

ORIGINAL ARTICLE

The Latin American population in Spain and organ donation. Attitude toward deceased organ donation and organ donation rates

Antonio Ríos,^{1,2,3,4} Ana I. López-Navas,^{1,2,5} Juan C. Navalón,⁶ Laura Martínez-Alarcón,^{1,2,4} Marco A. Ayala-García,^{7,8} María J. Sebastián-Ruiz,⁹ Francisco Moya-Faz,⁵ Gregorio Garrido,¹⁰ Pablo Ramirez^{2,3,4} and Pascual Parrilla^{3,4}

1 Proyecto Colaborativo Internacional Donante ('International Collaborative Donor Project'), Murcia, Spain

2 Regional Transplant Center, Consejería de Sanidad, Servicio Murciano de Salud, Murcia, Spain

3 Department of Surgery, Faculty of Medicine, University of Murcia, Murcia, Spain

4 Surgery Service, Murcia Health Service, Virgen de la Arrixaca University Hospital, Murcia, Spain

5 Department of Psychology, UCAM, San Antonio Catholic University, Murcia, Spain

6 Surgery Service, Orihuela Hospital, Alicante, Spain

7 Hospital Regional de Alta Especialidad del Bajío, León, Mexico

8 HGSZ No. 10 del Instituto Mexicano del Seguro Social Delegación Guanajuato, León, Mexico

9 Transplant Coordination Center, UMAE Hospital de Especialidades No 25 IMSS, Monterrey, Mexico

10 Organización Nacional de Trasplantes, Madrid, Spain

Keywords

attitude, body, family, Latin Americans, organ donation, population, psychosocial factors, Spain.

Correspondence

Antonio Ríos, Avenida de la Libertad no 208, Casillas 30007, Murcia, Spain.

Tel.: 34 968 27 07 57;

fax: 34 968 36 96 77;

e-mail: arzrios@um.es

Conflict of Interest

The authors have declared no conflicts of interest.

Received: 1 September 2014

Revision requested: 17 October 2014

Accepted: 30 December 2014

Published online: 21 January 2015

doi:10.1111/tri.12511

Summary

The Latin American (LA) population has similarities with the Spanish population which makes its integration into Spanish society easier. Objective: to analyze the attitude toward organ donation among Latin American citizens residing in Spain, to determine the psychosocial variables which affect this attitude, and to examine the correlation between donation rates of LA citizens in Spain and in their countries of origin. A random sample of LA residents in Spain was taken and stratified according to the respondent's nationality ($n = 1.314$), in the year 2010. Attitude was assessed using a validated questionnaire (PCID-DTO Dr Ríos). The survey was self-administered and completed anonymously. Statistical analysis: Student's t -test, the χ^2 test, and logistic regression analysis. There was a 94% completion rate ($n = 1.237$). Attitude toward donation was favorable in 60% of cases ($n = 745$), 12% ($n = 145$) were against, and 28% ($n = 347$) were undecided. The following variables were associated with attitude toward donation: sex ($P = 0.038$), level of formal education ($P < 0.001$), country of origin ($P = 0.002$), attitude toward the donation of a family member's organs ($P < 0.001$), having discussed donation with the family ($P < 0.001$), carrying out prosocial activities ($P = 0.025$), attitude toward cremation of the body ($P < 0.001$), attitude toward burial of the body ($P < 0.001$), attitude toward having an autopsy carried out ($P < 0.001$), previous experience of the organ donation and transplantation process ($P < 0.001$), fear of mutilation after donation ($P < 0.001$), knowledge that the Church has a positive attitude toward organ donation and transplantation ($P < 0.001$), knowledge of one's partner's attitude toward organ donation ($P < 0.001$), and a belief that one might need a transplant in the future ($P < 0.001$). The donation rates in this population group in Spain are higher than those recorded in their countries of origin (55.76 vs. <10 pmp; $P < 0.001$). The

attitude toward organ donation among LA citizens residing in Spain is slightly worse than that reported in the native Spanish population and is determined by many psychosocial factors. The donation rates of LA citizens in Spain are higher than those in their countries of origin.

Introduction

Organ transplantation is a fully acceptable therapy, mainly limited by the shortage of organs available for carrying it out [1]. To increase the number of transplant organs, it is necessary to take action on several levels, both within organizations and by raising awareness in society [2–6].

Currently, immigration is an increasingly common occurrence in western European societies given their greater level of economic development. This is having repercussions in the world of transplantation; consequently, most western European countries are experiencing a considerable increase in the number of nonnational patients on the transplant waiting list; requests for organs from nonnative families are being considered [1,4,7].

In Spain, this notable increase in the foreign population is creating a new social and demographic reality in the whole country. The Latin American population shares important cultural, religious, and linguistic similarities with Spain, which makes their integration into Spanish society much easier. This has turned Spain into a cosmopolitan area where there is a growing Latin American population that is perfectly integrated into the social structure. The situation is conditioned by the distance between Spain and the Latin American countries which involves a long and expensive journey for a population which is generally poor.

It has been reported that the Latin American immigrant population, especially in the USA, has a lower level of organ donation, below that of the white non-Latin American population [8]. Therefore, it is important to analyze their attitude toward organ donation and transplantation to establish their willingness to donate their organs [3–5,7].

The objectives of the study are as follows: (i) to find out the state of attitude toward the donation of one's own solid organs in the population older than 15 years of age in Spain born in any Latin American country, (ii) to analyze the psychosocial variables affecting this attitude, (iii) to define the favorable and unfavorable psychosocial profiles of individuals toward organ donation, and (iv) to examine the correlation between the donation rates of LA citizens in Spain and in their countries of origin.

