NOTAS E CONÓMICAS 47

Imprensa da Universidade de Coimbra
Coimbra University Press

Faculdade de Economia da
Universidade de Coimbra

Tiago Henriques
Faculdade de Economia, Universidade de Coimbra
tiagomanuelhenriques@gmail.com
Carlota Quintal
Faculdade de Economia, Universidade de Coimbra
qcarlota@fe.uc.pt

DOI: https://doi.org/10.14195/2183-203X_47_4

Young and healthy but reluctant to donate blood: An empirical study on attitudes and motivations of university students

Tiago Henriques
Carlota Quintal

Received for publication: July 17, 2018
Revision accepted for publication: October 11, 2018

ABSTRACT
Worldwide, demand for blood and blood products has increased and it is important to work on donor recruitment strategies; and because in developed countries the young have been more reluctant to donate, it is particularly pertinent to assess their motivations. The aim of this study is to assess attitudes, knowledge and motivations regarding blood donation and to identify factors associated with donation among young donors, using a sample of university students. We use a cross-sectional survey, collected in the city of Coimbra, Portugal, using a self-administered questionnaire, and adopted descriptive and multiple logistic regression analyses. We found that prevalence of donation is 16.5%. Donation is more likely among students engaged with the community, through volunteering activities, political participation or religion. Altruistic feelings positively affect donation. The odds of donation are 76% lower among students who expressed fear of needles. A traditional barrier, lack of time, is not statistically significant in our study. In the literature, altruistic feelings tend to be associated with older individuals, nonetheless, our results suggest that they play a relevant role even among students. Primary care services might be used to tackle the fear of needles and of the sight of blood at early ages. Time availability of students should be used to the advantage of authorities by promoting convenient collections at, for example, universities as already happens is some cases.
Keywords: Blood donation; motivations; students; Portugal.

JEL Classification: I10; I12; I18.

Acknowledgements: The authors would like to thank all the respondents who agreed to take part in the survey. We would also like to thank an anonymous reviewer for the valuable suggestions.

1. Introduction

Worldwide there have been concerns about the assurance of an adequate and safe supply of blood, partly due to the increase in life expectancy and the implementation of therapeutic and surgical procedures requiring large quantities of blood and blood products (Hollingsworth and Wildman, 2004; Marantidou et al., 2007). In recent years, the level of blood donation at a world level has come to a standstill or even decline (Martín-Santana and Beerli-Palacio, 2013), meaning that it is important to continue the research on donor motivations.

Notwithstanding the existent literature regarding factors impacting on blood donation, the relative importance of factors evolve over time and new barriers can appear along with societal changes (Gillespie and Hillyer, 2002); it is thus relevant to reassess what motivates individuals to donate blood (Duboz and Cunéo, 2010; Glynn et al., 2002). Moreover, there might be variations across demographic groups implying the need for targeted recruitment and programs tailored to specific groups (Glynn et al., 2002).

Figures regarding prevalence do in fact show differences across age groups - in high--income countries the lowest percentage (less than 20%) of donations come from the age group 18-24 (World Health Organization, 2011, 2016). Attention has been drawn on the need to further study and understand the motives that attract young people as recruitment programmes seem to have failed in this respect (Marantidou et al., 2007). Additionally, in Portugal there is sparse evidence on donor motivation. Hence, it is relevant to assess the motivations of younger individuals to promote blood donation precisely by those who are generally healthy and offer a great potential to become donors over decades (Lemmens et al., 2009)

The objectives of this study are therefore to assess perceptions and knowledge regarding blood donation of young people, using a sample of university students. We also aim to identify facilitating factors as well as barriers to donation in this specific group of the population.

2. Brief overview of the empirical literature on donor motivations

There is substantial evidence on factors impacting on blood donation. Some studies focus on organisational level factors (Ferguson, 1996; Healy, 2006), while others address individual motivations (Gillespie and Hillyer, 2002; Ferguson et al., 2007). Two additional perspectives have been adopted, one focusing on strategies to recruit new donors while the other is mainly concerned with strategies to retain current donors. It has been argued that organisational factors, such as inconvenient location and hours as well as time required for donation tend to affect return or regular donors more strongly than they do first-time donors (Hupfer et al., 2005).

