



Nursing students faced with organ donation: Multicenter stratified national study[☆]

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<https://doi.org/10.1016/j.nepr.2022.103394>

ARTICLE INFO

Keywords:

Attitude
Nurse students
Opinion questionnaire
Organ donation
Psychosocial factors
University

ABSTRACT

Aim: To analyze the attitude of university nursing students at Spanish universities toward organ donation and transplantation and the factors affecting to their attitude.

Background: The opinion of future nurses toward organ transplant donation could have an important influence on the population. Knowing that opinion and what factors influence it is important to improve the attitude towards organ donation and transplantation.

Design: A multicenter, sociological, interdisciplinary and observational study including university nursing diploma students in a complete academic year.

Methods: Selected and randomized sample was taken of students from 52 of the 111 faculties and nursing schools and faculties in Spain with teaching activity

Participants: A sample of 10,566 students was selected stratified by geographical area and year.

Measurement instrument: The instrument used was a validated questionnaire of attitude toward organ donation and transplantation, self-administered and completed anonymously.

Results: Completion rate: 85 % (n = 9001). Of the students surveyed, 78 % (n = 7040) would donate their organs after dying. Variables related to a favourable attitude: (1) Interest in listening to a talk about organ donation and transplantation [Odds ratio 1.66, 95 % confidence interval 2.05–1.35]; (2) Family discussion [Odds ratio 2.30, 95 % confidence interval 2.79–1.90] or discussion with friends about organ donation and transplantation [Odds ratio 1.56, 95 % confidence interval 1.86–1.31]; (3) Knowing that one's father [Odds ratio 1.54, 95 % confidence interval 1.94–1.22], mother's [Odds ratio 1.44, 95 % confidence interval 1.82–1.13] or partner [Odds ratio 1.28, 95 % confidence interval 1.60–1.03] has a favourable opinion; (4) Having a good self-assessment of information about organ donation and transplantation [Odds ratio 2.94, 95 % confidence interval 4.90–1.78]; (5) Not being worried about possible mutilation of the body after donation [Odds ratio 2.73, 95 % confidence interval 3.36–1.72].

Conclusions: Nursing students in Spain tend to have a favourable attitude toward organ donation and transplantation although more than 20 % of those surveyed are not in favour.

Tweetable Abstract: To maintain a high rate of organ donation for organ transplantation, it is necessary to improve the social awareness of future generations of nurses towards organ donation.

1. Introduction

Despite Spain having one of the world's highest deceased donation rates, there continues to be an organ transplant deficit mainly caused by the loss of potential donors because of their family's refusal to donate. In this sense, in addition to psychosocial factors in the population (Ríos et al., 2021; Ríos et al., 2010), one of the barriers preventing the procurement of more organs seems to be found within healthcare given that some healthcare professionals have been identified who are not in favour of organ donation and transplantation (Souza et al., 2021; Ríos et al., 2008).

The organ procurement process involves the participation of many healthcare professionals who play a key role in increasing organ donation and transplantation due to their direct relationship with patients and their families (Jawoniyi, et al., 2018). In this regard it has been seen that the positive and negative attitudes of nurses, physicians and other healthcare professionals about organ donation and transplantation, clearly influence the attitude of people who receive information from them (Ríos et al., 2006). Therefore, it is important to carry out activities to raise awareness about organ donation and transplantation within healthcare institutions because receiving rigorous information about the matter will help to improve attitudes toward organ donation and transplantation among these workers (Zambudio et al., 2006).

2. Background

Until now, organ donation and transplantation promotion activities have generally focused on physicians. However, it is known that their attitude is the most favourable of all the hospital workers (Zambudio et al., 2006; Zambudio et al., 2006). Therefore, specific training should be preferentially aimed at other subgroups of healthcare staff (Cebeci et al., 2011). In this regard, it is worrying that several studies show that among professional nurses, organ donation and transplantation generates stress and there is quite a lack of information about it (Lomero, et al., 2017).

It should not be forgotten that nursing personnel is an important group for caring for patients and promoting their health. The attitude they will have towards certain health issues will influence the population, since they are social generators of opinion (Zambudio et al., 2006). Therefore, if they are against donation, they will generate a negative attitude or an attitude of distrust toward donation in the population who might be exposed to their views. For this reason, it is important to analyze the attitude of future professional nurses, given that they are undergoing training and could consequently receive specific information about the subject which could broaden and improve their knowledge and attitude toward organ donation and transplantation. These students could actively participate in the promotion of the organs since they start their practices at the beginning of their studies. Throughout their training (4 years) they are in permanent contact with patients and their families. Patient care is the essence of the nursing profession, which can be defined as an activity that requires personal and professional value aimed at the conservation, restoration and self-care of life that is based on the nurse-nurse-patient relationship.

3. Aim

The objective of this study was to analyze the attitude of university nursing students in Spain toward deceased organ donation and the factors affecting their attitude.