Material and methods

Study population

Population aged ≥ 15 years residing in Spain and born in any Latin American country. To find out the population

with these characteristics, the latest census of inhabitants was taken as a population reference where there is a record of the legal population born in Latin American countries. In addition, a percentage of this population illegally resides in Spain, and different immigration charities were consulted to estimate the size of this group (Table 1).

Sample selection

A random representative sample was obtained stratified according to the respondent's nationality. The sample size, for this population ($n = 1\,403\,193$) and considering an attitude in favor of the 50% of respondents, was 1,314 people, with a confidence level ($1-\alpha$) of 95% and an accuracy (d) of 3%, considering a loss ratio (R) of 19%.

The sample was obtained in function of the legal situation:

1. Population with legal documentation: The population census of Spain provides the number of people of every nationality living in Spain, giving age, sex, and municipality of residence (<http://www.ine.es/inebase/cgi/axi>). The sample was stratified by age and sex for each nationality and according to these data (Table 1).
2. Population without legal documentation: Information about this population is not as accurate as the previous group, since there is no official information. Different immigration charities were consulted to estimate the size of this group. Given the characteristics of this population, a confidentiality of information given by the charities was drafted. With this information, an approximate population census was conducted with information on age, gender, and municipality of residence. The sample was stratified by age and sex for each nationality and according to these approximate data (Table 1).

Opinion survey and study variables

Attitude was assessed using a validated questionnaire of attitude toward organ donation and transplantation [3,4,7] ['PCID-DTO Ríos': Questionnaire of Proyecto Colaborativo Internacional Donante about Organ Donation and Transplantation (Donación y Trasplante de Organos in Spanish) developed by Dr. Ríos]. This questionnaire included items distributed in four subscales, and it was validated in Spanish population: (i) reasons in favor and against of organ donation, (ii) information about organ donation and transplantation, (iii) social factors, and (iv)

Table 1. Distribution of the respondents according to nationality and attitude toward organ donation.

	Legal residents	Estimated residents*	Estimated sample	Sample obtained	Attitude in favor	Attitude against	Undecided attitude
North America	8893	96 390	91	84			
Mexico	8893	96 390	91	84	54 (64%)	4 (5%)	26 (31%)
Central America	64 979	149 503	137	126			
Cuba	25 797	71 234	65	62	37 (60%)	5 (8%)	20 (32%)
Dominican Republic	31 582	68 769	63	57	36 (63%)	7 (12%)	14 (25%)
Other countries	7600	9500	9	7	6 (86%)	0	1 (14%)
El Salvador				1	1	0	0
Honduras				1	1	0	0
Guatemala				1	1	0	0
Puerto Rico				2	1	0	1
Panama				1	1	0	0
Costa Rica				1	1	0	0
South America	535 811	1 157 300	1086	1027			
Ecuador	216 474	513 000	470	461	271 (59%)	57 (12%)	133 (29%)
Colombia	160 104	217 000	207	178	124 (70%)	13 (7%)	41 (23%)
Bolivia	11 311	213 000	206	206	101 (49%)	44 (21%)	61 (30%)
Argentina	47 661	62 900	61	55	46 (84%)	2 (4%)	7 (13%)
Peru	38 531	49 600	47	39	20 (51%)	4 (10%)	15 (39%)
Brazil	18 305	31 000	29	24	16 (67%)	3 (13%)	5 (20%)
Venezuela	18 370	23 850	22	22	9 (41%)	1 (5%)	12 (54%)
Chile	14 126	23 650	22	22	12 (54%)	3 (14%)	7 (32%)
Uruguay	9746	19 500	19	18	12 (67%)	1 (5%)	5 (28%)
Other countries	1183	3800	3	2	1 (50%)	0	1 (50%)
Paraguay				2	1		1
Total	609 683	1 403 193	1314	1237	745 (60%)	145 (12%)	347 (28%)

*Total number of legal residents and those estimated to be illegal residents using information from immigration charities.

familiar factors. This model accounted for 63.203% of the common variance. Each factor was internally consistent, Cronbach's α of: $\alpha = 0.957$, $\alpha = 0.804$, $\alpha = 0.745$, and $\alpha = 0.641$, respectively. Addition was administered *ad hoc* questionnaire that includes other variables (Annex 1).

A pilot study was carried out using a random sample, to confirm and validate the questionnaire in this subset of the population ($n = 200$), where no problems were encountered.

Attitude toward the donation of one's own organs after death was studied as the dependent variable. The independent study variables were grouped into seven categories: (i) demographic variable: country; (ii) socio-personal variables: age, sex, marital status, descendents, and level of formal education; (iii) variables of knowledge about and attitude toward organ donation and transplantation: personal experience of organ donation and transplantation, a belief in the possibility of needing a transplant oneself in the future and understanding the concept of brain death; (iv) variables of social interaction and prosocial behavior: attitude toward the donation of a family member's organs, family discussion about donation and transplantation, a partner's opinion toward organ donation and transplantation, and carrying

out prosocial type activities; (v) variables of a religious nature: a respondent's religion and a respondent's knowledge of the attitude of his or her religion toward donation and transplantation; and (vi) variables of attitude toward the body: concern about mutilation after donation, acceptance of cremation, acceptance of burial, and acceptance of an autopsy if one were needed.

Application of the survey

The questionnaire was self-completed anonymously in a period of 3–5 min. The whole process was supervised by collaborators from the 'International Donor Collaborative Project,' who were previously trained in the matter and carried out the study during the period from January until December 2010.

Organ donation rates in the Latin American population in Spain and in the Latin American countries of origin

Organ donation rates in Latin American countries were requested in 2010 from the Transplant Newsletter [9].

