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Abstract:

Although blood is essential in healthcare systems for medical and surgical use, it is still a scarce resource. Given that blood cannot be produced artificially, donors are the backbone of the system, which is why it is crucial for transfusion centers to understand the factors that determine their behavior. The goal of this study is to help decision-makers at transfusion understand what lines of research have been developed in the literature and which ones might be useful to define and assess actions related to the attributes of the donation system and donor behavior. To that end, this work aims to present an overview of the available literature on blood donor behavior from a social marketing perspective, which is of in the context of blood donation. Based on the results of this review, which was performed by using the text mining methodology, this study presents current lines of investigation, and proposes additional future lines.

Lines of scientific research in the study of blood donor behavior from a social marketing perspective

Although blood is essential in healthcare systems for medical and surgical use, it is still a scarce resource. Given that blood cannot be produced artificially, donors are the backbone of the system, which is why it is crucial for transfusion centers to understand the factors that determine their behavior. The goal of this study is to help decision-makers at transfusion understand what lines of research have been developed in the literature and which ones might be useful to define and assess actions related to the attributes of the donation system and donor behavior. To that end, this work aims to present an overview of the available literature on blood donor behavior from a social marketing perspective, which is of paramount importance in the context of blood donation. Based on the results of this review, which was performed by using the text mining methodology, this study presents current lines of investigation, and proposes additional future lines.

Keywords: social marketing; blood donation; blood donor behavior; content analysis; text mining

Introduction

Blood transfusion is a vital service for healthcare systems. It enables to satisfy a wide variety of clinical needs (surgery, trauma, cancers, etc.) which increase the life expectancy and quality of life of blood recipients (World Health Organization [WHO] & International Federation of Red Cross and Red Crescent Societies [IFRC], 2010). However, as blood cannot be manufactured, blood donors, and more particularly voluntary non-remunerated donors (Farrugia, Penrod, & Bult, 2010; van der Poel, Seifried, & Schaasberg, 2002; WHO & IFRC, 2010), are vital for the correct functioning of healthcare systems, as the availability of sufficient blood depends entirely on their willingness to donate (Devine et al., 2007). However, despite the blood transfusion centers' efforts to retain current donors, recruit new donors and recover inactive and temporarily deferred donors, donation indices are still stagnant or have even diminished (Gillespie & Hillyer, 2002; Godin, Conner, Sheeran,

Bélanger-Gravel, & Germain, 2007). This reality presents a contradiction given that, in general, people have a good attitude and are well predisposed towards blood donation (Huis in 't Veld, de Kort, & Merz, 2019). Therefore, we need to apply marketing principles to the blood donation context (Beerli-Palacio & Martín-Santana, 2015), in order to translate such favorable predisposition into real behavior.

Social marketing then becomes increasingly important in blood donation (Pereira et al., 2016). The term "social marketing" refers to the use of techniques derived from traditional marketing in social issues, and its main aim is to persuade the public to accept, modify or change certain ideas, attitudes or behaviors to improve their own well-being and that of society in general (Gordon, Russell-Bennett, & Lefebvre, 2016). In this particular case, and following Truong (2014), in order to change how current and potential blood donors behave, it is vital to study donation behavior, which is complex and influenced by multiple factors, such as barriers, motivations, attitudes, previous experiences, sociodemographic profiles and donation intention (Bednall, Bove, Cheetham, & Murray, 2013). Among these factors, donation barriers are prevalent because they are an important cause for low donation rates due to their inhibiting effect. For this reason, one of the main goals of social marketing applied to blood donation is eliminating such barriers and, at the same time, highlighting the factors that help people overcome them (Beerli-Palacio & Martín-Santana, 2015; Polonsky, Francis, & Renzaho, 2015). For instance, we can suggest the following actions: highlighting motivations, both intrinsic and extrinsic; applying a complete quality management system to ensure positive donation experiences; defining relational marketing programs to achieve donor loyalty and recover inactive and temporarily deferred donors; etc. By knowing how current and potential donors behave, transfusion centers will be able to design differentiated and more effective marketing strategies in order to maintain a constant blood supply, which is the ultimate goal (Carter, Wilson, Redpath, Hayes, & Mitchell, 2011).

Despite the usefulness of social marketing in blood donation, transfusion centers are still skeptical about adopting marketing principles and practices, because they do not appreciate the meaning and relevance of the marketing concepts (Donovan, 2011; Mitchell, Madill, & Chreim, 2015; Modi & Mishra, 2010). Specifically in health services, where the medical staff is prominent, the importance of social marketing is not recognized or sufficiently valued. Moreover, there is an erroneous and limited view of marketing as public relations or as a promotion tool (Dolnicar & Lazarevski, 2009). Therefore, the application of social marketing in transfusion centers is a challenge, given that health staff is reluctant to embrace marketing activities (Russell-Bennett, Wood, & Previte, 2013).

In addition, blood donation in general has been a relatively minor topic in social marketing (Truong, 2014), and it has also been approached mainly from a health and not a commercial perspective. For all these reasons, this study aims to contribute to the field of social marketing applied to blood donation by analyzing the content of the existing literature on donor behavior from this perspective in order to identify the main developed lines of research and to propose future lines of research that will help improve the management of transfusion centers.

Methodology

Content analysis using text mining

Text mining can be of great use to identify the underlying elements of social marketing in the literature on donor behavior (mainly featured in hematology journals, and to a lesser degree, in marketing journals). It consists in selecting, exploring, modifying, modeling and evaluating large amounts of text data with the aim of uncovering common patterns among them. In order to do so, text mining uses an algorithm to find “hidden” information in a set of texts, and then, applies natural language processing methods, statistical techniques and machine learning to

identify similarities and underlying associations between the documents through the most repeated words (He, Zha, & Li, 2013; Upshall, 2014).

Text mining methodology comprises three stages. The first one, the pre-processing of the text, consists in transforming a text into a structure of data that allows it to be read and processed automatically to extract key concepts and provide an initial idea of its content (He et al., 2013; Kumar & Ravi, 2016; Verma, Ranjan, & Mishra, 2015). The process is as follows: the document format is eliminated and the text is separated into tokens (individual words); apart from this, stopwords, or words which lack meaning on their own (e.g. prepositions, auxiliary verbs, etc.) are filtered out, together with blank spaces, punctuation marks and/or numbers (Guerreiro, Rita, & Trigueiros, 2016; Thorleuchter & Van den Poel, 2016). Terms which do not discriminate are also excluded (e.g. words related to scientific research such as "author", "study" or "hypothesis") (Guerreiro et al., 2016). Lastly, in order to guarantee that similar terms are not identified as different, stemming is used, which involves eliminating prefixes and suffixes and only leaving the root (Guerreiro et al., 2016; Thorleuchter & Van den Poel, 2016).

The second phase, processing and analyzing the text (applying text mining as such) enables the identification of patterns and trends based on the structures of the generated data (Verma et al., 2015). Once the texts have the appropriate format and have been filtered, similar terms are extracted (Guerreiro et al., 2016; Thorleuchter & Van den Poel, 2016) and their frequency is determined. Some authors recommend representing these frequencies in a term-document matrix to facilitate their processing (Guerreiro et al., 2016; Kumar & Ravi, 2016). However, when documents from different fields of knowledge are analyzed, the matrix may be dispersed. Thus, it is advisable to apply certain criteria to discriminate words (Guerreiro et al., 2016). Once this process is over text mining allows documents to be classified with clustering algorithms, using the shared terminology as the criteria. Hence,

categories or clusters are obtained when the most recurring terms are associated and are classified under a common topic (Kumar & Ravi, 2016; Thorleuchter & Van den Poel, 2016; Verma et al., 2015).

The last stage, the assessment of findings, is the phase where patterns, associations and trends are analyzed and interpreted in order to generate new knowledge on each of the identified topics.

Data collection

To achieve the aim of the present work, an overview was carried out. According to Grant and Booth (2009, p. 99), an overview can be defined as "a summary of the literature that attempts to survey the literature and describes its characteristics". Overviews may have different degrees of systematicity (i.e. they can be totally or partially replicated), and may act as a starting point for those researchers coming to a new research field for the first time. The first step in the present overview involved identifying the articles on which to apply text mining by searching among the main indexed journals on Web of Science or Scopus in the areas of marketing, hematology, public administration and psychology, in line with the scope of the study. This article selection approach has been followed in previous overviews (e.g. Agndal, Åge, & Eklinder-Frick, 2017; Mellahi & Harris, 2016). In total, 50 carefully selected, English-language journals were analyzed. The searched keywords were "(blood) donation", "(blood) donor"; "(blood) donor behavior and "(social) marketing". Once these terms were inserted into the search engines of both platforms a first restrictive search was conducted in order to find articles with one or several of the keywords included in the title. Then, the search was extended to articles in which the keywords matched or were similar to these terms. Lastly, those articles in which the content of the abstract was related to blood donor behavior were also selected. This process was repeated for each of the 50 selected journals, leading to 207 articles published in 27 journals (see Appendix 1), published between 1957 and 2017.

Text mining

According to the text mining methodology described above, the second step involved the pre-processing stage described above: all 207 documents were analyzed and similar terms were extracted. Then, a matrix was generated, which associated each document with term frequency. In total, 21,762 different terms were extracted, whose frequency in the document collection ranged from 1 to 23,266. These initial results seemed to suggest that most terms had low representativeness in the selected documents. In fact, 10,154 terms appeared only once in the 207 documents processed. Therefore, terms with a dispersion greater than 20% were eliminated; terms which appeared in few documents and with low frequency were excluded in order to reduce the size of the matrix without affecting the relationship between terms. Following this, frequencies were standardized to reduce the effect of the terms which appeared in all documents and to give importance to those words which, although less frequent, did discriminate. At the end of this process, 170 terms remained, which served as the basis for clustering in the step described below.

Lastly, clustering was applied in order to group the documents according to the shared terminology. Most studies that have applied the text mining methodology in literature reviews on marketing or any of its branches use topic modelling (Cho, Fu, & Wu, 2017; Correia Loureiro, Guerreiro, Eloy, Langaro, & Panchapakesan, 2019; Guerreiro et al., 2016; Moro, Pires, Rita, & Cortez, 2019). However, in this study we have applied fuzzy clustering, specifically the fuzzy c-means (FCM)[1] algorithm. This algorithm assumes that each element in a dataset can belong to two or more clusters in different magnitudes, unlike hard clustering (e.g. k-means), which groups elements in an exclusive, sometimes forceful way (Bora & Gupta, 2014). This decision is due to the complex, multifactorial nature of blood donor behavior, by which a single document can be included in different clusters. Therefore, in this work, the algorithm FCM assumed that each of the selected documents bore certain similarity

to each of the clusters in which the collection was divided using the membership function, which ranged from 0 to 1. Thus, the membership of a document to a cluster was greater, the closer this value was to 1. As an initial step, the optimal number of clusters was determined using the Fukuyama-Sugeno, Xie-Beni indexes, partition coefficient and partition entropy[2]. The optimal number of clusters according to these indexes varied between 3 and 4. However, given that some of these initial clusters had clearly differentiated topics, their content was analyzed in detail and a larger number of clusters were created; 6 clusters was the most satisfactory number in terms of content and proximity to the values initially suggested. Table 1 shows the 6 identified clusters and the 20 most frequent terms in each of them. Each cluster has been assigned a key title based on the topic the articles share; these are described in the following section.

Table 1. Identified clusters and their 20 most frequent terms

#1 Donation system (72 documents)		#2: Barriers and motivations (53 documents)	
1. Nonremunerated	11. Shortage	1. Culture	11. Potential
2. Voluntary	12. Hepatitis	2. Religion	12. Motivation
3. Women	13. Employment	3. Gift	13. Family
4. Student	14. Family	4. Voluntary	14. Altruism
5. Replacement	15. Country	5. Community	15. Incentive
6. Paid	16. Information	6. Nondonor	16. Recommend
7. Ethics	17. Knowledge	7. Marketing	17. Barrier
8. Transmission	18. Access	8. Leader	18. Lack
9. Professional	19. Incentive	9. Ethics	19. Active donor
10. Community	20. Trust	10. Profession	20. Student
#3: Safety (5 documents)		#4: Repeat behavior (28 documents)	
1. HIV	11. Deferral	1. Frequent donor	11. Frequency
2. Infectious disease	12. Bank	2. Age	12. Repeat
3. Virus	13. Understand	3. Retrovirus	13. Sex
4. Risk	14. Shortage	4. Return	14. Factor
5. Drug	15. Knowledge	5. First-time donor	15. Lapse
6. Exclude	16. Replacement	6. Ethnic	16. Donor status
7. Paid	17. Country	7. Pattern	17. Education
8. Hepatitis	18. Acknowledge	8. Male	18. Status
9. Education	19. Prevent	9. First time	19. Degree
10. Transmission	20. Prospective	10. Female	20. Encourage

#5: TPB-based predictive models (14 documents)		#6: Vasovagal reactions (35 documents)	
1. Norm	11. Attitude	1. Retention	11. Prior
2. Subjective norm	12. Plan	2. Reaction	12. Future
3. Theory of Planned Behavior	13. Moral	3. Donor experience	13. Recruitment
4. Intention prediction	14. Construct	4. Vasovagal	14. Psychological
5. Ajzen	15. Control	5. Experience	15. Intention
6. Perceived	16. Self-efficacy	6. Anxiety	16. Cope
7. Behavior	17. Correlation	7. Adverse	17. Plan
8. Intention	18. Psychological	8. Event	18. First-time donor
9. Predict	19. Anticipated	9. First-time	19. Pain
10. Predictor	20. Action	10. Stress	20. Predictor

Overview of research lines

To describe each one of the identified clusters, we used the documents with the highest membership values in each cluster, along with documents that, albeit with lower values, are very relevant for the topic because of their contents. Nevertheless, given that the algorithm used when forming the clusters was FCM, a single document can be representative to describe more than one cluster. Appendix 2 shows all 207 documents and their membership values, one value per cluster.

