



Contents lists available at ScienceDirect

Transfusion and Apheresis Science

journal homepage: www.elsevier.com/locate/transci

Blood donation attitudes and knowledge in Spanish undergraduates with roles in health-education

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ARTICLE INFO

Keywords:

Blood donors
Knowledge, attitudes and practice in health
Students
Health
Education

ABSTRACT

Background: Recent investigations highlight how important it is to identify the key factors involved in the design of strategies to promote blood donation among undergraduates as a public health concern. The study aims to investigate attitudes and knowledge towards blood donation in university students with health education roles and examine the way sociodemographic and educational characteristics play a part in it.

Materials and methods: A cross-sectional and multi-center design was used. A structured questionnaire was answered by 1128 Spanish university students (Schools of Health Sciences and Education Sciences).

Results: The knowledge test indicated a low score ($M = 4.2$ out of 10), being $Me = 3.00$ in the case of Education Sciences and $Me = 5.00$ in Health Sciences students. The greatest degree of importance is found in the “external incentives” dimension ($M = 3.7$ out of 5). Health science students and participants with relatives who needed a donation showed fewer “fears” ($p \leq 0.001$) and “pretexts” ($p \leq 0.01$).

Conclusions: The low knowledge score stresses the need to develop valuable health education-related strategies in the curriculum of studies related with health education; showing room for improvement particularly in Education Science students. Health education interventions aimed at increasing donors in the university environment should be designed while considering differences among undergraduates. Based on their better attitudes, health science students might play a relevant role in promoting blood donation.

1. Introduction

Blood donation is a public health issue essential to guarantee quality medical-surgical care and save millions of lives every year. Despite numerous scientific advances, there is still no substitute product that can replace human blood obtained through donation [1]. The increase in the quality and life span of the population, together with the scientific, social and medical-surgical care improvements have exponentially triggered the demand for blood and its derivatives; prompting the reinforcement of unpaid national self-sufficiency policies by the WHO and the European Union [1–3].

In Spain, the donation of blood and its components is voluntary, altruistic and unpaid, while also ensuring the lowest possible risk of

disease transmission [4]. Unfortunately, the latest published data show a small decrease in the number of donations during 2018 and this is the lowest absolute rate for the period since 2014 [5]. Despite the global donation rate continuing to increase per thousand inhabitants, the WHO still considers it important to encourage blood donation [6].

The donation rate of young people (between 18 and 30 years) in our country is around 30% [5]. This population represents an ideal group of potential altruistic donors in an increasingly aging Europe. Recruiting and retaining young donors improves not only the supply, but also the safety of donations, the promotion of healthy lifestyles, the acquisition of greater awareness about one’s own health and the development of a mature attitude [7].

The decision to donate blood is motivated by several complex

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<https://doi.org/10.1016/j.transci.2022.103416>

Received 16 October 2021; Received in revised form 18 February 2022; Accepted 22 February 2022

Available online 25 February 2022

1473-0502/© 2022 The Author(s).

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factors, making it necessary to identify both the factors associated with a good attitude and whether potential donors have enough knowledge to decide responsibly [8]. Barriers, motivations and knowledge about blood donation could vary in countries with different cultures or religions. However, university students in the different countries show certain similarities such as fear of needles, previous negative experiences, lack of time, fear of getting a disease or ignorance about health-care blood needs, among many others [3,9]. When any of these conditions exists, the decision-making process is more complex and prolonged [10]. Although an increasing number of countries have unremunerative systems considered to work well, there are problems with the altruistic donation system such as fear of needles or lack of time in young people [11,12].

In our country, as in many others, there are few studies that have explored attitudes and knowledge towards blood donation in university students from different fields since they are mainly studied among those of health sciences [13]. The analysis of these factors in countries with voluntary donation systems is of great interest to improve methods in recruiting younger adults, promoting educational institutions as the ideal environment to develop educational interventions [14,15].

Given the importance of identifying key factors involved in the design of interprofessional health education strategies to promote blood donation in the university environment, the following objectives were defined:

1. To describe attitudes towards blood donation in undergraduates with roles in health education, identifying external barriers and motivations, as well as their knowledge about this issue.
2. To analyze the impact of personal variables on attitudes and knowledge about blood donation.

