Tesis Doctoral por compendio de artículos

El comportamiento del donante de sangre en España desde la perspectiva del marketing social

Programa de Doctorado en Empresa, Internet y Tecnologías de las Comunicaciones

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Las Palmas de Gran Canaria

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D. MIGUEL ÁNGEL FERRER BALLESTER, COORDINADOR DEL PROGRAMA DE DOCTORADO EMPRESA, INTERNET Y TECNOLOGÍAS DE LAS COMUNICACIONES DE LA UNIVERSIDAD DE LAS PALMAS DE GRAN CANARIA,

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1. Introducción

La transfusión de sangre es un servicio indispensable para cualquier sistema sanitario. Así, contribuye a salvar millones de vidas cada año, tanto en situaciones médicas rutinarias como en emergencias, permite la realización de intervenciones médicas y quirúrgicas cada vez más complejas, y mejora la esperanza y la calidad de vida de los pacientes con múltiples enfermedades agudas y/o crónicas (Organización Mundial de la Salud y Federación Internacional de Sociedades de la Cruz Roja y la Media Luna Roja, 2010). La importancia de la transfusión también se hace patente en la actual crisis de la COVID-19, pues diversos ensayos clínicos están investigando los efectos del plasma de pacientes curados del virus en el tratamiento de pacientes contagiados (Haw *et al.*, 2020).

No obstante, a pesar de la importancia de disponer de sangre segura y suficiente para satisfacer las necesidades clínicas, que es un derecho para todos los pacientes, existe un desequilibrio entre la oferta y la demanda, incluso en los países desarrollados con sistemas sanitarios bien estructurados (Organización Mundial de la Salud y Federación Internacional de Sociedades de la Cruz Roja y la Media Luna Roja, 2010). Esta descompensación no se debe al incremento en la demanda de sangre y productos sanguíneos en sí, sino a la disminución de la oferta. Dado que la sangre no se puede producir artificialmente (Moussaoui *et al*., 2016), la oferta depende íntegramente de los donantes (Piersma y Merz, 2019), siendo los donantes voluntarios y no remunerados los más idóneos en términos de seguridad y sostenibilidad del sistema (Organización Mundial de la Salud y Federación Internacional de Sociedades de la Cruz Roja y la Media Luna Roja, 2010). En las últimas décadas, el número de donantes ha disminuido (Devine, 2019), y sólo entre el 5 y el 10% de la población que cumple con los requisitos para donar sangre lo hace (Masser *et al*., 2019; Wevers, Wigboldus, van Baaren, *et al.*, 2014). Particularmente en España, las cifras también se sitúan en dicho intervalo. Así, de acuerdo con los últimos datos disponibles de la Federación Española de Donantes de Sangre (2020), en el año 2019 se registraron un total de 1.998.320 donantes activos. En 2019, según el Instituto Nacional de Estadística, en España había 30.244.852 hombres y mujeres de entre 18 y 65 años, tramo de edad en el que un individuo es apto para donar, siempre que tenga un peso corporal mayor de 50 kilos y goce de buena salud (Ministerio de Sanidad y Consumo, 2005). Esto se traduce en que sólo el 6,61% de la población donó sangre en 2019, por lo que la tasa de donación en España es de 36,65 donaciones por cada 1.000 habitantes (Federación Española de Donantes de Sangre, 2020). Además, teniendo en

cuenta que en 2019 se realizaron un total de 1.693.241 donaciones (Federación Española de Donantes de Sangre, 2020), se estima que los donantes en España realizan, en promedio, 0,85 donaciones al año, siendo posible donar un máximo de cuatro veces al año en el caso de los hombres y tres veces en el de las mujeres (Ministerio de Sanidad y Consumo, 2005).

Esta caída en el número de donantes se explica en gran parte por el envejecimiento de la población, que provoca que los donantes abandonen el sistema de forma forzada al dejar de cumplir con los requisitos de elegibilidad (Greinacher *et al.*, 2011). Sin embargo, también existe un número significativo de donantes que, por diversas razones, dejan de hacerlo (van Dongen *et al.*, 2012) o que, aun siendo aptos y teniendo una actitud favorable hacia donar sangre, nunca han dado el paso (Fonte *et al.*, 2016).