The organ donation rates of the Latin American population in Spain were requested from the National Transplant

Organization (ONT). Three aspects were taken into account to calculate the donation rates: 1) the number of legal residents, 2) the estimated number of residents, and 3) the number of donors of each nationality living in Spain in the last five years (from 2007 to 2011). Organ donation rates are useful for evaluating organ donation in countries and large population groups. However, in population groups of less than a million, these rates can over- or underestimate the number of donations, because small variations in the number of donors cause large variations in the organ donation rates. Therefore, a formula was designed to provide a reliable estimation of donations in these population groups over a period of five years. The organ donation rate was calculated for each population group using a formula, including two parts: (a) part a = $\{[1/(\text{no. of legal residents of a nationality}/1\ 000\ 000)] * \text{no. of donors of this nationality during the years 2007–2011}\}/5$; and (b) part b = $\{[1/(\text{no. of estimated residents of a nationality}/1\ 000\ 000)] * \text{no. of donors of this nationality during the years 2007–2011}\}/5$. The final calculation was made in the following way: organ donation rate = (part a + part b)/2. The organ donation rate of each nationality represents the donations per million population of this nationality in Spain per year in the last five years taking into account the legal residents in Spain as well as the estimated total number of residents.

Finally, we calculated the correlation between the organ donation rates for each nationality in their country of origin and in Spain.

Statistical analysis

The data were stored on a database and analyzed using the SPSS 15.0 (SPSS Inc., Chicago, IL, USA) statistical package. Descriptive statistical analysis was carried out on each of the variables, and for the bivariate analysis, Student's *t*-test and the χ^2 test were complemented by an analysis of remainders. Fisher's exact test was applied when the contingency tables had cells with an expected frequency of <5 . To determine and assess multiple risks, a logistic regression analysis was carried out on the variables that were statistically significant in the bivariate analysis.

In all cases, only when *P* values were <0.05 were the results considered to be statistically significant.

Results

Attitude toward the donation of one's own solid organs

The questionnaire completion rate was 94% (1237 surveyed of the 1314 selected). There was a favorable attitude toward the donation of one's own solid organs in 60% of the respondents ($n = 745$). The main reasons given for this positive attitude were solidarity (58%; $n = 435$); reciproc-

ity, which is doing to others what we would like to be performed to ourselves (53%; $n = 398$); and the prevention of the useless destruction of organs (27%; $n = 202$).

Of the rest, attitude was unfavorable in 12% ($n = 145$) of cases and 28% were undecided ($n = 347$). A large number of the respondents did not provide a reason for having this attitude (21%; $n = 102$), and among those who did, the most frequent reasons given were as follows: wanting to leave the dead in peace (18%; $n = 87$), religious reasons (15%; $n = 72$), and fear of bodily mutilation (13%; $n = 65$).

Factors affecting attitude toward organ donation

Demographic variable

To compare the countries, given the diversity among them and the small number of some of them, (as shown in Table 1), only those that had at least 30 respondents were selected to ensure that the statistical result would be really useful. A better attitude toward donation was found among the respondents from Argentina, where 84% were in favor, followed by Colombia with 70%. In contrast, among the respondents from Peru and Bolivia, only 51% and 49%, respectively, were in favor ($P = 0.002$).

Socio-personal variables

The mean age of the respondents was not related to whether they were in favor of donation or not (32 vs. 31 years; $P = 0.577$). With regard to sex, attitude was more favorable among female Latin Americans than among the males (62% vs. 56%; $P = 0.038$). Differences have also been found according to level of formal education: Those who stated they did not have any formal education were in favor in 42% of cases compared to 73.8% among those who had studied university level courses ($P < 0.001$). However, no relationship was found between attitude and either marital status ($P = 0.887$) or having descendents ($P = 0.798$). Finally, significant differences were found according to the respondent's profession (Table 2).

Variables of knowledge about and attitude toward organ donation and transplantation

The respondents who had had previous experience of the matter, through family and friends, had a more favorable opinion than those who had not had any experience (72% vs. 51%; $P < 0.001$). However, only 21% of the respondents had previous experience of the matter.

Furthermore, it is noteworthy that there was a significant association between attitude and a respondent's belief that he or she might need a transplant in the future. Those who believed they would need one were in favor in 73% of cases, compared to those who did not believe they would need one, 43%, and those who had doubts, 50% ($P < 0.001$).

Table 2. Socio-personal variables about donation and transplantation and of social interaction affecting attitude toward donation.

Variable	Favorable attitude (n = 745; 60%)	Unfavorable attitude (n = 492; 40%)	P	
Country				
Country of origin*				
Ecuador (n = 461)	271 (59%)	190 (41%)	0.002	
Bolivia (n = 206)	101 (49%)	105 (51%)		
Colombia (n = 178)	124 (70%)	54 (30%)		
Mexico (n = 84)	54 (64%)	30 (36%)		
Cuba (n = 62)	37 (60%)	25 (40%)		
Dominican Republic (n = 57)	36 (63%)	21 (37%)		
Argentina (n = 55)	46 (84%)	9 (16%)		
Peru (n = 39)	20 (51%)	19 (49%)		
Socio-personal variables				
Mean age: 32 ± 9 years	32 ± 9	31 ± 8		0.577
Sex				
Male (n = 452)	255 (56%)	197 (44%)	0.038	
Female (n = 785)	490 (62%)	295 (38%)		
Marital status				
Single (n = 526)	312 (59%)	214 (41%)	0.887	
Separated/Divorced (n = 128)	76 (59%)	52 (41%)		
Married (n = 567)	348 (61%)	219 (39%)		
Widowed (n = 16)	9 (56%)	7 (44%)		
Descendants				
Yes (n = 905)	547 (60%)	358 (40%)	0.798	
No (n = 331)	198 (59%)	134 (41%)		
Level of education				
No education (n = 236)	98 (42%)	138 (58%)	<0.001	
Primary (n = 603)	375 (62%)	228 (38%)		
Secondary (n = 262)	173 (66%)	89 (34%)		
University (n = 136)	99 (73%)	37 (27%)		
Profession				
Domestic work (n = 116)	66 (57%)	50 (43%)	<0.001	
Homemaker (n = 100)	60 (60%)	40 (40%)		
Agricultural worker (n = 48)	14 (29%)	34 (71%)		
Services (n = 385)	210 (55%)	175 (45%)		
Civil servants (n = 56)	39 (70%)	17 (30%)		
Self-employed (n = 83)	54 (65%)	29 (35%)		
Students (n = 27)	19 (70%)	8 (30%)		
Administrative workers (n = 66)	48 (73%)	18 (27%)		
Unemployed (n = 54)	42 (78%)	12 (22%)		
DK/NS (n = 302)	193	109		
Legal documentation				
With legal documentation (n = 601)	364 (61%)	237 (39%)	0.813	
Without legal documentation (n = 636)	381 (60%)	255 (40%)		