Contexts also differ across countries, where in many low- and middle-income countries blood donations per capita are substantially lower than in advanced economies. Additionally, in the former countries, blood supply is mostly collected through directed donations from relatives and friends to individuals needing transfusions or to replace blood used in emergencies (Iajya et al., 2013). In this paper we are interested in individual motivations

to become a donor in a context of undirected voluntary donations. Evidence suggests that a donor retention policy is more effective than a recruitment policy for new donors, still, recruitment programs are critical to replace ineligible repeat donors or deferred donors, as well as to guarantee stock (Martín-Santana and Beerli-Palacio, 2013) and previous works have pointed the need to focus on factors that motivate people to move from the status of non-donor to the status of blood donor (Duboz and Cunéo, 2010).

In the literature, a range of positive and negative motivations have been put forward to explain the decision to donate (or not) blood, once or repeatedly. On the positive side, altruistic motivations (whether genuine or self-interested) have been at the centre of many discussions. Among deterrent factors, fears regarding the collection process seem to be the most important, including fear of needles and of adverse reactions. It might also occur free riding behaviours in the sense that some individuals who are medically able to decide not to donate because others already do it. Further factors such as age, gender, education, family and social influence, engagement with the community, feeling part of a group and the awareness of need have also been linked with the decision to donate blood (Gillespie and Hillyer, 2002; Hollingsworth and Wildman, 2004; Healy, 2006; Masser et al., 2008; Duboz and Cunéo, 2010; Abasolo and Tsuchiya, 2014).

Regarding Portugal, in 2016, there were 21.7 donors per 1000 inhabitants. In terms of the age distribution of donors, 37.16% were in the 45-65 band, 48.62% were between 25 and 44 years and only 13.5% were aged between 18 and 24 years (Instituto Português do Sangue e da Transplantação, 2016). Blood is collected by the Portuguese Institute of Blood and Transplant which has three regional centres (Lisbon, Coimbra, Porto) and there are also some hospitals with this service. Because collections at university sites are common, it is pertinent to carry out analyses in this context. Concerning the specific topic of blood donor motivations in the Portuguese context, we did not find any peer-reviewed publication in our bibliographic search. Hence we also aim to contribute to fill this gap in empirical literature.

3. Methods

The study design was cross-sectional. Data were collected in the city of Coimbra from mid-March 2015 to mid-May 2015 using a self-administered questionnaire that was distributed in university sites (including all faculties of the University of Coimbra plus the Nursing School) by one of the authors. The approximate time to complete the questionnaire was 7 to 10 minutes. Although it was self-administered, one of the co-authors was present and available to clarify any question if necessary. Coimbra was chosen due to convenience but also because it hosts one of the largest universities in Portugal (over 24,500 students), which allows blood collections within its facilities. All students who were willing to participate in the study were included.

Survey instrument

The questionnaire was informed by the literature and was composed of seven parts, the first one asking individuals whether they had donated blood at least once. If they answered

'No', they were further asked if the reason for not giving was age, low weight or a known health problem or medical condition. Only those individuals eligible to donate were included in the final sample. The second section contained questions about sociodemographic aspects (age, sex, place of birth, residence) as well as about the participation in last elections, volunteering activities and religion practice (only yes/no answer). Then the respondent was asked some information about his or her student status (institution, course, and first year of registration). The next section included questions about channels through which the respondent heard about collection campaigns, if any, and questions associated with the process of blood collection, namely the minimum requirements. The remainder of the questionnaire contained questions that according to the literature might have an impact on the decision to donate (the last three parts of the questionnaire collected the information shown below in Tables 1 and 2 and Figure 1).

Analysis

Descriptive analyses were carried out to evaluate the prevalence of donors and the distribution of perceptions and knowledge. The chi-square test was used to check whether differences between donors and non-donors are statistically significant or not. All questions with 'yes' or 'no' answers were codified as follows: '0' if the respondent answered 'no' or 'do not know'; '1' if the respondent answered 'yes'. Given the binary nature of the variable 'donation', multiple logistic regression analysis was used to identify factors associated with blood donation. The dependent variable corresponds to a dummy with the value one if the individual donated blood at least once. In a logistic regression we model the probability that Y takes the value 1 as a function of the covariates X_1, X_2, ..., X_p. Let us denote the conditional probability to observe Y=1 given the covariate values x_1, x_2, ..., x_p by $\pi(x_1, x_2, ..., x_p)$. The logistic regression model is then given by equation (1) (Agresti, 2013):

$$logit\ \pi(x_1,x_2,...,x_p) = \log\left[\frac{\pi(x)}{1-\pi(x)}\right] = \beta_0 + \beta_1\beta x_1 + \beta_2\beta x_2 + ... + \beta_p\beta x_p. \quad (1)$$

