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BSc Nursing and Patient Care - Nurse

**Examination of knowledge and attitudes related to
donation and transplantation among health science
students**

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2024

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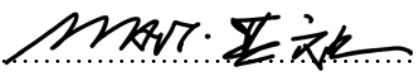
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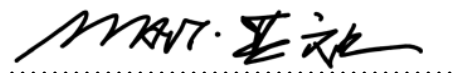
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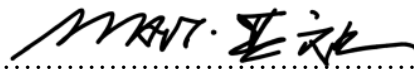


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**Examination of knowledge and attitudes related to donation and
transplantation among health science students**

Code: MAV123

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List of abbreviations

ESRD - End Stage Renal Disease

ET - Eurotransplant

GODT – Global Organ Donation Transplant

PMP – per million population

WHO – World Health Organization

COVID-19 – Corona Virus Disease 19

1. Introduction

Organ transplantation or organ replacement is the most preferred method of treatment for medical professionals when dealing with chronic organ failures. Organ transplantation improves the quality of life of end-stage organ failure patients for it restores the essential functions of the body by replacing the organ. Worldwide, there is a constant growth in demand for organ transplantation, which outnumbers the organ donors. According to the Committee of Transplantation of the Council of Europe, there were 35,529 organs transplanted globally in 2020; this showed a decline as compared to the data in 2019 due to the global pandemic of COVID-19 (Domínguez-Gil, 2022). In Europe, there were more than 150,000 patients waiting to receive organ transplantation in 2018 (Scholz, 2020).

The paucity of organ donors has existed as a major impediment to transplantation. Thousands of people die each year while waiting for a life-saving organ transplant. The deficit for organ transplantation is attributed to the loss of potential organ donors (Martínez-Alarcón et al., 2019), due to the organ donation refusal. Refusal to donate organs is a multifactorial phenomenon, influenced by a variety of factors, including lack of knowledge (Barth et al., 2021; Illés et al., 2017; Kanyári et al., 2021; Martínez-Alarcón et al., 2019), the concerns of bodily integrity (Pfaller et al., 2018), mistrust (Balliet et al., 2019; Terbonssen et al., 2016), the consent of the family (Akabayashi et al., 2018; Park & Kim, 2020), and lack of standardization of brain death and organ donation criteria (Da Silva & Frontera, 2015). Additionally, recent references suggest that knowledge, attitude, and behavior towards organ donation and transplantation are the main factors that affect the perception and willingness towards donation consent (Miller & Breakwell, 2018; Ruta et al., 2022).

Existing research recognizes the critical role played by healthcare professionals in terms of information dissemination and identifying potential donors who primarily influence the attitude of the public towards organ donation (Martínez-Alarcón et al., 2020). Moreover, recent studies suggest that the healthcare professionals possess inadequate experience in organ donation and transplantation, which is seen to be a critical barrier to organ donation (Allahverdi et al., 2020; Fernández-Alonso et al., 2020; Squires et al., 2018). Additionally, there is a growing body of evidence that recognizes the contribution of education in improving awareness and attitude (Allahverdi et al., 2020; Morgan et al., 2018; Rydzewska-Rosołowska et al., 2020).

Healthcare professionals need to be educated about organ donation and transplantation, as their knowledge and awareness regarding this topic will have a decisive impact on the patient and family's decision regarding organ donation (Martínez-Alarcón et al., 2019). It is ideal to implement this topic in the healthcare courses curriculum, as healthcare students will be the future healthcare professionals. Additionally, at an earlier level, the students will begin to grasp and understand the process of donation and transplantation. As expressed by Cantarovich, health education will help the public understand the significance of organ transplantation. Moreover, focusing on youth education plays a critical role in having a positive effect on organ donation (Cantarovich, 2002, 2004). In Spain, an intervention program was developed to improve knowledge, attitudes, and behavior of nursing students towards organ donation; this intervention was proven effective in knowledge acquisition, attitude and behavioral change among the participants (Bas-Sarmiento et al., 2023). The positive outcome of the aforementioned randomized controlled trial research shows the essentiality of education among the healthcare students. Furthermore, it is essential to address these gaps regarding education to equip the future healthcare professionals with proper knowledge and attitude.

1.1 Objectives of the study

This study will further examine the knowledge, attitudes, and behaviors of international healthcare students and factors that precipitates and limits organ donation and transplantation. An analysis of the data gathered of the selected population is necessary for the advancement of knowledge and the potential increase in organ donation and transplantation. The chief purpose of this study is to assess healthcare students' knowledge, attitudes, and behaviors towards organ donation and transplantation; measure the determinants that may influence the decision; investigate the different perceptions gathered to further identify the other barriers that affect organ donation; compare the result across the sociodemographic profile. This is to gain comprehensive insights, which aims to lay the groundwork for future directions in transplant education within the health science community.

1.2 Research Questions

The present research is aimed to explore the following:

Main Research Question: What relationship exists between the sociodemographic profile, knowledge level, attitudes, and behaviors towards organ donation and transplantation and the willingness of a healthcare student to engage in organ donation and transplantation activities?

Additional Questions:

1. What difference exists between the religious category of the respondents, namely, Christians and non-Christians and their willingness to donate?
2. What is the level of knowledge of the respondents regarding organ donation and transplantation?
3. What is the level of attitude of the respondents regarding organ donation and transplantation?
4. From the respondents' donation intent, what are the identified barriers and motivations to organ donation and transplantation?
5. What is the level of commitment of the respondents in terms of their willingness to participate in organ donation and transplantation training programs?

2. Literature Review

2.1 Organ Donation and Transplantation Current Situation and Challenges

Organ donation is categorized depending on the source of donation – either from a living donor or deceased donor. Furthermore, there are three classifications of deceased donors: actual deceased organ donor, donor after cardiac death, and donor after brain death. Actual deceased organ donor is a person who is declared deceased and at least one organ was recovered for transplantation. Cardiac death means that this is an irreversible cessation of the circulatory system. Brain death means that there is no more electrical activity on the brain. The criteria to declare brain death are irreversible coma, brainstem areflexia, and apnea (*Global Glossary of Terms and Definitions on Donation and Transplantation*, 2009). Living organ donation is seen as a probable solution to narrow the gap of patients in the waiting list and donation.