DK/NS, does not know/does not say.

*Countries with <30 respondents have been excluded (see Table 1).

Interestingly, there has been no association between knowledge of the brain death concept and attitude toward organ donation ($P = 0.953$). This is in spite of the fact that 18% of the respondents did not believe that it means the death of an individual, and another 52% were unsure (Table 3).

Variables of social interaction and prosocial behavior

It has been found that the respondents who were in favor of donating the organs of a deceased family member were more in favor of donating their own organs (78%), compared to those who were not (33%) and those who were unsure (48%) ($P < 0.001$).

With regard to social interaction variables, it has been found that those respondents who had previously discussed the subject of organ donation and transplantation within the family had a more favorable attitude (72% vs. 51%; $P < 0.001$). At a family level, the attitude of one's partner toward donation is also important. In this way, when one's partner was in favor, 79% of the respondents were in favor, whereas when the partner was against, this percentage was only 35% ($P < 0.001$).

Those respondents who regularly participated in prosocial voluntary or social help type activities, or were willing to do so, did not have a more favorable attitude than those who did not wish to participate in this kind of activities ($P = 0.025$) (Table 3).

Religious variables

No differences were found regarding a respondent's religion ($P = 0.085$). It is notable that the vast majority, 81% of the respondents, were Catholic. Among these respondents, knowing that the Church was in favor of organ donation and transplantation was associated with a more favorable attitude compared to when they did not know the Church's attitude (72% vs. 57%; $P < 0.001$). However, only 29% of respondents knew that the Church had a favorable attitude toward organ donation and about 6% believed that it was against, and in this latter group, attitude toward donation was very negative (only 37% in favor) (Table 4).

Variables of attitude toward the body

As shown in Table 4, the fear of mutilation after donation or doubts about the situation meant that attitude toward donation was less favorable in those who reported fear about this kind of mutilation compared to those who did not (46% and 51% vs. 76%; $P < 0.001$).

A close relationship has been found between attitude toward bodily manipulation and attitude toward organ donation. In this sense, those who would be prepared to accept cremation of the body after death were more in

Table 3. Variables of knowledge, of social interaction, and prosocial behavior affecting attitude toward donation.

Variable	Favorable attitude (n = 745; 60%)	Unfavorable attitude (n = 492; 40%)	P
Variables of knowledge about donation and transplantation			
Previous experience of donation and transplantation			
No (n = 944)	530 (56%)	414 (44%)	<0.001
Yes (n = 254)	194 (76%)	60 (24%)	
DK/NA (n = 39)	21	18	
A belief that one might need a transplant			
Yes (n = 526)	383 (73%)	143 (27%)	<0.001
No (n = 30)	13 (43%)	17 (57%)	
Doubts (n = 618)	307 (50%)	311 (50%)	
DK/NA (n = 63)	42	21	
Knowledge of the concept of brain death			
Wrong concept (n = 227)	135 (60%)	92 (40%)	0.953
Concept known (n = 313)	187 (60%)	126 (40%)	
Concept not known (n = 643)	389 (60%)	254 (40%)	
DK/NA (n = 54)	34	20	
Variables of social interaction			
Attitude toward the donation of a family member's organs			
Yes (n = 584)	456 (78%)	128 (22%)	<0.001
No (n = 172)	57 (33%)	115 (67%)	
Doubts (n = 466)	226 (48%)	240 (52%)	
DK/NA (n = 15)	6	9	
Family discussion about donation and transplantation			
No (n = 653)	332 (51%)	321 (49%)	<0.001
Yes (n = 548)	395 (72%)	153 (28%)	
DK/NA (n = 36)	18	18	
One's partner's opinion toward donation and transplantation			
Yes, favorable (n = 368)	290 (79%)	78 (21%)	<0.001
I do not know it (n = 510)	255 (50%)	255 (50%)	
Yes, against (n = 49)	17 (35%)	32 (65%)	
I do not have a partner (n = 235)	131 (56%)	104 (44%)	
DK/NA (n = 75)	52	23	
Carrying out prosocial activities			
Yes (n = 289)	177 (61%)	112 (39%)	0.025
I will not take part in them (n = 89)	42 (47%)	47 (53%)	
No but I would like to (n = 828)	513 (62%)	315 (38%)	
DK/NA (n = 31)	13	18	

DK/NS, does not know/does not say.

favor of donating their organs than those who were not (72% vs. 53%; $P < 0.001$). Similarly, attitude was more favorable among those who would accept an autopsy being carried out upon death if one were needed (71% vs. 55%; $P < 0.001$). Finally, those who would prefer other options apart from burial after death had a more favorable attitude (69% vs. 52%; $P < 0.001$).