4. Methods

4.1. Design

This is a sociological, observational, multicenter, stratified, national study, carried out in a complete academic year.

4.2. Study population

The study population comprised of students of the nursing diploma

program in Spain. We should note that in Spain this diploma certificate is a "first-cycle" qualification with a duration of 3 years. The size of this population was estimated using the data of students enrolled on the nursing diploma course in the academic year provided by the Ministry of Education and Professional Training (MEFP, 2018). When data were not available, these faculties were contacted by telephone or digitally. Thus, the number of students enrolled on this course was approximately 28,000.

4.3. Sample size

The sample size calculated for a population of 28,000 students with a proportion (attitude in favour of donation) of 76 %, a confidence level of 99 % and a precision of ± 1 %, was 10,566 students.

4.4. Data collection: Sample stratification

4.4.1. Geographical stratification of the sample

There were 111 faculties and nursing schools in Spain with teaching activity. These institutions were grouped into five geographical regions that represented the whole of the national territory of Spain, namely: (1) The northern area, consisting of the Autonomous Communities of Galicia, Asturias and Cantabria; (2) The northeastern area: the Basque Country, La Rioja, Navarre, Aragón and Catalunya; (3) The central/western area: Castilla y León, Madrid, Extremadura and Castilla-La Mancha; (4) The eastern area: Valencia, Murcia and the Balearic Islands; and (5) the southern area: Andalusia, The Canary Islands, Ceuta and Melilla.

The first sample proportionately stratified by geographical area, showed 6.8 % students in the northern area ($n = 718$); 22 % ($n = 2325$) in the northeastern area; 28 % in the central area ($n = 2958$), 23.2 % in the eastern area ($n = 2451$) and 20 % in the southern area ($n = 2114$).

4.4.2. Stratification by year of study

In each geographical area, a second stratification was carried out according to year of study.

4.5. Sampling technique

In each geographical area a selected and randomized sample was taken of students from the nursing schools and faculties, and they were formally invited to participate in the study. Contact was made with the head of the school or the dean of the faculty to obtain authorization for the study to be carried out in their institution. To prevent selection bias the questionnaire was applied in each year of study and in each School or Faculty, in one or several sessions with compulsory attendance (classes, practical sessions, seminars or laboratory sessions). The sample was only considered to be valid when the completion rate (number of questionnaires filled in and completed/ number of questionnaires administered) was greater than 80 % of the students present at the time of the compulsory session. First, a brief explanation of the study was given to the students and the structure and content of the survey were explained. Then, the confidentiality of the data obtained was explained to them and a questionnaire was given out to each student. This questionnaire was self-administered and completed voluntarily and anonymously.

The final selection of the participating groups was by convenient, non-probability sampling, until the necessary number of questionnaires was reached for each year of study according to the proportionality factor: the number of students enrolled in each year of study in each geographical area. Due to the questionnaires being applied in compulsory sessions for the students, a year of study was considered complete when the number of questionnaires that were administered ranged between ± 5 % of the number of questionnaires calculated to be necessary.

4.6. Inclusion and exclusion criteria for the participants

4.6.1. Inclusion criteria for students

- Nursing students of the Faculty of Health Sciences (faculties and nursing schools in Spain with teaching activity).
- Nursing students of both sexes.
- Students from 1st to 4th year of Nursing.
- Those who voluntarily want to participate in the study.
- b) Exclusion criteria for students
- Inability to understand the questions in the questionnaire.
- All those who do not meet the inclusion criteria

4.7. Measurement instrument

The measurement instrument used was a validated questionnaire of attitude toward organ donation and transplantation [PCID-DTO RIOS: A questionnaire designed by the "International Collaborative Organ Donation Project About Organ Transplantation And Donation"] (Ríos et al., 2018; Ríos Zambudio, 2018). This questionnaire includes questions distributed into four validated sub-scales or factors in the Spanish population, having a total explained variance of 63.203 % and a confidence interval for Cronbach's alpha coefficient of: 0.834.

The questionnaire was on paper, and the student completed it anonymously. A brief explanation of the study and the structure and content of the survey was provided to the students and after specifying the confidentiality of the data obtained, the questionnaire was handed out to every student in a compulsory session. This survey was self-administered and self-completed voluntarily and anonymously. The questionnaires were administered to student nurses by collaborative members of the "International Donor Collaborative Project" group in the schools and faculties that agreed to take part in the study.

4.8. Variables to study

The respondent's opinion about the donation of his or her own organs after death was studied as the dependent variable. The following seven categories of independent variables were analyzed: (1) Socio-personal variables; (2) Academic variables; (3) Variables of attitude toward organ donation and transplantation; (4) Variables of social interaction; (5) Variables of prosocial behavior; (6) Variables of attitude toward the body; and (7) Variables related to religion.

4.9. Data analysis

Data were stored in a database and analyzed using the statistical package SPSS 26.0 (IBM, Chicago, IL). Descriptive statistics were performed and Student t test and χ^2 test were applied for comparison of the different variables, supplemented by a residual analysis. Fisher's exact test was applied when the contingency tables had cells with an expected frequency of < 5 . For the multivariate analysis a logistic regression test was used. P values of less than 0.05 were considered statistically significant.