Para mantener un suministro de sangre estable que permita satisfacer las necesidades de la población, los centros de transfusión, que son los organismos responsables de la donación de sangre en España (Ministerio de Sanidad y Consumo, 2005), cuentan con tres estrategias: captar nuevos donantes, retener y fidelizar a los donantes activos, y recuperar a los donantes que, o bien han abandonado el sistema (donantes inactivos), o bien han sido rechazados temporalmente como donantes por no cumplir con los criterios de selección (Godin *et al.*, 2005; Weidmann *et al.*, 2012). Para lograr unos resultados óptimos, se recomienda que estas tres estrategias se apliquen de forma complementaria por los motivos que se describen a continuación. Los donantes activos tienen, en general, una menor incidencia de marcadores infecciosos y de reacciones físicas adversas, durante y después de donar. Además, tienden a estar más comprometidos con la causa y suelen donar con mayor frecuencia a lo largo del año (Kasraian y Tavassoli, 2012). Por su parte, los nuevos donantes son los candidatos a reemplazar a aquellos que abandonan el sistema por motivos voluntarios o forzados (Beerli-Palacio y Martín-Santana, 2015). Finalmente, los donantes inactivos y rechazados ya han demostrado interés por donar en el pasado (van Dongen *et al.*, 2012) y están familiarizados con el proceso (Klinkenberg *et al.*, 2018), por lo que pueden llegar a cumplir ambas funciones.

Sin embargo, la captación, retención y recuperación de donantes no deja de suponer un reto para los centros de transfusión (Fosgaard *et al.*, 2020). Donar sangre, a pesar de su importancia, requiere invertir ciertos recursos personales, a menudo escasos, como es el tiempo (Duboz y Cunéo, 2010); e incluso puede llegar a conllevar riesgos para el donante, como por ejemplo desmayos, hematomas en los brazos, etc.

(Piersma y Merz, 2019). Además, en los centros de transfusión suele predominar una filosofía de gestión muy orientada al producto (Russell-Bennett *et al.*, 2013), donde se prioriza la maximización de las bolsas de sangre en momento puntuales a través de campañas intensivas de promoción. Este enfoque de gestión hacia el producto deja la gestión de las relaciones con los donantes en un segundo plano (Romero-Domínguez *et al.*, 2019) y hace que los centros de transfusión se olviden de que los donantes también deben ser uno de sus *stakeholders* prioritarios, pues sin ellos es imposible satisfacer las demandas de los pacientes receptores (beneficiarios).

Para superar estas dificultades y garantizar el mantenimiento del sistema, se recomienda que los centros de transfusión apliquen los principios del marketing en sus estrategias de captación, retención y recuperación de donantes, con el fin de lograr una mayor eficacia y eficiencia de las mismas (Beerli-Palacio y Martín-Santana, 2015). De esta forma, es posible eliminar la contradicción que existe entre la actitud favorable generalizada de la población hacia la donación de sangre y las tasas de donación registradas (Huis in ’t Veld *et al.*, 2019).