From (1) it follows that:

$$\pi = \frac{e^{(\beta_0+\beta_1\beta x_1+\beta_2\beta x_2+...+\beta_p\beta x_p)}}{1+e^{(\beta_0+\beta_1\beta x_1+\beta_2\beta x_2+...+\beta_p\beta x_p)}}. \quad (2)$$

If $\beta_i = 0$, then the probability is the same at all levels of x_i; if $\beta_i > 0$ then the probability increases as x_i increases; if $\beta_i < 0$, then the probability decreases as x_i increases.

The odds of an event given x is:

$$odds(x) = \frac{\pi(x)}{1-\pi(x)}; \quad (3)$$

and the odds ratio (*OR*) is:

$$OR = \frac{odds(x+1)}{odds(x)}. \quad (4)$$

If we exponentiate the β_s from equation (2) we obtain the odds ratios for the predictors (Agresti, 2013). Thus, e^{β} represents the change in the odds of the outcome (in our case, donation) by increasing x by one unit. If $\beta_i = 0$, the odds and probability are the same at all levels of x_i and $e^{\beta i} = 1$; if $\beta_i > 0$ the odds and probability increase as x_i increases and $e^{\beta i} > 1$; if $\beta_i < 0$, the odds and probability decrease as x_i increases and $e^{\beta i} < 1$.

Our results are reported as odds ratios; the ratio of the odds of an event (donation) occurring in one group compared to the odds of that event occurring in another group, where $x = 0$ represents the baseline group or reference category. For example, if $x = 0$ represents female and OR=1.5, then men are 1.5 times more likely to donate blood than women; or, the risk of occurring donation increases by 50% for males.

The explanatory variables considered in this study are those that, according to the literature (Gillespie and Hillyer, 2002; Hollingsworth and Wildman, 2004; Healy, 2006; Masser et al., 20008; Duboz and Cunéo, 2010; Abasolo and Tsuchiya, 2014), are likely to affect donation. All data were coded and analysed with the SPSS software program (version 25).

4. **Results**

Sample characteristics

A total of 517 university students participated in the study but 26 were excluded from the final sample due to self-reported ineligibility for blood donation. Fifty-three per cent of the (491) respondents are female. The average age is 22 years (Min: 18; Max: 47; SD: 3.37). About half of respondents (50.3%) participated in the last general elections and 15.1% of respondents are or were engaged in volunteering activities. A similar minority (16.3%) practice a religion. Half respondents come from the Faculty of Economics and Faculty of Sciences and Technology. The other half come from the remainder institutions of the University of Coimbra and Nursing School (about 17.4% of respondents attend an institution associated with health related courses).

In total, 16.5% of respondents donated blood at least once (we identify this group as 'donors'). The prevalence of donation among female students is 18.5% while it is 14.3% among male students. Regarding reasons for not having donated blood (respondents could choose more than one alternative), 44.9% of the 410 non-donors mentioned "fear"; 51.2% also chose the alternative "unavailable"; and 52.9% selected the option "I never thought about it".

Knowledge about the process of blood collection

The higher percentages of correct answers were obtained for the eligibility criteria (94.5% of respondents know that that the minimum age is 18 years and 70.1% know that the minimum weight is 50 kilos). The lowest percentages were obtained for the minimum interval (two months) between collections (less than 15% of correct answers). A considerable percentage of respondents (65.8) know the quantity collected in each donation (between 450mL and 500mL). About 40% answered incorrectly the questions regarding reutilisation of materials and the existence of sufficient stocks of blood products in Portugal. We tested the association between correct knowledge (we assumed correct knowledge if the respondent answered correctly to five or more, out of seven, questions about the process of blood collection) and donation and found a significant positive association (Spearman's rho=0.129; p-value<0.01).