2. Material and methods

2.1. Design

Cross-sectional and multi-center study. The reporting of this study conforms to the STROBE statement.

2.2. Participants and data collection

The study was undertaken during the 2018–2019 academic year. Participants were recruited using convenience sampling from undergraduate students attending the Schools of Health Sciences (Degrees of Nursing and Medicine) and Education Sciences (Degrees of Pedagogy, Social Education, Primary teacher training and Early Childhood Education) at two campuses of the University of ([Blinded for Review]), (region of Galicia, NW Spain, Europe). Therefore, participants belonged to seven different degrees with differing roles in health education. They were included if they i) attended in-person classes during the specified data collection period, and ii) provided informed consent to participate. Students were informed about the purpose of the study, the questionnaire was distributed electronically and completed at the end of the class.

2.3. Instrument

A well-structured self-administered questionnaire to study barriers, motivations and knowledge of university students with five dimensions was used [14].

The questionnaire of barriers and motivations related to blood donation (CADS-19) included 26 items belonging to the four following dimensions: “Personal reasons and prejudices” (9 items), “Fears of blood donation” (5 items) and “Pretexts to avoid blood donation” (5 items) and “External incentives” (7 items). In all items the answers were recorded using a 5-point Likert scale (ranging from 1 = “no importance” to 5 = “great importance”). A knowledge test on blood donation (the fifth

dimension) composed of 10 multiple-choice questions with a single correct answer was also used (score from 0 to 10) (see [Supplementary files S1 and S2](#) for more details).

The principal component factor analysis was used to examine construct validity, showing the existence of 4 dimensions whose factor loads are presented in [Supplementary file S1](#): “External incentives to blood donation” explained 20.5% of the variance, “Fears to blood donation” explained 13.8%, “Personal reasons and prejudices” 9.0%, and “Pretexts” 5.7%. A Cronbach reliability coefficient of 0.810 was obtained for the scale, indicating a good internal consistency.

2.4. Data analysis

Statistical analyses were performed with SPSS 20.0 for Mac (IBM Inc.) and R, using the libraries “foreign” [16] and “ARTool” [17,18]. Descriptive analyses (frequencies, percentages, means (M), medians (M_e), standard deviations (SD) and quartiles) were used to describe the sample. To check whether the items of the barriers and motivations scale towards blood donation corresponded to the dimensions proposed in this study, an analysis of the main components was carried out based on the correlation matrix ([Supplementary file S1](#)). A scree test was used to make the decision on the selection of the number of components to be extracted [19]. Since oblique rotations is recommended when the existence of correlation between factors is expected [20], the extracted components were rotated using the Promax procedure [21] in order to facilitate result analysis. In addition, to test the internal consistency or reliability of the test, the Cronbach alpha index was obtained. Because the response variables were ordinal and did not follow a normal distribution, non-parametric analyses were performed with a threshold of significance set at 0.05. Concretely, robust ANOVAs with four inter-subject factors (Gender, Area of Knowledge, Experience in blood donation and Study Year) were performed, using the Aligned Rank Transform for non-parametric factorial analyses [17,18]. In case of interactions between factors, multiple pairwise comparisons (Mann-Whitney U, p values adjusted using Bonferroni corrections) were performed. Also, the effect of having a relative who had previously needed a blood transfusion was explored using non-parametric tests (Mann-Whitney U). In all cases, the statistical contrast was first performed using the average of the scores of the items that made up each dimension. Subsequently, for those cases in which significant differences were obtained, statistical contrasts (Mann-Whitney U) were performed for each item of these dimensions.

2.5. Ethical considerations

The study protocol was approved by the Bioethics Committee of the ([Blinded for Review], approval number 14122018), following the Declaration of Helsinki. On the cover sheet of the web-based questionnaire, information concerning the nature, purposes and research team was included. Participation was voluntary, online informed consent was obtained and all data were processed anonymously according to current European regulations on data protection.