Multivariate analysis

The following independent variables also feature as an influence on attitude toward the donation of one's own

Table 4. Variables of religion and attitude toward the body affecting attitude toward donation.

Variable	Favorable attitude (n = 745; 60%)	Unfavorable attitude (n = 492; 40%)	P
Religious variables			
A respondent's religion			
Catholic (n = 999)	605 (61%)	394 (39%)	0.085
Atheist-Agnostic (n = 100)	68 (68%)	32 (32%)	
Another religion (n = 120)	64 (53%)	56 (47%)	
DK/NA (n = 18)	8	10	
Knowledge of one's religion toward donation and transplantation*			
Yes, in favor (n = 345)	249 (72%)	96 (28%)	<0.001
Yes, against (n = 70)	26 (37%)	44 (63%)	
I do not know it (n = 683)	391 (57%)	292 (43%)	
DK/NA (n = 21)	3	18	
Variables of attitude toward the body			
Concern about mutilation after donation			
Concern (n = 344)	159 (46%)	185 (54%)	<0.001
No concern (n = 600)	459 (76%)	141 (24%)	
Doubts (n = 200)	103 (51%)	97 (49%)	
DK/NA (n = 93)	24	69	
Acceptance of cremation			
No (n = 783)	415 (53%)	368 (47%)	<0.001
Yes (n = 430)	311 (72%)	119 (28%)	
DK/NA (n = 24)	19	5	
Acceptance of burial			
No (n = 545)	376 (69%)	169 (31%)	<0.001
Yes (n = 666)	348 (52%)	318 (48%)	
DK/NA (n = 26)	21	5	
Acceptance of autopsy if one were necessary			
No (n = 815)	444 (55%)	371 (45%)	<0.001
Yes (n = 396)	280 (71%)	116 (29%)	
DK/NA (n = 26)	21	5	

DK/NS, does not know/does not say.

*For this cross section only the groups of Catholics and Another Religions were used.

organs: 1) level of education, 2) one's partner's opinion toward donation and transplantation, 3) carrying out prosocial activities, 4) knowledge of one's religion toward donation and transplantation, 5) concern about mutilation after donation, and 6) acceptance of cremation (Table 5).

Relation between organ donation rates in Spain and in Latin American

In Table 6, a correlation has been calculated between donation rates in their countries of origin and in Spain according to nationality. The donation rates of the residents of Latin American origin in Spain are much higher than in their countries of origin: The mean number of donors per million population in Latin American is below 10, while in Spain, the mean donation rate per million population of the LA population is 55.76.

Table 5. Variables affecting attitude toward deceased organ donation. A multivariate logistic regression analysis.

Variable	Regression coefficient (β)	Standard error	Odds ratio (confidence intervals)	P
Level of education				
No education (n = 236)			1	
Primary (n = 603)	0.779	0.224	2.178 (3.378–1.404)	0.001
Secondary (n = 262)	0.959	0.255	2.610 (4.310–1.579)	<0.001
University (n = 136)	0.596	0.321	1.814 (3.401–0.968)	0.063
One's partner's opinion toward donation and transplantation				
Yes, against (n = 49)			1	
Yes, favorable (n = 368)	1.719	0.459	5.586 (13.698–2.267)	<0.001
I do not know it (n = 510)	0.782	0.448	2.188 (5.263–0.908)	0.081
I do not have a partner (n = 235)	0.897	0.470	2.450 (6.134–0.976)	0.056
Carrying out prosocial activities				
I will not take part in them (n = 89)			1	
Yes (n = 289)	0.745	0.358	2.105 (4.255–1.043)	0.038
No but I would like to (n = 828)	1.231	0.322	3.424 (6.451–1.821)	<0.001
Knowledge of one's religion toward donation and transplantation*				
Yes, against (n = 70)			1	
Yes, in favor (n = 345)	1.024	0.373	2.785 (5.780–1.340)	0.006
I do not know it (n = 683)	0.525	0.360	1.692 (3.424–0.835)	0.144
Concern about mutilation after donation				
Concern (n = 246)			1	
No Concern (n = 424)	1.043	0.186	2.840 (4.081–1.972)	<0.001
Doubts (n = 139)	0.074	0.226	1.077 (1.675–0.692)	0.741
Acceptance of cremation				
No (n = 783)			1	
Yes (n = 430)	0.839	0.177	2.341 (3.278–1.633)	<0.001

*For this cross section only the groups of Catholics and Another Religions were used.

Discussion

Latin America is a vast region whose main characteristic is its heterogeneity in terms of ethnicity, development, resources, culture, and population. This region includes Brazil, with its mega population, as well as the small Caribbean islands. The economic profile of this region ranges from agrarian to highly industrialized economies. Ethnically, the population is made up of mixture of the initial Spanish and Portuguese settlers together with the different genetic groups who lived in the regions before its discovery. All the countries have at least one transplant program, and the number of new programs is rapidly increasing. It must be taken into account that surgical transplantation is not the only part of the donation process: It also requires a careful follow-up and relatively expensive immunosuppressive medication which is not always affordable [9,10].

Currently, Latin America has donation rates at below 10 donors per cadaver p.m.p. (per million population), besides some exceptions such as Uruguay and Argentina, as shown in Table 6. This is due to two fundamental reasons: firstly, the high number of family refusals, and secondly, the failures to detect brain deaths [9,10]. In the present study, we found donation rates among citizens of these

nationalities living in Spain were higher than in their countries of origin and even higher than the rates of the native Spanish population. To calculate these rates, we have taken a mean of the last five years, and both the resident and nonlegal population have been used as a reference. We have performed it in this way because as they are populations with no more than a million population, just one donor can lead to significant changes in the donation rates. Accordingly, a more reliable estimation can be made of the Latin Americans in Spain.

