It proposes the following research questions and an analytical model (Fig. 1) on different types of post-donation outcomes.

Research Question 1: What are the demographic, psychological, and experiential characteristics of anonymous organ donors, and how do they perceive psychological and social changes after donation?

Research Question 2: How can the psychological and social outcomes of anonymous organ donors post-donation be classified using the Gaussian Mixture Model?

Research Question 3: How are demographic, motivational, and experiential factors associated with different categories of post-donation outcomes for anonymous organ donors?

Participants and data collection procedure. Data for this study come from a comprehensive survey that was conducted in October 2022, targeting individuals in Korea who had previously donated organs to unspecified recipients. The Korean Organ Donor Program (KODP), the country's largest and pioneering non-profit organization dedicated to organ donation, assisted in identifying potential participants. KODP, which initiated organ donation efforts in Korea in the 1990s when public awareness was limited, recommended 230 accessible individuals for this study from a pool of 650 anonymous organ donors between 1991 and 2019. Of these 230 organ donors, 200 voluntarily agreed to participate in the survey.

To encourage participation, recruitment materials were distributed at small group meetings and larger events, such as an annual walking event[1] for anonymous donors. During these gatherings, the research team introduced the study, explaining its objectives and participation process in detail. Participation was entirely voluntary, and no financial incentives were provided. Before taking part in the survey, all individuals received a comprehensive explanation of the study and provided informed consent, ensuring adherence to ethical guidelines.

The survey was conducted in October 2022 at the KODP conference rooms following a walking event or small group meetings, where interested participants completed the questionnaire. Additionally, some participants visited the KODP office at a prearranged time to complete the survey. The research team provided each participant with an individual questionnaire and offered clarifications as needed. All participants completed the questionnaire in its entirety, resulting in a 100% response rate with no missing data, thereby ensuring the completeness and reliability of the dataset.

This study protocol was reviewed and approved by the Institutional Review Board (IRB) of the author's university before the commencement of data collection, ensuring compliance with ethical research practices. To protect participant privacy and maintain confidentiality, all personal information was permanently deleted upon completion of the data collection phase. This rigorous approach to data management underscores the study's commitment to ethical research conduct and participant protection.

Measures of variables

Independent variable

Demographic and other characteristics: Demographic characteristics were measured, as shown in Table 1.

This study measured various characteristics of donors, including altruism and life priorities. To assess altruism, the Self-Report Altruism Scale developed by Rushton et al. (1981) was

Table 1 Demographic characteristics.

Variable	Measurement
Age	Measured continuously
Gender	Male (ref.), female
Marital status	Without spouse (ref.), with spouse
Religion	None (ref.), yes
Employment status	Others (ref.), full-time employed, self-employed, housewives
Subjective economic status	Self-perceived economic status low = 1, lower-middle = 2, middle = 3, upper-middle = 4, high = 5
Subjective health status	Self-perceived current health status after donation worsened compared to before donation = 1, no change = 2, improved compared to before donation = 3
Timing of donation[a]	1990–1999 (ref.), 2000–2009, 2010–2019

[a]The study participants ($n = 200$) included 185 kidney donors, 3 liver donors, and 12 individuals who donated both kidney and liver. For the individuals who donated twice, the donation timing was measured according to the year of the most recent donation.

utilized. This scale comprises 20 items, each rated on a 5-point scale ranging from "never" (0) to "very often" (4). Example items include statements such as "I have given money to a charity" and "I have donated blood." The total score ranges from 0 to 80, with higher scores indicating higher levels of altruism. Life priorities were measured using seven items adapted from Kurleto et al. (2020). The questionnaire items included "Religious beliefs," "Family," "Friends," "Material goods," "Job," "Social recognition," and "Self-esteem." Participants rated the importance of each item on a 5-point scale, from "not important" (1) to "the most important" (5). This measurement approach ensures a comprehensive assessment of both altruistic tendencies and the life priorities of anonymous organ donors, providing valuable insights into the tendencies and priorities.

Motivations of anonymous organ donation: To assess the motivations underlying anonymous organ donation, the study employed a questionnaire derived from the works of Goldaracena et al. (2019) and Kang et al. (2022). This approach ensures a comprehensive examination of the multifaceted drivers behind organ donation decisions, considering both personal and societal influences. The questionnaire comprised five key motivational factors: a sense of responsibility to help others; empathy for those in need; religious beliefs; receiving blessings as a result of donation; and a desire to give back to society. Participants evaluated their level of agreement with each item using a 5-point Likert scale, ranging from "strongly disagree" (1) to "strongly agree" (5). This measurement approach allows for a nuanced understanding of the relative importance of different motivations among anonymous organ donors.

Experiences of family support and thoughtful deliberation: The experiences of organ donors, specifically family support and thoughtful deliberation, were measured using questionnaire items derived from the research of Wadström et al. (2019), Humar et al. (2022), and Kang et al. (2022). Family Support was assessed with a single item: "How did your family members react to your consideration of organ donation?". Participants responded on a 4-point scale, ranging from "None of my family members supported it at all" (1) to "All of my family members supported it completely" (4). Thoughtful Deliberation was also evaluated with a single item: "Have you deliberated sufficiently before deciding on organ donation?". Participants responded on a 5-point scale, ranging from "Not at all" (1) to "Absolutely" (5).