3. Results

3.1. Sample characteristics

The study participants consisted of 1128 students (92% response rate) from the ([Blinded for Review]), with an average age of 20.5 ± 3.3 years, mostly female (82.2% women), of whom 532 were students of health sciences and 596 of education sciences. The geographical origin was 52.7% of urban municipality, 21.6% semi-urban and 25.7% rural. Of the total sample, 28.1% had previously donated and 34.1% had a relative or close person who had needed a blood transfusion.

3.2. Dimension scores

The greatest degree of importance given by the participants is found in the “external incentives” dimension ($M = 3.66$ out of 5; $SD 0.98$), followed by the “fears” dimension ($M = 1.84$; $SD 0.86$), “pretexts not to donate” ($M = 1.71$; $SD 0.67$) and “personal reasons and prejudices” ($M = 1.70$; $SD 0.61$). The scores of the knowledge test have shown a low level, with an average of 4.24 ($SD 1.89$) over a maximum score of 10. [Table 1](#) shows mean scores obtained for all dimensions after analyzing predictive variables (personal and sociodemographic characteristics).

3.3. Associations between predictive variables and attitudes or knowledge about blood donation

3.3.1. Differences in the evaluated dimensions depending on the gender variable

The robust ANOVAs showed a significant effect of Gender in two of the five dimensions evaluated: “pretexts not to donate” ($F(1,1096) = 12.253$, $p = 0.002$) and “external incentives” ($F(1,1096) = 7.226$, $p = 0.007$), showing males’ and females’ higher levels, respectively. Specific items significantly associated with the gender variable are shown in [Table 2](#). Contrastingly, no differences were found in the knowledge test.

3.3.2. Differences in the evaluated dimensions depending on the area of knowledge

The robust ANOVAs showed a significant effect of Area of Knowledge in two of the five dimensions evaluated. The students of education sciences scored higher in “fears” ($F(1,1096) = 27.182$, $p \leq 0.001$). Therefore, this group expressed greater fears about blood donation. Specific items significantly associated with this variable are shown in [Table 2](#). In the knowledge test, health sciences students scored significantly higher than education sciences students, showing a greater level of knowledge about blood donation issues ($F(1,1096) = 55.615$, $p \leq 0.001$). In addition, a statistical trend was also found for the dimension “pretexts” ($F(1,1096) = 3.763$, $p = 0.053$), revealing that students of Education Sciences expressed more excuses not to donate (see [Table 2](#)).

3.3.3. Differences in the evaluated dimensions depending on the previous experience with blood donation

Significant differences were found depending on whether the students had previously donated in three of the five dimensions evaluated. Those who had never donated gave greater importance to fears ($F(1,1096) = 40.345$, $p \leq 0.001$), and were the most influenced by the

pretexts not to donate ($F(1,1096) = 9.348$, $p = 0.002$). Regarding the knowledge test, higher scores were obtained in those participants who had previously donated ($F(1,1096) = 52.956$, $p \leq 0.001$).

The analysis by items revealed that participants who had not previously donated showed greater fears in all cases and gave a greater relevance to all pretexts except for the “lack of time” as reasons not to donate ([Table 3](#)). As regards having a relative who has previously needed a blood transfusion, the Mann-Whitney U tests showed significant differences in two of the five dimensions evaluated. In “fears” ($U = 122447$, $p \leq 0.001$) as well as in “pretexts” ($U = 125564$, $p = 0.001$), those students who did not have a relative or someone close who had previously needed a blood transfusion scored greater, therefore expressing more fears and more excuses not to donate ([Table 3](#)). In the “fears” dimension, the analysis by items showed significant differences in all of them, whereas in the “pretexts” dimension, three items were statistically associated with this variable ([Table 3](#)).

3.3.4. Differences in the evaluated dimensions depending on the interaction between factors

Robust ANOVAs revealed an interaction effect between Gender and Area of Knowledge for the knowledge test scores. However, significant effects for this interaction were lost in the pairwise multiple comparisons adjusted to Bonferroni, as differences between Health Science and Education Science students were found for both genders (males: $p \leq 0.001$, females: $p \leq 0.001$). No significant differences were found between males and females in any Area of Knowledge (Health Sciences: $p = 0.912$, Education Sciences: $p = 0.216$). The analyzes did not reveal any other interaction effect on any dimension.