Cluster #1 (Donation system)

This cluster encompasses a total of 72 documents whose membership values range between 0.315 and 0.998, of which 69.5% present values higher than 0.5. This cluster was labelled "Donation system". The documents included in it (1) analyze the dichotomy between voluntary donation and remunerated donation through its pros and cons, (2) argue that voluntary donation is more appropriate than the other options, (3) suggest actions aimed at improving the voluntary system by enhancing donor experience, fostering donation since an early age and using donors as donation prescribers.

Given the altruistic nature of blood donation, it is assumed that voluntary donation is safer than paid donation and replacement donation. This view has been supported by

organizations such as WHO or the Council of Europe (Barker & Westphal, 1998; Hollingsworth & Wildman, 2004). Arguments in favor of voluntary donation are mainly two: (1) voluntary donors are considered a better alternative to prevent infectious diseases from being transmitted because infectious markers are usually less prevalent among such donors (Barker & Westphal, 1998; Maghsudlu, Nasizadeh, Abolghasemi, & Ahmadyar, 2009); and (2) no society should offer monetary compensation for an action that should be altruistic and humanitarian, otherwise it would contradict the values and motivations of the people who do it (Marantidou et al., 2007; Simon, 2003).

In spite of the above, some authors in this cluster support giving remuneration for donating. One of them is Simon (1998), who suggests as follows. Firstly, it is impossible that the demand for blood and blood products can be completely satisfied only with voluntary donations. It is precisely because of this impossibility that China has implemented a mutual aid payment policy[3]. This practice has been harshly criticized by experts because, although it promotes donation among the population, its ultimate goal is just obtaining a monetary reward, which goes against the philosophy of voluntary donation (Ou-Yang & Bei, 2016). Secondly, Simon (1998) states that, when a person donates a part of their body and this implies a risk, they should be compensated for assuming that risk. In a following paper, Simon (2003) explains that voluntary donation in the USA has been ineffective since the beginning due to the confluence of the following factors: the scarcity of certain blood groups, the seasonality of the offer and regional recruiting differences. For these reasons, the country has been faced with constant blood scarcity. Given that it is difficult to overcome these challenges, Simon (2003) suggests using remunerated donation. Moreover, the author suggests that (1) the belief that remunerated donors are less safe than voluntary donors is based in very ambiguous data; (2) there is no evidence that remunerated donors are less honest than voluntary donors when disclosing their health information; and (3) the higher

infectious disease markers among remunerated donors depend on the population's sociodemographic characteristics, not on the donation modality.

Even with arguments such as the above, many countries around the world have adopted a voluntary, non-remunerated donation system to guarantee the safety of blood received by means of transfusion (Maghsudlu et al., 2009; Yang, Shao, Zhang, Kong, & Xu, 2015). More precisely, according to the most recent data from 2015, 78/139 countries collect more than 90% of their blood supply from voluntary donors, including 56 countries with 100% voluntary donations (WHO, 2019). The evidence on the suitability of voluntary donation is considerable. An example can be found in the city of Shenzhen (China), which implemented voluntary donation before the Blood Donation Law was approved at the national level in 1998 (Yang et al., 2015). Twelve years after its complete implementation, the number of donors in Shenzhen was increased in 59.4%. Moreover, given that these donors were largely repeat and regular donors and that they donated the maximum volume of blood allowed, in this period Shenzhen became a completely self-sufficient city, satisfying its population's medical demand for blood (Yang et al., 2015). The benefits of this system were so great, that the local authorities extended the recruitment and retention programs for voluntary donors with regard to other blood products (e.g. platelets, bone marrow), in order to meet a wider range of medical needs (Kong et al., 2004).

The documents included in this cluster reveal that keeping a voluntary, non-remunerated donation system requires great effort. It also needs the collaboration between government organizations, transfusion centers and donor associations to raise awareness among the population on the importance of blood donation, to create a suitable environment for voluntary donation, to improve service quality, and to design and disseminate effective donor recruitment campaigns (Chassaigne, 1996; Yang et al., 2015). In this sense, informing and educating donors is essential. The more information a person has, the more aware they

will be about the importance of donating, the safer they will think that the act of donating is and, consequently, the more willing they will be to donate blood and carry on doing it in the long term (Batiha & Albashtawy, 2013; Pagliariccio, Guermandi, Marinozzi, & Piani, 2003). Moreover, making donors give blood regularly and repeatedly is fundamental to correctly sustain voluntary donation systems (Kheiri & Alibeigi, 2015; Maghsudlu et al., 2009).

Additionally, in a context where only a small minority of the population donates blood (Batiha & Albashtawy, 2013; Kheiri & Alibeigi, 2015) and where sociodemographic variations might cause shortages (Weidmann, Schneider, Litaker, Weck, & Klüter, 2012), it is necessary to identify which procedures might promote donation efficiently (Jason, Rose, Ferrari, & Barone, 1984). Blood transfusion centers, traditionally and usually, rely on donors' altruism and social responsibility for communication campaigns and calls for donation. However, the moderate results of these actions suggest that they should change the way blood donation is promoted among the population (Cacioppo & Gardner, 1993). It is only this way that the donation system can function properly.

Among the documents that make up this first cluster, we can find studies describing some of the following procedures based on results. Ferrari, Barone, Jason and Rose (1985) proved the usefulness of non-monetary incentives (e.g. participating in raffles, discount coupons) as cost-efficient mechanisms to stimulate donation. Guéguen (2013), additionally, successfully applied the "even a penny will help"[4] technique, typical of monetary donations, for the first time in the blood donation context, in order to activate the donors' values and therefore increase the number of donations. On the other hand, this cluster includes some studies that view ensuring positive donation experiences as a useful tool for encouraging donors to remain in the system. Daigneault and Blais (2004), based on the experience in Quebec, proposed using quality indicators to monitor and enhance the donation experience, e.g. by reducing the length of the process, customizing the service, etc. Pagliariccio and

Marinozzi (2012), who highlighted the negative impact of adverse physical reactions on donor retention, successfully designed and tested an action protocol based on a 3-step psychological approach (welcome, psychological interview with the doctor and accompanying the donor to the donation site) to assess the emotional dynamics associated with donation, with the aim of preventing these reactions, thus favoring donor retention. Ditto et al. (2013), in addition, emphasized the role of donors in the process and suggested transfusion centers give donors tools so that they can improve their own donation experience by themselves. For instance, they could be taught special techniques to prevent adverse physical reactions such as applied muscle tension (see Cluster #6 Vasovagal reactions). To sum up, applying procedures and actions such as those described above can help people view blood donation as a pleasant experience that is worth repeating over time (Batiha & Albashtawy, 2013).

Other documents in this cluster emphasize the importance of promoting voluntary donation since early ages and education stages to ensure the system's stability (Batiha & Albashtawy, 2013). For example, in the Guangdong province (China), people hold the Adult Oath ceremony every year. When teenagers finish high school, they make an oath to become responsible, honest and polite adults. A symbol of maturity is to give blood for the first time. This tradition, which actually is a part of an official recruitment program, is aimed at fostering donation from an early age, so that young people keep donating during their university years and become regular donors in the future (Ou-Yang & Bei, 2016). In fact, there is evidence that, the more times an individual donates blood in their first year as a donor, the likelier it is for them to continue doing so in the long term (Kheiri & Alibeigi, 2015).

Finally, a number of documents place an emphasis on the donors' role in promoting donation. Thus, in Guangdong too there are the so-called Blood Donor Volunteer Teams. These are experienced donor groups who carry out several actions to encourage people to

donate. For example, they recruit potential donors in mobile collection points, assist first-time donors, etc. (Kong et al., 2004; Ou-Yang & Bei, 2016; Yang et al., 2015).

Cluster #2 (Barriers and motivations)

The second cluster comprises a total of 54 documents whose membership values range between 0.280 and 0.653, of which 22.2% has values higher than 0.5. This cluster includes papers that highlight the importance of studying barriers and motivations as determining factors for blood donation, as well as the use of this information when designing social marketing strategies. In particular, some studies underline the importance of studying barriers in two groups where there are a large number of non-donors: ethnic minorities and young people. With regard to barriers, the documents in this cluster mainly identified and studied three elements: fear, lack of information and being unable to donate. Concerning motivations, in addition to disproving that altruism is the only motivation to donate, the documents included in this cluster analyzed the controversy on donation incentives as an alternative to encourage donation among people. They also identified other extrinsic motivations associated to blood donation.

Studies in this cluster agreed that the decision to donate is explained by a confluence of factors inhibiting or motivating donation, that is, barriers and motivations (Karacan, Cengiz Seval, Aktan, Ayli, & Palabiyikoglu, 2013; Ngoma et al., 2013). Understanding barriers and motivations helps centers improve social marketing strategies in order to change the population's behaviors (Beerli-Palacio & Martín-Santana, 2009; Mostafa, 2010). The impact of these factors on individuals is not homogeneous. Therefore, to recruit and retain blood donors, social marketing strategies should be differentiated according to the typology and the interactions between barriers and motivations (Evans & Ferguson, 2014; Guarnaccia, Giannone, Falgares, Caligaris, & Sales-Wuillemin, 2016; Iajya, Lacetera, Macis, & Slonim, 2013; Martín-Santana & Beerli-Palacio, 2008; Reid & Wood, 2008).

It should be noted that a few studies included in this cluster analyzed donation barriers in the context of ethnic minorities, who are usually underrepresented in donor pools from highly multicultural countries such as the USA (Shaz et al., 2009) or Australia (Renzaho & Polonsky, 2013). This focused research is based on the importance of achieving high representation of such collectives in donor pools. From a genetic point of view, their blood can be used to create blood products aimed at treating diseases that are prevalent in these groups and need several blood transfusions (e.g. sickle cell disease, thalassemia) (Grassineau et al., 2007; Polonsky, Renzaho, & Brijnath, 2011). For this reason, it is fundamental for centers to develop specific programs aimed at recruiting and retaining individuals from the above mentioned collectives as blood donors (Renzaho & Polonsky, 2013).

Besides ethnic minorities, another underrepresented collective in donor pools who have been studied in documents from this cluster is young people (Leigh, Bist, & Alexe, 2007; Ngoma et al., 2013). Having young donors is essential because they can potentially become long-term donors (Hupfer, 2006) and in general they are well predisposed to donating (Reid & Wood, 2008).

A large number of documents in this cluster are focused on donation barriers, associated to fear of donation, perceived risks in the act of donating and other factors inhibiting donation (e.g. lack of time, lack of information). These factors are one of the main reasons of non-donation (Beerli-Palacio & Martín-Santana, 2009; Martín-Santana & Beerli-Palacio, 2008; Mostafa, 2010; Polonsky et al., 2011; Reid & Wood, 2008).

Analyzing the documents included in this cluster allows us to conclude that fear (e.g. of needles, of sight of blood, of fainting) is one of the most important donation barriers (Charbonneau & Tran, 2013; Leigh et al., 2007; Martín-Santana & Beerli-Palacio, 2008; Ngoma et al., 2013). This is especially relevant in non-donors (Shaz et al., 2009), because the lack of familiarity with the process and the system instills uncertainty and insecurity.

Eliminating this barrier is not easy given that it is markedly intrinsic. Therefore, transfusion centers must focus on designing communication campaigns intended to thoroughly explain what the donation process consists of, how harmless it is for the donor and how important the blood collection staff's skills are to care for donors and act under any circumstance.

Another barrier that has been extensively studied in the documents analyzed is the lack of information (e.g. about donation requirements, places where people can donate, uses of donated blood). This barrier is closely related to fear because a lack of information can cause irrational fears and concerns (Boenigk, Mews, & de Kort, 2015), especially among individuals who have never interacted with the system. For instance, non-donors usually say that they are worried about potentially contracting diseases when giving blood or receiving a blood transfusion, even though donating blood is a completely safe process (Shaz et al., 2009; Zaller et al., 2005). Logically, this prevents them from giving blood. For this reason, in a high-risk, compromising action such as blood donation, information is the basis for people to make the decision. As such, the more information people have, the more willing they will be to donate (Beerli-Palacio & Martín-Santana, 2009; Renzaho & Polonsky, 2013). Information is not only limited to dispelling fears and misconceptions, but it also reinforces the notion that giving blood brings a number of prosocial benefits (Beerli-Palacio & Martín-Santana, 2009).