Post-donation outcomes of anonymous organ donation: The questionnaire items used to assess the post-donation outcomes of anonymous organ donation were derived from Kang et al. (2022). This questionnaire item assesses nine domains of post-donation experiences: negative experiences; improved relationships with others; social recognition; exposure to social prejudice; increased sense of meaning in life; increased self-esteem; no regrets; expansion of positive influence; and increased trust. Participants responded to each item on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Higher scores indicate greater agreement within each domain. All items assessed participants' current perceptions of outcomes following organ donation.

To identify natural groupings among respondents, a GMM was applied to the 40 items. This approach allowed for the classification of participants into three clusters: highly enriched positive experience; moderately enriched positive experience; and scarcely enriched positive experience.

These clusters were subsequently utilized as the dependent variable in a model examining the factors associated with different post-donation outcome profiles. Table 2 presents the full list of 40 items comprising the post-donation outcomes questionnaire. This comprehensive assessment provides valuable insights into the multifaceted experiences of anonymous organ donors following their donation.

Statistical analyses. This study employed descriptive statistics, Gaussian Mixture Model (GMM), and multinomial logistic regression as analytical methods. First, descriptive statistics were used to summarize the characteristics, motivations, and experiences of anonymous organ donors. Means and standard deviations were calculated for continuous variables, while frequencies and percentages were computed for categorical variables.

Second, to classify post-donation outcomes, we utilized a GMM, a probabilistic clustering method that assumes the data is generated from a mixture of a finite number of Gaussian distributions with unknown parameters (Shakoor et al. 2021). Unlike traditional methods that rely on fixed statistical cutoffs, GMM estimates the probability of each data point belonging to different clusters, allowing for a more flexible and natural classification of post-donation outcomes. GMM offers several advantages[2] over traditional hard clustering methods (Baek et al. 2023). The optimal number of clusters was determined using the Bayesian Information Criterion (BIC) (Mirzal 2020). This analysis indicated that a three-cluster model best fits the data. Based on their distinctive features, the clusters were labeled as: highly enriched positive experience cluster; moderately enriched positive experience cluster; and scarcely enriched positive experience cluster.

Finally, to examine factors influencing differences among the three clusters, this study employed multinomial logistic regression. This analysis used the scarcely enriched positive experience cluster as the reference group, thus identifying factors associated

Table 2 Categories and items of post-donation outcomes.

Category	Detailed statement items
Negative experiences	"I experienced health issues as a result of organ donation." "After experiencing the consequences, I regretted having donated organs."
Improved relationships with others	"My family feels proud of me." "My relationship with my family has gotten better." "My friends have rated me highly." "Those around me have come to trust me more."
Social recognition	"I have received recognition from the government/society." "The attitude towards me in the workplace has improved." "Donating organs has helped me secure a better job." "I have earned a good reputation at work." "Promotion at work has been easier because of my good reputation." "My network has expanded because of my good reputation." "I have gained a good reputation through social participation (religious, volunteer work, etc.)."
Exposure to social prejudice	"I was suspected of having been paid for organ donation." "People around me became concerned about potential health issues." "People around me started to see me as somewhat odd." "At work, I was perceived as unfocused and causing unnecessary trouble."
Increased sense of meaning in life	"I was able to start new things that I enjoy doing." "I felt a sense of peace.", "I felt happier than I did before." "Being an organ donor boosted my confidence." "I began to see my life as being more meaningful." "I'm grateful for being able to help others."
Increased self-esteem	"I became more satisfied with myself." "I started to see myself as excellent." "I have come to believe that I possess good qualities." "I felt proud of myself." "I started to see myself as a valuable person." "I felt that I was leading a successful life."
No regrets	"I am convinced that organ donation is one of the best choices I have made in my life." "If circumstances allow, I might consider choosing organ donation again."
Expansion of positive influence	"I have consistently made monetary donations." "I have consistently participated in volunteer activities." "I have consistently donated blood." "I have become more diligent in assisting strangers in need." "I have educated others about the importance and facts of organ donation." "I have actively encouraged many people to think about organ donation."
Increased trust	"I have come to trust my acquaintances more." "I have developed greater trust in people." "I have developed greater trust in society."

Table 3 Demographic characteristics ($N = 200$).

Attributes	N (%)
Gender	
Male	121 (60.5)
Female	79 (39.5)
Age (years)	
30–39	2 (1)
40–49	5 (2.5)
50–59	49 (24.5)
60–69	92 (46)
≥70	52 (26)
Mean ± SD	63.90 ± 8.81
Religion	
Yes	174 (87)
None	26 (13)
Marital status	
With spouse	167 (83.5)
Without spouse	33 (16.5)
Employment status	
Full-time employed	54 (27)
Self-employed	61 (30.5)
Housewives	23 (11.5)
Others	62 (31)
Subjective economic status	
Low class	35 (17.5)
Lower-middle class	53 (26.5)
Middle class	84 (42)
Upper-middle class	23 (11.5)
High class	5 (2.5)
Subjective health status	
Worsen compared to before donation	28 (14)
No change	107 (53.5)
Improved compared to before donation	65 (32.5)
Timing of donation	
1990–1999	80 (40)
2000–2009	82 (41)
2010–2019	38 (19)

SD standard deviation.

with belonging in both the highly enriched and moderately enriched positive experience clusters. All statistical analyses were performed using Stata/IC 16.0 and Python. The significance level was set at $p < 0.05$ for all analyses.