4.10. Ethical considerations

This study was approved by the ethics committee of the coordinating centre (Clinical Research Ethics Committee of University of Murcia CEO12114). Since this is an observational study where data were anonymized, no consent was required.

5. Results

5.1. Completion rate

Fifty-two of the schools and faculties that participated in the study

were selected. Of the 10,590 students selected (10,566 selected plus 0.9 % because of the type of sample: with the questionnaire being applied in compulsory sessions) the questionnaire was adequately completed in 9001 cases (overall response rate: 85 %). In Table 1, stratification of the sample is shown together with the sample completion rate according to

geographical area, university and year of study.

The lowest response rate (84.5 %) was located in the central area, given that universities C14 and C15 did not obtain valid questionnaires in the first and third year, following the methodological validity criteria.

Table 1
Sample and questionnaire completion data of the university nursing students according to geographical area, university and year of study.

	YEARS OF STUDY						TN ₀	TN _R	TR (%)
	1st		2nd		3rd				
	1stN ₀	1stN _R	2ndN ₀	2ndN _R	3rdN ₀	3rdN _R			
NORTHERN									
N1	40	40	45	45	41	41	126	126	
N2	39	39	19	19	24	24	82	82	
N3	53	53	56	56	59	53	168	162	
N4	41	0	40	0	92	77	173	77	
N5	50	50	63	63	56	56	169	169	
N _T	223	182	223	183	272	251	718	616	85.79
NORTHEASTERN									
NE1	93	93	54	54	66	66	213	213	
NE2	36	0	18	16	131	117	185	133	
NE3	68	66	52	51	65	55	185	172	
NE4	100	92	66	0	72	0	238	92	
NE5	86	78	107	103	107	96	300	277	
NE6	93	88	136	129	123	115	352	332	
NE7	15	12	22	20	29	25	66	57	
NE8	69	69	70	70	82	82	221	221	
NE9	134	107	128	102	46	37	308	246	
NE10	143	126	67	57	47	41	257	224	
N _T	837	731	720	602	768	634	2325	1967	84.60
CENTRAL									
C1	114	114	102	85	123	123	339	322	
C2	35	35	65	54	36	31	136	120	
C3	60	53	85	71	57	49	202	173	
C4	42	42	3	3	19	19	64	64	
C5	87	83	110	91	75	71	272	245	
C6	25	24	37	31	32	30	94	85	
C7	56	49	67	54	43	40	166	143	
C8	74	74	85	63	83	83	242	220	
C9	55	49	69	56	59	51	183	156	
C10	68	68	145	120	28	28	241	216	
C11	94	91	61	51	73	73	228	215	
C12	62	56	69	57	21	19	152	132	
C13	63	54	65	54	78	70	206	178	
C14	56	0	103	87	53	47	212	134	
C15	89	76	25	21	107	0	221	97	
N _T	980	868	1091	898	887	734	2958	2500	84.51
EASTERN									
E1	15	15	16	16	10	10	41	41	
E2	15	15	7	6	9	9	31	30	
E3	60	60	72	72	123	122	255	254	
E4	129	128	31	31	136	133	296	292	
E5	96	94	89	88	130	130	315	312	
E6	37	36	49	48	38	39	124	123	
E7	96	0	167	150	130	117	393	267	
E8	42	37	90	0	52	0	184	37	
E9	190	168	259	223	172	142	621	533	
E10	82	81	98	98	11	9	191	188	
N _T	762	634	878	732	811	711	2451	2077	84.74
SOUTHERN									
S1	39	38	50	48	70	60	159	146	
S2	61	61	45	44	26	25	132	130	
S3	73	62	14	12	58	0	145	74	
S4	34	32	20	18	14	13	68	63	
S5	70	70	62	62	70	70	202	202	
S6	124	107	137	116	115	134	376	357	
S7	113	113	60	60	68	68	241	241	
S8	110	107	105	102	102	89	317	298	
S9	19	15	10	8	18	14	47	37	
S10	56	50	45	38	29	26	130	114	
S11	49	0	48	0	92	82	189	82	
S12	41	37	38	34	29	26	108	97	
N _T	789	692	634	542	691	607	2114	1841	87.08
N _T	3591	3107	3546	2957	3429	2937	10,566	9001	

N1 to N5: University nursing schools in the northern area; NE1 to NE10: University nursing schools in the northeastern area; C1 to C15: University nursing schools in the central area; E1 to E10: University nursing schools in the eastern area; S1 to S12: University nursing schools in the southern area; First to third: years

5.2. Attitude toward the donation of one's own organs

Of the students 7040 (78 %) had a favourable attitude toward the donation of their own organs after death. Of the 22 % (n = 1961) who were not in favour, 2 % (n = 175) were against and 20 % (n = 1786) had doubts. The most notable reasons given for being in favour of donation included solidarity (62 %) and reciprocity (71 %). Some of the reasons given for being against donation included: the fear of apparent death (20 %), the idea of mutilation (13 %) and 19 % did not give a reason for their rejection.