Globally in 2021, the most common organs donated by the living organ donors are the kidneys and liver that accounts 37% and 20% living donors, respectively. There are 37,653 actual deceased donors – approximately 77.3% belongs to the donors after brain death, and 22.7% for the donors after cardiac death (Domínguez-Gil, 2022). The GODT indicated more than 150,000 organ transplants are performed annually; these transplants represent only approximately 10% of the global need. Figure 1 shows that the organ donation trend has been increasing since 2005, however, it decreased drastically by 17.6% in 2020 due to the COVID-19 pandemic.

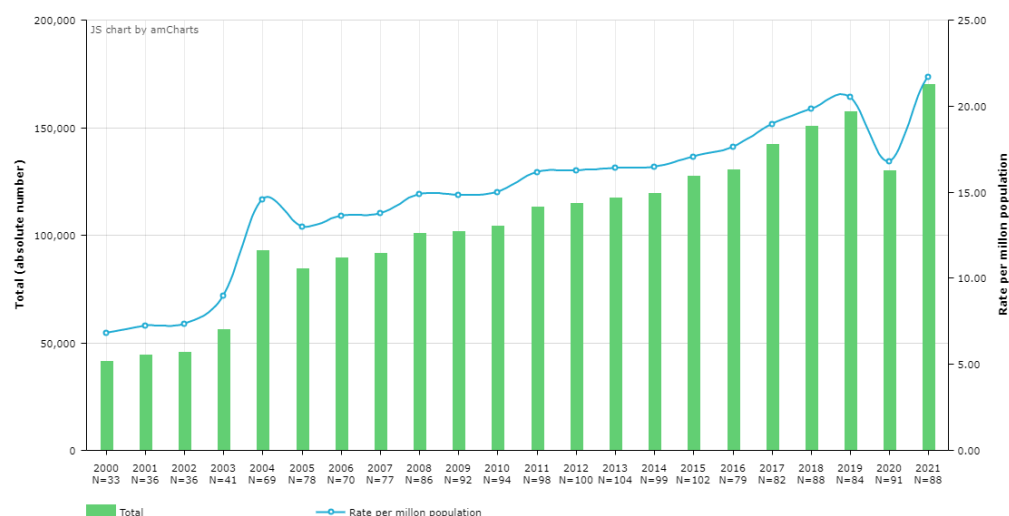


Figure 1 - Total Global Organ Donation Rates from 2000 - 2021 (in PMP)

As seen from Figure 2, the leading in worldwide organ donation is the United States of America, followed by Spain, Israel, and Netherlands with their rates 76.57pmp, 63.17pmp, 54.09pmp, and 53.26pmp respectively.

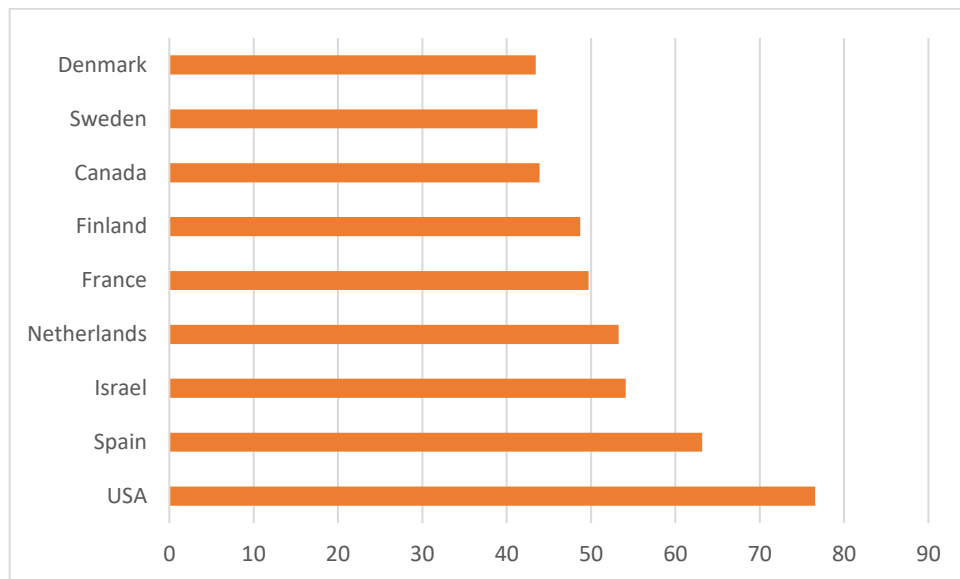


Figure 2 Top 10 Countries in Organ Donation (From 10th to 1st)

There are two systems enforced on organ donation and transplantation. These are the opt-in system and the opt-out system. Opt-in system is a donation policy that obliges a person to express their preference or consent to be an organ donor. Opt-out system, on the other hand, is a donation policy that makes all individuals residing in a country or region to be an organ donor unless they express their written objection while they are still alive (Etheredge, 2021). Countries such as Australia, Canada, Germany, Japan, UK, USA, and the Philippines practices the opt-in system of donation. In contrast with Austria, Belgium, France, Singapore, Spain, and Hungary, which practices the opt-out system (Shepherd et al., 2014).

According to the report regarding Human Organ and Tissue Transplantation by the WHO Director General on the seventy-fifth World Health Assembly, “there is an apparent insufficient growth and asymmetrical development of transplantation worldwide.” It was stated in the report that there are several factors, mainly the differences of capabilities and priorities of each country’s healthcare system. National and regional barriers are present due to lack of understanding of the burden of disease of end-stage organ failure; inadequate national transplantation strategies, legislation and ethical frameworks, government oversight; limited community awareness and knowledge; shortcomings in donor identification and management due to low awareness and engagement among the public

and healthcare workers; deficient universal health coverage; and inadequate protection from exploitation of living donors (World Health Organization, 2022). Another main challenge discussed in this report is the low availability of transplantation services, which is believed to be the root cause of transplantation tourism, illegal and unethical methods of acquiring organs. This is also associated with the exploitation of vulnerable communities. Even though there are national legislations prohibiting these practices, there are issues related to lacking government oversight, reporting, and investigation.

2.2 Knowledge, Attitude, Behavior, and Sociodemographic Profile and its effects on Organ Donation and Transplantation

Knowledge is the acquisition of a variety of theoretical or practical information that contributes to the understanding of a certain subject. It is the awareness obtained by different experiences and situations. A study by Fan et al. (2016) with the general public in China supported that increased knowledge on organ donation and transplantation may improve the number of the people willing to be organ donors. Conversely, in multiple studies, people from various industries have revealed knowledge deficit in concepts related to organ donation and transplantation, which in turn negatively affects organ donation and procurement. These concepts are (1) knowledge of transplantable organs, (2) brain death and cardiac death, (3) organ donation process, and (4) the legal and ethical regulations, along with the religious and cultural beliefs. In the research involving university students, there were knowledge gaps and misconceptions regarding organ donation and transplantation (Kose, 2015). In their study, Ali et al. (2020) highlighted the significance of acknowledging and addressing cultural and religious diversity in understanding organ donation practices. They observed that medical and nursing students, despite their training, may lack sufficient knowledge about these perspectives, potentially hindering their ability to effectively communicate with potential donors and their families.