Results

Korean anonymous organ donors

Demographic and other characteristics. The gender distribution among the sample of donors was 121 males (60.5%) and 79 females (39.5%), indicating that males outnumber females by approximately 1.5 times.[3] The average age of the donors was 63.9 years.[4] Most donors reported having a religious affiliation. Regarding marital status, 83.5% of the donors live with a spouse. Employment status varied among participants, with 31.0% categorized as other, 30.5% as self-employed, 27.0% as employed full-time, and 11.5% as housewives. In terms of subjective economic status, 42.0% identified as middle class, 26.5% as lower-middle class, 17.5% as low class, 11.5% as upper-middle class, and 2.5% as high class. When comparing subjective health status before and after donation, 53.5% reported no change, 32.5% reported improvement, and 14.0% reported a worsening. The timing of donations showed that 41.0% donated between 2000–2009, 40.0% between 1990–1999, and 19.0% between 2010–2019. Detailed demographic characteristics of the examined group are presented in Table 3.

A descriptive analysis of altruistic tendencies and life priorities among anonymous organ donors provides insight into their underlying motivations. First, the mean altruism score among anonymous organ donors in this study was 62.7 (SD = 11.4), which is approximately 22 points higher than the midpoint score of 40.5 (Table 4), indicating a relatively high level of altruism among participants. Compared to Israeli anonymous donors in a study by Kurleto et al. (2020), the median altruism score of Korean donors (64) was notably higher than the median score of Israeli donors (51). This finding suggests potential cross-cultural differences in altruistic tendencies, though further research is needed to confirm this observation.

Table 4 Altruism and life priorities ($N = 200$).

Variable	Mean ± SD	Median	Min-Max	Not important (%)	Slightly important (%)	Important (%)	Very important (%)	The most important (%)
Altruism	62.7 ± 11.39	64	8–80	-	-	-	-	-
Religious beliefs	4.28 ± 1.25	5	1–5	15 (7.5)	10 (5)	16 (8)	22 (11)	137 (68.5)
Family	4.81 ± 0.55	5	1–5	1 (0.5)	1 (0.5)	6 (3)	18 (9)	174 (87)
Friends	4.35 ± 0.90	5	1–5	3 (1.5)	5 (2.5)	25 (12.5)	53 (26.5)	114 (57)
Material goods	3.44 ± 1.11	3	1–5	11 (5.5)	26 (13)	64 (32)	61 (30.5)	38 (19)
Job	4.08 ± 0.99	4	1–5	3 (1.5)	13 (6.5)	34 (17)	64 (32)	86 (43)
Social recognition	3.66 ± 1.22	4	1–5	11 (5.5)	28 (14)	44 (22)	51 (25.5)	66 (33)
Self-esteem	4.49 ± 0.84	5	1–5	3 (1.5)	3 (1.5)	18 (9)	44 (22)	132 (66)

SD standard deviation.

Table 5 Motivations of anonymous organ donation ($N = 200$).

Variable	Mean ± SD	Min-Max
A sense of responsibility to help others	4.22 ± 1.19	1–5
Empathy for those in need	3.67 ± 1.45	1–5
Religious beliefs	3.33 ± 1.69	1–5
A desire to give back to society	2.46 ± 1.59	1–5
Receiving blessings as a result of donation	2.01 ± 1.44	1–5

SD standard deviation.

Table 6 Experiences of anonymous organ donation ($N = 200$).

Variable	*N* (%)
Thoughtful deliberation, Mean ± SD (Min-Max)	3.50 ± 1.67 (1–5)
Family support, Mean ± SD (Min-Max)	2.61 ± 1.23 (1–4)
None of the family members supported it at all	53 (26.5)
More family members did not support it	45 (22.5)
More family members supported it	29 (14.5)
All family members supported it completely	73 (36.5)

Table 7 Analysis results on post-donation outcomes by GMM.