Being unable to donate is another barrier detected which is widely present in the cluster. This barrier does not only refer to not being in an optimal health condition to donate safely (e.g. low body weight, low hemoglobin), but also to being in certain circumstances that might endanger recipients' health (e.g. having travelled to countries with a high risk of malaria or other transfusion-transmitted diseases) (Charbonneau & Tran, 2013; Shaz et al., 2009; Zaller et al., 2005). Although there is a number of donor screening criteria that determine when an individual is medically eligible for donation or not (see Cluster #3 Safety), health conditions are important as donation barriers because people might hold

misconceptions about whether they are eligible for donation or not. This might cause them to mistakenly exclude themselves, which unnecessarily reduces the number of available donors (Zaller et al., 2005). Again, it becomes evident how essential the information disseminated by transfusion centers is.

In particular with regard ethnic minorities, aside from the above, the decision to donate is influenced by other specific barriers such as (1) lack of trust in the host country's healthcare system due to the impact of previous donation experiences in their countries of origin; (2) cultural and religious factors; (3) perceived discrimination or exclusion in the host country; and (4) linguistic barriers (Boenigk et al., 2015; Polonsky et al., 2011; Renzaho & Polonsky, 2013).

Concerning motivations, these have been extensively studies, even more than barriers, given their importance when adopting social behaviors (Martín-Santana & Beerli-Palacio, 2008). In social marketing, it is fundamental to study motivations because one of the field's aims is to revalue them in order to counter the inhibiting effect of barriers (Mostafa, 2010).

Several papers have identified altruism as one of the motivations for donation (Charbonneau, Cloutier, & Carrier, 2015; Gonçalez et al., 2013; Karacan et al., 2013; Mostafa, 2010). Now, altruism is actually a complex, multidimensional concept that goes beyond the pure, selfless desire to help others. It also implies obtaining an emotional reward from doing good deeds, a desire to fulfill a social obligation, etc. (Evans & Ferguson, 2014; Ferguson, 2015; Karacan et al., 2013). This premise, by which giving blood is an action both the donor and the recipient benefit from, has been called "the hypothesis of benevolence" (Farrugia et al., 2010). Consequently, it is a mistake to suggest that blood donation is only motivated by altruism, even when giving blood is viewed as one of the most purely altruistic behaviors that exist (Guiddi, Alfieri, Marta, & Saturni, 2015). This statement has been supported by some of the documents included in this cluster. They indicated that, although

donors are usually more influenced by intrinsic motivations, for non-donors or less experienced donors there are other sources of extrinsic motivation, such as incentives, an urgent call for donations or peer pressure, among others[5] (Beerli-Palacio & Martín-Santana, 2009; C. R. France, Kowalsky, et al., 2014; Gonçalez et al., 2013; Guiddi et al., 2015). Additionally, motivations for donation are not constant. They change over time, just as the donor's career does (Gonçalez et al., 2013; Guiddi et al., 2015). Therefore, taking into account that behavior based on intrinsic motivations is more likely to last in the long term (C. R. France, Kowalsky, et al., 2014), transfusion centers should identify what are their donors' motivations and foster a transition from extrinsic to intrinsic motivations using appropriate social marketing actions.

Donation incentives, an extrinsic form of donation motivation, are not exempt from the controversy. Although in most countries it is tacitly accepted that donors should be compensated in some way (Farrugia et al., 2010), some authors criticize incentives because they might go against the altruistic nature of blood donation, causing a crowding-out effect (Chmielewski, Bove, Lei, Neville, & Nagpal, 2012). Additionally, offering donation incentives might attract individuals at risk who are motivated just by the chance to receive such incentive, increasing the likelihood of unsafe donations (Farrugia et al., 2010; Iajya et al., 2013). The controversy results from the fact that the line that separates "paid incentives" and "unpaid incentives" is very thin. For example, the Council of Europe views "the time off work reasonably required for donation and travel" as a paid incentive, whereas in the USA the Food and Drug Administration considers it an unpaid incentive (Farrugia et al., 2010). However, in the European context, "the reimbursement of direct costs and direct travel expenses" is actually viewed as an incentive that is compatible with voluntary, non-remunerated donation (European Parliament and Council of the European Union, 2003). However, there is variance in how European Member states implement this normative.

Along this line, some authors in this cluster state that medical incentives (e.g. test for infectious diseases, health check) and incentives that make donating easier (e.g. mobile drives near home or workplace) can be useful tools to motivate donation (Leigh et al., 2007; Martín-Santana & Beerli-Palacio, 2008) because they are low-cost mechanisms that do not cause a crowding-out effect (Chmielewski et al., 2012).

Other extrinsic motivations studied by the authors in this cluster are (1) the benefits of donation for the donor's health, e.g. blood oxygenation, increase in energy levels (Charbonneau & Tran, 2013); (2) helping a friend or a relative who needs blood (Karacan et al., 2013; Zaller et al., 2005); and (3) having blood reserves for the future in case they are necessary, both for oneself and relatives or friends (Charbonneau et al., 2015; Leigh et al., 2007). Finally, some studies emphasize that, given that voluntary donation is associated to "doing good," offering a credible symbol of pro-sociality to people who give blood (e.g. a diploma, a certificate) can increase the number of donations (Chmielewski et al., 2012; Iajya et al., 2013). Having said that, getting formal recognition is not usually a particularly relevant motivation for donation (Evans & Ferguson, 2014; Leigh et al., 2007).

Cluster #3 (Safety)

The third cluster, made up of 5 research papers whose membership values were all higher than 0.990, comprises two lines of research: (1) establishing and applying donor screening criteria, and (2) the importance of making people aware of such criteria in order to disseminate information and raise awareness. Both lines contribute to reaching the main goal of voluntary blood donation systems, i.e. to guarantee the safety of donated blood. To that end, transfusion centers are encouraged to prevent donations by individuals who are at risk of suffering transfusion transmitted infectious diseases such as HIV/AIDS, hepatitis, etc. These individuals pose a risk for the system because (1), if they became sick recently and were still in the window period[6] of the disease, clinical analyses might not detect the disease (van der

Poel et al., 2002); or (2) they could use the blood donation to get their analysis results and find out whether they suffered from any contagious disease (Gonçalez et al., 2010; Shi, Wang, Stevens, Ness, & Shan, 2014).

The first line deals with the establishment and application of donor selection criteria (James, Hewitt, & Barbara, 1999). Apart from the minimum requirements to guarantee donor safety during the donation procedure (e.g. weight, hemoglobin, blood pressure), these criteria include certain risk factors that stop donation for recipient safety reasons. These factors refer to infectious medical conditions (e.g. VIH/AIDS, hepatitis, syphilis), drug consumption, unsafe sexual relationships, among others (James et al., 1999; Miranda et al., 2014; Shi et al., 2014).

These criteria, which should be periodically revised to take into account new risk behaviors that might appear in society (James et al., 1999), are found in the pre-donation health questionnaires, and their main aim is to detect donors who are potentially at risk beforehand, and to defer or exclude these donors accordingly (Miranda et al., 2014). Thus, not only does it prevent the system from being at risk, but transfusion centers also avoid the extra cost associated of analyzing and processing blood which is not suitable for transfusion (Shi et al., 2014; van der Poel et al., 2002). To achieve this goal, it is important for transfusion centers to design such questionnaires so that any individual, regardless of their background, can understand and fill them in (James et al., 1999; Miranda et al., 2014).

The second line of research addressed by this cluster is the design of effective actions that inform about the mentioned selection criteria and raise awareness about their significance. Transfusion centers should provide clear and unequivocal information on the selection criteria and on their purpose, so that individuals can exclude or defer themselves (James et al., 1999; WHO, 2012). To that end, they can use both communication campaigns and their promoters as spokespeople, allowing for more direct, customized communication

with potential donors if necessary (Gonçalez et al., 2010). It is also important to provide effective information on the existence of the aforementioned window period to make the population aware of the dangers of risk behavior for the healthcare system (Gonçalez et al., 2010; Miranda et al., 2014). The documents in this cluster stress that the success of these actions depends on whether the healthcare staff in charge of the extraction can convey the importance of answering the questionnaire truthfully and on whether they can transmit the level of trust and confidentiality for the donor to feel they can express having been involved in risk behavior without feeling judged (James et al., 1999; Miranda et al., 2014; Shi et al., 2014).

Cluster #4 (Repeat behavior)

The fourth cluster is made up of 28 documents whose membership values range between 0.267 and 0.882, of which 57.1% has values higher than 0.5. Documents in this cluster address the sociodemographic and experiential factors associated to repeat donation behavior, demographic changes that have a negative impact on the maintenance of the donation system and the need for transfusion centers to design and implement differential strategies aimed at retaining both repeat and first-time donors.

Among the most important documents in this cluster, we can find studies carried out in the context of the Retrovirus Epidemiology Donor Study (REDS). REDS is a multidimensional multicenter program that, in addition to blood donation safety studies, has done research on repeat behavior and the relationships between such behavior and donors' sociodemographic characteristics and experiences (Guo et al., 2012, 2013; Murphy et al., 2009; Schreiber et al., 2006, 2005).

As for sociodemographic characteristics, in most studies men show higher repeat rates (Gemelli, Hayman, & Waller, 2017; Germain et al., 2007; Lattimore, Wickenden, & Brailsford, 2015; Murphy et al., 2009; Volken, Buser, Holbro, Bart, & Infanti, 2015).

However, some studies identified that this behavior is more prevalent among women (Guo et al., 2013), whereas others did not find significant differences in terms of sex (Ownby, Kong, Watanabe, Tu, & Nass, 1999; Schreiber et al., 2005). Gemelli et al. (2017) argued that the greater donation frequency among men is assumedly caused by the fact that women apply exclusive selection criteria (e.g. pregnancy, lactation). Additionally, women also are more biologically predisposed to not meeting the minimum weight and hemoglobin requirements to donate safely. These circumstances make it more difficult for women to give blood the maximum number of times permitted per year, preventing them from developing repeat behavior. Another characteristic analyzed is age, with stronger repeat behavior observed in older people (Gemelli et al., 2017; Germain et al., 2007; Guo et al., 2013; Lattimore et al., 2015; Murphy et al., 2009; Ownby et al., 1999; Schreiber et al., 2005; Volken et al., 2015). Some authors suggest that lower donation repetition among young people is because they usually tend to not meet the selection criteria owing to their lifestyles (e.g. piercings/tattoos, risk behavior such as taking alcohol or drugs) or to change their place of residence, which makes it more difficult to repeat donation (Lattimore et al., 2015; Misje, Bosnes, & Heier, 2008). Finally, documents also observed that donors with higher level of studies are more frequently repeat donors (Murphy et al., 2009; Ownby et al., 1999; Schreiber et al., 2005). However, the results found by Guo et al., (2013) show the opposite, with donors who have lower levels of studies showing greater return behavior. However, these contradictory results can be due to the context of the study: China. In this country, as pointed out in Cluster #1 (Donation system), the policy of mutual aid payment is applied, which could attract people with lower levels of studies and income. Apart from sex, age and level of studies, other papers have identified different factors encouraging repetition, e.g. not belonging to a migrant or ethnic minority (Murphy et al., 2009; Ownby et al., 1999), living in a rural or non-

metropolitan urban area (Lattimore et al., 2015; Volken et al., 2015) or having Rh-negative (Gemelli et al., 2017; Ownby et al., 1999; Volken et al., 2015).

As for the impact of previous experiences on blood donation, documents included in this cluster identified the following factors with a positive association with repetition: (1) the number of previous donations (Gemelli et al., 2017; Guo et al., 2013); (2) having previous experience with blood transfusion (Ownby et al., 1999); (3) having previous donation experiences that were positive and satisfactory (Germain et al., 2007; Nguyen, DeVita, Hirschler, & Murphy, 2008; Schreiber et al., 2006), including the absence of adverse physical reactions (Gemelli et al., 2017); (4) not having had deferrals before (Gemelli et al., 2017; Germain et al., 2007); and (5) having donated at mobile collection sites (Guo et al., 2013).

From a global point of view, other documents analyzed how sociodemographic changes experienced by societies impact blood supplies (Murphy et al., 2009; Schreiber et al., 2006; Volken et al., 2015). Among them, we can emphasize an aging population (Lattimore et al., 2015; Misje et al., 2008; Volken et al., 2015; S. Yuan, Hoffman, Lu, Goldfinger, & Ziman, 2011) and an increase of migrants and ethnic minorities (Lattimore et al., 2015; Murphy et al., 2009; Shaz, James, Demmons, Schreiber, & Hillyer, 2010; S. Yuan et al., 2011). These documents revealed the need to carry out longitudinal studies (Lattimore et al., 2015; Murphy et al., 2009) and to use social marketing as a tool to achieve return behavior (Gemelli et al., 2017; Volken et al., 2015; Yu, Chung, Lin, Chan, & Lee, 2007; S. Yuan, Chang, Uyeno, Almquist, & Wang, 2016). Social marketing strategies should not only retain repeat donors who are already a part of the system, but also first-time donors.