Numerous studies have established a correlation between limited public knowledge and awareness about organ donation and transplantation. A study involving Chinese healthcare professionals revealed that knowledge levels, beliefs, and attitudes significantly influence individuals' willingness to register as organ donors (Hu & Huang, 2015). Similarly, a study conducted in Malaysia linked low organ donation rates to inadequate public awareness and knowledge regarding the process (Husin et al., 2020). The shortage

of organ donations is often attributed to a combination of factors, including a lack of public awareness and accurate information, along with prevalent myths and misconceptions rooted in religious and cultural beliefs, which ultimately discourage people from becoming organ donors (Bhandari et al., 2020). Research in Hungary further highlights the absence of knowledge regarding legal regulations, ethical stances, and religious beliefs surrounding organ donation (Kanyári et al., 2021). These findings suggest that there is a need for increased public education and awareness campaigns to promote organ donation and address the myths and misconceptions that may be deterring individuals from becoming donors.

Most of the researchers found out that one key concept that would make the people more accepting and willing towards organ donation is a clear explanation on the concept of brain death and cardiac death (Fan et al., 2022; Jawoniyi & Gormley, 2015). Other reasons affecting the attitude are family discussions, demographic factors, and religious beliefs (Ríos et al., 2018; Stadlbauer et al., 2020). There are also individuals who do not approve of deceased brain donors because they fear that there might be a possible inappropriate usage of the body and organ, and a fear that healthcare professionals might prematurely withdraw advanced life support. Hence, educating people in these concepts may improve the rates of deceased organ donation (Akgün et al., 2002).

Extensive research has revealed that comprehensive education and accurate information can cultivate positive perceptions towards organ donation and transplantation (Gürkan & Kahraman, 2018; Tengku Anuar et al., 2022). Besides, the influence of family members on individual decisions regarding organ donation stands out as particularly noteworthy, underscoring the significance of familial and cultural influences in shaping attitudes (Luo et al., 2020). Generally, attitudes towards organ donation and transplantation are formed by multiple determinants, encompassing educational, social, cultural, religious, and emotional influences. Medical professionals, public education initiatives, and family discussions all play pivotal roles in shaping these attitudes. Additionally, knowledge, awareness, and religious beliefs exert a profound influence on individuals' perspectives on organ donation.

Numerous studies have explored the knowledge levels, attitudes, and perspectives of medical professionals towards organ donation and transplantation. These studies have

identified knowledge deficits and negative attitudes among healthcare professionals, stemming from factors such as inadequate information, distrust of the healthcare system, and family influences (Ali et al., 2020; Almutairi, 2020). Additionally, healthcare professionals, particularly nurses, play a critical role in shaping public perceptions of organ donation, and their knowledge and beliefs directly influence the overall organ donation rate (Vlaisavljevic & Zivanovic, 2018). However, research has revealed inconsistencies in nurses' education regarding organ donation and transplantation, highlighting the need for comprehensive training in this area (Hoy et al., 2017). Consequently, the perspectives of medical and healthcare professionals towards organ donation and transplantation are shaped by a combination of factors, including knowledge levels, educational background, and their role in influencing public opinion. Addressing knowledge gaps and unfavorable attitudes among healthcare professionals is essential for improving organ donation rates and outcomes.

2.3 Implications of Education

Increasing awareness and targeted education is the main recommendation of most of the studies in this field, which proves the need for more information campaigns and health education. Media is an effective tool for information dissemination, but it is also imperative that people should look out for misinformation. In the discussion of a research, it is found out that appropriate information dissemination can increase patient knowledge, which connects to a positive effect on the number of living donation (Barth et al., 2021). This is not only applicable to raise the awareness of patient's knowledge, nonetheless, it also applies to everyone. Additionally, most of the Turkish students who became aware of organ donation and transplantation was through mass media and when they have undergone health education. According to the respondents of the same study, they wanted to raise awareness through meetings and conferences (Akgün et al., 2002).

Studies have shown that educational programs significantly impact individuals' understanding and opinions regarding organ donation (Li et al., 2019; Vlaisavljevic & Zivanovic, 2018). According to Akgün et al. (2002) university students who made donation plans had already been exposed to a number of concepts related to organ transplantation during their high school studies. Numerous researchers also concluded that a person's attitude and motivation towards organ donation will change as a result of increased

knowledge and awareness (Hoy et al., 2017; Rydzewska-Rosołowska et al., 2020; Vlaisavljevic & Zivanovic, 2018). Unfortunately, organ donation and transplantation are frequently not covered in the curriculum of health science courses during the undergraduate years, which has an impact on the approach of the healthcare professionals toward this (Kurz, 2014). Including this topic in the training is crucial to the field as this will equip the students with essential information on the main principles of organ donation and transplantation including the transplantable organs, who can become a donor, the criteria for brain death and cardiac death, the process of organ donation and retrieval, different cultural beliefs and traditions, and the ethics revolving organ donation (Kurz, 2014; Xie et al., 2017).

Conclusively, the impact of education on organ donation and transplantation is profound. Educational initiatives not only equip students and healthcare professionals with comprehensive knowledge and favorable attitudes towards organ donation, but they also hold the promise of boosting donation rates and fostering a deeper understanding of the intricate processes governing organ donation and transplantation.

3. Methodology

For this study, a quantitative correlational research design was used to assess respondents' attitudes and willingness as well as their level of knowledge on the subject of organ donation and transplantation. Furthermore, a correlational design evaluated the relationship between the variables namely sociodemographic profile, knowledge, attitude, behavior, and willingness.

3.1 Study Population

This study was conducted in the University of Debrecen Faculty of Health Sciences among the international healthcare students. Both the Nyíregyháza and Kassai Campus in Debrecen participated in this study. The eligibility criteria for the respondents were 1) above 18 years of age, 2) currently enrolled for the academic year 2022/2023 from first year to fourth year, 3) an international student, and 4) can be able to read and write in English. The programs included in this study were the programs offered in English which were Bachelor of Science in Nursing and Patient Care (Nurse), Bachelor of Science in Nursing and Patient Care (Physiotherapy), and the Bachelor of Science in Healthcare and Disease Prevention (Public Health). The total number of international students was procured with the assistance of the university.