Se ha demostrado que el marketing se puede aplicar en contextos no lucrativos, aunque con ciertos matices (Padanyi y Gainer, 2004). En el caso particular de la donación de sangre, el marketing social adquiere una especial relevancia (Pereira *et al*., 2016). El término marketing social fue acuñado originalmente por Kotler y Zaltman (1971) para referirse al uso de técnicas derivadas del marketing tradicional en causas sociales, y su principal objetivo es persuadir a los individuos para que acepten, modifiquen o abandonen ciertas ideas, actitudes o comportamientos para beneficiarse directamente ellos mismos o a la sociedad de la que forman parte (Pereira *et al*., 2016; Polonsky *et al*., 2015). De acuerdo con Truong (2014), para lograr un cambio a favor de la donación de sangre entre la población, es imprescindible estudiar el comportamiento de donación, el cual varía sustancialmente entre individuos y es altamente complejo al estar influido por múltiples factores como son las barreras, las motivaciones, las actitudes, la experiencia previa, las características sociodemográficas y la intención de donar (Bednall *et al*., 2013). Entre ellos, las barreras adquieren especial interés porque son una causa directa del detrimento de la oferta de sangre, tanto en términos de donantes como de donaciones. Por este motivo, uno de los principales objetivos del marketing social aplicado a la donación de sangre es eliminar dichas barreras y, al mismo tiempo, poner en valor los factores que contribuyan a superarlas (Beerli-Palacio y Martín-Santana, 2015; Polonsky *et al*., 2015), como por ejemplo las motivaciones. Así, al conocer qué factores son los más

influyentes en el comportamiento de donación de donantes activos y potenciales (Piersma y Merz, 2019) y cómo varían según sus perfiles (Patel *et al*., 2019), los centros de transfusión podrían diseñar e implementar acciones diferenciadas de captación, retención y recuperación (Mostafa, 2010). Esto contribuiría al tan necesario cambio en la perspectiva de la gestión de donantes, pues los centros de transfusión tienden a diseñar acciones indiferenciadas, dirigidas a públicos muy amplios y con mensajes homogéneos que no alcanzan los resultados deseados (Sundermann *et al*., 2017; Trenholm, 2017).

Ahora bien, a pesar de la utilidad de los principios y prácticas del marketing en el contexto de la donación de sangre (Pesavento y Bégué, 2011; Wakefield *et al*., 2010), los centros de transfusión, como muchas de las organizaciones del ámbito sanitario, se mantienen bastante escépticos ante la aplicación de los mismos (Russell-Bennett *et al*., 2013), pues en dicho sector, el marketing tiende a estar erróneamente asociado a los conceptos de relaciones públicas o promoción (Dolnicar y Lazarevski, 2009). Además, en el contexto del marketing social, el comportamiento del donante ha tenido un tratamiento limitado (Truong, 2014) y principalmente desde una perspectiva sanitaria y no comercial.

Teniendo en cuenta lo anterior, el objetivo de la presente Tesis Doctoral presentada por compendio de artículos es analizar el comportamiento del donante de sangre en España bajo la perspectiva del marketing social. Esta Tesis, por tanto, contribuye simultáneamente a dos áreas de conocimiento. Por un lado, al área sanitaria, pues arroja luz sobre los principales determinantes del comportamiento de los donantes españoles, activos y potenciales, permitiendo a los centros de transfusión modificar su modelo de gestión tradicional y diseñar acciones y estrategias diferenciadas y más efectivas. Y, por otro lado, al área del marketing social, ampliándola mediante la aplicación de sus principios en un ámbito escasamente estudiado como es la donación de sangre voluntaria y no remunerada.

2. Estado del arte

2.1. Las barreras hacia la donación de sangre

Como se mencionó anteriormente, uno de los principales objetivos del marketing social aplicado al contexto de la donación de sangre es eliminar las barreras hacia la donación. En términos generales, las barreras son las dificultades potenciales y contextos que un individuo necesita superar para desempeñar un comportamiento

(Godin *et al*., 2007). En este contexto particular, por tanto, las barreras constituyen las razones por las que los individuos no donan sangre. Aunque generalmente se estudian para los no donantes y los donantes inactivos, correspondiéndose respectivamente con las razones para no haber donado nunca o para haber dejado de hacerlo (Duboz y Cunéo, 2010; Wevers, Wigboldus, De Kort, *et al*., 2014), las barreras hacia la donación también afectan a los donantes activos, actuando como obstáculos para donar con mayor frecuencia (Charbonneau *et al*., 2016). Además, la importancia de las barreras radica en cómo afectan al comportamiento de donación. Mientras que un individuo puede estar motivado por múltiples factores (p.ej., cumplir con un deber social, sentirse útil, recibir un regalo de agradecimiento), cuyos efectos suman en la predisposición a donar, una única barrera puede hacer fracasar por completo un intento de donación (Bednall y Bove 2011). Por todo ello, el análisis de las barreras hacia la donación se convierte en un aspecto básico en el estudio del comportamiento del donante y en el diseño de acciones de marketing por parte de los centros de transfusión.