The number of clusters	Loglikelihood	BIC	Counts by cluster
2	−49.036	28,732.94	135:65
3	−33.918	27,247.55	93:83:24
4	−26.749	28,941.95	81:62:39:18

Second, an analysis of donors' life priorities revealed a distinct ranking (Table 4). Family was rated as the highest priority ($M = 4.81$), followed by self-esteem ($M = 4.49$), friends ($M = 4.35$), religious beliefs ($M = 4.28$), job ($M = 4.08$), social recognition ($M = 3.66$), and material goods ($M = 3.44$). Based on frequency distributions, the majority of participants considered family (87.0%) and religious beliefs (68.5%) as paramount, while material goods (19.0%) were of relatively low importance. This finding partially aligns with those of Kurleto et al. (2020), who found that Israeli donors similarly prioritized family (96.5%) and religious beliefs (85.2%). While this consistency suggests that family and religious beliefs may play a crucial role in motivating and shaping the experiences of anonymous organ donors across different cultural contexts, differences in priorities—such as the relatively high importance of self-esteem observed among Korean donors—warrant further investigation into potential cultural variations

Motivations of anonymous organ donation: The motivations of anonymous organ donors across the sample were rated as follows: "a sense of responsibility to help others" received a mean score of 4.22 out of 5.00, "empathy for those in need" received 3.67, "religious beliefs" received 3.33, "a desire to give back to society" received 2.46, and "receiving blessings as a result of donation" received 2.01 (Table 5). These findings are similar to those observed among Israeli donors, whose motivations predominantly involved a willingness to help others and a desire to do good, alongside religious motivations (Kurleto et al. 2020). This similarity suggests a commonality in altruistic and religious motivations across cultural contexts, highlighting the universal nature of these driving factors in anonymous organ donation.

Experiences of anonymous organ donation: Family support and thoughtful deliberation are crucial factors in the context of organ donation. The mean score for family support in organ donation was 2.61, which is slightly above the midpoint score of 2.5 on the scale. This suggests that, on average, family support was close to a neutral level. A more detailed analysis of the distribution of family support provides additional insights. Full support from all family members was reported by 73 individuals (36.5%), whereas a complete lack of support was reported by 53 individuals (26.5%). As presented in Table 6, family support was relatively evenly divided, with 51% of respondents experiencing some level of support and 49% receiving little or no support. Similarly, the average score for thoughtful deliberation in donation decisions was 3.5, about 0.5 points above the midpoint score of 3. This indicates that organ donors engaged in a moderate to somewhat above-average level of careful consideration when making their decision.

GMM clustering on post-donation outcomes

Results of GMM. GMM clustering was conducted to classify post-donation outcomes into an unknown number of groups. The Bayesian Information Criterion (BIC) was used as the performance indicator for model selection, with the optimal model identified by the minimum BIC value (Na 2017). Based on this criterion, a 3-cluster solution was selected as it had the lowest BIC, indicating the best fit for the data (Table 7).

A plurality of donors ($n = 93$, 47%) were categorized into Cluster 1, 24 donors (12%) fell into Cluster 2, and 83 donors (41%) fell into Cluster 3. Cluster 1 is characterized by the highest

Table 8 Mean values in post-donation experiences of anonymous organ donors: a cluster-based analysis.

Domains	Cluster 1 ($n = 93$)	Cluster 2 ($n = 24$)	Cluster 3 ($n = 83$)
Negative experiences	1.41	1.87	1.52
Improved relationship with others	4.36	2.26	3.52
Social recognition	2.88	1.36	2.24
Exposure to social prejudice	2.20	1.85	2.04
Increased sense of meaning in life	4.43	2.36	3.49
Increased self-esteem	4.54	2.02	3.27
No regrets	4.72	3.37	4.20
Expansion of positive influence	3.87	2.24	3.19
Increased trust	4.10	1.77	2.91
Cluster name	Highly enriched positive experience cluster	Scarcely enriched positive experience cluster	Moderately enriched positive experience cluster

mean scores in domains such as improved relationships with others, increased social recognition, increased sense of meaning in life, increased self-esteem, no regrets, expansion of positive influence, and increased trust. Conversely, Cluster 2 is characterized by the lowest mean scores in these same domains. Specifically, Cluster 1's mean values for improved relationships with others, increased sense of meaning in life, increased self-esteem, and increased trust were more than two points higher than those in Cluster 2. There were minimal differences in mean values between clusters regarding negative experiences and exposure to social prejudice. Cluster 3's mean values across all variables were intermediate, ranging between those of Clusters 1 and 2. Cluster 3 had a mean of 3 or higher, indicating outcomes closer to positive, in domains such as improved relationships with others, increased sense of meaning in life, increased self-esteem, no regrets, and expansion of positive influence.

Based on these characteristics, Cluster 1 was labeled as the "Highly Enriched Positive Experience Cluster," Cluster 2[5] as the "Scarcely Enriched Positive Experience Cluster," and Cluster 3 as the "Moderately Enriched Positive Experience Cluster." Detailed characteristics of the three clusters are presented in Table 8. These results indicate that while many donors experienced an overall internal reward, often referred to as the "warm glow," from their organ donation, approximately 12% had a somewhat negative perception of the overall donation experience. This finding suggests that the "warm glow" associated with organ donation is not a universally shared experience, as a subset of donors reported less positive or even undesirable feelings after their donation.

Predictors related to post-donation outcomes

Results of multinomial logistic regression analysis. This study employed multinomial logistic regression analysis to examine the predictors associated with the three clusters of post-donation outcomes. Table 9 presents the results of the multinomial logistic regression analysis. In this analysis, the dependent variable, post-donation outcomes, was categorized into three clusters. Using the scarcely enriched positive experience cluster as the reference group, this study identified significant factors associated with the highly enriched positive experience cluster and the moderately enriched positive experience cluster. The results of the likelihood ratio (LR) test were statistically significant, and the Pseudo R-squared value was 0.286.