In what concerns campaigns, 55.8% of respondents heard about collection campaigns in the last months prior to the administration of the survey. Most of them (45.1%) received information in their respective faculties; and 19.8% (7.3%) got information through leaflets (email).

Attitudes, motivations and barriers to donate blood

Table 1 shows some motivations regarding blood donation of donors and non-donors. As expected, willingness to give blood is higher in the former group than in the latter, except in question four. We obtained the lowest percentage of positive answers by donors in this case and figures are basically the same in both groups (this is the only case where there is not a statistically significant difference between the two groups). Percentages of positive answers vary little across topics in the case of non-donors and it is noticeable that, even in a hypothetical emergent situation, only half of them said they would be willing to give blood. Knowing the beneficiary of the donation (including friends and family) does not seem to matter to non-donors.

Table 1: Motivations for blood donation

	Mean (standard error in parentheses)		χ^2 test
	Donors (n=81)	Non-donors (n=410)	
1. If you knew the beneficiary of your donation, would you give blood?	0.988 (0.01235)	0.546 (0.02462)	55.86 $p < 0.001$
2. In the case of an urgent appeal for blood donation (natural disaster, war) would you give blood?	0.975 (0.01735)	0.517 (0.02471)	58.83 $p < 0.001$
3. Would you give blood to a friend or family member in need?	0.963 (0.02111)	0.534 (0.02467)	52.04 $p < 0.001$
4. Would you give blood in exchange for monetary compensation?	0.519 (0.05586)	0.527 (0.02469)	0.019 $p = 0.904$
5. Would you give blood in exchange for a non-monetary compensation?	0.642 (0.05360)	0.481 (0.02470)	7.06 $p = 0.010$
6. Campaigns to encourage blood donation have any effect on your attitude towards donation?	0.667 (0.05270)	0.512 (0.02472)	6.49 $p = 0.014$

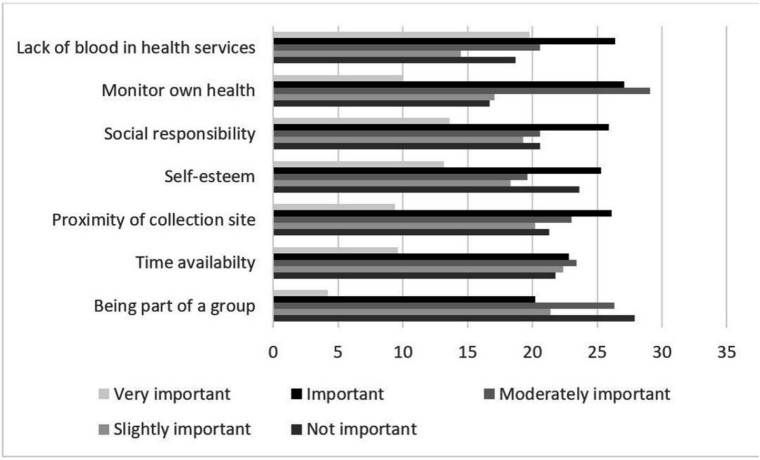
In Table 2 we present the results concerning the respondents' opinions about some potential barriers to donation and facilitating factors. Overall, these are as expected in terms of the relative position of donors and non-donors, with the former group revealing higher percentages of "yes" answers in the case of facilitating factors and lower percentages in the case of obstacles. In the majority of cases, differences between the groups are around 26-27 percentage points with two main exceptions. Results are similar regarding the recognition of "lack of time" as a barrier to donate blood and they are quite different in question nine, with fewer than five per cent of non-donors considering that there is enough information. Results also differ markedly in question eight: 43.7% of non-donors think that there are donors enough to make their own contribution dispensable compared to about 10% of donors.