La literatura ha detectado una amplia variedad de barreras hacia la donación, entre ellas, el miedo (p.ej., a la extracción en sí, a las agujas o a la visión de la sangre), se considera una de las más importantes. Además de predisponer negativamente al individuo hacia la donación de sangre al generar estrés y aversión (France y France, 2018; Piersma y Merz, 2019), el miedo constituye un antecedente de las reacciones físicas adversas durante o después de la donación (p.ej., mareos, náuseas, desvanecimientos) (France *et al*., 2019), las cuales también influyen negativamente en el comportamiento de donación (Gillet *et al*., 2015). Comparativamente, los no donantes (Ngoma *et al*., 2013; Shaz *et al*., 2010) y los donantes de primera vez (Martín-Santana y Beerli-Palacio, 2012; Mohammed y Essel, 2018) son las tipologías de donantes a las que más afecta esta barrera porque están menos familiarizados con el proceso de donacion y con el equipamiento implicado. Además, esta falta de experiencia incrementa los niveles de miedo y ansiedad (Vavić *et al*., 2012). Eliminar las barreras asociadas al miedo, sin embargo, no resulta sencillo para los centros de transfusion, pues se trata de obstáculos predominantemente intrínsecos al individuo.

Otra de las barreras más importantes hacia la donacion es la inconveniencia del acto de donar (Schreiber *et al*., 2006). El término inconveniencia puede hacer referencia a la localización de los puntos de donación (p.ej., Hupfer *et al*., 2005), a los horarios en los que estos operan (p.ej., Klinkenberg *et al*., 2018) o a ambos aspectos a

la vez (p.ej., Shaz *et al*., 2010). En cualquier caso, esta barrera refleja la aparente dificultad que tienen los individuos para integrar la donación de sangre en sus rutinas (van Dongen *et al*., 2014), a pesar de los esfuerzos de los centros de transfusión para hacer de la donación de sangre un acto accesible y de transmitir la importancia y la necesidad de donar sangre de forma repetitiva y prolongada en el tiempo.

En línea con lo anterior, algunos estudios han detectado la falta de tiempo como otro impedimento relevante para donar sangre (Bani *et al*., 2014; Charbonneau *et al*., 2016). La falta de tiempo puede deberse a múltiples motivos, pero entre los más habituales se encuentran las responsabilidades laborales y/o académicas y las cargas familiares (Bani *et al*., 2014; Charbonneau *et al*., 2016). Afirmar que no se dispone de tiempo libre para donar, según Duboz y Cunéo (2010), es un indicio de que los individuos consideran que donar sangre requiere demasiado tiempo. Sin embargo, la duración del propio proceso de extracción está establecida de acuerdo con una serie de criterios de seguridad, tanto para el donante como para la sangre donada, por lo que difícilmente puede reducirse. La falta de tiempo, por tanto, es una barrera que depende por completo del individuo.