As anticipated in Cluster #1 (Donation system), and as pointed out in documents in this cluster, the interest for repeat donors results from the fact that they show fewer infectious markers, experience fewer adverse reactions and make a substantially greater contribution in terms of lifetime donations (Gemelli et al., 2017; Germain et al., 2007; Guo et al., 2013;

Murphy et al., 2009; Schreiber et al., 2005; Yu et al., 2007). Ownby et al. (1999) focused on the importance on directly contacting repeat donors as soon as they become eligible again once the interdonation interval has passed. Communication technologies offer multiple tools to contact these donors: from traditional methods such as telephone calls, text messages or e-mails, to modern alternatives such as mobile applications (Yu et al., 2007; S. Yuan et al., 2016).

With regard to first-time donors, some studies indicated that, despite the fact that they play an essential role in replacing donors who voluntarily or forcibly leave the system (Lattimore et al., 2015), first-time donors make a significantly smaller contribution because they only donate once, and many of them do not donate again (Gemelli et al., 2017; Germain et al., 2007; Volken et al., 2015; Yu et al., 2007). For this reason, it is necessary to make an effort to turn first-time donors into repeat donors. That said, the conversion is not automatic. It requires specific, and especially early, strategies to transform behavior donation into a habit as soon as possible (Guo et al., 2012; Volken et al., 2015). The importance of implementing these strategies can be justified by the fact that the likelihood of conversion is greater (1) the less time passes from the first donation to the following one, and (2) the more donations are made within the first 12 months following the first donation (Ownby et al., 1999; Schreiber et al., 2005).

In view of these results, some authors state that transfusion centers should focus not only on retaining older donors (at least, as long as the law or their health allow it), but also younger first-time donors because the latter will replace the former when older donors leave the system (Lattimore et al., 2015; Misje et al., 2008; Ownby et al., 1999; Volken et al., 2015). Furthermore, it is important to design strategies aimed at recovering inactive donors because they are more familiarized with the donation process and, therefore, it is easier to recover them (Volken et al., 2015).

Cluster #5 (TPB-based predictive models)

This cluster is made up of 14 articles, whose membership values range between 0.412 and 0.994, of which only one has a value lower than 0.5. Documents in this cluster study donation intention and donation behavior from the perspective of Ajzen's Theory of Planned Behavior. For that, they use the basic model, which includes the subjective norm, attitude and perceived behavioral control, and extended models which consist of additional constructs indented to more accurately predict blood donation intention and behavior. Both the basic model and the extended models explain a large part of the variance in donation intention, but it diminishes when the dependent variable is donation behavior. Knowing which factors have a greater influence on donation intention allows transfusion centers to know what actions should be included in their social marketing strategies to strengthen donation intention and consequently increase donation behavior.

According to the conclusions drawn the documentd in this cluster, the Theory of Planned Behavior[7] (TPB) is one of the most robust conceptual frameworks to explain human behavior (J. L. France et al., 2014). This framework is also applicable to blood donation (Bednall et al., 2013), because blood donation is more planned than spontaneous in nature (Masser, Bednall, White, & Terry, 2012).

According to this theory, intention is the most immediate direct determinant of behavior (Bednall et al., 2013; Masser, White, Hyde, & Terry, 2008). Thus, it can be suggested that the more an individual intends to engage in a given behavior, the more likely is its actual performance (Armitage & Conner, 2001; Lemmens et al., 2005). Said intention is, in turn, determined by three variables: attitude, which is the positive or negative evaluation of behavior; the subjective norm, which is the perception that there is certain social pressure to perform that behavior; and perceived behavioral control (PBC), which is the degree of ease or difficulty to perform that behavior (J. L. France et al., 2014; Masser et al., 2008). Thus,

according to TPB, people are more positively predisposed to behave in a certain way when (1) the behavior is viewed positively, (2) social pressure drives them to behave in that way, and (3) people think that they can perform that behavior (Armitage & Reidy, 2008).

With regard to PBC, it is true that asking donors if donating is "easy" or "difficult" can cause some ambiguity, because donating blood can be difficult due to an inconvenient location or a fear of needles. The psychological mechanisms underlying these difficulties are different. To show these differences, some authors propose self-efficacy as another predictor of donation intention (Masser et al., 2008). Self-efficacy is defined as the confidence in one's ability to perform the behavior because they have the necessary skills and resources (Armitage & Conner, 2001). Although some authors in this cluster regard self-efficacy and PBC as synonyms (Armitage & Reidy, 2008) or that the former is a dimension of the latter (J. L. France et al., 2014), others have provided evidence that they are different, discriminating constructs, and even that self-efficacy shows a greater predictive power than PBC (e.g. Armitage & Conner, 2001). For this reason, some studies have directly replaced PBC with self-efficacy in their models (e.g. Lemmens et al., 2005; Polonsky, Renzaho, Ferdous, & McQuilten, 2013).

Having reviewed the documents included in this cluster, it can be concluded that the three variables of TPB are significant predictors of donation intention and donation behavior, placing special emphasis on the influence of control variables: PBC and self-efficacy (Bednall et al., 2013; Faqah, Moiz, Shahid, Ibrahim, & Raheem, 2015; Godin et al., 2007; Holdershaw, Gendall, & Wright, 2011; Masser et al., 2012). The subjective norm is the one that provides less conclusive results (Masser et al., 2008). Consequently, given the importance of control variables, it is important for transfusion centers to tell donors that donating is easy and that they can do it. To that end, the centers can start actions to make donation easier (e.g. mobile

units, extended opening times) and provide donors with tools to increase their self-efficacy (e.g. strategies aimed at managing anxiety or preventing adverse reactions).

In order to reinforce the predictive power of this model in the blood donation context, some authors have designed extended models incorporating additional constructs (Masser et al., 2012), which we will address below.

The scarce or non-existent influence of the subjective norm on donation intention has encouraged some researchers to incorporate other norms that can explain the psychological mechanisms of blood donation as altruistic behavior. One of them is the moral norm, defined as the perceived responsibility to perform some behavior (Armitage & Conner, 2001; Godin et al., 2007; Holdershaw et al., 2011; Lemmens et al., 2005). The decision to donate is related to convictions and moral values, not to potential coercion. For this reason, the moral norm is better suited for the blood donation context that the subjective norm. Another norm that has been added is the descriptive norm, which refers to the prevalence of a specific behavior in an individual's surroundings (Faqah et al., 2015; Godin et al., 2007). Giving blood is a public, social act, so the decision to donate can be influenced not only by other people's opinion (included in the subjective norm), but also by their decisions and behavior. In other words, having relatives or friends who donate blood increases the likelihood of being or wanting to be a donor as well. For this reason, the descriptive norm has been incorporated into extended models.

Some authors also highlight the inclusion of self-identity as a predictor of donation intention (Armitage & Conner, 2001; Masser et al., 2012). Self-identity indicates the extent to which individuals perceive themselves as performers of a particular social role, which in this case is being blood donors (Armitage & Conner, 2001). Its inclusion is justified because this factor is one of the main precursors that encourage novice donors to become committed donors (Masser et al., 2012). On the other hand, other authors highlight the importance of past

donation behavior (Godin et al., 2007; Masser et al., 2008), reinforcing the notion that habit, which is established as people keep donating, is a fundamental determining factor that explains the decision to donate (Bednall et al., 2013; Godin et al., 2007).

Additionally, the decision to donate is determined by a number of affective-emotional beliefs that are not considered by the basic model of TPB, which has received criticism due to being fundamentally cognitive in nature (Bednall et al., 2013; Conner, Godin, Sheeran, & Germain, 2013; Conner, McEachan, Taylor, O'Hara, & Lawton, 2015; Masser et al., 2008). In fact, if an emotional attribute (e.g. donating blood is painful) is stronger than a cognitive attribute (e.g. donating blood is necessary), the intention to donate can disappear completely (Masser et al., 2008). For that reason, some extended models have incorporated anticipated affective reactions as predictors of donation intention (Conner et al., 2013; Lemmens et al., 2005). Anticipated affective reactions refer to emotions, either positive or negative, that people expect to experience after performing behavior or not (e.g. "If I gave blood, I would feel proud", "If I did not give blood, I would regret it") (Conner et al., 2015). One of the anticipated affective reactions with an increased presence in this cluster, owing to its negative influence on donation intention (Masser et al., 2008), is anticipated regret (Faqah et al., 2015; Godin et al., 2007). The study of anticipated regret caused by being able to donate or not (Masser et al., 2008) is explained by the altruistic, socially desirable nature of blood donation. Along this line, given that donating blood is a behavior that, in general terms, tends to generate aversion (see Cluster #2 Barriers and motivations), Faqah et al., 2015 included donation anxiety as a very relevant antecedent of intention.

Finally, albeit to a lesser extent, knowledge about the need for and importance of donor blood and about the procedures concerning registration and blood donation has been included as an antecedent of donation intention in two documents contained in this cluster

(Lemmens et al., 2005; Polonsky et al., 2013). This construct has been incorporated on the basis that information is needed to make any sort of decision (Polonsky et al., 2013).

On the other hand, some authors in this cluster have included salient beliefs in their models as antecedents of constructs belonging to the basic model of TPB, i.e. subjective norm, attitude and PBC (e.g. Armitage & Reidy, 2008; Godin et al., 2007). These authors refer to normative, behavioral and control beliefs, respectively (Armitage & Conner, 2001; Godin et al., 2007; Lemmens et al., 2005; Masser et al., 2008). Transfusion centers should identify which salient beliefs have a positive or negative impact on donation intention and establish social marketing strategies based on actions aimed at strengthening or diminishing such beliefs (Armitage & Conner, 2001; Armitage & Reidy, 2008; Lemmens et al., 2005; Masser et al., 2008).

Despite the lack of consensus on which measurement scales should be used to measure variables in the basic and extended TPB models that have analyzed donation intention (J. L. France et al., 2014; Holdershaw et al., 2011), these have explained a large percentage of its variance, even up to 86% (e.g. Armitage & Conner, 2001; Faqah et al., 2015; Holdershaw et al., 2011; Lemmens et al., 2005; Masser et al., 2012; Polonsky et al., 2013). However, the model is not as effective when it comes to predicting actual donation behavior (Bednall et al., 2013; Holdershaw et al., 2011). In fact, the correlation between intention and behavior has turned out to be rather weak in some studies expressly focused on measuring it (Holdershaw et al., 2011; Masser et al., 2012). In this regard, Holdershaw et al. (2011) state that, although behavior depends directly on intention, it is common for individuals to act against their initial intention due to the existence of situational factors (e.g. lack of time, health conditions, etc.). Consequently, the intention to donate does not always translate into an actual donation, so intention is not as useful to predict behavior. In other words, TPB is useful to predict donation intention and donation behavior, but not to establish cause-effect

relationships (Armitage & Reidy, 2008). Therefore, researchers who wish to use intention as a proxy variable of behavior should exercise caution when making estimations.

Cluster #6 (Vasovagal reactions)

This sixth and final cluster encompasses 35 articles whose membership values range between 0.297 and 0.942, of which 54.3% presents values that are higher than 0.5. This cluster deals with the issue of experiencing adverse physical reactions and, more precisely, vasovagal reactions, as a barrier to donor retention. To address this risk, some documents have developed and studied different procedures aimed at preventing and managing these reactions.

Analyzing this cluster allows us to conclude that suffering a physical reaction during or after donation significantly diminishes the likelihood of remaining in the donation system (Ferguson, France, Abraham, Ditto, & Sheeran, 2007; Ringwald, Zimmermann, & Eckstein, 2010; van Dongen, 2015). This is specially usual in first-time donors (Bagot, Murray, & Masser, 2016), who are the type of donors that tend to experience such reactions more often (J. L. France et al., 2015; Masser, White, & Terry, 2013). This greater propensity results from the fact that first-time donors experience higher levels of fear and anxiety owing to their lack of familiarity with the donation process (Thijsen, King, & Waller, 2016). Anxiety increases needle pain, which at the same time makes adverse reactions more frequent (C. R. France, France, et al., 2014; C. R. France, France, Wissel, et al., 2013; van Dongen, Ruiter, Abraham, & Veldhuizen, 2014).

Most studies that have addressed these reactions focused on vasovagal reactions (VVR) (Masser et al., 2013; Thijsen et al., 2016). VVR are physiological reactions such as faintness, dizziness, lightheadedness and/or nausea, due to a drop of blood pressure caused by a reduction of blood volume after a donation (Newman, 2014). Some authors point out that the main factors related to experiencing VVR are fear, a young age, being a first-time donor, weight (an important reason why women are more susceptible to suffering VVR than men (C.