Throughout the Latin American population, in their countries of origin, few studies have been carried out to assess the attitude toward organ donation and transplantation. In the studies that have been conducted, the attitude in favor of donation ranges between 50 and 80% [11–13]. However, as seen in our study, one cannot make generalizations given that significant differences have been found between the different nationalities. In this way, a more favorable attitude toward donation has been found among those respondents of Argentine, Colombian, and Brazilian nationality, and a worse attitude among natives from Ecuador, Bolivia, and Peru.

The current tendency of Latin American governments is to promote organ donation and transplantation. Therefore,

Table 6. Annual rate of deceased donors (per million population) in the year 2010 in Latin American countries; and in Spain in this population.

	Rate in native countries in 2010	Rate in Spain during 2007–2011
North America		
Mexico	2.8	61.4
Central America		
Cuba	9.3	58.08
Dominican Republic	1.1	73.91
Other countries	<2	71.05
South America		
Ecuador	2.2	38.75
Colombia	12.3	44.49
Bolivia	1.4	195.5
Argentina	14.5	81.13
Peru	3.2	87.62
Brazil	9.9	86.89
Venezuela	3.4	77.37
Chile	5.4	33.92
Uruguay	14.4	184.66
Other countries	<2	775.92
Total Latin America	<10	55.76

they work in close collaboration with the ONT (Spanish National Transplant Organization) with the aim of introducing the ‘Spanish Model.’ Consequently, there have been projects such as the Siembra and Alianza Project [9,14,15], in collaboration with the ONT, for promoting the ‘Spanish Model’ and developing transplant programs for training professionals [16].

Our study data have shown that the attitude toward donation among Latin Americans residing in Spain is slightly worse than that reported in the native Spanish population [3,5]. This is illustrated by the population data reported by our group [3], using the same questionnaire, showing that 63% of the native Spanish population is in favor of deceased organ donation, compared to 60% observed in the study presented here.

Contrary to our findings, in the USA (The United States), which is the other country with high rates of immigration from Latin America, most studies have shown that the Latin American population in the USA donates very little [17] and does not have a very positive attitude toward donation [18–22]. In this way, authors such as Frates *et al.* [18] analyzed the perceptions of the Latin American population in the USA, more specifically, in California, toward organ donation and showed that there were many taboos associated with the subject. However, not all the authors agree about this: those such as Pérez *et al.* [23], after studying the donation patterns in three large cities in the USA, found that the blacks and the Latin Americans had a similar

family rejection rate to donation, which was higher than that in the white population in each city. In addition, they also stated [23] that the rejection rate varies considerably from city to city and they attribute this variation to nationality. In Miami, for instance, they believe that this is due to the high percentage of the Latin American population of Cuban origin, while in other cities, other nationalities feature more predominantly, especially Mexicans. It seems to be clear that the origin of the population has an influence on attitude, because although the Latin American population (more than 500 million inhabitants) is united by strong sociocultural, historical, linguistic, and religious ties, within this uniformity, there is also a certain amount of heterogeneity, and the donation rates vary according to a person’s nationality both in their native countries, in the USA and in Spain [21–23].

In Spain, the Latin American population is a young population. This means that in Latin America, attitude should be less favorable because there will be more elderly people who tend to be less aware of the matters of organ donation and transplantation [3,4]. What is more, in Spain, this is an exclusive population group within emigrant Latin Americans, due to the high cost of the journey, and this is reflected in the fact that 11% of respondents report having completed university education. All of this leads us to believe that attitude will be worse in their countries of origin and among the Latin American population from nearby countries such as the USA [17–19].

In Spain, a coordination system has been achieved which has achieved high donation rates, together with a quality control system which has reduced any potential donor losses due to requests not being made for donation. In addition, through institutional and political support, action taken on a public level to raise awareness about the matter and to reduce donation refusals has led to an increase in organ donation [1,13]. This system has meant that organ donation rates in the Latin American population residing in Spain are similar to those reported in the Spanish population [1,24] and much higher than in their countries of origin.

On analyzing the psychosocial profile of the respondents, it was found that most of the factors described in western population studies also appear in the Latin American population residing in Spain. There are notable differences between countries as we commented earlier. Factors such as previous experience of donation and/or transplantation, that is, the fact of knowing a neighbor, friend, or family member who has had a transplant [3,5], and participation in prosocial activities, or being prepared to participate in them, encourage a positive attitude toward donation. It is clear that donation is seen to be part of an altruistic view of life which encompasses solidarity exemplified in collaboration in prosocial activities [3,4].

Therefore, solidarity and a moral duty are often stated as reasons for being in favor of donation. It is notable that there is limited awareness of the matter of donation and transplantation among the Latin American population, and the evidence for this is that only 20% have had previous experience of the organ donation and transplantation process. However, among those who have had previous experience, the effect is very positive and they show a more favorable attitude toward donation. Thus, compared with the Spanish population, a lack of awareness and a greater amount of indecision are also a prominent feature [3]. In this sense, some studies carried out in the USA [25–27] state that this factor could explain why in interventional campaigns on the radio or television, the appearance of a Latin American person explaining their positive experience of receiving an organ increases donation rates in this population subset.

The knowledge of the concept of brain death, a factor classically related to attitude toward donation [3,4], does not feature as a significant factor in this population group. In this sense, it should be highlighted that there is a great lack of understanding and that only 25% of respondents accept that this concept means an individual's death.