La falta de información también ha surgido como barrera hacia la donación de sangre (Kalargirou *et al*., 2014), especialmente entre los no donantes (Beerli-Palacio y Martín-Santana, 2009; Duboz y Cunéo, 2010). Esto se debe a que la informacion es la base fundamental para tomar cualquier decisión (Polonsky *et al*., 2013), más aún si dicha decisión implica un comportamiento de riesgo como es donar sangre (Barkworth *et al*., 2002). Los aspectos sobre los que los individuos afirman estar desinformados son, principalmente, la necesidad e importancia reales de donar sangre regularmente (Mathew *et al*., 2007; Shaz *et al*., 2010), los lugares a los que hay que acudir para hacerlo (James *et al*., 2013; Muthivhi *et al*., 2015), y en qué consiste el propio proceso de donacion (Atherley *et al*., 2016; Mohammed y Essel, 2018). Con respecto a lo último, este desconocimiento puede generar ideas incorrectas, prejuicios, e incluso miedos irracionales sobre la donación de sangre. Por ejemplo, los no donantes a menudo expresan su preocupación por contagiarse de alguna enfermedad infecciosa al donar o recibir una transfusión sanguínea, a pesar de que se trata de procesos totalmente seguros (Shaz *et al*., 2009; Zaller *et al*., 2005). Adicionalmente, una parte significativa de la población desconoce o no ha interpretado correctamente cuáles son los requisitos para donar (Baig *et al*., 2013; Mohammed y Essel, 2018). Esto resulta especialmente preocupante porque puede provocar que individuos potencialmente aptos para donar se apliquen erróneamente un auto-aplazamiento o una auto-

exclusión (Zaller *et al*., 2005) y decidan abandonar el *pool* de donantes, o simplemente nunca lleguen a formar parte de él.

Por otra parte, muchos individuos, tanto no donantes (Batiha y Albashtawy, 2013; Gomes *et al*., 2019) como donantes regulares (Baig *et al*., 2013; Marantidou *et al*., 2007), afirman que no donan sangre o no lo hacen con más frecuencia porque nadie les ha pedido expresamente que lo hagan. Según Mathew *et al*. (2007), en circunstancias normales, los individuos no piensan en la necesidad constante de sangre, ni son conscientes de que el equilibrio entre la oferta y la demanda de sangre es tan relevante. Por ese motivo, en ocasiones, esperan a que los centros de transfusión hagan un llamamiento urgente (Simon, 2003; Solomon, 2012) o contacten directamente con ellos para donar (James *et al*., 2013; Veerus *et al*., 2017).

Finalmente, la calidad del servicio prestado en las experiencias de donación anteriores, si es deficiente, también constituye una barrera importante para donar en el futuro (Ringwald *et al*., 2010), especialmente cuando se trata de la primera donación (Devine *et al*., 2007; Vavić *et al*., 2012). La calidad del servicio puede estar determinada por múltiples aspectos como el trato del personal de extracción (Mohammed y Essel, 2018; Veerus *et al*., 2017), los elementos ambientales tales como la privacidad de las instalaciones, la limpieza, etc. (Melián-Alzola y Martín-Santana, 2020; Saha y Bhattacharya, 2019); los tiempos de espera (McKeever *et al*., 2006), la experimentación de reacciones adversas (Masser *et al*., 2013) o la incorrecta gestión de un aplazamiento por no cumplir con los requisitos para donar (Beal, 1999; Ringwald *et al*., 2010). En cualquier caso, prestar un servicio de calidad es fundamental para fomentar la retención de donantes porque una mala experiencia de donación no sólo influye negativamente al donante que la experimenta, sino que, mediante el boca-oreja negativo, también puede incidir en otros donantes, tanto regulares como potenciales (Bednall y Bove, 2011).

2.2. Las motivaciones hacia la donación de sangre

Paralelamente a eliminar las barreras, otro de los objetivos del marketing social aplicado a la donación de sangre es poner en valor las motivaciones para contrarrestar el efecto que las barreras tienen sobre el comportamiento de donación. Las motivaciones pueden definirse como las fuentes o fuerzas que impulsan a los individuos a actuar. En términos más simples, las motivaciones son las razones por las que los individuos “hacen cosas” (Martín-Santana y Beerli-Palacio, 2013; Ryan y Deci, 2000). Su estudio es crucial al analizar el comportamiento del donante por su

importancia en la adopción de un comportamiento socialmente deseable como es la donación de sangre (Martín-Santana y Beerli-Palacio, 2008). Además, conocer qué motiva a los individuos a donar es complejo ya que, como se mencionó anteriormente, los donantes pueden donar por múltiples razones a la vez (Bednall y Bove, 2011; Karacan *et al*., 2013), y dichas motivaciones tienden a cambiar a lo largo del tiempo (France *et al*., 2014; Guiddi *et al*., 2015).