R. France, Rader, & Carlson, 2005; Masser et al., 2013), the length of the extraction process and sleeping hours (Newman, 2014; Thijsen et al., 2016).

Given the influence of VVR on donation repetition (France et al. 2005; 2014; van Dongen et al. 2014), these reactions should be identified, studied, prevented and managed. The main tools that transfusion centers have to reach this goal is observation and registration, carried out by the blood extraction staff (Newman, 2014). However, it is also advisable to ask donors directly about this issue, because it is difficult for the staff to detect some VVR (e.g. dizziness) (Newman, 2014) or because these might cause donors unnecessary concerns or alarm. Both situations should be identified to prevent them from having a negative impact on return behavior (C. R. France, France, Wissel, et al., 2013; C. R. France et al., 2005).

With regard to the risk of VVR, some documents in this cluster describe and apply a number of procedures aimed at preventing or reducing VVR. Some of these procedures are intended to increase blood pressure, which inevitably drops when donating, whereas others try to diminish the anxiety and stress that some people might suffer (Ferguson et al., 2007). Among them, we highlight the following.

Pre-donation liquid loading, specifically water (e.g. Vavić, Pagliariccio, Bulajić, Dinić, & Marinozzi, 2014) or caffeine (Sauer & France, 1999) within 30 minutes before donation, is a VVR prevention and management technique with great potential due to how easy it is to apply and the good results it provides (Ferguson et al., 2007; Ringwald et al., 2010).

Another procedure described in this cluster is applied muscle tension, which is easy to learn, safe to use and proven to be successful in the blood donation context (e.g. Ditto & France, 2006; Holly, Balegh, & Ditto, 2011). It consists of performing repeated, rhythmic contractions of main muscle groups in the arms and legs to enhance blood flow towards the brain (Ferguson et al., 2007), thus increasing blood pressure. The potential of this VVR

prevention and management technique lies in its practically immediate effects (Thijsen et al., 2016). In addition, it also has the advantage of serving as a distraction (Ferguson et al., 2007; Holly et al., 2011), which is another valid VVR management strategy (e.g. reading materials, TV, tablets) (Ferguson et al., 2007; Newman, 2014; van Dongen, 2015).

Finally, other authors propose several ways to support donors with a greater risk of experiencing VVR, i.e. the most fearful donors (Bagot et al., 2016; van Dongen, 2015). Among them, the following actions have been proposed: individualized talks, classes about VVR management techniques as the ones describe above, and support provided by the staff throughout the extraction process (C. R. France, France, et al., 2014; C. R. France, France, Wissel, et al., 2013; Newman, 2014).

Thus, with regard to Cluster #5 (TPB-based predictive models), some studies have proved that applying the above procedures can enhance control (i.e. self-efficacy) and affective attitude, as well as diminish donation anxiety, which helps transfusion centers retain donors (C. R. France, France, Kowalsky, et al., 2013; Masser et al., 2013; Newman, 2014; Ringwald et al., 2010).

In order to encourage donors to implement the coping strategies that require their active involvement (e.g. applied muscle tension, pre-donation liquid loading), Ferguson et al. (2007) suggested using implementation intentions, which are if-then plans ("If situation X happens, then I will do Y") that delegate behavior control to the situation, not to the individual. Thus, when the aforementioned situation takes place, the behavior is elicited automatically. Additionally, transfusion centers can use, apart from their staff, informative materials, either written, audiovisual or a combination of both formats (e.g. websites), describing the advantages of applying these techniques and instructions to use them properly (C. R. France, France, Kowalsky, et al., 2013).

Besides strategies to prevent and manage VVR, some documents in this cluster suggest strategies aimed at preventing donors who have experienced VVR from leaving the system, and also at making donors give blood again. The first strategy was proposed by van Dongen (2015); it consists of making donors reevaluate the negative emotions and consequences they experienced. Therefore, the goal is to teach donors that, although giving blood sometimes implies experiencing some inconveniences, it saves lives, so the output compensates the potential risks involved in the process. Another proposal is to assure donors that the next donation will be more pleasant, or at least less unpleasant. Identifying the factors that cause VVR in an individualized way (e.g. by telephone) helps transfusion centers address them and teach donors that VVR can be due to external circumstances, and not necessarily to their health condition (J. L. France et al., 2015; Masser et al., 2013). This action is aimed at preventing mistaken self-exclusions and encouraging new donations.

Finally, this cluster reveals that there are other adverse reactions different from VVR, such as arm injuries caused by needles, the feeling of fatigue after donation, etc. The literature has not paid as much attention to these reactions as to VVR (van Dongen, 2015). Nevertheless, they should not be ignored. Although these adverse reactions have a lower impact than VVR, they can be perceived as service errors that might result in donor loss (Masser, Bove, White, & Bagot, 2016).

Discussion of future lines of research

After carrying out a content analysis and applying text mining to 207 articles from 27 impact factor journals (Journal Citation Reports and Scimago Journal & Country Rank), 6 major lines of research, similar to those identified by Bednall et al. (2013), were extracted from the literature on blood donation behavior and the different factors that determine it. It is essential to understand these lines of research in order to define and implement actions aimed at achieving social marketing goals. These lines are: “Donation system”, “Barriers and

motivations", "Safety", "Repeat behavior", "TPB-based predictive models" and "Vasovagal reactions".

The attention paid by academics to the study of blood donor behavior has not translated into the performance of transfusion centers, because donation rates have not achieved the desired levels yet. One of the possible reasons for this situation is that the research on donor behavior has not been used when designing actions implemented by transfusion centers. Another reason might the existing short-sightedness with regard to researching donor behavior. It is necessary to expand and explore new lines of research related to developing the notion of marketing in our current society, applying new paradigms in the context of social marketing. That is why in this section we suggest a number of future lines of research, based on the results of text mining, as well as the new paradigms that have appeared with regard to the concept of marketing.

Donor behavior from a holistic approach

After analyzing the scope of the different clusters obtained in this study, it can be concluded that it is common for studies on donor behavior to conduct non-holistic analyses which do not take into account the variety of factors that determine donor behavior. There are studies focusing exclusively on barriers, (e.g. Polonsky et al., 2011); on motivations (e.g. Gonçalez et al., 2013); on TPB variables (e.g. Godin et al., 2007); on the cause and effects of vasovagal reactions (e.g. C. R. France, France, Wissel, et al., 2013); or on the sociodemographic characteristics of donors (e.g. Lattimore et al., 2015). Few studies analyze the different variables involved in the decision to donate and their interaction from a combined perspective (e.g. Beerli-Palacio & Martín-Santana, 2009). Therefore, the study of donor behavior using more holistic models which include all the determining factors of donation and which take into account their cause-effect relationship, is a potential line of research which has not been sufficiently explored.

The simultaneity of barriers and motivations

After analyzing the contents of Cluster #2 (Barriers and motivations), we have found that there is also a lack of research analyzing which barriers and/or which motivations are more determining or important in the decision to donate when individuals experience them at the same time. The co-existence and multiplicity of barriers and motivations in current and potential donors, as revealed by some studies (e.g. Charbonneau, Cloutier, & Carrier, 2016; Nilsson Sojka & Sojka, 2008), justifies even more the need to delve into this line of research. Thus, it would be interesting for transfusion centers to know the intensity and typology of barriers and motivations that simultaneously affect their donors, as well as the existing differences among donor types. For that, it is essential to reach a consensus beforehand on the terminology that should be used to study the wide range of existing barriers and motivations (Bednall & Bove, 2011; Martín-Santana, Beerli-Palacio, & Romero-Domínguez, 2019).

Preventive social marketing interventions

At the same time, and given that one of the main aims of social marketing is to eliminate donation barriers and highlight its benefits, another future line of research could focus on proposing and evaluating possible interventions with that aim. Up to now, as can be concluded based on some articles in Cluster #1 (Donation system) and Cluster #6 (Vasovagal reactions), the literature has proposed interventions of a psychological (e.g. Pagliariccio & Marinozzi, 2012) and/or physiological nature (e.g. Holly et al., 2011) which are applied just before or during donation, but not preventively. In this sense, given the need to incorporate new donors into the system and to raise awareness among the population since an early age, it is proposed that transfusion centers make a greater effort to design and evaluate actions aimed, for example, at educating people, diminishing barriers and reinforcing motivations, by using new technologies (e.g. gamification, VR) or organizing regular talks at education centers.

Experiential marketing

A new line based on the new paradigms of marketing is the application of experiential marketing, sensory marketing or emotional marketing in the context of blood donation (Pintado Blanco *et al.*, 2017; Schmitt, 1999; Y. Yuan & Wu, 2008). In blood donation, promotional actions are commonly aimed at donor's emotions using messages that are humanitarian or highlight the benefits of donation for donors (e.g. Ferguson *et al.*, 2008). However, when dealing with positive "donation experiences" as mechanisms to instill donor loyalty, the literature generally associates these experiences to quality attributes (e.g. staff friendliness, waiting time, etc.) (Martín-Santana & Beerli-Palacio, 2012; Vavić *et al.*, 2012). Although quality is certainly the most determining factor to create a positive experience (Y. Yuan & Wu, 2008), it is not the only one. In other words, transfusion centers are not fully applying the principles of experiential marketing. If the experience of donation could become a more emotional one, the bond between donors and the cause would strengthen, and thus their commitment and the donation rates would increase. As an example, donating sites could be transformed into cozier and less clinical spaces through the use of sensory stimuli such as music, images or aromas. However, given that the donation staff provides a high-contact service, they are also largely responsible for the success of the donation process. For this reason, the staff should stay professional and attentive at all times, which requires they be qualified with necessary technical and social skills. Another approach could involve asking experienced donors to participate in promotion activities, thus adding a more social perspective to the act of donation. In the end, the way that the components of the service experience are configured is fundamental, because each component can have an impact on the decision to keep donating, speak positively about the experience or recommend it to others (Jaafar, Chong, & Alavi, 2017; Russell-Bennett et al., 2013). In this sense, Melián-Alzola and Martín-Santana (2019), in a recently published paper, confirmed the importance of the "moment of truth", as it is called in the service literature (Bitner, Booms, & Mohr, 1994). The

authors proved that service quality influences donor satisfaction, as well as the effect of these two constructs on donor loyalty. Therefore, each donation can contribute in a positive or negative way on donor loyalty depending on the transfusion center's management.

Neuromarketing to eliminate donation barriers

Given that studying the emotional dimension of behavior is as important as the rational one, this study proposes applying neuromarketing (Cartocci et al., 2017; Pintado Blanco et al., 2017) in the study of donor behavior, as the literature has not yet addressed the emotional responses of donors from a neurophysiological perspective. The written and/or spoken answers of donors on their attitude towards blood donation (e.g. the experienced barriers) could be biased, as donating blood is considered a socially desirable conduct. Therefore, social marketing campaigns do not meet the expected targets. By applying neuromarketing, it would be possible to understand which stimuli really generate negative reactions in donors based on their neurophysiological reactions, over which donors exert no control. Thus, transfusion centers could make changes in their promotional actions before they are launched in order to guarantee a change in the population's donation behavior. Among some of the possible techniques, virtual reality must be highlighted; it enables the creation of simulated scenarios with different degrees of immersion in order to analyze the individuals' reactions to the manipulated stimuli (McCall & Blascovich, 2009; Pintado Blanco et al., 2017). These technologies would enable creating a virtual environment that simulates a donation and all the possible associated barriers (e.g. sight of needles, of blood bags), without actually having to carry out a real donation. Through this experience of virtual reality, transfusion centers would have a means of showing more reluctant donors (specially young ones) that donating blood is a painless, harmless and safe procedure without generating the anxiety or fear that a real donation could trigger in inexperienced individuals.

Donor orientation

The last proposed line of investigation focuses on the study of the influence of market orientation (Kohli & Jaworski, 1990; Narver & Slater, 1990) in the context of blood donation, which would be referred to as donor orientation. Although transfusion centers have two types of clients (donors and recipients), if the needs of the former are not adequately met, there will not be enough blood to meet the demands of the latter. Currently, transfusion centers are dominated by medical staff, which has meant that product orientation has been the norm in these centers (Russell-Bennett et al., 2013); the priority of these professionals is to maximize the number of blood bags. This orientation towards the product irretrievably overshadows the relationship with donors. Given that donors are the backbone of the healthcare system, which management approach would be the most appropriate? To the best of our knowledge, this approach should be sustained in an organizational culture that leads to a change in individuals' behavior in order to foreseeably enhance the retention of blood donors and, in turn, the recruitment of new ones. Service-focused social marketing would be applied in this case, advocating for transformative service that seeks to improve social and individual welfare (Ostrom et al., 2010) by facilitating voluntary behavior change (Russell-Bennett et al., 2013). For these reasons, transfusion centers must abandon product orientation and adopt a donor orientation.