The most important factors detected in this population, which also feature in the multivariate analysis, are mainly related to three aspects: the family, manipulation of the body, and religion. At the level of the family, it has been seen that talking about the matter in family circles increased the chances of being in favor. In this context, the attitude of a respondent's partner toward donation was fundamental. It should also be highlighted that there was a more favorable attitude among those respondents who were married, had a family, and descendants. Therefore, it would seem to be beneficial to encourage dialogue about matters of donation and transplantation within family circles and with one's partner [3,4,28–33]. However, this more basic information-decision-making mechanism comes into conflict with ancestral taboos which prevent conversations about death or make them difficult. In this way, most Latin Americans do not usually talk about the subject of death because they believe this brings bad luck, and therefore, as potential donors, many of them are lost because their families never knew the attitude of the deceased when they were alive. In this sense, Guadagnoli *et al.* [34] state that 50% of those who wish to donate do not communicate this decision to their families.

Another group of independent variables related to attitude toward deceased organ donation is manipulation of the body [35,36]. Generally, those who have an unfavorable attitude toward donation are more afraid of the manipulation and disfigurement of the body, and they have a preference for a whole or intact body after death [35,37,38]. In this study, those who would prefer cremation of the body

would accept an autopsy being carried out if one were needed, and those who were not concerned about bodily mutilation after death had a significantly more favorable attitude toward organ donation.

Finally, regarding the religious factor, it is notable that a high percentage of the population is religious, practicing their faith to some extent, and we should take advantage of this situation as a way of promoting donation [39]. When these religious respondents knew that their 'Church' was in favor of donation, their attitude was more favorable. Therefore, at present, when religions are mostly in favor, we should raise awareness among the religious authorities about the necessity of indicating to their followers the importance of organ donation so that they do not oppose such healthcare activity [3].

All of these data presented explain the current discrepancies in the literature. Although there were exceptions, the Latin American respondents generally had a more favorable attitude toward organ donation, compared to those in their countries of origin. This finding coincides with our experience in Spain where Latin Americans had an attitude which was more similar to that of the native Spanish population, and the organ donation rates were similar to, or higher than, the Spanish ones. However, in the USA, the attitude reported among Latin Americans is very negative and the donation rates are very low [17–19]. The possible reasons for this can be found not in the solidarity of the respondents but rather in other factors such as their lack of integration, their language, and the American healthcare system which is very restrictive for them. In fact, confidence in the healthcare system could explain the difference in the donation rates [36,40,41]. In some countries, although an individual can be a donor, he or she might not become a recipient because of the transplant costs in a private healthcare system. For example, in the USA, many Latin Americans who cannot afford medical healthcare insurance do not benefit from total healthcare cover. All of these reasons are frequently not taken into account and might partly be the reason for the failure of their donation in the USA and the higher donation rates of the Latin American population in Spain.

To conclude, the attitude toward organ donation among Latin Americans who reside in Spain is slightly worse than that reported in the native Spanish population and is determined by many psychosocial factors, mainly related to the family, bodily manipulation, and religious matters. The donation rates of LA citizens in Spain are higher than those in their countries of origin.

Authorship

RA: conception and design. RA, L-NA, NJC, A-GMA, SMJ and MF: acquisition of a substantial portion of data. RA,

L-NA, GG, RP and PP: analysis and interpretation of data. RA and LNA: drafting of the manuscript. RA, L-NA, A-GMA, SMJ and GG :critical revision of the manuscript for important intellectual content. RA and L-NA: statistical expertise: RA: obtaining funding for this project or study. RA and L-NA: supervision. RA, L-NA, A-GMA, SMJ, NJC, M-AL, MFF, GG, RP and PP: final approval of the version to be published.

Funding

Study co-financed by the Research Project of the CajaMurcia Foundation (FFIS/CM09/001).

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Annex 1. Questionnaire “PCID – DTO Ríos”: Questionnaire of Proyecto Colaborativo Internacional Donante about Organ Donation and Transplantation (Donación y Trasplante de Organos in Spanish) developed by Dr. Ríos