The data collection started in October, until December. Prior to the survey collection, a pilot questionnaire was conducted among 10 participants. Comments and suggestions were considered.

Each respondent had the right, at any time and for any reason, to decline and withdraw from the study. This research utilized a paper questionnaire for the data collection. Following a study orientation, the chosen respondents were handed a paper questionnaire. In front was the information sheet and the participant consent form. The participant consent form was signed by the respondent to be considered valid. During data collection, an assistance personnel was available to guide and answer any queries that may arise.

3.2 Questionnaire Content

A 37-item self-designed questionnaire was created and was categorized into six domains, (1) sociodemographic profile, (2) information, (3), knowledge, (4) attitude, (5)

willingness, and (6) behavior. This form included yes-or-no, multiple-choice questions, and open ended questions. To guarantee that respondents only provide information that they are knowledgeable of, the option "I don't know" was included. The questions on the five-level Likert scale were coded from 1 to 5. A code of 1 indicated a strong disagreement, whereas a code of 5 indicated a strong agreement. The questionnaire's language was English.

The questionnaire was adapted and modified from three different studies, survey among the medical students at the University of Leeds (Bedi et al., 2015); a study among medical students in Ohio (Essman & Thornton, 2006); and from the paper about validating a survey on organ donation in an Arabic scenario (Singh et al., 2018). The general topics of the questionnaire included the awareness of the respondent to the organ donation and transplantation process and laws; the attitudes of the respondent towards donation and transplantation from relatives and non-relatives; the motivating and limiting factors, and perceptions on the organ donation process; the willingness of the respondent to donate their organs; and their intent and behaviors of the respondent to participate in activities related to organ donation and transplantation.

The assessment of the willingness of the respondent involved five questions (questions 28-32). The question "would you donate your organs after death" was evaluated with a three-option question of "yes", "no", and "I don't know". Those who have agreed to donate proceeded to the question "In case you agreed to donate organs, what is your motivation?". While those who disagreed to donate were asked about the reason behind their disagreement. Those who were unsure of their decision by answering "I don't know", also answered both their motivation if they decide to donate, and their reason if they decide to not donate. All respondents were then asked if they wanted to learn more regarding the topic.

3.3 Data Analysis

The questionnaire was comprised of six domains: sociodemographic profile, information, knowledge, attitudes, willingness, and behavior. Descriptive and comparative analyses were performed using the Stata Statistical Software. Descriptive statistics were employed to analyze participants' responses in each domain. Furthermore, question 27 ("terms that best describe the process of organ donation") was also analyzed descriptively.

Fisher's exact test was employed to determine the association between the outcome variable, question 28 ("Would you want to donate your organs after death"), and the following predictor variables: gender, college program, study year, religion, question 8 ("awareness towards organ donation"), knowledge domain, question 34 ("discussing intentions with family"), and question 35 ("involvement in initiatives and educational programs related to organ donation"). A Fisher's exact value less than 0.05 was considered statistically significant.

For the attitude domain, responses from the 5-point Likert scale were analyzed through the mean. For the categorization and interpretation of the responses, a quantitative scale with ranges based on class width was utilized (1 = 1.00 to 1.7, 2 = 1.8 to 2.5, 3 = 2.6 to 3.3, 4 = 3.4 to 4.1, and 5 = 4.2 to 5.0.). Additionally, the two-sample Wilcoxon rank-sum test (Mann-Whitney test) was used to assess the relationship between attitude questions 17 to 26 and the outcome variable, question 28 ("Would you want to donate your organs after death"). Similar to Fisher's exact test, the p-value less than 0.05 is statistically significant.

To determine the overall knowledge and attitude level, the answers were calculated, and tested with question 28 ("Would you want to donate your organs after death") using Fisher's exact test, and Mann-Whitney Test, respectively. Subsequently, the overall knowledge level will be tested with the overall attitude level to test their relationship.

3.4 Ethical Approval

This study was approved by the *Ethics Review Board of the University of Debrecen*. Control Number: DE RKEB/IKEB 6596-2023.

4. Results

4.1 Sociodemographic Profile and Information

Of the 299 students who were studying for a bachelor's degree, only 136 students completed it yielding a response rate of 45.48%.

Table 1 shows that the majority of the respondents (65.93%) are female, and majority of the respondents were aged 20 to 21 years old. Regarding the college programs, the nursing program has the most (41.91%), followed by the Public Health (29.41%) and the Physiotherapy (28.68%) program. The first year (48.53%) formed the largest group, followed by the second year (40.44%), and third year (11.03%). To analyze the religion, it is grouped into Christian and non-Christian. Christian included Roman Catholics, Greek Catholics, Christians, Jehovah's Witnesses, etc., while the non-Christians includes Muslims, Hindu, Buddhists, etc. The majority of respondents (31.62%) identified were Christians, followed by Muslims (30.88%), Roman Catholics (13.23%), Buddhists (7.35%), Hindus (1.47%), and those who preferred not to disclose their religion (15.45%). In terms of nationality, the top five of the respondents were Nigerians (26.15%), Pakistanis (6.92%), Chinese (5.38%), Indians (5.38%), Zimbabweans (4.61%), Filipinos (3.84%), and Ugandans (3.84%).

Characteristics	n (%)
<i>Number of Respondents</i>	136
<i>Age, years (mean)</i>	20.77
<i>Gender</i>	
<i>Male</i>	46 (34.07%)
<i>Female</i>	89 (65.93%)
<i>College Program</i>	
<i>BSc Nursing and Patient Care (Nurse)</i>	57 (41.91%)
<i>BSc Nursing and Patient Care (Physiotherapy)</i>	39 (28.68%)
<i>BSc Health Care and Disease Prevention (Public Health)</i>	40 (29.41%)
<i>Academic Year</i>	
<i>I</i>	66 (48.53%)
<i>II</i>	55 (40.44%)
<i>III</i>	15 (11.03%)
<i>Religion</i>	
<i>Christian</i>	61 (44.85%)
<i>Non-Christian</i>	54 (39.71%)
<i>Do not wish to disclose</i>	21 (15.44%)

Table 1: Sociodemographic Profile and Information Results

Source of information

The respondents showed high awareness of organ donation wherein the majority of respondents (91.91%) had heard about organ donation, as seen on Table 2. The primary sources of information were social media (65.44%) and television (51.47%). However, most respondents (78.68%) indicated they did not know someone who had donated an organ, and 76.47% stated they did not know someone who had received an organ transplant.