Numerosos trabajos han identificado el altruismo como la principal motivación para donar sangre (Charbonneau *et al*., 2015; Gonçalez *et al*., 2013; Karacan *et al*., 2013; Mostafa, 2010; Steele *et al*., 2008; Swanevelder *et al*., 2019), tanto en donantes de primera vez (e.g. Boenigk *et al*., 2011) como donantes repetidores (e.g. Gonçalez *et al*., 2013). Tal es así, que la mayoría de las campañas de captación y retención de donantes que realizan los centros de transfusión se basan en mensajes que apelen al altruismo (Chell y Mortimer, 2014; Ferguson, 2015). El altruismo puede definirse como el deseo de ayudar a otros sin recibir ningún tipo de beneficio o recompensa a cambio, incurriendo a su vez en una serie de costes personales (Ferguson y Lawrence, 2016). Sin embargo, el altruismo en realidad es un concepto mucho más complejo que va más allá del deseo de ayudar desinteresadamente a otros. También implica obtener una recompensa emocional (p.ej., alegría, satisfacción) que se deriva de hacer una buena obra, de cumplir con un deber hacia la sociedad, etc. (Evans y Ferguson, 2014; Ferguson, 2015; Karacan *et al*., 2013). Esta premisa, por la cual donar sangre es un comportamiento por el que tanto el donante como el paciente receptor se benefician, se denomina hipótesis de la benevolencia (Farrugia *et al*., 2010) y está estrechamente relacionado con el concepto de altruismo impuro descrito por Andreoni (1990). Así, donar sangre, aunque es en sí un comportamiento altruista, está “motivado por interés” (Ferguson y Lawrence, 2016). Esta realidad parece explicar el por qué las campañas de promoción de la donación, habitualmente centradas en mensajes principalmente altruistas y humanitarios, no han tenido el éxito esperado (Moussaoui *et al*., 2016).

En la literatura existen diversos enfoques que estudian las motivaciones hacia la donación de sangre más allá de la forma más pura del altruismo. Uno de ellos es el enfoque de mecanismos del altruismo (Evans y Ferguson, 2014; Ferguson, 2015). De acuerdo con este enfoque, que se basa en la literatura sobre psicología, economía y biología evolutiva, la donación de sangre puede estar motivada por los siguientes siete motivos: (1) altruismo puro, entendido como el deseo de ayudar a otros de forma totalmente desinteresada; (2) *warm-glow*, que son las recompensas emocionales derivadas de la realización de un comportamiento (el altruismo impuro, mencionado en

el párrafo anterior, resulta de combinar el altruismo puro y el *warm-glow*); (3) altruismo reluctante, que surge como respuesta ante la falta de confianza en que otros donen sangre; (4) responsabilidad social, que refleja el sentido del deber hacia la donación; (5) hedonismo, un motivo puramente egoísta que consiste en donar para recibir un beneficio personal al margen del bienestar de los pacientes receptores (p.ej., recibir un regalo de agradecimiento o los resultados del análisis de la sangre donada); (6) obtención de reputación, y (7) selección de parentesco, bajo la cual los individuos muestran una preferencia por ayudar a los miembros de su familia (Evans y Ferguson, 2014).