Table 2: Attitudes of donors and non-donors

	Mean (standard error in parentheses)		χ^2 test
	Donors (n=81)	Non-donors (n=410)	
1. Do you fear needles?	0.198 (0.04451)	0.544 (0.02463)	32.48 $p < 0.001$
2. Do you feel uncomfortable with the sight of blood?	0.198 (0.04451)	0.476 (0.02469)	21.34 $p < 0.001$
3. Are you afraid of fainting during blood collection?	0.272 (0.04973)	0.488 (0.02472)	12.76 $p < 0.001$
4. Are you afraid of contracting a disease during blood collection?	0.173 (0.04227)	0.449 (0.02459)	21.40 $p < 0.001$
5. Do you feel trust regarding the equipment used?	0.864 (0.03830)	0.602 (0.02420)	20.26 $p < 0.001$
6. Is lack of time an obstacle for you to give blood?	0.469 (0.5580)	0.488 (0.2472)	0.094 $p = 0.808$
7. Living/working close to the collection site is an incentive for you to donate blood?	0.741 (0.04900)	0.551 (0.02459)	9.99 $p = 0.002$
8. Do you think there are enough donors, making your contribution unnecessary?	0.099 (0.03336)	0.437 (0.0452)	32.74 $p < 0.001$
9. Do you think the available information regarding blood donation is sufficient?	0.469 (0.05580)	0.046 (0.01039)	117.83 $p < 0.001$

Figure 1 offers a perspective on how important are various factors to motivate respondents (donors and non-donors) to donate blood. Factors are ordered according to their mean (weighted) level of importance. On average, what seems to matter most is lack of blood in health services, followed by control of own health. Social responsibility comes third. At the bottom, the least important factor is the sense of belonging to a group. In between, appear obstacles related with time and location.

Figure 1: Level of importance of some potential motivations
(% of respondents, including donors and non-donors)



Factors associated with donation

The logistic regression analyses (Table 3) reveal that donation is more likely among students who are engaged with the community, through volunteering activities and political participation. Altruistic feelings (both genuine and more self-interested) as well as practicing a religion also positively affect donation. The odds of donation are 76% lower among students who expressed fear of needles. Despite the difference between donors and non-donors in question eight of Table 2, introducing the variable *Enough_donors* in model 2 led to a marginal improvement in the Hosmer-Lemeshow goodness of fit test but caused only slight changes in the magnitude of the effects, not altering the group of variables with statistical significance. Still, de odds ratio of *Enough_donors* is lower than one, as expected. In fact, all odds ratios in Table 3 are in accordance with the literature.

Table 3: Logistic regression analyses. Factors associated with blood donation, excluding (including) free riding motivation, model 1 (model 2)

	Logistic regression analysis – model 1		Logistic regression analysis – model 2	
	OR	95% CI	OR	95% CI
Male	1.49	0.71-3.15	1.52	0.72-3.22
Volunteering_activity	8.81***	3.83-20.29	8.23***	3.56-19.01
Practice_religion	2.82**	1.32-6.04	2.66*	1.24-5.72
Voted_last_elections	5.14***	2.18-12.12	5.06***	2.13-12.03
Heard_about_campaign	2.05	0.93-4.51	1.99	0.91-4.37
Health_related_course[a]	1.06	0.43-2.65	1.03	0.41-2.58
Fear_of_needles	0.24**	0.11-0.54	0.26**	0.11-0.58
Fear_getting_disease	0.71	0.32-1.62	0.79	0.34-1.84
Lack_time_obstacle[b]	0.99	0.49-1.98	1.04	0.52-2.09
Low_distance_motivation[c]	1.63	0.76-3.52	1.49	0.68-3.28
Social_responsibility[d]	7.49***	3.24-17.31	6.99***	2.99-16.36
Self-esteem[e]	2.97**	1.42-6.19	2.99**	1.42-6.28
Enough_donors[f]	--	--	0.59	0.22-1.63

Notes: a: = 1 if attend institution associated with health related courses (reference category – remainder institutions); b: = 1 if answered 'yes' in question 6 of Table 2; c: =1 if answered 'yes' in question 7 of Table 2; d: =1 if considered the motivation social responsibility important/very important; e: =1 if considered the motivation self-esteem important/very important; f: = 1 if answered 'yes' in question 8 of Table 2
*p < 0.05; **p < 0.01; ***p < 0.001
Model 1: Nagelkerke R^2 = 0.612; Hosmer–Lemeshow test: p = 0.951.
Model 2: Nagelkerke R^2 = 0.614; Hosmer–Lemeshow test: p = 0.978.