Source of Information	n (%)
<i>Have you ever heard about organ donation?</i>	
Yes	125 (91.91%)
No	10 (7.35%)
No response	1 (0.74%)
<i>Where did you hear about organ donation? ^a</i>	
Television	70 (51.47%)
Social Media	89 (65.44%)
<i>Do you know someone who has donated an organ?</i>	
Yes	27 (19.85%)
No	107 (78.68%)
<i>Do you know someone who has received an organ transplant?</i>	
Yes	29 (21.32%)
No	104 (76.47%)

Table 2 Information

^a more than one answer possible

4.2 Knowledge, Attitude, Willingness and Behavior

Knowledge on the organ donation and transplantation process is crucial in understanding several factors that affect the student's awareness regarding this topic. As shown on Table 3, when asked about their knowledge of brain death, 75.74% of participants were aware of the term. Furthermore, 52.94% were aware of the existence of laws in their country pertaining to organ donation and transplantation. However, 67.65% did not know how to proceed with the organ donation process. In contrast, 82.36% were knowledgeable about the organs that can be transplanted, and 84.56% were aware of the possibility of organ donation while still alive. The overall knowledge of the students was reported to be good ($M = 3.28 \pm 1.27$), however this did not reflect each category under the knowledge and awareness domain.

Knowledge and Awareness	n (%)
<i>Have you ever heard about the term brain death?</i>	
Yes	103 (75.74%)
No	30 (22.06%)
No response	3 (2.21%)
<i>According to the best of your knowledge, are there any laws in your country about organ donation and transplantation?</i>	
Yes	72 (52.94%)

No	62 (45.59%)
No response	2 (1.47 %)
Do you know how to proceed when you want to donate an organ?	
Yes	41 (30.15%)
No	92 (67.65%)
No response	3 (2.21%)
Do you know what organs can be transplanted?	
Yes	112 (82.36%)
No	22 (16.17%)
No response	2 (1.47%)
Do you think a person can donate his/her organs during lifetime?	
Yes	115 (84.56%)
No	22 (16.17%)
No response	2 (1.47%)

Table 3: Knowledge Results

In the domain of attitudes, the overall stance toward organ donation was positive, as depicted by Table 4. The criteria for the interpretation of the weighted mean can be seen in Table 5. Participants expressed agreement with organ donation from both relatives and non-relatives, and they indicated a willingness to receive an organ transplant if it could save their lives. Furthermore, respondents perceived organ donation as ethically acceptable. Additionally, there was expressed support for providing financial assistance to the families of donors. The majority of participants also agreed that organ donation should be actively promoted.

In terms of the two systems, opt-in and opt-out, respondents exhibited a neutral attitude towards both.

Attitude Statements	$\bar{x}$	σ	Code	Perception
You think that organ donation is ethically acceptable	4.07	0.96	Agree	Positive
You would agree with organ donation from relatives	4.04	1.11	Agree	Positive
You would agree with organ donation from non-relatives	3.65	1.26	Agree	Positive
You would agree to donate organs of a family member after their death	3.27	1.15	Neutral	Neutral
You would agree that financial help should be provided to those families who donate an organ	3.86	1.26	Agree	Positive
If laws and religion encourage donation, you will donate	3.35	1.40	Neutral	Neutral
You would agree that organ donations should be promoted	3.55	1.26	Agree	Positive

The law should be changed so that everyone is an organ donor unless they say no	2.74	1.39	Neutral	Neutral
The law should be changed so that everyone is encouraged to formalize their donation intentions	3.32	1.18	Neutral	Neutral
You would agree to receive an organ transplant if it would save your life	4.20	1.18	Strongly Agree	Positive
Total Score	35.33	8.40	Agree	Positive

Table 4 Attitude Results

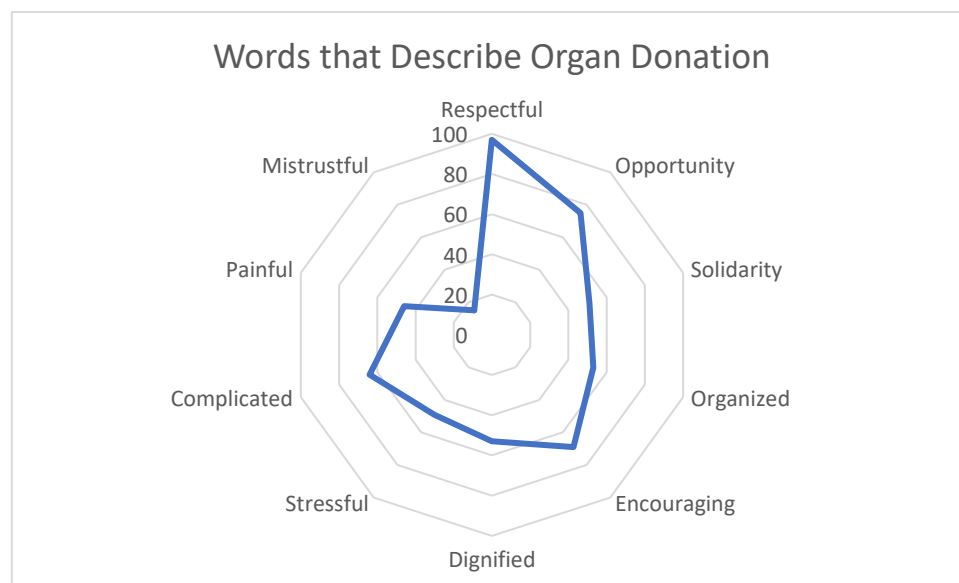


Figure 3 Words that Describe Organ Donation

When querying respondents about their perception of the organ donation process, as seen in Figure 3, the top five descriptors were "Respectful" (71.32%), "Stressful" (57.35%), "Opportunity" (55.15%), "Encouraging" (50.74%), and "Complicated" (50%). Additional positive words, including "selfless," "altruistic," "loving," and "systematic," emerged from the responses. However, some terms such as "anxious," "expensive," and "long wait" conveyed a more negative sentiment.