However, traditional measurement scales of market orientation cannot be replicated in transfusion centers. Therefore, they would need to have their own scale of donor orientation which, on the one hand, takes their characteristics into account (e.g. the lack of profit motive) and on the other, eliminates those constructs which are not applicable to this specific context (e.g. competition). As this scale does not exist, this paper proposes the design and validation of a donor oriented scale, as well as its use in empirical studies, as another future line of investigation.

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Endnotes:

[1] For more information on FCM see Bezdek, Ehrlich and Full (1984).

[2] For more information on these indexes see Fukuyama and Sugeno (1989), Xie and Beni (1991), Bezdek (1973) (partition coefficient) and Bezdek (1975) (partition entropy).

[3] In China, patients who receive a transfusion have to pay for the costs associated from blood collection, storage and distribution. On the other hand, people who donate blood after undergoing a procedure, or who find another person that gives blood in their stead before the transfusion, receive an reimbursement of such fees (Ou-Yang & Bei, 2016).

[4] "Even a penny will help" is a compliance-coherence tactic consisting in inducing a situation which triggers individuals' values to then ask them to donate. Donation is presented as something which requires little effort. Thus, contributing to the cause, although minimally, allows donors to be coherent with their values (Guéguen, 2013).

[5] For more information on donation motivations identified by the literature see Bednall and Bove (2011).

[6] The window period is the time interval during which an infection may not be unequivocally detected in laboratory screening tests (van der Poel et al., 2002).

[7] For more information on the Theory of Planned Behavior see Ajzen (1991).

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Appendix 1. Consulted journals, research fields, impact factors and amount of articles extracted from each of them

Journal name	Research field	Impact factor (2017)	Extracted articles
Transfusion Medicine Reviews	Hematology	4,111	10
Journal of Public Administration Research and Theory	Public administration	3,907	1
Transfusion	Hematology	3,423	63
Journal of Health Economics	Healthcare policy	3,250	1
Health Psychology	Psychology	3,177	16
Annals of Behavioral Medicine	Psychology	3,118	1
Social Science and Medicine*	Social sciences	3,007	2
Journal of Psychosomatic Research*	Psychiatry	2,947	1
British Journal of Health Psychology	Psychology	2,706	3
Contemporary Clinical Trials*	Experimental medicine	2,658	1
European Journal of Health Economics	Healthcare policy	2,601	1
Transfusion Medicine and Hemotherapy	Hematology	2,152	2
Blood Transfusion	Hematology	2,138	5
Vox Sanguinis	Hematology	2,107	22
Journal of Social Marketing	Marketing	2,000	2
Transfusion Medicine	Hematology	1,798	20
Transfusion and Apheresis Science	Hematology	1,755	36
Nonprofit Management & Leadership	Public administration	1,633	1
Journal of Applied Social Psychology	Psychology	1,439	1
Voluntas	Social sciences	1,273	2
Journal of Social Psychology	Psychology	1,227	3
Pakistan Journal of Medical Sciences*	General medicine	0,719	1
International Journal of Health Care Quality Assurance	Public administration	0,358†	1
International Journal of Nonprofit and Voluntary Sector Marketing	Marketing	0,357†	5
Journal of Nonprofit & Public Sector Marketing	Marketing	0,357†	2
Health Marketing Quarterly	Marketing	0,203†	1
International Review on Public and Nonprofit Marketing	Marketing	0,191†	3

* These journals were not included in the initial search, but appeared in related searches
† These impact factors correspond to SJR impact factor (2017)

Appendix 2. Memberhip values of the 207 documents for each cluster

Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
Ferrari1985	The use of incentives to increase blood donations	**0,998401**	0,001504	1,93E-11	9,28E-05	2,92E-11	1,96E-06
Jason1984	Personal versus impersonal methods for recruiting blood donations	**0,998401**	0,001504	1,93E-11	9,28E-05	2,92E-11	1,96E-06
Chassaigne1996	Recent trends in donor selection and donor recruitment in Europe: French experience	**0,996648**	0,00327	1E-11	8,14E-05	4,06E-12	8,71E-07
Daigneault2004	Rethinking the donation experience: An integrated approach to improve the efficiency and the quality of each blood donation experience	**0,993372**	0,006298	6,87E-11	0,000314	1,07E-10	1,53E-05
Hollingsworth2004	What population factors influence the decision to donate blood?	**0,980414**	0,016864	1,06E-10	0,002705	1,17E-10	1,76E-05
Kong2004	Recruitment of voluntary non-remunerated apheresis donors: The second five years' experience in Shenzhen	**0,976337**	0,021758	1,61E-09	0,001799	1,54E-09	0,000107
Simon1998	Monetary compensation for plasma donors: A record of safety	**0,975818**	0,022114	8,31E-09	0,002029	8,13E-10	3,88E-05
Gueguen2013	"Even a donation one time in your live will help...": The effect of the legitimizing paltry contribution technique on blood donation	**0,969041**	0,029341	2,25E-10	0,001471	1,16E-09	0,000147
Pagliariccio2003	Can better information increase hemapheresis?	**0,967543**	0,029605	2,66E-09	0,002763	9,6E-10	8,84E-05
Cacioppo1993	What underlies medical donor attitudes and behavior?	**0,95277**	0,043703	3,77E-10	0,003098	5,91E-09	0,000429
Ditto2013	The effects of leg crossing and applied tension on blood donor return	**0,929953**	0,051393	1,34E-09	0,013547	3,91E-09	0,005107
OuYang2016	Blood donation in Guangdong Province, China, from 2006-2014	**0,916195**	0,077902	5,15E-09	0,005636	3,11E-09	0,000267
Kheiri2015	An analysis of first-time blood donors return behaviour using regression models	**0,91245**	0,03153	1,4E-09	0,055791	9,78E-10	0,000228
Maghsudlu2009	Blood donation and donor recruitment in Iran from 1998 through 2007: Ten years' experience	**0,909313**	0,059581	9,22E-09	0,03069	1,63E-09	0,000416
Weidmann2012	A spatial regression analysis of German community characteristics associated with voluntary non-remunerated blood donor rates	**0,904988**	0,084113	1,85E-09	0,010587	4,6E-09	0,000312
Batiha2013	Knowledge of Philadelphia University students regarding blood donation	**0,893964**	0,099925	5,06E-09	0,005967	4,47E-09	0,000144
Pedersen2015	The heritability of blood donation: A population-based nationwide twin study	**0,863242**	0,099572	1,61E-09	0,036584	4,94E-09	0,000602
Baig2013	Knowledge, misconceptions and motivations towards blood donation among university students in Saudi Arabia	**0,860437**	0,132791	2,74E-08	0,006574	1,31E-08	0,000199
Bowman1997	Donor attitudes about exporting and importing blood	**0,830788**	0,146841	4,36E-08	0,021865	3,74E-08	0,000506

JavadzadehShahshahani 2007	Why don't women volunteer to give blood? A study of knowledge, attitude and practice of women about blood donation, Yazd, Iran, 2005	**0,813077**	0,149909	1,11E-06	0,033207	7,94E-07	0,003805
Yang2015	Two decades of voluntary nonremunerated blood donation in Shenzhen, China	**0,809775**	0,132161	2,48E-07	0,052753	2,49E-07	0,00531
Trimmel2005	Voluntary whole-blood donors, and compensated platelet donors and plasma donors: Motivation to donate, altruism and aggression	**0,79918**	0,154886	1,55E-08	0,045439	9,16E-09	0,000496
Marantidou2007	Factors that motivate and hinder blood donation in Greece	**0,797673**	0,176366	1,09E-07	0,02534	2,93E-09	0,00062
Beal1999	Deferred blood donors and their care	**0,773914**	0,152383	2,37E-05	0,068839	4,84E-07	0,00484
McKeever2006	An investigation of the impact of prolonged waiting times on blood donors in Ireland	**0,767153**	0,172005	1,32E-07	0,043535	1,29E-06	0,017305
Kilic2013	Assessing anxiety levels and empathic tendency in blood and platelet donors	**0,723217**	0,174681	1,52E-07	0,095711	1,45E-07	0,00639
Whitney2010	Using an integrated automated system to optimize retention and increase frequency of blood donations	**0,72179**	0,160462	2,67E-07	0,087058	8,46E-07	0,030689
Pagliariccio2013	Emotional support to apheresis donors: Effect and implication	**0,711382**	0,197538	8,78E-08	0,039552	1,38E-07	0,051528
Grace1957	Blood donor recruitment: A case study in the psychology of communication	**0,704639**	0,221375	3,68E-07	0,060639	7,08E-07	0,013346
Kasraian2012	Blood donors' attitudes towards incentives: Influence on motivation to donate	**0,676072**	0,263456	1,29E-07	0,058625	5,28E-08	0,001847
Pagliariccio2012	Increasing regular donors through a psychological approach which reduces the onset of vasovagal reactions	**0,675799**	0,187535	1,05E-06	0,083469	2,73E-06	0,053193
McQuilten2014	Blood donation by African migrants and refugees in Australia: The role of demographic and socio-economic factors	**0,665508**	0,248009	4,33E-07	0,083793	1,65E-07	0,002688
Ditto2006	The effects of applied tension on symptoms in french-speaking blood donors: A randomized trial	**0,664492**	0,191374	7,49E-07	0,081955	1,55E-06	0,062177
Senemeaud2014	Labeling of previous donation to encourage subsequent donation among experienced blood donors	**0,653684**	0,188038	1,53E-07	0,134394	1,56E-06	0,023882
Bani2014	Gender differences and frequency of whole blood donation in Italian donors: Even though I want to, I cannot?	**0,647428**	0,183136	5,51E-07	0,15889	4,98E-07	0,010546
Price2006	Mailing of a sickle cell disease educational packet increases blood donors within an African American community	**0,631282**	0,228462	3,16E-06	0,132427	1,43E-06	0,007824
Kimani2011	Blood donors in Kenya: A comparison of voluntary and family replacement donors based on a population-based survey	**0,630809**	0,285231	0,000913	0,073853	2,43E-06	0,009191
Simon2003	Where have all the donors gone? A personal reflection on the crisis in America's volunteer blood program	**0,619975**	0,327313	1,39E-07	0,047525	3,61E-08	0,005187
Papagiannis2016	Blood donation knowledge and attitudes among undergraduate health science students: A cross-sectional study	**0,614094**	0,305249	1,52E-06	0,073213	2,84E-06	0,00744
Charles-Sire2014	The effect of priming with a love concept on blood donation promise	**0,612554**	0,34148	7,16E-08	0,036553	3,08E-07	0,009413

Vavic2014	Giving blood donors something to drink before donation can prevent fainting symptoms: Is there a physiological or psychological reason?	**0,603468**	0,223575	9,76E-06	0,087777	1,81E-05	0,085152
Alfieri2016	Economic crisis and blood donation: How are donors' motivations changing?	**0,59131**	0,346218	6,74E-08	0,059594	1,06E-07	0,002878
Alinon2014	Emotional-motivational barriers to blood donation among Togolese adults: A structural approach	**0,571488**	0,357845	1,09E-06	0,063749	1,01E-06	0,006915
Chamla2006	Eliciting repeat blood donations: Tell early career donors why their blood type is special and more will give again	**0,569548**	0,2392	7,51E-07	0,073898	5,35E-06	0,117348
Barker1998	Voluntary, nonremunerated blood donation: Still a world health goal?	**0,567176**	0,291066	0,001306	0,108796	0,000157	0,031498
Colligan2015	Innovative research, improving quality, and celebrating patient successes and the role of donors within transfusion services	**0,564656**	0,337058	1,61E-06	0,07531	9,99E-07	0,022974
Bambrick2013	Community attitudes to remunerated blood donation in Australia: Results from a national telephone survey	**0,563797**	0,281049	6,18E-07	0,152884	1,5E-07	0,00227
Moog2009	Retention of prospective donors: A survey about services at a blood donation centre	**0,559572**	0,227108	1,48E-05	0,179652	7,1E-06	0,033646
France2004	Mild reactions to blood donation predict a decreased likelihood of donor return	**0,559394**	0,177732	6,76E-07	0,128773	1,98E-06	0,134099
Koster2011	Attitudes towards blood donation and transfusion in Bamenda, Republic of Cameroon	**0,528543**	0,380704	5,41E-05	0,076182	6,75E-06	0,01451
Smith2013	Recruitment and retention of blood donors in four Canadian cities: An analysis of the role of community and social networks	**0,493782**	0,378215	4,52E-07	0,109186	6E-07	0,018816
Godin2008	Asking questions changes behavior: Mere measurement effects on frequency of blood donation	**0,492488**	0,321258	7,25E-07	0,093756	0,000156	0,092341
Poon2013	Variation of motivation between weekday and weekend donors and their association with distance from blood donation centres	**0,48068**	0,24698	2,66E-07	0,266014	2E-07	0,006325
Vavic2012	Blood donor satisfaction and the weak link in the chain of donation process	**0,472147**	0,269656	8,19E-06	0,166954	1,12E-05	0,091223
Atherley2016	Knowledge, attitudes and practices towards blood donation in Barbados	**0,466414**	0,447047	6,27E-06	0,080598	1,66E-06	0,005933
France2008	Re-donation intentions among experienced blood donors: Does gender make a difference?	**0,464911**	0,270112	4,17E-07	0,106676	0,000988	0,157312
Lee1998	Perceptions and preferences of autologous blood donors	**0,453786**	0,323173	0,00477	0,157288	0,000593	0,06039
Gazibara2015	Factors associated with positive attitude towards blood donation among medical students	**0,444058**	0,312941	0,000158	0,168132	0,000569	0,074142
DeSousa2006	International forum - The "6 Pillars" of best practice in apheresis technologies: Introductory remarks	**0,421724**	0,380112	0,000368	0,156771	5,5E-05	0,04097
White2014	How do we design, implement, and manage an ongoing program to provide iron supplements to women blood donors?	**0,415659**	0,225269	0,000179	0,256773	3,45E-05	0,102086
Jones2003	Remuneration for blood donation and attitudes towards blood	**0,415508**	0,296438	4,65E-05	0,280299	2,49E-06	0,007707