5. **Discussion**

From a policy perspective it is both relevant to target those who are more likely to donate (particularly to achieve short run goals) and to design strategies for whom donations are low (Hollingsworth and Wildman, 2004). Based on our results, recruitment is more likely to be successful among students involved in volunteering activities, thus, social institutions (and religious too) might be involved in recruitment. In the long run, students should be encouraged to engage in such activities. It has been argued that there might be a substitution effect between volunteering and donation (both can be regarded as altruistic acts) (Steele et al., 2008) but our results do not support this hypothesis. In the same line, political participation should be encouraged and, from a short run perspective, mobile blood collection should be considered when there are elections.

Another strong result concerns the impact of regarding donation as a social responsibility. This might be viewed as a form of genuine altruism in the sense that it has no obvious benefit for the respondent (Gillespie and Hillyer, 2002). Self-esteem, on the other hand, might be regarded as a form of impure altruism in the sense that individuals donate partly because of a utility gain from donating or the so-called 'warm-glow' of giving (Andreoni, 1989; Wildman and Hollingsworth, 2009; Ferguson, 2015). It has been suggested that altruistic behaviour is more pronounced in older people, maybe because the desire of acting unselfish develops with age and life experience (Steele *et al.*, 2008). But, according to our results, both forms of altruistic feelings, particularly the pure form of altruism, play an important role even among young adults. The question is that this variable might be less amenable to policy intervention than others. Altruistic feelings tend to be set early in childhood and there is little evidence that interventions such as campaigns are able to modify these personality characteristics (Steele et al., 2008). Studies specifically addressing altruistic behaviour of young adults, namely university students, should be further analysed and developed in order to identify individuals with such characteristics, reinforcing recruitment among them.

As in other studies (Armitage and Conner, 2001; Gillespie and Hillyer, 2002; Abasolo and Tsuchiya, 2014), including some using student samples (Karim et al., 2012; Iajya et al., 2013), ours results suggest that fear of needles (which in turn is positively associated with other fears) importantly affects donation. It seems crucial to work with children, in primary care for example, to prevent this fear from persisting in adolescence and later in life. Or, repeat donors could explain their experiences as donors to help reduce fears and campaigns should definitely avoid the use of images such as blood units or needles (Martín-Santana and Beerli-Palacio, 2013).

Results might actually underestimate the prevalence of fear (individuals might not want to admit it) (Abasolo and Tsuchiya, 2014). On the other hand, fears might serve mainly as rationalisation to avoid giving blood (Gillespie and Hillyer, 2002). Results in Table 3 further show that donation is less likely among students who expressed fear of getting a disease during the process of collection though this variable is not statistically significant. This might be because, overall, respondents put trust in the entities responsible for blood collection. More research on this issue might help to interpret the results and to disentangle the different motivations involved.

Information is a key element in order to reduce fears and to raise awareness of need. Other studies found relevant shortcomings regarding knowledge among young people (Lemmens et al., 2005; Bossolan et al., 2011; Zito et al., 2012). In our study we too obtained a positive and significant association between donation and correct knowledge. Although it is not possible to draw conclusions on the causal effects, in any case it suggests poorer information among non-donors. Non-donors in our sample feel themselves this lack of information.

Time constraints have been identified in the literature as relevant obstacles to donation. It has further been said that issues of time and donor convenience may be more relevant barriers now than in previous decades (Gillespie and Hillyer, 2002) and that more leisure time and fewer obligations to family and children could explain differences between age groups (Steele et al., 2008). In our study, time and convenience (location) did not emerge as distinctive features between donors and non-donors and these factors were not attributed high relevance. Our results may reflect the fact that students still have a considerable

amount of leisure time and convenience is somehow ensured with collections at university sites. In this sense, they should continue and our results also suggest that the area of studies is irrelevant for donation (the idea that medical students could be more sensible to donation was not confirmed). Our findings diverge from previous works (cf. Martín-Santana and Beerli-Palacio, 2013), where contrarily to us, the authors concluded that convenience and location play a more important role than altruism in the decision of donating blood, especially among younger donors.

In our study, gender is not significantly associated with donation as well, meaning that recruitment does not need to target specifically male or female students. In previous decades donors were mainly men (Gillespie and Hillyer, 2002) but this situation has evolved over time. In one study (Hollingsworth and Wildman, 2004), for example, it was found that young men were not as likely to donate as young women. Though, another study found that women are more likely to free ride (Abasolo and Tsuchiya, 2014). In our sample, the prevalence of donation is actually higher among female students (consistent with Hollingsworth and Wildman, 2004) but once other determinants are considered (in the regression analyses) the situation changes with the odds ratios for male emerging as greater than one (nonetheless it is not statistically significant).