Criteria	Interpretation	n (%)
1.0-1.7	Strongly Disagree	5 (3.68 %)
1.8-2.5	Disagree	7 (5.15%)
2.6-3.3	Neutral	39 (28.68%)
3.4-4.1	Agree	51 (37.50 %)
4.2-5.0	Strongly Agree	31 (22.79%)

Table 5 Frequency of Attitude according to Interpretation

Regarding the willingness of respondents, the majority (52.2%) indicated an unwillingness to donate their organs after death. On the other hand, 45.59% expressed a

willingness to donate, with 61.03% open to donating to both their families and non-relatives, and 16.91% inclined to donate exclusively to family members. Among those who agreed to donate, the primary motivating factors were the desire to help (73.96%), no longer needing the organs (19.79%), and religious beliefs (4.17%). Notably, one respondent mentioned financial benefit as motivation, although the specific reason remained unexplained. Conversely, the main reasons hindering donation were lack of trust in the healthcare system (47.45%), religious beliefs (18.64%), and the absence of financial benefit (16.95%). Additional factors such as fear of body disfigurement (5.08%) and strong unwillingness (11.86%) also emerged. However, when asked about their willingness to learn more about organ donation and transplantation during their studies, 75.74% expressed agreement.

In terms of behavior, a mere 6.62% of the respondents were registered organ donors. Furthermore, the majority (84.56%) have not discussed their organ donation intentions with their families, and only a fraction of them (13.24%) actively participated in educational programs or initiatives related to organ donation and transplantation. When inquired about their commitment to actively engage in organ donation and transplantation related activities throughout their careers, the majority exhibited moderate commitment (36.03%), while 16.91% expressed very high commitment, 16.91% demonstrated no commitment at all, 16.18% indicated slight commitment, and only 8.82% showed extremely high commitment.

4.3 Relationship between Sociodemographic Profile and Willingness

Gender, college program, and religion were not found to be significant predictors of willingness for deceased organ donation, as shown on Table 6. This means that the odds of being willing to donate an organ were not significantly different for men and women, for students in different college programs, or for students of different religions. However, a significant association was found between the academic year and willingness to donate. This means that students in higher academic years were more likely to be willing to donate organs than students in lower academic years.

<i>Characteristic</i>	<i>Do you want to donate your organs after death?</i>		<i>p value</i>
	Yes	No	
Gender			
Male	18	27	0.359
Female	44	44	
College Program			
BSc Nursing	24	33	0.361
BSc Physiotherapy	16	21	
BSc Public Health	22	17	

Academic Year			
I	22	41	
II	30	25	0.029
III	10	5	
Religion			
Christian	28	33	0.707
non-Christian	22	31	

Table 6 Relationship between Sociodemographic Profile and Willingness

4.4 Relationship between Knowledge and Willingness

Student willingness to donate organs was strongly correlated with their level of knowledge and awareness about organ donation. Table 7 shows that students who have a better understanding of the organ donation process were more likely to be willing to donate their organs. Additionally, on the present study, awareness on organ donation, brain death, existence of laws in home country, knowledge on transplantable organs and live donation did not show any significant relationship to the decision of the students to donate. Moreover, when tested with the Mann-Whitney test, the overall knowledge ($p = 0.92$) did not seem to have an effect on the donation intentions of the students.

Knowledge Characteristics	Do you want to donate your organs after death?		
	Yes	No	<i>p</i> value
Awareness on organ donation			
Yes	56	67	0.732
No	5	4	
Awareness on brain death			
Yes	51	52	0.396
No	11	17	
Awareness on existence of laws in their country			
Yes	38	34	0.164
No	24	36	
Knowledge on the process of organ donation			
Yes	27	14	0.004
No	34	56	
Knowledge on transplantable organs			
Yes	53	59	1.000
No	9	11	
Knowledge on live donation			
Yes	57	58	0.192
No	5	12	
Overall Knowledge			0.92

Table 7 Relationship between Knowledge and Willingness

4.5 Relationship between Attitude and Willingness

Examining the various attitude factors influencing the organ donation intentions among the respondents is crucial to understanding their perceptions on organ donation and transplantation. Table 8 enumerates the main topics on organ donation and transplantation, such as ethical acceptability, familial and non-familial donation, the two systems of donation, and attitudes towards promoting organ donation.

Regarding the perception of ethical acceptability of organ donation, it was seen that the ethical considerations surrounding organ donation did not significantly vary among the respondents and was not seen as a factor that influences the willingness to donate organs.

Examining broader perspectives, attitude towards financial incentive for the families of the organ donor, the same insignificance was found which suggests a shared understanding among the respondents, irrespective of their intention to donate organs.

In terms of familial aspects, the agreement with organ donation from relatives and non-relatives was investigated. The results indicated a significant difference in agreement with both familial and non-familial organ donation between those who intend to donate organs and those who did not, which implies that individuals willing to donate organs hold distinct views on the acceptability of donation from both sources. Those expressing a desire to donate organs were notably more willing to consider donating organs of a family member after their death, underlining the personal connection and commitment to organ donation within the familial context.

Laws and religious beliefs played a vital role in shaping organ donation intentions, as evident from Table 8. The statistical analyses revealed significant differences between the two groups, indicating that legal and religious encouragement could impact the student's decision regarding organ donation. On another note, questions were asked about the opt-in and opt-out system of organ donation. This demonstrated significant differences between those who support the opt-in system and those who support the opt-out system, which suggests that legal frameworks and initiatives promoting explicit intent play a pivotal role in influencing organ donation decisions.

Finally, the respondent's willingness to receive an organ transplant on a life-saving process showed significant relationship. This intriguing finding highlighted the complex interplay between the willingness to donate and receive organs, suggesting a nuanced relationship between these two aspects.

Generally, it was seen that the overall attitude level of the students had an effect on their donation intents.

Attitude	<i>p</i> value
Ethical acceptability	0.331
Agree with donation from relatives	0.023
Agree with donation from non-relatives	0.008
Agree to donate organs of family members	< 0.0001
Agree to financial incentives for organ donor family	0.1308
Response to laws and religion	< 0.0001
Perception on the promotion of organ donation	< 0.0001
Support for the opt-out system	0.0001
Support for the opt-in system	0.0003
Willingness to receive transplant	0.0459
Overall Attitude Level	< 0.0001

Table 8 Relationship of Attitude and Willingness

4.6 Relationship between Behavior and Willingness

Table 9 indicated that familial discussions play a significant role in shaping student intentions regarding organ donation and transplantation. This implied that open and honest conversations about organ donation within families can have a profound influence on individual decisions about becoming donors. In contrast, previous involvement in educational programs or initiatives related to organ donation did not appear to significantly impact student willingness to become organ donors. This suggests that while educational programs can increase knowledge and awareness, they may not necessarily translate into an immediate change in attitudes or intentions regarding donation.