Three demographic variables showed statistically significant relationships. First, being female was significantly associated with higher odds of belonging to both the highly enriched positive experience cluster and the moderately enriched positive experience cluster, compared to males. This finding suggests that female organ donors may derive greater emotional fulfillment and a stronger sense of personal meaning from donation. Women tend to exhibit higher levels of empathy, altruism, and emotional engagement in prosocial behaviors (McDonald and Kanske 2023), which may contribute to their more enriched positive experiences following organ donation. Second, self-employed individuals were significantly less likely to belong to the highly enriched positive experience cluster. This finding suggests that self-employed donors are more likely to experience negative post-donation outcomes compared to donors in other employment statuses. Shaw and Bell (2014) reported that self-employed donors who do not receive leave benefits often face financial hardship and emotional strain; it may be the case that the lack of benefits for self-employed donors contributes to a more negative perception of their donation outcomes. Third, subjective health status was also significantly associated with higher odds of belonging to the highly enriched positive experience cluster. Specifically, organ donors who rated their health status highly had 2.97 times higher odds of being in this cluster compared to those who rated their health status lower ($OR = 2.969$, $p < 0.05$). This suggests that better subjective health may be linked to greater physical and emotional resilience, allowing individuals to cope more effectively with any challenges or uncertainties related to organ donation. Those who feel healthier may also be less likely to experience post-donation stress or regret, leading to more positive overall experiences.

Regarding other characteristics, altruism showed no significant association with either the highly enriched positive experience cluster or the moderately enriched positive experience cluster. Significant differences in life priorities were observed, particularly concerning self-esteem and job importance. First, self-esteem had a significant positive association with higher odds of belonging to the highly enriched positive experience cluster. Specifically, organ donors who placed greater importance on self-esteem in their lives had 5.05 times higher odds of belonging to the highly enriched positive experience cluster compared to those who placed less importance on self-esteem ($OR = 5.048$, $p < 0.001$). Second, job importance exhibited a significant positive association with higher odds of belonging to the moderately enriched positive experience cluster. Organ donors who placed greater importance on jobs in their lives were 2.89 times higher odds of belonging to the moderately enriched positive experience cluster compared to those who placed less importance on job ($OR = 2.889$, $p < 0.01$).

Regarding motivations for anonymous organ donations, none reached statistical significance at the conventional threshold

Table 9 Results of multinomial logistic regression analysis.

Variables	Reference group: scarcely enriched positive experience cluster					
	High			Moderate		
	Coef.	OR	*p* value	Coef.	OR	*p* value
Demographic characteristics						
Age	0.012	1.012	0.825	−0.020	0.979	0.701
Gender (ref. Male)	2.500*	12.190	0.022	2.488*	12.044	0.022
Marital status (ref. without spouse)	0.819	2.268	0.420	0.884	2.421	0.372
Religion (ref. none)	−0.509	0.601	0.695	−0.574	0.562	0.629
Employment status (ref. others)						
Full-time employed	−0.224	0.798	0.847	−0.825	0.438	0.470
Self-employed	−2.177*	0.113	0.034	−1.720#	0.178	0.081
Housewives	−2.312	0.098	0.131	−2.898#	0.055	0.060
Subjective economic status	0.411	1.509	0.265	0.449	1.567	0.213
Subjective health status	1.088*	2.969	0.049	0.177	1.194	0.743
Timing of donation (ref. 1990 ~ 1999)						
2000–2009	−0.393	0.674	0.641	−0.850	0.427	0.300
2010–2019	0.143	1.154	0.895	0.017	1.017	0.987
Other characteristics						
Altruism	0.041	1.042	0.216	0.026	1.026	0.403
Life priorities						
Religious beliefs	0.443	1.558	0.254	0.328	1.388	0.371
Family	−0.121	0.885	0.864	0.177	1.194	0.793
Friends	−0.624	0.535	0.240	−1.002#	0.366	0.063
Material goods	−0.492	0.611	0.203	−0.013	0.986	0.971
Job	0.738#	2.092	0.066	1.061**	2.889	0.008
Social recognition	0.240	1.271	0.427	0.154	1.167	0.603
Self-esteem	1.619***	5.048	0.000	0.498	1.645	0.204
Motivations of donation						
A sense of responsibility to help others	0.048	1.049	0.891	0.369	1.446	0.283
Empathy for those in need	0.351	1.420	0.250	0.198	1.219	0.497
Religious beliefs	0.185	1.203	0.476	0.168	1.183	0.511
Receiving blessings as a result of donation	0.617#	1.854	0.071	0.423	1.527	0.211
A desire to give back to society	−0.257	0.772	0.361	0.029	1.029	0.915
Experiences of donation						
Family support	0.731*	2.078	0.019	0.500#	1.649	0.097
Thoughtful deliberation	0.727***	2.070	0.000	0.473*	1.605	0.013
Cons	17.726***		0.000	−9.551*		0.044

$N = 200$; Log likelihood = −139.30901; LR $x^2(52) = 111.57$***; Pseudo $R^2 = 0.2859$.
Coef. coefficient, *OR* odds ratio, *SD* standard deviation.
#$p < 0.1$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

($p < 0.05$). However, the motivation of "receiving blessings as a result of donation" showed a marginally significant positive association ($p = 0.071$) with higher odds of belonging to the highly enriched positive experience cluster. Although this motivation, which involves giving not only for the benefit of recipients but also for oneself and one's family (Kang et al. 2022), appears unique to Korean society and approaches statistical significance, it is essential to interpret this association cautiously and encourage further research to confirm its validity.