	donation and receipt in Leeds						
Frye2014	Evaluating a program to increase blood donation among racial and ethnic minority communities in New York City	**0,414178**	0,409708	1,41E-06	0,156375	1E-06	0,019736
Masser2012a	Beliefs underlying blood donors' intentions to donate during two phases of an avian influenza outbreak	**0,409633**	0,321534	0,006198	0,141013	0,00207	0,119553
Balegh2016	Increasing nondonors' intention to give blood: addressing common barriers	**0,396041**	0,380937	7,49E-07	0,100679	9,33E-05	0,122248
Reich2006	A randomized trial of blood donor recruitment strategies	**0,385565**	0,214174	2,65E-06	0,333882	1,64E-06	0,066375
Niza2013	Incentivizing blood donation: Systematic review and meta-analysis to test Titmuss' hypotheses	**0,378219**	0,378078	0,000434	0,176385	0,000128	0,066756
Bagot2016	Building a flexible, voluntary donation panel: An exploration of donor willingness	**0,377436**	0,344876	1,06E-06	0,172432	4,21E-06	0,105251
Fonte2016	How to encourage non-donors to be more willing to donate blood? Testing of binding communication based interventions	**0,364125**	0,327598	0,000127	0,127866	0,004921	0,175362
Livitz2017	A brief motivational interview promotes internal motivation to donate blood among young adults with and without a prior donation history	**0,357595**	0,347603	1,28E-06	0,254232	5,37E-06	0,040563
Wildman2009	Blood donation and the nature of altruism	**0,350918**	0,323873	0,000131	0,283282	0,000119	0,041678
Domen1995	Paid-versus-volunteer blood donation in the United States: A historical review	**0,319258**	0,267607	0,147975	0,179046	0,00421	0,081904
Wevers2015	Increasing first-time blood donation of newly registered donors using implementation intentions and explicit commitment techniques	**0,314982**	0,261458	8,06E-05	0,211498	0,001332	0,210649
Mostafa2010	Psychographic clustering of blood donors in Egypt using Kohonen's self organizing maps	0,198773	**0,653514**	5,65E-06	0,096042	0,000153	0,051512
Polonsky2011	Barriers to blood donation in African communities in Australia: The role of home and host country culture and experience	0,20456	**0,613704**	5,83E-05	0,146434	0,000137	0,035106
Beerli-Palacio2009	Model explaining the predisposition to donate blood from the social marketing perspective	0,281585	**0,598117**	5,14E-07	0,071122	2,31E-06	0,049174
Martin-Santana2008	Potential donor segregation to promote blood donation	0,290779	**0,590752**	4,75E-07	0,102156	6,32E-07	0,016312
Boenigk2015	Missing minorities: Explaining low migrant blood donation participation and developing recruitment tactics	0,22124	**0,581465**	0,000101	0,159172	7,62E-05	0,037947
Grassineau2007	Improving minority blood donation: Anthropologic approach in a migrant community	0,317082	**0,577615**	5,92E-05	0,089716	1,74E-05	0,01551
Charbonneau2013	The symbolic roots of blood donation	0,24602	**0,575228**	2,51E-05	0,144322	4,88E-05	0,034357
Guarnaccia2016	Differences in social representation of blood donation between donors and non-donors: An empirical study	0,437827	**0,531339**	1,31E-08	0,02743	9,28E-08	0,003404
Leigh2007	Marketing blood drives to students: A case study	0,331754	**0,52987**	1,41E-06	0,115053	2,31E-06	0,023319

Renzaho2013	The influence of acculturation, medical mistrust, and perceived discrimination on knowledge about blood donation and blood donation status	0,315269	**0,524403**	5,02E-05	0,146805	3,09E-05	0,013441
Shaz2009	Motivators and barriers to blood donation in African American college students	0,291042	**0,523199**	4,33E-06	0,162138	3,14E-06	0,023613
Ngoma2013	Barriers and motivators to blood donation among university students in Japan: development of a measurement tool	0,37646	**0,521645**	1,72E-07	0,093088	4,06E-07	0,008806
Zaller2005	Knowledge, attitude and practice survey regarding blood donation in a Northwestern Chinese city	0,357707	**0,484788**	0,000438	0,140184	3,27E-06	0,016879
Muthivhi2015	Motivators and deterrents to blood donation among Black South Africans: A qualitative analysis of focus group data	0,168301	**0,484069**	2,82E-05	0,274971	1,99E-05	0,072612
Evans2014	Defining and measuring blood donor altruism: A theoretical approach from biology, economics and psychology	0,255356	**0,459937**	2,79E-06	0,196436	0,000467	0,087801
Dubey2014	Knowledge, attitude and beliefs of people in North India regarding blood donation	0,429054	**0,448058**	3,55E-05	0,097891	7,14E-06	0,024955
Karacan2013	Blood donors and factors impacting the blood donation decision: Motives for donating blood in Turkish sample	0,332634	**0,442648**	4,14E-08	0,218891	1,49E-07	0,005826
Iajya2013	The effects of information, social and financial incentives on voluntary undirected blood donations: Evidence from a field experiment in argentina	0,313952	**0,442606**	0,000379	0,173775	9,75E-05	0,069191
Mews2013	Does organizational reputation influence the willingness to donate blood?	0,310757	**0,434568**	5,02E-05	0,128262	0,000224	0,126138
France2014a	The Blood Donor Identity Survey: A multidimensional measure of blood donor motivations	0,28563	**0,42912**	1,81E-06	0,144391	6,66E-05	0,140791
Abasolo2014	Blood donation as a public good: An empirical investigation of the free rider problem	0,399481	**0,424727**	1,05E-06	0,169051	9,92E-07	0,006739
Guiddi2015	New donors, loyal donors, and regular donors: Which motivations sustain blood donation?	0,287993	**0,417669**	3,09E-06	0,229603	1,4E-05	0,064717
Reid2008	An investigation into blood donation intentions among non-donors	0,143234	**0,408834**	4,74E-05	0,181924	0,022241	0,24372
Farrugia2010	Payment, compensation and replacement - the ethics and motivation of blood and plasma donation	0,384959	**0,407623**	0,003254	0,151957	0,000357	0,05185
Alessandrini2007	Community volunteerism and blood donation: Altruism as a lifestyle choice	0,239466	**0,406596**	0,001185	0,266747	0,001158	0,084848
Goncalez2013	Motivation and social capital among prospective blood donors in three large blood centers in Brazil	0,261724	**0,401698**	1,97E-05	0,306019	2,55E-05	0,030514
Griffin2014	Blood donation: Comparing individual characteristics, attitudes, and feelings of donors and nondonors	0,250802	**0,392765**	1,55E-05	0,113296	0,001591	0,241531
Boenigk2011	Altruistic values, satisfaction and loyalty among first-time blood donors	0,162201	**0,38974**	0,000145	0,248377	0,001066	0,19847
Charbonneau2015	Whole blood and apheresis donors in Quebec, Canada: Demographic	0,144479	**0,387556**	0,000158	0,365081	0,000144	0,10258

	differences and motivations to donate						
Houston2006	"Walking the walk" of public service motivation: Public employees and charitable gifts of time, blood, and money	0,235575	**0,379415**	0,005544	0,249576	0,009634	0,120257
Ferguson2015	Mechanism of altruism approach to blood donor recruitment and retention: A review and future directions	0,138093	**0,375664**	0,000258	0,202175	0,005441	0,278369
Solomon2012	Segmentation and communications to solve the blood shortage: An exploration of the problem with recommendations	0,269095	**0,374762**	0,002036	0,277058	0,000608	0,076441
Goette2009	Free cholesterol testing as a motivation device in blood donations: Evidence from field experiments	0,28747	**0,368306**	3,37E-06	0,273456	8,23E-06	0,070757
Polonsky2015	Is removing blood donation barriers a donation facilitator?	0,201616	**0,364959**	0,004926	0,222905	0,020873	0,184721
McCullough2013	Strengthening blood programs in developing countries	0,296581	**0,353195**	0,022417	0,201992	0,005224	0,12059
Bagot2013	Asking for something different from our donors: Factors influencing persuasion success	0,321642	**0,352042**	2,04E-06	0,137398	1,32E-05	0,188903
Chmielewski2012	A new perspective on the incentive-blood donation relationship: Partnership, congruency, and affirmation of competence	0,225159	**0,352017**	0,005731	0,249699	0,004203	0,163191
Chell2014	Investigating online recognition for blood donor retention: An experiential donor value approach	0,197757	**0,346751**	0,000907	0,232743	0,006675	0,215168
Renner2013	Guilt appeals and prosocial behavior: An experimental analysis of the effects of anticipatory versus reactive guilt appeals on the effectiveness of blood donor appeals	0,28852	**0,346611**	0,001408	0,175578	0,008685	0,179198
Promberger2013	When do financial incentives reduce intrinsic motivation? Comparing behaviors studied in psychological and economic literatures	0,278758	**0,34205**	0,002879	0,201418	0,005844	0,169051
Sundermann2017	Under blood pressure - differentiated versus undifferentiated marketing to increase blood donations	0,207704	**0,332976**	0,005133	0,228172	0,008583	0,217431
James2011	Contribution of attitudinal factors to blood donation in African American church attendees	0,251597	**0,330777**	0,004006	0,308256	0,002996	0,102367
Duboz2010	How barriers to blood donation differ between lapsed donors and non-donors in France	0,201514	**0,323209**	0,001803	0,310105	0,002552	0,160818
Queniart2013	Blood donation within the family: The transmission of values and practices	0,291064	**0,32254**	0,007698	0,254297	0,005215	0,119186
Kowalsky2014	Blood donation fears inventory: Development and validation of a measure of fear specific to the blood donation setting	0,293723	**0,320207**	0,000132	0,156718	0,00053	0,22869
Hupfer2006	Helping me, helping you: Self-referencing and gender roles in donor advertising	0,307106	**0,3156**	3,28E-05	0,214821	0,000127	0,162313
Geyer2005	The impact of e-mail in acquiring and retaining whole-blood donors: A comparative analysis of the Puget Sound Blood Center donor e-mail communication program	0,306848	**0,313811**	0,000344	0,274479	0,000308	0,10421
Bove2011	Understanding the plasmapheresis donor in a voluntary,	0,202641	**0,308223**	0,000316	0,266287	0,000804	0,221729

	nonremunerated environment						
Boenigk2016	Acquiring potential blood donors in large cities: A preference-based donor segmentation study	0,166366	**0,302877**	0,006774	0,242377	0,01312	0,268487
Bagot2015	A novel approach to increasing inventory with the current panel: Increasing donation frequency by asking for a different blood product	0,219614	**0,297688**	0,000103	0,289145	0,000333	0,193118
Shehu2015	Profiling donors of blood, money, and time	0,198925	**0,29274**	0,021664	0,290406	0,020748	0,175517
Martin-Santana2012	Achieving donor repetition and motivation by block leaders among current blood donors	0,161232	**0,291881**	0,000265	0,269078	0,002265	0,275279
Godin2005	Factors explaining the intention to give blood among the general population	0,167694	**0,28003**	8,74E-06	0,11414	0,215578	0,22255
James1999	How understanding donor behavior should shape donor selection	0,000153	0,000208	**0,999273**	0,000213	1,18E-05	0,000142
Miranda2014	Knowledge of HIV testing and attitudes towards blood donation at three blood centres in Brazil	0,000517	0,000475	**0,998559**	0,000358	1,25E-06	8,95E-05
VanderPoel2002	Paying for blood donations: Still a risk?	0,000713	0,000646	**0,997738**	0,000589	2,28E-05	0,000291
Goncalez2010	The impact of simple donor education on donor behavioral deferral and infectious disease rates in São Paulo, Brazil	0,00079	0,000821	**0,996623**	0,001418	7,45E-06	0,000341
Shi2014	Blood safety and availability: Continuing challenges in China's blood banking system	0,002734	0,00284	**0,990278**	0,003126	1,29E-05	0,001009
Murphy2009	Minority and foreign-born representation among US blood donors: Demographics and donation frequency for 2006	0,05544	0,048313	6,42E-05	**0,882421**	3,54E-06	0,013758
Guo2013	Long-term return behavior of Chinese whole blood donors	0,050024	0,041627	3,08E-05	**0,877224**	1,25E-05	0,031081
Schreiber2005	First year donation patterns predict long-term commitment for first-time donors	0,073838	0,072211	0,000238	**0,809002**	4,84E-05	0,044662
Ownby1999	Analysis of donor return behavior	0,133615	0,076257	1,42E-05	**0,765722**	6,86E-06	0,024384
Guo2012	First-time donors responding to a national disaster may be an untapped resource for the blood centre	0,089617	0,079195	0,000903	**0,763781**	1,99E-05	0,066484
Volken2015	Blood donor to inactive donor transition in the Basel region between 1996 and 2011: A retrospective cohort study	0,156427	0,082449	5,48E-07	**0,724308**	6,98E-07	0,036814
Yuan2011	Motivating factors and deterrents for blood donation among donors at a university campus-based collection center	0,100152	0,159291	3,35E-06	**0,72362**	1,82E-06	0,016932
Yuan2016	Blood donation mobile applications: Are donors ready?	0,147337	0,149369	7,09E-06	**0,687131**	1,73E-06	0,016154
Yu2007	Predicting potential drop-out and future commitment for first-time donors based on first 1.5-year donation patterns: The case in Hong Kong Chinese donors	0,118768	0,11901	0,000142	**0,679386**	0,000174	0,08252
Nguyen2008	Blood donor satisfaction and intention of future donation	0,096251	0,119222	0,000126	**0,659756**	6,47E-05	0,124581
Lattimore2015	Blood donors in England and North Wales: Demography and	0,164073	0,158199	0,001681	**0,588921**	0,000479	0,086647