5.3. Factors affecting attitude toward organ donation

5.3.1. Socio-personal variables

An analysis of the socio-personal variables affecting attitude revealed that females had a more favourable attitude (79 % vs. 72 %; p < 0.001). In the case of age, it was found that older students tended to be more in favour (p < 0.001).

5.3.2. Academic variables

There were differences between the years of study, with students in the third year being those with a more favourable attitude than those in the first or second year (81 % in the third year vs. 77 % in the first and

Table 2

Socio-personal, university-related and ODT-related variables of nursing students in Spain that affect attitude toward deceased organ donation for transplantation.

VARIABLE	In favor n = 7040 (78 %)	Not in favor n = 1961 (22 %)	p
Socio-personal variables			
Mean age (22 ± 5 years)	22 ± 5.5	21 ± 5.1	< 0.001
Sex:			
Male (n = 1509)	1088 (72 %)	421 (28 %)	< 0.001
Female (n = 7429)	5897 (79 %)	1532 (21 %)	
MD (n = 63)	55	8	
Geographical location:			
Northern (n = 616)	485 (79 %)	131 (21 %)	0.781
Northeastern (n = 1967)	1536 (78 %)	431 (22 %)	
Central (n = 2500)	1945 (78 %)	555 (22 %)	
Eastern (n = 2077)	1644 (79 %)	433 (21 %)	
Southern (n = 1841)	1430 (78 %)	411 (22 %)	
University academic variables			
Type of university:			
Public university (n = 8056)	6285 (78 %)	1771 (22 %)	0.186
Private university (n = 945)	755 (80 %)	190 (20 %)	
Year of study of nursing diploma:			
First (n = 3107)	2390 (77 %)	717 (23 %)	< 0.001
Second (n = 2957)	2287 (77 %)	670 (23 %)	
Third (n = 2937)	2363 (81 %)	574 (19 %)	
Variables related to organ donation and transplantation			
Knowing a transplanted patient:			
Yes (n = 2076)No (n = 6905)MD (n = 20)	1722 (83 %)	354 (17 %)	< 0.001
Knowing a donor:			
Yes (n = 1393)	5304 (77 %)	1601 (23 %)	< 0.001
No (n = 7585)	1184 (85 %)	209 (15 %)	
MD (n = 23)	5836 (77 %)	1749 (23 %)	
Organ needs covered:			
Yes (n = 383)	296 (77 %)	87 (23 %)	0.663
No (n = 8546)	6685 (78 %)	1861 (22 %)	
MD (n = 72)	59	13	
Having received a talk about ODT:			
Yes (n = 3493)	2819 (81 %)	674 (19 %)	< 0.001
No (n = 5475)	4196 (77 %)	1279 (23 %)	
MD (n = 33)	25	8	
Donating a family member's organs:			
Yes (n = 1382)	1174 (85 %)	208 (15 %)	< 0.001
No (n = 7596)	5846 (77 %)	1750 (23 %)	
MD (n = 23)	20	3	

MD= Missing data

second year; p < 0.001) (Table 2).

5.3.3. Variables related to organ donation and transplantation

On analyzing the variables related to organ donation and transplantation, there were differences in attitude when there had been previous experience of organ donation and transplantation: when the respondent had known a transplant patient (83 % of those who knew someone vs. 77 % of those who did not; p < 0.001), or known a donor (85 % vs. 77 %; p < 0.001), had received a talk about organ donation and transplantation (81 % vs. 77 %; p < 0.001) and was willing to donate a family member's organs if the decision had to be taken (p < 0.001) (Table 2).

5.3.4. Social interaction variables

Attitude toward organ donation and transplantation was more favourable when this subject has been commented on and discussed in family circles (p < 0.001) or among friends (p < 0.001) (Table 3).

Moreover, the respondent's parents or partner's attitude toward the matter also had an influence so that the student's attitude was more favourable if his or her father was in favour and the respondent knew their father's positive attitude (90 % vs. 71 %; p < 0.001) and the same

Table 3

Variables of social interaction and opinion of nursing students in Spain that affect attitude toward deceased organ donation for transplantation.