4. Discussion

The aims of the study were to identify attitudes about blood donation in undergraduates with roles in health education and their relationship with personal variables. Therefore, a questionnaire was answered by 1128 university students from Spain. Relevant information regarding the factors limiting the donation process in undergraduates is provided. This could be useful in the design of interprofessional blood donation campaigns to increase their effectiveness in higher-learning institutions as an issue of public health. In this vein, this research categorized previously reported aspects and their association with different variables.

In our study, participating university students came from different locations throughout the region and 28.1% had donated before the study was conducted, in line with donation rates found in previous studies in

Table 1

Scores obtained in the dimensions of the barriers and motivations for blood donation questionnaire (out of 5) and in the knowledge test (out of 10) in five predictive variables.

Predictive variable	Barriers and motivations				Knowledge test Me [Q1–Q3]
	Personal reasons Me [Q1–Q3]	Fears Me [Q1–Q3]	Pretexts Me [Q1–Q3]	External incentives Me [Q1–Q3]	
Gender					
Females	1.56 [1.22–2.00]	1.60 [1.00–2.40]	1.60 [1.20–2.00]	3.71 [3.14–4.14]	4.00 [3.00–6.00]
Males	1.56 [1.22–2.11]	1.60 [1.00–2.20]	1.80 [1.40–2.40]	3.29 [2.86–3.86]	4.00 [2.00–6.00]
Type of municipality					
Urban	1.56 [1.22–2.00]	1.60 [1.00–2.40]	1.60 [1.20–2.20]	3.57 [3.00–4.14]	4.00 [3.00–6.00]
Suburban	1.56 [1.22–2.00]	1.60 [1.00–2.40]	1.40 [1.00–2.00]	3.57 [3.00–4.14]	5.00 [3.00–6.00]
Rural	1.56 [1.33–2.00]	1.60 [1.00–2.40]	1.60 [1.20–2.00]	3.57 [3.14–4.14]	4.00 [3.00–6.00]
Area of knowledge					
Health	1.44 [1.22–2.00]	1.40 [1.00–2.00]	1.40 [1.00–2.00]	3.71 [3.14–4.29]	5.00 [4.00–6.00]
Education	1.56 [1.33–2.00]	2.00 [1.20–2.60]	1.60 [1.20–2.20]	3.57 [3.00–4.14]	3.00 [2.00–5.00]
Previous blood donation					
Yes	1.44 [1.22–2.11]	1.20 [1.00–1.80]	1.40 [1.00–1.80]	3.71 [3.14–4.29]	5.00 [4.00–7.00]
No	1.56 [1.33–2.00]	1.80 [1.20–2.60]	1.60 [1.20–2.20]	3.57 [3.00–4.14]	4.00 [3.00–5.00]
Previous need for blood transfusion of a relative					
Yes	1.44 [1.22–2.00]	1.40 [1.00–2.20]	1.40 [1.00–2.00]	3.71 [3.00–4.14]	5.00 [3.00–6.00]
No	1.44 [1.22–2.00]	1.80 [1.00–2.40]	1.60 [1.20–2.20]	3.57 [3.00–4.14]	4.00 [3.00–6.00]

Medians (M_e), first quartiles (Q1) and third quartiles (Q3).

Table 2

Items from the questionnaire of barriers and motivations related to blood donation that showed significant associations with the variables “gender” and “area of knowledge” (Health Sciences or Education Sciences).