Under a voluntary blood donation system, donating blood for transfusion to strangers is a matter of collective giving that can be looked at as a public good, thus, incentives to free ride might arise (Abasolo and Tsuchiya, 2014). We obtained a large difference between donors and non-donors in terms of their views in respect to the existence of enough donors - a considerably greater percentage of non-donors think their own contribution is dispensable. This can be interpreted as a free riding attitude. On the other hand, it might also happen that students do not yet regard donation as their responsibility. Some authors (Lemmens et al., 2005) found that students who had never considered blood donation were more likely to associate blood donation with people other than students. Still, despite the differences between donors and non-donors in the responses to question eight of Table 2, the variable Enough_donors is not statistically significant in the logistic regression, meaning that, once combined with other factors, free riding does not seem to affect donation.

The issue of financial incentives for donation has generated a lot of discussion in the literature (Gillespie and Hillyer, 2002; Van der Poel et al., 2002; Alfouzan, 2014) and previous results are mixed. Some claim that these incentives are potentially effective (Ferguson, 2015) while others conclude that they are not (Jones et al., 2003). In our study, we did not obtain a difference between donors and non-donors regarding their willingness to donate in exchange for monetary compensation and this question obtained the lowest adherence from donors. It is not possible to draw solid conclusions based on these results but it seems that monetary incentives are little likely to motivate donation. It has been said that young donors show more interest in incentives (which is understandable given their traditionally low income) but our results might be influenced by the way the question was framed (monetary incentives). The evidence suggests that among young donors the most motivating incentives are rewards such as free tickets, gifts, discounts and raffles (Martín-Santana and Beerli-Palacio, 2013). Additionally, it must be noted that currently, in Portugal, blood donation is anonymous, voluntary and non-remunerated. Therefore, this discussion matters from a dynamic, future-oriented, perspective.

We think that interesting results were obtained in the current study but some caution is required before the findings can be generalised to the student population. First, compared to administrative data, interview surveys are vulnerable to biases introduced by recall or the presence of an interviewer but, on the other hand, only with survey it is possible to explore reasons behind choices (Abasolo and Tsuchiya, 2014). Second, when questioned about donation, respondents maybe unaware, unable or unwilling to reveal their underlying motivations (Gillespie and Hillyer, 2002). Thirdly, the student population might differ across contexts. In a study using Canadian students (Hupfer *et al.*, 2005), the authors conclude that family and social influences are relevant factors impacting on donations and beliefs about giving blood. In Portugal, differences can also emerge because in Coimbra blood collections at university sites are carried out by the University Hospital. In other cities, without a close connection between university and the collector (Portuguese Institute of Blood and Transplant), propensity to donate might be lower.

6. **Conclusions**

The need to draw attention on donor recruitment strategies has been acknowledged. In developed countries, donations coming from young individuals are the fewer, therefore, it is relevant to develop research focusing on their motivations. In this study we address the specific context of university students.

Based on our results, not only volunteering activities should be promoted among students but it also seems promising to use the entities involved in such activities as donor recruiters.

In the literature, altruistic feelings tend to be associated with older individuals, with a longer life experience, nonetheless, our results suggest that altruistic feelings play a relevant role even among students. It is therefore important to develop research to identify such feelings and reinforce recruitment among students with such sentiments. Previous evidence shows that this variable might be less amenable to policy intervention, meaning that rather than emphasising altruism, donor media campaigns might be more successful if they focused on reducing fears, which emerged in our study as a crucial deterring factor. Primary care services might also be used to tackle the fear of needles and of the sight of blood at early ages.

Lack of time has been identified in the literature as an important obstacle to donation, even more so in recent decades. Our results suggest that it is not yet a relevant barrier for students; this should be used to the advantage of the authorities, reinforcing recruitment among students.

In the future, purely random and representative samples of university students should be used as well as other groups as donations are low among young people in general. Finally, after a successful recruitment, it is very important to retain donors. Therefore, research on strategies to ensure that first time young donors will continue to donate on a regular basis should also complement the kind of approach reported in the current study.

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