VARIABLE	In favor n = 7040 (78 %)	Not in Favor n = 1961 (22 %)	p
Social interaction variables			
Family discussion about the topic:			
Yes (n = 6357)	5529 (87 %)	828 (13 %)	< 0.001
No (n = 2622)	1501 (57 %)	1121 (43 %)	
MD (n = 22)	10	12	
Discussion with friends:			
Yes (n = 6422)	5395 (84 %)	1027 (16 %)	< 0.001
No (n = 2563)	1635 (64 %)	928 (36 %)	
MD (n = 16)	10	6	
Father's opinion about ODT:			
Yes, it is favorable (n = 4256)	3829 (90 %)	427 (10 %)	< 0.001
Not known (n = 3867)	2573 (67 %)	1294 (33 %)	
Yes, he is against (n = 534)	379 (71 %)	155 (29 %)	
MD (n = 344)	259	85	
Mother's opinion about ODT:			
Yes, it is favorable (n = 5062)	4487 (89 %)	575 (11 %)	< 0.001
Not known (n = 3265)	2060 (63 %)	1205 (37 %)	
Yes, she is against (n = 616)	448 (73 %)	168 (27 %)	
MD (n = 58)	45	13	
Partner's opinion about ODT:			
Yes, it is favorable (n = 2712)	2363 (87 %)	349 (13 %)	< 0.001
Not known (n = 2949)	2019 (69 %)	930 (32 %)	
Yes, he/she is against (n = 331)	237 (72 %)	94 (28 %)	
I do not have a partner (n = 2816)	2252 (80 %)	564 (20 %)	
MD (n = 193)	169	24	
Possibility of needing a transplant:			
Yes (n = 7034)	5628 (80 %)	1406 (20 %)	< 0.001
No (n = 155)	105 (68 %)	50 (32 %)	
Doubts (n = 1777)	1281 (72 %)	496 (28 %)	
MD (n = 35)	26	9	
Interest in receiving a talk about ODT:			
Yes (n = 7435)	5962 (80 %)	1473 (20 %)	< 0.001
No (n = 250)	180 (72 %)	70 (28 %)	
Doubts (n = 1283)	872 (68 %)	411 (32 %)	
MD (n = 33)	26	7	
Self-assessment of information about ODT:			
Good (n = 1580)	1385 (88 %)	195 (12 %)	< 0.001
Normal (n = 3578)	2937 (82 %)	641 (18 %)	
Limited (n = 3527)	2550 (82 %)	977 (18 %)	
Bad (n = 204)	107 (52 %)	97 (48 %)	
Nonexistent (n = 93)	49 (53 %)	44 (47 %)	
MD (n = 19)	12	7	

MD= Missing data

was true of their mother's (89 % vs. 73 %; $p < 0.001$) or partner's attitude (87 % vs. 72 %; $p < 0.001$). Those who believed that they might need a transplant organ in the future were more in favour of donation than those who did not believe this was possible (80 % vs. 68 %; $p < 0.001$). In addition, those who believed that an informative talk about organ donation and transplantation would be interesting for their training, had a more favourable attitude than those who had doubts about this (80 % vs. 68 %; $p < 0.001$). And those who believed they possessed good information about organ donation and transplantation had a more favourable attitude than those who believed that this information was bad (88 % vs. 52 %; $p < 0.001$) (Table 3).

5.3.5. Variables of pro-social behavior

Regarding variables of pro-social behavior, the students who had taken part in voluntary activities, had a more favourable attitude (84 % vs. 56 %; $p < 0.001$), in the same way as those who were blood donors (88 % vs. 56 %; $p < 0.001$) (Table 4).

5.3.6. Variables of attitude towards the body and religion

When we consider manipulation of the body, attitude toward donation is more favourable among those subjects who were not afraid of possible scars or mutilation after donation (86 % vs. 63 %; $p < 0.001$). Furthermore, a more favourable attitude was found among those who were willing to accept cremation after their own death (83 % vs. 64 %; $p < 0.001$) or to have an autopsy carried out (81 % vs. 61 %; $p < 0.001$). Similarly, those respondents who correctly understood the concept of brain death had a more favourable attitude (80 % understood it vs. 73 % who did not; $p < 0.001$) (Table 4). On analyzing religious variables, the students who were atheists or agnostics had a more favourable attitude than the Catholics (84 % vs. 75 %; $p < 0.001$).

5.4. Multivariate analysis

In a multivariate analysis of the variables that independently affected attitude toward donation, it was found that the following variables had an influence on attitude toward organ donation and transplantation (Table 5): 1) Interest in receiving a talk about organ donation and transplantation (Odds Ratio=1.669); 2) Having talked to one's family about organ donation and transplantation (OR=2.304); 3) Having commented organ donation and transplantation with friends (OR=1.567); 4) Being aware of one's father's favourable opinion about organ donation and transplantation (OR=1.543); 5) Being aware of one's mother's favourable opinion (OR=1.443); 6) Being aware of one's partner's favourable opinion (OR=1.288); 7) Self-assessed information about organ donation and transplantation (OR=2.949); 8) A favourable attitude toward blood donation (OR=2.506) or 9) Not being worried about possible mutilation of the body (OR=2.732).

6. Discussion

The attitude of nursing students in Spain toward the donation of their own organs after death is better than that reported in other studies in Europe, Asia and North America where attitude in favour ranges between 39 % and 73 % (Lei et al., 2018; Jawoniyi et al., 2018). What is more, if these results are compared with the attitude reported among nursing staff in Spain, their attitude is also more favourable (78 % versus 63 %–73 %) (Ríos et al., 2010; Zambudio et al., 2006). Studies with preliminary results in Spanish nursing students already showed a favourable attitude towards donation despite the fact that more than 20 % were not in favour (Martínez-Alarcón et al., 2020a, 2020b).