Behavior	<i>Do you want to donate your organs after death?</i>		
	Yes	No	<i>p</i> value
Discussed organ donation intentions with family			
Yes	11	4	0.05
No	50	64	
Involvement in educational programs or initiatives related to organ donation			
Yes	10	8	0.61
No	51	59	

Table 9 Relationship between Behavior and Willingness

5. Discussion

5.1 Relationship between Sociodemographic Profile towards Willingness

The sociodemographic profile of the respondents is a crucial factor in comprehending the intent of students to become organ donors. Various factors, such as culture, religion, and education, have been identified in several studies as influencing an individual's willingness to be an organ donor (Martínez-Alarcón et al., 2020; Stadlbauer et al., 2020). In contrast, studies highlighted religion as a significant factor in shaping organ donation intention (Cebeci et al., 2011; Janatolmakan et al., 2020), the present study revealed no significant relationship between religion and the intention of nursing students. Additionally, the college program of the students did not emerge as a determining factor affecting their donation intentions. Interestingly, the academic year was identified as a variable influencing students' intent on organ donation, aligning with findings from a study conducted among medical and nursing students in Spain (Martínez-Alarcón et al., 2020). Understanding and addressing these factors are crucial for promoting and facilitating organ donation and transplantation.

5.2 Relationship between Knowledge, Attitude, Behavior towards Willingness

The donation intentions of students are heavily influenced by their knowledge and awareness. The present study demonstrated that a comprehensive understanding of the organ donation process significantly contributes to a student's willingness to be an organ donor. This finding aligned with a study examining the perceptions of Qatari healthcare workers, which identified the lack of awareness and information about organ donation as a key factor affecting organ donation registration (Agarwal et al., 2018). In contrast, a study involving Nepalese nursing students showed that a student's decision regarding organ donation is significantly impacted by their knowledge and awareness of organ donation, encompassing concepts such as brain death and transplantable organs (Limbu et al., 2019). This underscores the importance of knowledge and awareness in shaping students' attitudes toward organ donation.

Concerning the perception of organ donation's ethical standing, it was evident that the ethical considerations associated with organ donation did not exhibit significant variations among the respondents and cannot be attributed as a major driver of their willingness to donate. However, this result had not previously been described by the study among Pakistani medical students, which highlighted the significant association between willingness to donate and knowledge of organ donation in religion, emphasizing the ethical perceptions in shaping individuals' willingness to donate organs (Ali et al., 2013).

Expanding the analysis to broader perspectives, it was found that respondents' attitudes towards providing financial incentives to organ donor families displayed minimal variation, regardless of their individual willingness to donate. This observation suggested a shared consensus among the participants, indicating that monetary compensation is not a significant determinant of organ donation intentions. This finding corroborated the results of a Malaysian study that investigated the impact of financial incentives on donor willingness. The research concluded that financial rewards were not effective means of motivating organ donation; instead, altruistic motives emerged as the primary driving force (Rasiah et al., 2020).

Delving into familial aspects, the study explored attitudes towards donating organs from both relatives and non-relatives. The findings revealed a significant discrepancy in agreement with organ donation from both sources between those who expressed a willingness to donate their own organs and those who did not. This distinction suggests that individuals' willingness to donate is accompanied by distinct perceptions regarding the appropriateness of organ donation from both family and non-family members. Interestingly, those who expressed a desire to donate their own organs were noticeably more open to the idea of donating the organs of a deceased family member, highlighting the personal connection and commitment to organ donation within familial relationships. Additionally, research demonstrated that education on organ donation can strengthen the alignment between individuals' attitudes towards organ donation and their readiness to donate their own or a family member's organs (U. J. Park et al., 2019).

Further analysis of the data uncovered that legal frameworks and religious beliefs significantly influenced individuals' intentions to donate organs. Statistical analyses revealed notable differences between those who expressed a willingness to donate and those who did not, suggesting that legal encouragement and religious support could impact an individual's decision regarding organ donation. Studies showed that religious influences on organ donation attitudes were multifaceted and complex, making them challenging to summarize. However, social background factors within each country have been shown to significantly impact attitudes towards organ donation (Tsubaki et al., 2020).

Additionally, the survey inquired about individuals' support for the opt-in and opt-out systems of organ donation. A significant discrepancy was observed between those who favored the opt-in system and those who preferred the opt-out system, indicating that legal structures

and initiatives that promote explicit consent play a crucial role in shaping organ donation decisions.

Furthermore, the respondents' willingness to receive an organ transplant in a life-saving situation demonstrated a significant correlation. This intriguing discovery highlighted the intricate relationship between an individual's willingness to donate and receive organs, indicating a distinct connection between these two aspects.

In general, it is evident that the overall attitude level of individuals had a substantial impact on their intentions to donate organs. In accordance with the present results, previous studies have demonstrated that attitude towards organ donation is significantly correlated with the willingness of nursing and medical students to become donors (Dibaba et al., 2020; Valiee et al., 2019).

This illuminates the multifaceted nature of attitudes and beliefs towards organ donation. While ethical considerations appear consistent across groups, familial and non-familial factors, legal frameworks, and religious beliefs significantly influence individuals' intentions to donate organs. These insights are invaluable for designing targeted interventions to promote and enhance organ donation.

5.3 Relationship between Behavior and Willingness

The result from the present study delves into the exploration of donation intentions concerning family discussions and student participation in educational programs or initiatives related to organ donation. Students expressing a desire to donate their organs after death were more inclined to have engaged in discussions with their family regarding their organ donation intentions. This inclination may stem from a more thoughtful consideration of organ donation, leading to a firm decision. The act of discussing organ donation intentions with family served as a means for individuals to share their decisions with loved ones and seek their support. These results were consistent with another research among medical students that showed an increase in willingness to donate organs depending on discussion with family and friends (Sengul & Sahin, 2022). Although, it is also important to emphasize that while familial discussions and donation intentions may be associated with each other, the influence may differ across cultural groups.

Contrastingly, involvement in educational programs or initiatives related to organ donation did not appear to be associated with the desire to donate organs after death. This lack of association could be attributed to these programs primarily providing information rather than

actively persuading individuals to become organ donors. Additionally, individuals who already harbored an interest in organ donation may be more predisposed to seek out such educational programs, explaining the absence of a clear link between participation in these initiatives and the intention to donate organs after death.

It is crucial to underscore that this data suggested a significant relationship between discussing organ donation intentions with family and the inclination to donate organs after death. However, the lack of association with educational programs highlighted the need for a nuanced approach in understanding the factors influencing organ donation intentions.