DIMENSIONS	PRETEXTS		Gender				Statistical analyses
			Females		Males		
			Me	[Q1–Q3]	Me	[Q1–Q3]	
		Not thinking about donating	1.00	[1.00–2.00]	1.00	[1.00–3.00]	79347.50***
		Lack of time	1.00	[1.00–2.00]	2.00	[1.00–3.00]	69675.50***
		Not knowing where to donate	1.00	[1.00–2.00]	1.00	[1.00–3.00]	79367.00***
		Nobody ever asked me to donate	1.00	[1.00–1.00]	1.00	[1.00–2.00]	83297.00***
	EXTERNAL INCENTIVES	Getting information by mass media	3.00	[2.00–4.00]	3.00	[2.00–4.00]	81833.50**
		Discovering that relevant/famous people are donors	3.00	[2.00–4.00]	2.00	[1.00–3.00]	79305.50***
		Getting detailed information about blood donation	4.00	[3.00–4.00]	3.00	[2.00–4.00]	79731.00**
		The donation is for somebody I know	5.00	[5.00–5.00]	5.00	[4.00–5.00]	80427.00***
		A catastrophe taking place	5.00	[4.00–5.00]	5.00	[4.00–5.00]	79576.00***
DIMENSIONS	FEARS		Area of knowledge				Statistical analyses
			Health		Education		
			Me	[Q1–Q3]	Me	[Q1–Q3]	
		Fear of pain	1.00	[1.00–2.00]	2.00	[1.00–3.00]	121245.00***
		Fear of the extraction procedure	1.00	[1.00–3.00]	2.00	[1.00–4.00]	116074.50***
		Fear of blood loss	1.00	[1.00–2.00]	1.00	[1.00–2.00]	138390.00***
		Rejection of the hospital environment	1.00	[1.00–1.00]	1.50	[1.00–3.00]	104495.50***
		Belief that giving blood weakens the body	1.00	[1.00–2.00]	1.00	[1.00–2.00]	140490.50***
	PRETEXTS	Not thinking about donating	1.00	[1.00–2.00]	1.00	[1.00–2.00]	140445.50***
		Lack of time	2.00	[1.00–3.00]	1.00	[1.00–2.00]	143484.00**
		Nobody ever asked me to donate	1.00	[1.00–1.00]	1.00	[1.00–2.00]	140178.00***
		Little information about blood donation	1.00	[1.00–2.00]	2.00	[1.00–3.00]	118106.00***

Medians (Me), first quartiles (Q1), third quartiles (Q3) and statistical contrasts using Mann-Whitney U test. P < 0.05 was considered statistically significant. *, **, and *** to indicate significance at the p < 0.05, p < 0.01, and the p < 0.001 levels were used, respectively.

Table 3

Items from the questionnaire of barriers and motivations related to blood donation that showed significant associations with the variables “having donated previously” and “previous need for blood transfusion of a relative”.

DIMENSIONS	FEARS		Previous donation				Statistical analyses
			Yes		No		
			Me	[Q1–Q3]	Me	[Q1–Q3]	
		Fear of pain	1.00	[1.00–2.00]	2.00	[1.00–3.00]	85615.00***
		Fear of the extraction procedure	1.00	[1.00–2.00]	2.00	[1.00–4.00]	82476.00***
		Fear of blood loss	1.00	[1.00–1.00]	1.00	[1.00–2.00]	102007.00***
		Rejection of the hospital environment	1.00	[1.00–1.00]	1.00	[1.00–2.00]	105658.50***
		Belief that giving blood weakens the body	1.00	[1.00–2.00]	1.00	[1.00–2.00]	109301.00***
	PRETEXTS	Not thinking about donating	1.00	[1.00–1.00]	1.00	[1.00–3.00]	996668.50***
		Not knowing where to donate	1.00	[1.00–2.00]	1.00	[1.00–2.00]	115171.00***
		Nobody ever asked me to donate	1.00	[1.00–1.00]	1.00	[1.00–2.00]	110282.00***
		Little information about blood donation	1.00	[1.00–2.00]	2.00	[1.00–3.00]	106415.50***
DIMENSIONS	FEARS		Previous need for blood transfusion of a relative				Statistical analyses
			Yes		No		
			Me	[Q1–Q3]	Me	[Q1–Q3]	
		Fear of pain	1.00	[1.00–3.00]	2.00	[1.00–3.00]	123776.50***
		Fear of the extraction procedure	1.00	[1.00–3.00]	2.00	[1.00–3.00]	124632.00***
		Fear of blood loss	1.00	[1.00–2.00]	1.00	[1.00–2.00]	129248.00**
		Rejection of the hospital environment	1.00	[1.00–2.00]	1.00	[1.00–2.00]	133272.00 *
		Belief that giving blood weakens the body	1.00	[1.00–2.00]	1.00	[1.00–2.00]	129492.50**
	PRETEXTS	Not knowing where to donate	1.00	[1.00–2.00]	1.00	[1.00–2.00]	132880.50 *
		Nobody ever asked me to donate	1.00	[1.00–1.00]	1.00	[1.00–1.00]	132401.00**
		Little information about blood donation	1.00	[1.00–2.00]	2.00	[1.00–3.00]	128923.50**