In the context of donation experiences, both family support and thoughtful deliberation were significantly associated with enriched positive experiences. First, family support emerged as a significant contextual predictor of anonymous organ donation experiences, demonstrating a positive association with higher odds of belonging to the highly enriched positive experience cluster. Specifically, donors who received positive family support were 2.08 times more likely to be classified in this cluster compared to those without such support (OR = 2.078, $p < 0.05$). This finding aligns with Kang et al.'s (2022) study, which identified family support as a crucial factor in overcoming the challenges associated with organ donation. Furthermore, positive family support appears to enhance post-donation well-being by reinforcing a sense of validation and reducing potential emotional distress. Discussing organ donation with family can foster a supportive environment, ultimately leading to more fulfilling outcomes for both donors and recipients. Collectively, these findings indicate that family support continues to exert a positive influence on anonymous organ donors even after the donation process. Second, thoughtful deliberation also emerged as a significant contextual predictor associated with positive post-donation experiences among anonymous organ donors. Specifically, donors who engaged in thorough contemplation prior to donation had 2.07 times higher odds of belonging to the highly enriched positive experience cluster (OR = 2.070, $p < 0.001$) and 1.61 times higher odds of belonging to the moderately enriched positive experience cluster (OR = 1.605, $p < 0.05$) compared to those with less deliberation. These findings suggest that donors who carefully consider their decision may be better prepared for the donation process, leading to more positive post-donation experiences. This aligns with existing literature emphasizing the importance of informed decision-making in organ donation processes (Shaw and Bell 2014; Wadström et al. 2019).

Conclusion and implications

This study provides novel insights into the post-donation outcomes and experiences of anonymous organ donors in South Korea, addressing a significant gap in the literature by highlighting a culturally distinct perspective. Utilizing the largest sample of anonymous organ donors to date ($n = 200$), this research sheds light on a population that is inherently difficult to access due to donor anonymity and rarity. By identifying diverse characteristics associated with organ donation in a non-Western context, this study expands current understanding of donor experiences. Furthermore, it employs a range of predictors to analyze post-donation outcomes, offering a more comprehensive

perspective on the psychological and social effects of donation. These findings contribute to the growing body of knowledge on organ donation and may inform future policies and support systems for anonymous donors.

First, the descriptive analysis of the characteristics, motivations, and experiences of Korean anonymous organ donors revealed that approximately 61% were male, with an average age of 64 years at the time of the survey. These donors exhibited high levels of altruism and placed significant importance on family and religious values. The gender distribution observed in our study was consistent with the overall ratio of male donors among the 650 anonymous organ donors who participated in the KODP between 1991 and 2019. However, this pattern warrants further investigation into potential cultural or societal factors that may influence the demographic profile of anonymous donors. The primary motivations for donation were a "sense of responsibility to help others" and "empathy for those in need," underscoring the altruistic nature of these donors. This finding aligns with previous research on anonymous organ donors in other countries (Kurleto et al. 2020; Maple et al. 2014), suggesting that certain psychological and motivational traits may be universally shared among this unique group of donors.

Second, using GMM clustering, this study identified three distinct clusters of post-donation outcomes: highly enriched positive experiences (47%), moderately enriched positive experiences (41%), and scarcely enriched positive experiences (12%). This nuanced classification provides a more comprehensive understanding of the heterogeneity in post-donation experiences, demonstrating that while most donors report positive outcomes, a non-negligible minority face challenges. This finding extends beyond the predominantly positive outcomes reported in previous studies (Jacobs et al. 2015; Wadström et al. 2019) and highlights the necessity of acknowledging and addressing the full spectrum of donor experiences. This finding broadly aligns with Andreoni's (1990) "warm glow" theory of altruism. The high proportion of donors reporting enriched positive experiences (88% across the highly and moderately enriched clusters) suggests that most anonymous organ donors experience a significant internal reward from donation, reinforcing their sense of self-worth, life meaning, and overall well-being. This "warm glow" effect appears to play a crucial role in shaping favorable post-donation outcomes, helping donors navigate the physical and emotional challenges associated with organ donation. However, the presence of a "scarcely enriched" cluster (12%) raises important limitations to the universality of the warm glow effect. While altruistic motivation may provide psychological fulfillment for many donors, it does not guarantee uniformly positive outcomes. Some donors may not experience the anticipated emotional gratification or may face unforeseen challenges—such as unmet expectations, social stigma, or a lack of post-donation support—that diminish their overall well-being. This variability underscores the importance of considering individual differences, contextual factors, and the need for tailored support systems to enhance donor experiences and mitigate potential risks.