5.4 Motivations and Barriers to Organ Donation

From this study, the main identified motivating factor to deceased organ donation is based on altruistic factors, followed by the thought of not needing their organs anymore, and finally due to their religious beliefs. Altruistic behaviors as a motivation to donate organs matched those observed in earlier studies (Souza et al., 2022; Tarzi et al., 2020). Additionally, it would be valuable to delve deeper into the intriguing concept of altruism to uncover the underlying factors that motivate this selfless behavior.

While financial benefits were identified as a motivating factor, their underlying mechanisms remain unclear. The idea of financial incentives for organ donation is intriguing as it challenges the traditional concept of altruism. However, a study by Rasiah et al. (2020) found that financial incentives cannot effectively supplement altruistic motivations in increasing organ donation rates. Additionally, there was a paucity of empirical research within the medical and health science community examining the effects of financial incentives on organ donation rates, suggesting a need for further investigation.

The study identified several key barriers that hindered organ donation among students, including lack of trust in the healthcare system, religious beliefs, and the absence of financial incentives. A study in China found that mistrust in the healthcare system, intertwined with traditional values, significantly influenced organ donation rates (Li et al., 2019). Similarly, Tsubaki et al. (2020) highlighted the role of religious beliefs as a limiting factor. Additionally, the study revealed other concerns such as fear of body disfigurement and a strong reluctance to donate organs.

5.5 Implications for Organ Transplant Education

It was found out that there was a disparity between the knowledge and awareness levels of the students in the healthcare community. This proves the need for more information campaigns and health education. Media is an effective tool for information dissemination, but it is also imperative that people should look out for misinformation. In the discussion of a research, it was found out that appropriate information dissemination can increase patient knowledge, which connects to a positive effect on the number of living donation (Barth et al., 2021). This was not only applicable to raise the awareness of patient's knowledge, nonetheless, it also applies to everyone.

The study demonstrated a keen interest among students to pursue additional education and training on organ donation and transplantation. This avenue served as a crucial means of enhancing knowledge and awareness about this vital topic. By acquiring this expertise, healthcare students will be well-equipped to handle situations involving organ donation and transplantation when they enter their professional practice. Equipped with comprehensive knowledge, healthcare students, as future healthcare professionals, will be well-positioned to dispel prevalent myths and misconceptions about organ donation, effectively explaining the procedure to individuals seeking more information (Li et al., 2019; Mills & Koulouglioti, 2016). Therefore, educational intervention towards this topic must be explored.

Numerous studies have corroborated the effectiveness of educational interventions in enhancing awareness and improving attitudes towards the topic. These studies consistently demonstrated that lectures on the subject positively impact students' knowledge, attitudes, and behaviors (N. F. Ali et al., 2013; Martínez-Alarcón et al., 2020; Sengul & Sahin, 2022). Although this had been proven effective, this was still not covered in the curriculum among the health science courses during undergraduate studies. This prompted concerns and queries whether to incorporate a discussion of organ donation and transplantation into the curriculum of the health science courses.

Including this topic in their training as undergraduate nursing students will benefit the nursing students to explore their feeling and perceptions towards death and organ donation. This will equip the students with essential information on the main principles of organ donation and transplantation including the transplantable organs, who can become a donor, the criteria for brain death and cardiac death, the process of organ donation and retrieval, different cultural beliefs and traditions, and the ethics revolving organ donation (Kurz, 2014; Xie et al., 2017).

6. Conclusions and Recommendations

The findings of this study provided valuable insights into the determinants that affect the willingness of international healthcare students to become organ donors. Moreover, this also examined their different sociodemographic profile, knowledge levels, attitude, and behaviors towards organ donation and transplantation, which offered a nuanced understanding of the complex factors that affects the donation intentions of each student.

The study's key findings underscored the profound influence of knowledge and attitudes on students' perceptions of organ donation and transplantation. A higher level of knowledge and positive attitudes generally lead to a more favorable outlook on organ donation. While this may increase the likelihood of becoming a willing donor, it does not guarantee registration as an organ donor. The essential aspect is maintaining a positive perception of organ donation and transplantation, as this can significantly benefit the field throughout their future professional endeavors. Further, the study emphasized the importance of educational interventions to enhance understanding of the intricate process of organ donation and transplantation.

Another notable finding was the role of family discussions in shaping organ donation intentions. Students who have engaged in an open conversation with their family members regarding the topic were more inclined to have a firm decision on the matter. This suggested that family support is a vital factor in facilitating organ donations.

The study also identified a range of motivations and barriers that influenced organ donation intentions among the healthcare students. Altruistic motives, which were the desire to help others, emerged as the primary motivating factors. However, mistrust in the healthcare system, religious beliefs, and concerns of body disfigurement acted as barriers to organ donation. Additionally, the role of financial incentives must also be explored as comprehending this concept might benefit or jeopardize the field of organ transplant.

The study's strength lies in its international scope, encompassing students from various nationalities and cultures. This diverse representation provided a broader understanding of cultural perspectives on organ donation and transplantation. However, further studies tailored to specific cultures are necessary to avoid generalizations based on a limited sample size. It is also important to acknowledge that individual respondents may not fully represent their respective cultures due to exposure to diverse backgrounds.

This study limited its focus on the international bachelor healthcare students enrolled in the Faculty of Health Sciences of a selected university in Hungary due to accessibility. In future studies, a more diverse sample should be examined to increase the reliability of the results and to explore the perspectives of other demographic groups.

Persistent efforts are required to enhance organ donation and transplantation rates by addressing knowledge gaps. This proactive approach can dispel prevalent myths, misconceptions, and inaccurate information that hinders organ donation initiatives. It is crucial to expand our focus beyond physicians, encompassing other healthcare professionals like nurses and public health students, to effectively promote organ donation and transplantation.

Additionally, research should explore the implementation of a dedicated organ donation and transplantation course within the health science community to assess its effectiveness. Healthcare professionals also need ongoing education and training to provide patients and families with the most current and accurate information about organ donation.

Finally, social media platforms, such as Facebook, X, and Instagram, can serve as powerful tools to disseminate accurate and up-to-date information about organ donation and transplantation. Through visually appealing content, such as infographics, videos, and personal testimonials, we can effectively capture the attention of a wide audience and dispel common myths and misconceptions. By creating interactive campaigns and hosting virtual forums, we can foster open dialogue and encourage individuals to actively engage in understanding the significance of organ donation. These platforms can also serve as a centralized hub for information, providing users with access to detailed guides and resources specific to their local communities.

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