Medians (Me), first quartiles (Q1), third quartiles (Q3) and statistical contrasts using Mann-Whitney U test. P < 0.05 was considered statistically significant. *, **, and *** to indicate significance at the p < 0.05, p < 0.01, and the p < 0.001 levels were used, respectively.

Europe [3,15]. Women represent most of our sample (82.2%), reflecting the feminization trend of health and education sciences studies in our country, similar to other European universities [3,15], and far from other contexts, where women are much less represented [8,9] or even totally absent [22].

The degree of knowledge found in our research was quite low, particularly in Education Science students as neither area of knowledge deals with blood donation as part of their curriculum. This knowledge score is in line with studies carried out with the same instrument in nursing students of different countries [11,13]. We find this particularly important, since the lack of knowledge could lead university students to

exclude themselves for false reasons, when their lifestyle and health would really allow a safe donation. Furthermore, myths or taboos originated from insufficient information negatively influence the recruitment of voluntary donors [23]. This insufficient knowledge justifies the insistence on interdisciplinary educational campaigns and discussion in the university environment, which might result in new generations of donors [24]. Educational innovation campaigns and specific training programs, linking education and health systems, are a good way to improve both awareness and learning since they must go hand in hand to minimize unjustified opt-outs of potential donors [14].

Regarding the global attitude analysis, the relevance granted to the

different obstacles is consistent with previous research, where the barriers that hinder donation include: “not suitable for lifestyle features”, “medically unfit” or “medical reasons” [3,15,25]. Overall, the “pretexts” dimension (with aspects such as having little information about blood donation or lack of time) obtains the highest score in this study, differing from several investigations where “fears” (of getting damaged or infected, of needles or of feeling sick) were the most frequent reasons given [7,26,27].

4.1. Differences in the evaluated dimensions depending on the gender variable

The detailed analysis of the social and personal variables shows that the majority of “pretexts to avoid blood donation” are significantly influenced by gender, to which male participants resort more frequently, while females give more importance to external incentives. Previous authors have also reported gender as a factor that influences the decisions of young people and greater motivations [7] or fewer pretexts [13] among females, whereas others did not find differences [28]. Likewise, “not thinking about donating” is one of the pretexts most pointed out by the participants, especially by men, in line with Zito et al. [7]. The lack of time was reported by males as the most important pretext not to donate, whereas Zito et al. [7] attributed it to females. Regarding the incentives identified, we can point out that women show significant differences in the items “solve my doubts with detailed information”, “receive information through the media” and “the donation is for somebody I know” in line with previous results [7].

Fears are the most frequently given reasons that prevent blood donation in many countries, constituting one of the biggest challenges the donation system must face [27]. In our study, no significant gender differences in this dimension were found, differing from others that identified greater fears in females [7,12] explained previously by religious or cultural differences [26].

Regarding the degree of knowledge, our research has not shown gender-associated differences, in accordance with previous results in Portugal, India or Jordan [9,11,25], but differing from a study that reported greater knowledge of females in the same context [8].

4.2. Differences in the evaluated dimensions depending on the area of knowledge

Concerning the area of knowledge, it must be pointed out that students of the area of health sciences obtained significantly higher scores in the knowledge test than those of education sciences. This difference has also been observed among students from different fields of health studies such as Nursing or Medicine [8,25] compared to students from other areas.