On analyzing of the profile of the student who is in favour of organ donation and transplantation, we find that the most influential academic factor is year of study. In this way, the students in the final year have a more favourable attitude with 81 % are in favour. Among medical students it was also found that final year students were more in favour (Ríos et al., 2019; Souza et al., 2021). Academic and healthcare training, with

Table 4

Opinion of nursing students in Spain depending on whether they have carried out prosocial activities, attitude toward the body and religious variables.

VARIABLE	In favor n = 7040 (78 %)	Not in Favor n = 1961 (22 %)	p
Variables of pro-social behavior			
Carrying out pro-social activities:	686	127	< 0.001
Yes, usually (n = 813)	(84 %)	(16 %)	
Yes, occasionally (n = 1656)	1386	270	
No, but I would be willing to (n = 5871)	(84 %)	(16 %)	
No, nor will I in the future (n = 582)	4550	1321	
MD Yes (n = 79)	(78 %)	(22 %)	
	366	216	
	(56 %)	(44 %)	
	52	57	
Donating blood:	1717	244	< 0.001
Yes, usually (n = 1961)	(88 %)	(12 %)	
Yes, occasionally (n = 1621)	1306	315	
No, but I would be willing to (n = 4955)	(81 %)	(19 %)	
No, nor will I in the future (n = 434)	3749	1206	
MD Yes (n = 30)	(76 %)	(24 %)	
	243	191	
	(56 %)	(44 %)	
	25	5	
Variables of attitude toward the body			
Fear of mutilation or possible scars:	723	432	< 0.001
Yes, I am very worried (n = 1155)	(63 %)	(37 %)	
I do not mind (n = 5725)	4908	817	
I do not know (n = 1930)	(86 %)	(14 %)	
MD (n = 191)	1274	656	
	(66 %)	(34 %)	
	135	56	
Acceptance of cremation:	5336	1071	< 0.001
Yes (n = 6407)	(83 %)	(17 %)	
No (n = 1771)	1135	636	
MD (n = 823)	(64 %)	(36 %)	
	569	254	
Acceptance of burial:	2244	751	< 0.001
Yes (n = 2995)	(75 %)	(25 %)	
No (n = 3711)	2949	762	
MD (n = 2295)	(80 %)	(20 %)	
	1847	448	
Acceptance of an autopsy:	5794	1389	< 0.001
Yes (n = 7183)	(81 %)	(19 %)	
No (n = 760)	460	300	
MD (n = 1058)	(61 %)	(39 %)	
	786	272	
Understanding of the brain death concept:	4873	1211	< 0.001
Yes, I understand the concept (n = 6084)	(80 %)	(20 %)	
I do not understand it (n = 2391)	1780	611	
Wrong concept (n = 385)	(74 %)	(26 %)	
MD (n = 141)	281	104	
	(73 %)	(27 %)	
	106	35	
Religious variables			
A religious attitude (following a religion):	739	249	< 0.001
Practising Catholic (n = 988)	(75 %)	(25 %)	
Non-practising Catholic (n = 4386)	3335	1051	
Other religion (n = 282)	(76 %)	(24 %)	
Atheist – Agnostic (n = 3153)	179	103	
MD (n = 192)	(64 %)	(36 %)	
	2643	510	
	(84 %)	(16 %)	
	144	48	
Attitude of one's religion toward ODT:	3035	777	< 0.001
Yes, in favor (n = 3812)	(80 %)	(20 %)	
Yes, against (n = 1182)	872	310	
I do not know it (n = 2116)	(74 %)	(26 %)	
MD (n = 1891)	1561	555	
	(74 %)	(26 %)	
	1572	319	

MD= Missing data

Table 5
Variables affecting the attitude of nursing students in Spain toward deceased organ donation. Multivariate Logistic regression analysis.