References

- Council of Europe. Internacional Figures on Donation and Transplantation 2009. Newsletter Transplant 2011; 16 (Nº 1, Monográfico).
- Matesanz R, Domínguez-Gil B, Coll E, de la Rosa G, Marazuela R. Spanish experience as a leading country: what kind of measures were taken? *Transpl Int* 2011; **24**: 333.
- Conesa C, Ríos A, Ramírez P, Canteras M, Rodríguez MM, Parrilla P. Estudio multivariante de los factores psicosociales que influyen en la actitud poblacional hacia la donación de órganos. *Nefrología* 2005; **25**: 684.
- Ríos A, Cascales P, Martínez L, et al. Emigration from the British Isles to south-eastern Spain: a study of attitudes toward organ donation. *Am J Transplant* 2007; **7**: 2020.
- Scandroglio B, Domínguez-Gil B, López JS, et al. Analysis of the attitudes and motivations of the Spanish population towards organ donation after death. *Transpl Int* 2011; **24**: 158.
- Ríos A, Ramírez P, Martínez L, et al. Are personnel in transplant hospitals in favor of cadaveric organ donation? Multivariate attitudinal study in a hospital with a solid organ transplant program. *Clin Transplant* 2006; **20**: 743.
- Ríos A, Martínez L, Sánchez J, Jarvis N, Parrilla P, Ramírez P. German citizens in south-eastern Spain: a study of attitude toward organ donation. *Clin Transplant* 2010; **24**: 349.
- Klein AS, Messersmith EE, Ratner LE, Kochik R, Baliga PK, Ojo AO. Organ donation and utilization in the United States, 1999–2008. *Am J Transplant* 2010; **10**: 973.
- Red – Consejo Iberoamericano de Donación y Trasplante. Trasplante en Iberoamérica. Newsletter 2011; 5 (Nº 1. Monográfico).
- Santiago-Delpin EA, Duro García V. Estado actual del trasplante de órganos en América Latina. *Butlletí Trasplantament* 2002; **20**: 6.
- Domínguez JM, González ZA, Morales Otero LA, Torres A, Santiago-Delpin EA. Knowledge and attitude about organ donation in a hispanic population. *Transplant Proc* 1991; **23**: 1804.
- Barcellos FC, Araujo CL, da Costa JD. Organ donation: a population-based study. *Clin Transplant* 2005; **19**: 33.
- Martínez L, Rodríguez L, Vaccarezza A, Trucco C. Public opinion regarding organ donation in Chile. *Transplant Proc* 1991; **23**: 2528.
- Mizraji R. Proyecto Siembra 7 años después. *Nefrología* 2001; **21**(Suppl 4): 138.
- Matesanz R. El programa Alianza de Cooperación con Latinoamérica. *Nefrología* 2005; (Vol 5. Monográfico).
- Milanés CL, Gonzalez L, Hernández E, Arminio A, Clesca P, Rivas-Vetencourt PA. Transplant coordination program: a useful tool to improve organ donation in Venezuela. *Prog Transplant* 2003; **13**: 296.
- Hagle ME, Rosenberg JC, Lysz K, Kaplan MP, Sillix D Jr. Racial perspectives on kidney transplant donors and recipients. *Transplantation* 1989; **48**: 421.
- Frates J, Garcia Bohrer G. Hispanic perceptions of organ donation. *Prog Transplant* 2002; **12**: 169.
- Ciancio G, Burke GW, Gomez C, et al. Organ donation among Hispanics: a single center experience. *Transplant Proc* 1997; **29**: 3745.
- Osmar Medina-Pestana J, Duro-García V. Strategies for establishing organ transplant programs in developing countries: the Latin America and Caribbean Experiencia. *Artif Organs* 2006; **30**: 498.
- Mizraji R, Alvarez I, Palacios RI, et al. Organ donation in Latin America. *Transplant Proc* 2007; **39**: 333.
- René AA, Viera E, Daniels D, Santos Y. Organ donation in the Hispanic population: dondó estan ellos? *J Natl Med Assoc* 1994; **86**: 13.
- Perez LM, Schulman B, Davis F, Olson L, Tellis VA, Matas AJ. Organ donation in three major American cities with large Latino and black populations. *Transplantation* 1988; **46**: 553.
- <http://www.ont.msc.es/>(Last consult January 2014).
- Callender C, Burston B, Yeager C, Miles P. A national minority transplant program for increasing donation rates. *Transplant Proc* 1997; **29**: 1482.
- Callender CO, Bey AS, Miles PV, Yeager CL. A national minority organ/tissue transplant education program: the first step in the evolution of a national minority strategy and minority transplant equity in the USA. *Transplant Proc* 1995; **27**: 1441.
- Frates J, Bohrer GG, Thomas D. Promoting organ donation to Hispanics: the role of the media and medicine. *J Health Commun* 2006; **11**: 683.
- Gross T, Martinoli S, Spagnoli G, Badia F, Malacrida R. Attitudes and behavior of young European adults towards the

- donation of organs—a call for better information. *Am J Transplant* 2001; **1**: 74.
29. Ríos A, Ramírez P, Galindo PJ, et al. Primary Health Care personnel faced with cadaveric organ donation: a Multicenter study in the South-Eastern Spain. *Clin Transplant* 2008; **22**: 657.
 30. Ríos A, Ramírez P, Rodríguez MM, et al. Attitude of ancillary personnel faced with living kidney donation in a hospital with a living donor kidney transplant program. *Transplantation* 2007; **83**: 336.
 31. Ríos A, Ramírez P, Rodríguez MM, et al. Personnel in cadaveric organ transplant-related hospital units faced with living liver donation. An attitudinal study in a Spanish hospital with a cadaveric and living liver transplant programme. *Liver Int* 2007; **27**: 687.
 32. López JS, Valentín MO, Scandroglio B, et al. Factors related to attitudes toward organ donation after death in the immigrant population in Spain. *Clin Transplant* 2012; **26**: E200.
 33. Ríos A, Ramírez P, Rodríguez MM, et al. Attitude of hospital personnel faced with living liver donation in a Spanish center with a living donor liver transplant program. *Liver Transplant* 2007; **13**: 1049.
 34. Guadagnoli E, Christiansen CL, DeJong W, et al. The public's willingness to discuss their preference for organ donation with family members. *Clin Transplant* 1999; **13**: 342.
 35. Sanner M. A comparison of public attitudes toward autopsy, organ donation, and anatomic dissection. A Swedish survey. *JAMA* 1994; **271**: 284.
 36. McNamara P, Guadagnoli E, Evanisko MJ, et al. Correlates of support for organ donation among three ethnic groups. *Clin Transplant* 1999; **13**: 45.
 37. Irving MJ, Jan S, Tong A, et al. What factors influence people's decisions to register for organ donation? The results of a nominal group study. *Transpl Int* 2014; **27**: 617.
 38. Manyalich M, Guasch X, Paez G, Valero R, Istrate M. ET-POD (European Training Program on Organ Donation): a successful training program to improve organ donation. *Transpl Int* 2013; **26**: 373.
 39. Kumar V, Ahlawat R, Gupta AK, et al. Potential of organ donation from deceased donors: study from a public sector hospital in India. *Transpl Int* 2014; **27**: 1007.
 40. Siegel JT, Alvaro EM, Jones SP. Organ donor registration preferences among Hispanic populations: which modes of registration have the greatest promise? *Health Educ Behav* 2005; **32**: 242.
 41. Alvaro EM, Jones SP, Robles AS, Siegel J. Hispanic organ donation: impact of a Spanish-language organ donation campaign. *J Natl Med Assoc* 2006; **98**: 28.