In relation to conditions or attitudes to donate, we found that students of education sciences report more “fears” and “pretexts” than their peers of health sciences. Regarding fears, our findings are in line with previous research that shows less fear of needles by students of the School of Medicine [29] and differs from others that point to greater fear of infection or weakness by the students of health sciences [8]. Regarding “pretexts”, we have not obtained significant differences depending on the area of knowledge, whereas other authors indicated that the lack of time or eligibility was greater in medical science students [29]. In our opinion, the study of these two areas of knowledge is highly relevant, since future professionals from both fields will play a key role in health education, having opportunities to promote blood donation from an interprofessional point of view.

4.3. Differences in the evaluated dimensions depending on the previous experiences with blood donation

In relation to the personal variable “to be a donor or not” previously, non-donor participants have experienced more “fears” and indicated

more “pretexts”, supporting results of previous research [8,15]. Interestingly, in our sample the main motivating factor for both donors and non-donors of our study is that the blood is destined for a person that they know, contrary to data given by Cicolini et al. [15] who found practical information as the main motivation for donating. Lack of time is the only item in the “pretexts” dimension not associated with previous donations, unlike another investigation that found donors as the most likely group to adduce it [29]. In our study, being a previous donor influenced the level of knowledge, similar to another study showing that students with greater donation intensity presented more knowledge, more positive attitudes and fewer fears, helping them to better understand the need for donation [26].

The last personal variable analyzed, ‘having a family member or close person who has needed a blood transfusion’, is significantly associated with greater knowledge, fewer fears, and fewer excuses not to donate. This is in line with other findings reporting that in many cases the reasons that motivate donating blood are to help a family member or a sick friend [23] or to save others’ lives [22]. Moreover, almost all donors and non-donors would donate to a family member or friend or after an emergency call for blood, as shown in other investigations [28] and contrary to what happens in contexts where the opposition of family or religious reasons represent a barrier to blood donation [26,27]. The need for blood from a family member was a positive determining factor towards blood donation, as demonstrated in the present study and in another by Piersma et al. [30].

4.4. Limitations and strengths

Some limitations of the study should be noted. Participants belong to just two scientific areas (health and education sciences) and might not necessarily represent all the students at this university. The research was carried out in a single region of Spain, so similar studies in other areas are needed to extend our conclusions. The main strengths of this investigation include the large sample size and the use of a questionnaire whose reliability and consistency can be verified in our context, as well as its effectiveness to identify variables influencing predisposition towards blood donation. These findings could also help in the formulation of recommendations, as well as in the development of further studies in similar settings, where more research is needed.

5. Conclusions

This study addresses a gap in the knowledge for a possible health education intervention aimed at increasing the number of donors among university students. Consistent with previous studies and the differences found in this research, when the population is well informed and familiar with the process and the benefits involved, barriers are reduced, especially considering that the fear of the unknown is one of the most powerful inhibitors.

Our evidence suggests that the development of interventions for undergraduates aimed to promote blood donation should consider aspects such as gender, field of knowledge or donation history. Furthermore, in view of the relevance attributed to having had a relative in need of blood, campaigns could emphasize that donation is for anyone and the only way to ensure availability is through periodic donations, so “fears” and “pretexts” can be overcome. Based on the results and due to their community roles and professional profile, health science students might also play a relevant role in promoting blood donation among their peers and the general public. The aforementioned reasons reveal that if future health professionals receive appropriate training as part of their curriculum, they could develop skills and competencies while improving public health and social concern.

CRedit authorship contribution statement

Alba-Elena Martínez-Santos: design of the work, acquisition and

analysis of the data, drafting the work and final approval of the version to be published. **Josefa del Carmen Fernández de la Iglesia:** design of the work, analysis and interpretation of the data, drafting the work and final approval of the version to be published. **Lorena Casal Otero:** design of the work, acquisition of the data, revising it critically for important intellectual content and final approval of the version to be published. **Marcos Pazos-Couselo:** design of the work, revising it critically for important intellectual content and final approval of the version to be published. **Raquel Rodríguez-González:** Project administration, design of the work, acquisition of the data, drafting the work and final approval of the version to be published.

Funding statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Acknowledgements

We are grateful to Diego Lopez-Cao for his services in editing the manuscript.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.transci.2022.103416](https://doi.org/10.1016/j.transci.2022.103416).

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