Variable	Regression Coefficient (β)	Standard Error	Odds Ratio (Confidence Intervals)	P
Interest in receiving a talk about ODT: Doubts (n = 1283)	0.512	0.106	1	<
Yes (n = 7435)	0.131	0.277	1.669 (2.053 – 1.355)	0.001
No (n = 250)			1.140 (1.964 – 0.662)	0.636
Family discussion: No (n = 2622)	0.834	0.098	1	<
Yes (n = 6357)			2.304 (2.793 – 1.901)	0.001
Discussion with friends: No (n = 2563)	0.449	0.088	1	<
Yes (n = 6422)			1.567 (1.862 – 1.319)	0.001
Father's opinion about ODT: Not known (n = 3867)	0.434	0.119	1	<
Yes, it is favorable (n = 4256)	0.286	0.190	1.543 (1.949 – 1.222)	0.001
Yes, he is against (n = 534)			0.751 (1.090 – 0.517)	0.133
Mother's opinion about ODT: Not known (n = 3265)	0.366	0.120	1	<
Yes, it is favorable (n = 5062)	0.041	0.188	1.443 (1.824 – 1.138)	0.002
Yes, it is against (n = 616)			0.960 (1.386 – 0.664)	0.829
Partner's opinion about ODT: Not known (n = 2949)	0.253	0.111	1	<
Yes, it is favorable (n = 2712)	0.650	0.196	1.288 (1.602 – 1.036)	0.001
Yes, he or she is against (n = 331)	0.165	0.096	0.522 (0.766 – 0.355)	0.023
I do not have a partner (n = 2816)			1.179 (1.424 – 0.976)	0.086
Self-assessed information about ODT: Bad (n = 204)	1.083	0.258	1	<
Good (n = 1580)	0.888	0.238	2.949 (4.901 – 1.782)	0.001
Normal (n = 3578)	0.701	0.236	1.782	<
Limited (n = 3527)	0.424	0.412	2.433 (3.875 – 1.524)	0.001
Nonexistent (n = 93)			2.016 (3.194 – 1.270)	0.003
Blood donation: No, nor will I in the future (n = 434)	0.918	0.190	1	<
Yes, usually (n = 1961)	0.509	0.185	2.506 (3.636 – 1.724)	0.001
Yes, occasionally (n = 1621)	0.522	0.167	1.663 (2.392 – 1.157)	<
No, but I would be willing to (n = 4955)			1.686 (2.336 – 1.215)	0.002
Fear of mutilation or possible scars: Yes, I am very worried (n = 1155)	1.004	0.107	1	<
I do not mind (n = 5725)	0.155	0.117	2.732 (3.367 – 2.212)	0.001
I do not know (n = 1930)			1.166 (1.468 – 0.927)	0.186
	0.657	0.085		

Table 5 (continued)

Variable	Regression Coefficient (β)	Standard Error	Odds Ratio (Confidence Intervals)	P
Acceptance of cremation: No (n = 1771)			1	<
Yes (n = 6407)			1.930 (2.277 – 1.633)	0.001
Acceptance of an autopsy: No (n = 760)	0.598	0.112	1	<
Yes (n = 7183)			1.818 (2.262 – 1.461)	0.001

the increase in acquired knowledge, generate greater awareness of the subject and improve attitudes toward organ donation and transplantation (Allahverdi et al., 2020; López-Montesinos et al., 2010; Ríos et al., 2021). In students of Medicine it has been seen that receiving a specific course about donation before or during their studies is a significant predictor of knowledge about organ donation and transplantation (Ríos et al., 2019; Souza et al., 2021; Singh et al., 2021).

The social and family setting also plays an important role in generating a favourable attitude (Tsubaki et al., 2020). For instance, knowing one's father's or mother's favourable attitude toward donation and having spoken about organ donation and transplantation among friends and/or family members affects attitude (OR=2.304). Therefore, as in the general public (Ríos et al., 2010) and in workers (Zambudio et al., 2006), it is beneficial to encourage dialogue in the family. It has been reported that teaching students about the benefits of donation can create a more conducive setting for achieving family consent modifying behaviors and beliefs (Tackmann et al., 2020; Ríos et al., 2019).

Attitude toward manipulation of the body is another crucial factor, where it was seen that students who would be willing to have an autopsy or be cremated after death had a more favourable attitude toward donation. In addition, it was found that attitudes were twice as favourable among those who stated that they were not worried about manipulation of the body after death (OR=2.732) and only 15 % stated that they were afraid of this. However, other studies have detected that nursing students are afraid of the loss of the body integrity Tackmann et al. (2020); Reynolds-Tylus et al. (2020) and they directly relate being registered as an organ donor with death, leading them to have fear and anxiety about the matter. A similar situation occurs in health workers who are not prepared to be subjected to an autopsy, who have a worse attitude (Zambudio et al., 2006). Another factor that hinders donation is fear of manipulation of the body. Although it was believed that professionals had fewer reservations about this manipulation than the general public, they still have difficulty with a medical procedure as accepted as transplantation (Zambudio et al., 2006).

We should not forget that information provided by healthcare professionals has a great impact on the general public (Martínez-Alarcón et al., 2020a, 2020b). And not only this but, the negative attitude generated by comments made by healthcare personnel is very difficult to turn around, as it is quite a credible source of information for the general public, further reinforced by their "health worker status". In this regard, several studies have reported an attitude that is not entirely favourable, with quite a lot of fear, a lack of knowledge and uncertainty about the question of organ donation and transplantation in both nursing workers (Bener, El-Shoubaki, . et al., 2008;) and students of nursing (Vincent et al., 2019, Ruta et al., 2021) and students of medicine (Martínez-Alarcón et al., 2020a, 2020b, Ríos et al., 2019, Vincent et al., 2019). The results of this study indicate that only 18 % of the students believe they have good information about organ donation and transplantation, although 83 % are of the opinion that it would be interesting to receive this information as part of their training as future workers. Similar data have been found among Greek students where only 38 % understood the correct definition of organ donation and transplantation, with 86 % being interested in receiving more information about the

subject (Katsari, . et al., 2015). In this sense, some authors suggest that only a limited time is dedicated to this aspect in the university curriculum and they highlight the need for students to receive information in this regard from the beginning of their university training (Ruta et al., 2019, Symvoulakis et al., 2014). The Council of Universities, the National Transplant Organization or even each University could promote specific courses designed for students. In this way, we would ensure that all future professionals have received the same specific training before joining the labor market.