	patterns of donation						
Schreiber2006	Convenience, the bane of our existence, and other barriers to donating	0,115242	0,158638	0,001429	**0,575497**	0,000676	0,148518
Shaz2010	The African American church as a donation site: Motivations and barriers	0,12217	0,240522	0,003542	**0,564444**	0,000742	0,06858
Germain2007	Determinants of return behavior: A comparison of current and lapsed donors	0,12355	0,195653	0,001348	**0,553652**	0,000696	0,125102
Gemelli2017	Frequent whole blood donors: Understanding this population and predictors of lapse	0,127972	0,15875	0,000657	**0,5343**	0,000476	0,177845
Steele2008	The role of altruistic behavior, empathetic concern, and social responsibility motivation in blood donation behavior	0,122438	0,225237	0,002108	**0,51904**	0,001824	0,129353
Misje2008	Recruiting and retaining young people as voluntary blood donors	0,213261	0,214469	0,000923	**0,497576**	0,000179	0,073592
James2013	Blood donations motivators and barriers: A descriptive study of African American and white voters	0,172281	0,310762	0,000117	**0,486959**	2,29E-05	0,029859
Misje2010	Gender differences in presentation rates, deferrals and return behaviour among Norwegian blood donors	0,177903	0,186071	0,007551	**0,479823**	0,002296	0,146356
Zito2012	Adolescents and blood donation: Motivations, hurdles and possible recruitment strategies	0,149425	0,238705	0,000379	**0,469448**	0,001282	0,140761
Beerli-Palacio2015	How to increase blood donation by social marketing	0,160752	0,287516	6,46E-05	**0,444199**	0,000117	0,107352
Glynn2002	Motivations to donate blood: Demographic comparisons	0,136101	0,237904	0,009484	**0,435789**	0,002589	0,178133
Weidmann2013	Donor satisfaction with a New German blood donor questionnaire and intention of the donor to return for further donations	0,303708	0,197434	6,58E-05	**0,389995**	3,96E-05	0,108758
Kalargirou2014	Attitudes and behaviours of Greeks concerning blood donation: Recruitment and retention campaigns should be focused on need rather than altruism	0,158121	0,380389	0,00016	**0,389126**	0,000307	0,071897
Charbonneau2016	Why do blood donors lapse or reduce their donation's frequency?	0,210114	0,329524	0,000159	**0,361087**	0,000109	0,099008
Veldhuizen2013	Donor cycle and donor segmentation: New tools for improving blood donor management	0,210293	0,228081	0,004605	**0,360816**	0,002203	0,194001
Hupfer2005	Understanding Canadian student motivations and beliefs about giving blood	0,127101	0,2978	0,00038	**0,333873**	0,000839	0,240006
Davison2015	Getting personal with blood donors - the rationale for, methodology of and an overview of participants in the UK blood donor survey	0,169866	0,189023	0,244666	**0,267487**	0,004342	0,124617
France2014a	Development of common metrics for donation attitude, subjective norm, perceived behavioral control, and intention for the blood donation context	0,000939	0,001294	2,79E-05	0,000882	**0,994273**	0,002584
Armitage2001	Social cognitive determinants of blood donation	0,000854	0,001176	5,83E-05	0,000922	**0,994172**	0,002817
Conner2015	Role of affective attitudes and anticipated affective reactions in predicting health behaviors	0,000964	0,001328	8,2E-05	0,00104	**0,99376**	0,002825

Masser2012	Predicting the retention of first-time donors using an extended Theory of Planned Behavior	0,00049	0,000796	1,62E-07	0,0005	**0,993374**	0,00484
Faqah2015	Assessment of blood donation intention among medical students in Pakistan - an application of theory of planned behavior	0,001945	0,002843	7,64E-07	0,000988	**0,989945**	0,004279
Godin2007	Determinants of repeated blood donation among new and experienced blood donors	0,002557	0,003592	1,76E-06	0,002423	**0,976354**	0,015073
Holdershaw2011	Predicting blood donation behaviour: Further application of the theory of planned behaviour	0,005047	0,006834	8,52E-05	0,004505	**0,969866**	0,013663
Armitage2008	Use of mental simulations to change theory of planned behaviour variables	0,005506	0,005931	1,06E-05	0,003046	**0,969585**	0,015922
Lemmens2005	Why don't young people volunteer to give blood? An investigation of the correlates of donation intentions among young nondonors	0,007078	0,01005	0,000121	0,006529	**0,963686**	0,012536
Masser2008	The psychology of blood donation: Current research and future directions	0,004248	0,006552	0,000819	0,006757	**0,96264**	0,018984
Conner2013	Some feelings are more important: Cognitive attitudes, affective attitudes, anticipated affect, and blood donation	0,012516	0,014528	0,001122	0,011092	**0,938835**	0,021907
Polonsky2013	African culturally and linguistically diverse communities' blood donation intentions in Australia: Integrating knowledge into the theory of planned behavior	0,031391	0,052227	0,000504	0,02399	**0,857348**	0,03454
Bednall2013	A systematic review and meta-analysis of antecedents of blood donation behavior and intentions	0,025103	0,039502	0,001015	0,033714	**0,771722**	0,128944
Ferguson2012	Exploring the pattern of blood donor beliefs in first-time, novice, and experienced donors: Differentiating reluctant altruism, pure altruism, impure altruism, and warm glow	0,068738	0,117054	0,000975	0,12298	**0,411652**	0,278601
VanDongen2015	Easy come, easy go. Retention of blood donors	0,016129	0,019596	2,56E-05	0,020817	0,001031	**0,942401**
Bagot2016a	How can we improve retention of the first-time donor? A systematic review of the current evidence	0,010016	0,019475	4,35E-05	0,036998	0,004632	**0,928836**
Masser2013	Beliefs underlying the intention to donate again among first-time blood donors who experience a mild adverse event	0,024086	0,036589	2E-05	0,03817	0,001516	**0,899619**
Masser2016	Negative experiences and donor return: An examination of the role of asking for something different	0,027903	0,032202	0,000104	0,042431	0,000408	**0,896952**
Ferguson2007	Improving blood donor recruitment and retention: Integrating theoretical advances from social and behavioral science research agendas	0,013068	0,025138	5,01E-05	0,019953	0,133525	**0,808266**
France2015	Motivating first-time, group O blood donors to return: Rationale and design of a randomized controlled trial of a post-donation telephone interview	0,02653	0,043178	1,45E-05	0,039289	0,083896	**0,807093**
Newman2014	Management of young blood donors	0,053739	0,063369	0,001465	0,080588	0,001713	**0,799126**
Ringwald2010	Keys to open the door for blood donors to return	0,034766	0,073557	1,73E-06	0,131482	9,63E-06	**0,760183**

Bagot2015a	Recruiting and retaining plasmapheresis donors: A critical belief analysis	0,053506	0,089409	0,000112	0,10484	0,01047	**0,741663**
VanDongen2014	Predicting blood donation maintenance: The importance of planning future donations	0,124194	0,084559	5,36E-06	0,053496	0,000786	**0,736959**
France2013a	Donor anxiety, needle pain, and syncopal reactions combine to determine retention: A path analysis of two-year donor return data	0,089318	0,099423	0,000153	0,104739	0,003655	**0,702713**
Martin-Santana2013	Intention of future donations: A study of donors versus non-donors	0,035829	0,139859	2,04E-06	0,151912	7,04E-05	**0,672328**
France2014	Fear of blood draws, vasovagal reactions, and retention among high school donors	0,126047	0,123527	0,00083	0,135385	0,001836	**0,612375**
Thijsen2016	Lost in translation: Knowledge, attitudes and practices in donors experiencing a vasovagal reaction	0,157749	0,129291	3,43E-05	0,11163	5,47E-05	**0,601241**
France2005	Donors who react may not come back: Analysis of repeat donation as a function of phlebotomist ratings of vasovagal reactions	0,096354	0,080789	4,91E-05	0,228716	9,6E-05	**0,593995**
Gillespie2002	Blood donors and factors impacting the blood donation decision	0,027277	0,089256	0,000243	0,302658	0,000651	**0,579917**
Bagot2013a	Perceived deterrents to being a plasmapheresis donor in a voluntary, nonremunerated environment	0,085603	0,185492	7,2E-05	0,170866	0,00048	**0,557487**
Sauer1999	Caffeine attenuates vasovagal reactions in female first-time blood donors	0,158394	0,177705	0,001003	0,146469	0,001575	**0,514854**
France2013b	A Web-based approach to blood donor preparation	0,137447	0,183816	0,000113	0,161421	0,006182	**0,511021**
Ferguson2008	Blood donation is an act of benevolence rather than altruism	0,117895	0,243611	5,67E-05	0,140867	0,007069	**0,490501**
Ditto2014	Social contagion of vasovagal reactions in the blood collection clinic: A possible example of mass psychogenic illness	0,194969	0,16425	0,000161	0,150784	0,000322	**0,489514**
Schlumpf2008	Factors influencing donor return	0,098341	0,139254	0,000374	0,318629	0,007617	**0,435786**
Masser2010	An evaluation of a donation coping brochure with Australian non-donors	0,209589	0,201592	0,000657	0,129564	0,034035	**0,424564**
Holly2011	Applied tension and blood donation symptoms: The importance of anxiety reduction	0,23335	0,21392	0,000139	0,140463	0,000369	**0,41176**
Bednall2011	Donating blood: A meta-analytic review of self-reported motivators and deterrents	0,060543	0,19974	0,003374	0,325267	0,013104	**0,397971**
Ferguson1996	Predictors of future behaviour: A review of the psychological literature on blood donation	0,078587	0,109044	0,002907	0,100804	0,322277	**0,386381**
Carter2011	Donor recruitment in the 21st century: Challenges and lessons learned in the first decade	0,151534	0,24181	0,00191	0,221695	0,002453	**0,380599**
Ferguson2002	Predicting future blood donor returns: Past behavior, intentions, and observer effects	0,193451	0,209282	9,44E-05	0,214989	0,005972	**0,376212**
Godin2014	Promoting the return of lapsed blood donors: A seven-arm randomized controlled trial of the question-behavior effect	0,134956	0,184332	0,002505	0,247892	0,071826	**0,358488**
Lemmens2010	Motivating blood donors to recruit new donors: Experimental	0,185866	0,227869	0,001934	0,212223	0,020672	**0,351436**

	evaluation of an evidence-based behavior change intervention						
Ferguson2004	Conscientiousness, emotional stability, perceived control and the frequency, recency, rate and years of blood donor behaviour	0,135582	0,185773	0,000608	0,306626	0,02325	**0,348161**
Devine2007	Donor recruitment research	0,111253	0,257874	6,86E-06	0,297619	7,69E-06	**0,333239**
France2017	A motivational interview promotes retention of blood donors with high internal motivation	0,26017	0,23632	7,17E-06	0,173036	0,00018	**0,330287**
Godin2010	Which survey questions change behavior? Randomized controlled trial of mere measurement interventions	0,16091	0,199039	0,002204	0,160376	0,169932	**0,307539**
VanDongen2013	Does questionnaire distribution promote blood donation? An investigation of question-behavior effects	0,1983	0,244428	0,003504	0,21556	0,040976	**0,297232**

* Membership values range from 0 to 1. The closer to 1, the greater the membership.