Third, the multinomial logistic regression analysis identified several significant factors associated with post-donation outcomes, including family support, thoughtful deliberation, gender, employment status, subjective health status, and life priorities, such as self-esteem and job importance. Among these predictors, family support and thoughtful deliberation emerged as particularly crucial predictors of positive post-donation experiences, reinforcing the role of both emotional and cognitive preparedness in shaping donor well-being. These findings build upon previous qualitative research (Humar et al. 2022; Zuchowski et al. 2021) by quantifying the importance of these predictors and demonstrating their predictive power in determining post-donation outcomes. The variability in family support levels—where nearly half of the donors (49%) reported either receiving no support or only partial support—underscores a critical challenge for anonymous donors. Unlike living-related donors, who often receive emotional reassurance and practical assistance from their families, anonymous donors may lack sufficient psychological stabilization before and after donation. Similarly, thoughtful deliberation ($M = 3.5$, $SD = 1.67$) emerged as an essential component of donor decision-making, suggesting that donors who engage in deeper contemplation about their choice tend to experience more positive post-donation outcomes. These findings highlight that potential donors should be encouraged to engage in family support and comprehensive reflection, ensuring they fully understand the psychological, familial, social, and ethical implications of their decision.

These findings have important implications for organ donation policies and practices. First, donor support programs should be more attuned to the variability of post-donation experiences, particularly recognizing that a subset of anonymous organ donors may face significant challenges after donation. While the majority of donors report positive experiences, the identification of a sizable "scarcely enriched positive experience" cluster underscores the reality that not all donors experience the expected psychological fulfillment or social well-being. This group, characterized by lower levels of post-donation benefits and a higher likelihood of emotional or social difficulties, requires particular attention. Understanding the factors contributing to these differential outcomes is critical for improving donor care. For instance, certain subgroups—such as self-employed donors or those with lower subjective health status—may be more vulnerable to post-donation difficulties. These findings highlight the importance of developing targeted interventions that address the unique challenges faced by at-risk donors. Support services should offer customized psychological counseling, post-donation monitoring with longitudinal follow-up, and tailored assistance programs to mitigate potential distress.

Second, the organ donation evaluation process should systematically incorporate assessments of family support and encourage thorough deliberation, as these factors significantly influence post-donation experiences. Given the identification of organ donors who may struggle with emotional, social, or psychological challenges, it is essential to refine pre-donation assessments to better predict and address potential post-donation difficulties. One approach is to integrate standardized measures of family support into donor evaluation protocols. More specifically, this could take the form of pre-donation interviews, validated family support questionnaires, or structured discussions designed to gauge the extent of familial involvement. In addition, thoughtful deliberation should be actively encouraged during the donor evaluation process. Anonymous organ donation involves profound ethical, emotional, and psychological considerations, making it imperative that donors engage in comprehensive pre-donation reflection. This could be facilitated through structured decision-making frameworks, which help potential donors evaluate their motivations, anticipated post-donation experiences, and coping mechanisms. Incorporating decision-making counseling sessions could also strengthen donor preparedness and reduce the likelihood of negative outcomes. By embedding these comprehensive assessment strategies into the donor evaluation framework, organ donation programs can not only enhance the ethical integrity of anonymous organ donation but also foster a more supportive environment that maximizes positive donor experiences while mitigating potential risks.

To ensure that these findings directly inform practice, we propose a set of specific, implementable interventions. First, transplant centers and organ procurement organizations, such as

the Korean Organ Donor Program, should institutionalize a donor support coordination system, wherein a designated staff member accompanies each anonymous donor throughout the donation journey—from pre-donation reflection to post-donation follow-up. Second, standardized assessment tools (e.g., Family APGAR, structured deliberation worksheets) should be embedded in donor evaluation protocols. These tools can be adapted to reflect cultural nuances and administered through structured interviews. Third, longitudinal monitoring programs should be implemented, ideally coordinated by a national body such as the Korean Network for Organ Sharing (KONOS), to track donor well-being over time and offer timely psychosocial support. To facilitate adoption, we recommend a phased implementation, beginning with pilot programs in major urban transplant centers, followed by national scale-up informed by feedback and outcome evaluations. These policy measures not only operationalize the study's findings but also offer a realistic path toward enhancing the well-being and safety of anonymous organ donors.

These findings also highlight important areas for further research on anonymous organ donation. First, to better understand the long-term psychological and social outcomes of anonymous organ donation, we recommend that future studies adopt longitudinal research designs. Such designs are critical for validating and expanding upon the current findings, particularly the typology of post-donation outcomes. By tracking donors' psychological and health status over time, longitudinal research can clarify how variations in these factors influence well-being, distinguish between temporary and persistent outcomes, and identify critical periods of vulnerability when targeted interventions may be most needed. For example, panel studies with follow-up intervals at 1 year, 3 years, and 5 years post-donation could illuminate the evolving nature of donor experiences and the dynamic interplay between emotional resilience, support systems, and well-being. This approach would address limitations inherent in cross-sectional research and enhance the reliability of future findings through temporal validation. Moreover, it would help refine post-donation support frameworks, enabling the development of evidence-based policies tailored to donor trajectories over time.