It is also notable that although psychosocial studies make it possible to find out about attitude toward a topic and to establish the factors affecting this attitude, they also involve some limitations. Generally, the intention of people to donate their own organs is slightly lower than their attitude toward the organ donation and transplantation process. Based on the theoretical objective of this study: to find out how many students will have a sufficiently favourable attitude toward the donation process so that they can mediate with family members and thus increase donation rate, it was considered that the respondent's personal intention to donate his or her organs was the best indicator of attitude toward this process. Therefore, this possible bias was considered and accepted from the beginning.

The use of questionnaires is one of the most widely-used data collection techniques in social research. The questionnaire is an instrument used to quantify and universalize information and standardize the interview process, something that does not happen in most studies about this topic. Given that its purpose is to compare information that has been gathered, it should be appropriately designed, and it should be valid, sensitive, precise and be able to measure the characteristics that we intend to measure. In addition, its components should be clearly demarcated, where each one independently contributes to the total scale (the construct validity is fulfilled). To meet these characteristics, it should undergo a complex creation and validation process. This basic premise is not met in most studies about attitude toward organ donation and transplantation. As most studies use tools that are not designed for this purpose or which are not validated, this could lead to an uncertain interpretation and generalization of the results.

One of the efforts made in this study was to achieve a representative sample of nursing students from all over Spain, conserving proportionality according to geographical area and year of study. Added to that, the response rate of attitude studies is an indicator of its quality and it is desirable for this rate to be above 75 % (Ríos et al., 2010) to avoid a positive bias, given that those who try to respond to the questionnaire tend to be more interested in the topic. In this respect, some studies only recognize 48 % (Zampieron et al., 2010) of their questionnaires as being valid and in others the completion rate was between 69 % and 77 % (Katsari et al., 2015; Symvoulakis et al., 2014). The design of the study and the way the questionnaire was administered has resulted in the high participation rate and the results obtained. Such a high response rate perhaps reflects the students' interest in the topic, as well as the immediate and direct collection of the questionnaire after it was completed. In this sense, there are few studies that follow this same methodology. Recently, (Ríos et al., 2019) published the results on the attitude towards donation in a group of Spanish medical students, which follows the same methodology as our study. It details the attitude of 9275 medical students stratified by course and geographically, as in our study. In this case, the proportion of students in favour was 80 %, very similar to those obtained in our study.

We should remember that donation should be promoted by healthcare professionals because in this way we can improve good health care practices and transplantation is the only option for achieving health for many patients. Therefore, a specific training course could be useful for increasing awareness about this topic, communicating adequate information and providing familiarity with organ and tissue donation (Allahverdi et al., 2020; Symvoulakis et al., 2014). In this sense, it has been seen that receiving information about donation while at university can improve the capacity of student nurses to identify potential donors

when they become health staff Reynolds-Tylus et al. (2020); Allahverdi et al. (2020). Furthermore, all of these measures could lead to even more favourable attitudes toward organ donation and transplantation (Souza et al., 2021; Tsubaki et al., 2020).

7. Limitations

Although this research study was carried out using an expressly validated measurement tool, the interpretation of the results should include certain limitations. The first limitation is a consequence of the tendency of the participant to respond in a way that is considered "socially desirable" in the place where he or she lives. Secondly, we should note the difference between the participants' responses to certain questions and their eventual behavior if the situation under consideration were to happen in real life. Moreover, there are many social and cultural factors related to donation in the country of origin of each student that have not been considered in this analysis and that could have had an influence on their willingness to donate their organs. This aspect should not, however, take away interest from the findings obtained in the present study given that the information offered exposes in the most reliable way possible and available today about what is known about the real situation of the opinion of nursing students toward organ donation and transplantation.

8. Conclusions

To conclude, the attitude of nursing students toward deceased organ donation is generally favourable. This attitude is better than that reported among university nursing students in other countries or even in professional nurses themselves. Receiving information about donation while at university can improve the capacity of student nurses to identify potential donors when they become health staff and improve good health care practices. Having adequate knowledge together with the favourable attitude of these health sciences students could play a key role in our country. Receiving information about donation while at university can improve the capacity of student nurses to identify potential donors when they become health staff and improve good health care practices.

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

The data underlying this article will be shared on reasonable request to the corresponding author.

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