Second, while anonymous organ donation is a globally recognized practice, its motivations, promotional strategies, policies, and regulations can vary across cultural contexts. This study examines both the universal and culturally specific aspects of anonymous organ donation in Korea. For example, motivations such as a "sense of responsibility to help others" and "empathy for those in need" are commonly observed among Korean donors, similar to patterns seen in Western contexts. However, some Korean donors also cite "receiving blessings as a result of donation" as a culturally specific motivation. This finding underscores the importance of comparative research in understanding both shared and culturally distinct factors shaping organ donation motivations and outcomes. A deeper exploration of these similarities and differences can contribute to a more comprehensive understanding of donor experiences and the mechanisms that influence organ donation behaviors across cultures.

Third, this study relied on self-reported data, which may introduce potential validity concerns, such as recall bias or social desirability effects. Additionally, to measure post-donation outcomes, this study utilized items derived from a qualitative study on anonymous organ donors in Korea (Kang et al. 2022), as no prior standardized measures were available. While this approach provided valuable insights, it also highlights the need for future research to develop and validate more robust measurement tools. Addressing these limitations through multiple data collection methods, such as longitudinal tracking, clinical assessments, or third-party evaluations, could enhance the accuracy and reliability of findings. Furthermore, construct refinement efforts —including the development of standardized and psychometrically validated scales—are essential for advancing research in this field and ensuring a more comprehensive understanding of post-donation outcomes.

By addressing these practical implications, policymakers, healthcare providers, and organ donation organizations can take meaningful steps toward enhancing the experiences and outcomes of anonymous organ donors. Similarly, by tackling these research challenges, scholars can contribute to developing a more comprehensive and systematic understanding of anonymous organ donation. This study serves as a foundational step in this critical area, encouraging further research into the complexities of anonymous organ donation both in Korea and globally. Moreover, it underscores the need for a more holistic and nuanced approach to donor support—one that acknowledges both the altruistic potential and the challenges associated with this unique form of giving.

Data availability

The data that support the finding of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy or ethical restrictions.

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Notes

1 The walking event was an annual gathering aimed at promoting the health and well-being of anonymous donors while providing a space for interaction of the community.
2 Firstly, GMM assigns probabilities of cluster membership to each data point, allowing for more nuanced classification. Secondly, it can capture complex data patterns that may be missed by simpler clustering algorithms. Thirdly, it provides a more flexible approach to data assignment compared to deterministic methods like k-means.
3 Among the 650 anonymous organ donors who participated in the KODP from 1991 to 2019, 439 (67.5%) were male, and 211 (32.5%) were female. This gender distribution closely reflects the gender ratio of the target study population.
4 The average age of donors at the time of donation was 43.8 years.
5 Cluster 2 had the most negative perception of post-donation experiences among the three clusters.

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Author contributions

Chulhee Kang developed the initial idea for the study and led the project. Hyelim Hong and Chanmi Kim were responsible for data collection from anonymous organ donors. Under Kang's supervision, Hong and Kim conducted interviews and a survey with anonymous organ donors and analyzed the data. All authors engaged in continuous discussions of the study project and contributed significantly to drafting and finalizing the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

This study was approved by the Institutional Review Board of Yonsei University (Approval number: 7001988-202304-HR-1701-03) on October 4, 2022. The approved protocol encompassed all procedures related to participant recruitment, informed consent, and data collection. All research involving human participants was conducted in accordance with institutional ethical standards and relevant national regulations. To ensure confidentiality, all personal identifying information was permanently deleted following data collection.

Informed consent

Following the Institutional Review Board's approval, all participants were recruited on a voluntary basis with the invaluable assistance of the Korean Organ Donor Program (KODP). In October 2022, the research team engaged with potential participants, providing comprehensive written and verbal explanations concerning the study's objectives, procedures, confidentiality protocols, and their unequivocal right to withdraw at any point without penalty. These detailed briefings occurred during a series of small group meetings and the annual walking event for anonymous organ donors, where individuals were invited to participate. The informed consent process was meticulously managed across two primary modalities. A group of 30 participants provided their written informed consent and completed the survey concurrently on-site during the walking event held on October 7. The remaining 170 participants, having expressed interest during these initial gatherings, subsequently scheduled visits to the KODP conference rooms. For each of these individuals, written informed consent was meticulously obtained by the research team on the same day their survey was completed. This latter phase of data collection and consent acquisition occurred throughout October 2022, spanning various dates from October 13 to October 23. Crucially, all participants were fully apprised of the measures taken to protect their anonymity, the exclusive use of their data for academic research, and the absence of any foreseeable risks associated with their participation. These assurances, along with the specifics of data handling and the intent to publish anonymized and aggregated findings, were clearly delineated in both the written informational materials provided and the signed informed consent forms. No financial incentives were provided for participation, and all identifying personal information was permanently deleted upon the conclusion of the data collection phase to further safeguard participant privacy.

Additional information

Correspondence and requests for materials should be addressed to Chulhee Kang.