Otro enfoque que apoya la idea del carácter múltiple de las motivaciones para donar sangre es el funcionalista. Según esta perspectiva, los individuos desempeñan actividades de voluntariado para satisfacer diversas necesidades y funciones psicológicas (Clary *et al*., 1998). Estas motivaciones se agrupan en seis categorías: (1) de valores, que persiguen expresar y compartir con otras personas los valores altruistas y humanitarios que promueven el voluntariado; (2) de conocimiento, que se basan en la obtención de nuevas experiencias de conocimiento y en la aplicación de habilidades, destrezas y conocimientos que, en otros contextos, no sería posible aplicar; (3) sociales, entendidas como el deseo de establecer nuevas relaciones, ampliar el círculo social y/o realizar el voluntariado con personas conocidas; (4) de carrera, que responden a la búsqueda de un impulso en la carrera profesional; (5) de defensa del yo, es decir, motivaciones dirigidas a proteger el ego (p.ej., reducir el sentimiento de culpa por ser más afortunado que otros); y (6) de autoestima, que persiguen mejorar el humor, la autoestima y el autoconcepto (Clary *et al*., 1998). Bajo la premisa de que donar sangre puede considerarse una actividad de voluntariado en la que los donantes, en lugar de ofrecer su tiempo, ofrecen una parte de sí mismos (B. M. Masser *et al*., 2008), algunos autores han aplicado con éxito el enfoque funcionalista a este contexto particular (Alfieri *et al*., 2017; Guiddi *et al*., 2015; Saha y Chandra, 2018), confirmando que existen otras motivaciones para donar sangre aparte del deseo de ayudar a otros sin recibir nada a cambio. Concretamente, los estudios anteriores constatan que las motivaciones de valores, motivaciones sociales, de defensa del yo y de autoestima son las que los donantes de sangre tienden a señalar.

De todo lo anteriormente descrito se desprende que el altruismo por sí solo no puede asegurar el mantenimiento los suministros de sangre (Irving *et al*., 2020). Es por ello que algunos centros de transfusión han optado por ofrecer incentivos para promover la donación de sangre entre la población (Chell *et al*., 2018). De hecho, en la

mayoría de países está tácitamente aceptado que los donantes deberían recibir algún tipo de compensación por desempeñar dicha conducta de riesgo (Farrugia *et al*., 2010). Dado que la modalidad de donación a la que instan diversos organismos internacionales como la Organización Mundial de la Salud (2009) o el Consejo de Europa (1995) es la voluntaria y no remunerada por los riesgos que implica la donación remunerada (Titmuss, 1997), muchos centros de transfusión han optado por ofrecer incentivos no monetarios (p.ej., regalos, chequeos de salud gratuitos, agradecimiento formal en forma de certificados y/o diplomas), los cuales se ha demostrado que no minan la motivación intrínseca de los donantes (Chmielewski *et al*., 2012; Goette *et al*., 2009). El problema de los incentivos radica en que la línea que separa los incentivos no monetarios de los monetarios es muy delgada. Por ejemplo, el Consejo de Europa (1995) considera que conceder más tiempo libre del razonablemente necesario (p.ej., un día entero) para que un individuo se ausente de su puesto de trabajo y vaya a donar sangre es un sustituto de la remuneración y, por tanto, incompatible con la donación voluntaria. Por su parte, la Administración de Alimentos y Medicamentos de Estados Unidos (2002) no lo considera como tal. En cualquier caso, ofrecer indistintamente los mismos incentivos a la totalidad de la población no es económicamente viable, ya que, hasta la fecha, ningún incentivo ha sido identificado como unánimemente aceptable por todas las tipologías de donantes (Chell *et al*., 2018). Por ese motivo, y de acuerdo con los principios del marketing social, es necesario conocer qué colectivos de la población están motivados por los incentivos, y cuáles son esos incentivos.

2.3. La falta de consenso en el estudio de barreras y motivaciones hacia la donación de sangre

De lo expuesto en los apartados anteriores se desprende que las barreras y las motivaciones hacia la donación de sangre han recibido un amplio tratamiento en la literatura sobre el comportamiento del donante. No obstante, el estudio de estos factores se ha llevado a cabo de una forma fragmentada. Esta fragmentación se observa, por un lado, en la diversidad de la terminología empleada. En la literatura es habitual encontrar diferentes denominaciones para un mismo concepto de barrera o de motivación (Piersma *et al*., 2017). Por ejemplo, al analizar la inconveniencia como barrera, mientras algunos autores se refieren a su dimensión temporal (p.ej., horarios de apertura de los puntos de donación inconvenientes) o espacial (p.ej., ubicación de los puntos de donación inconveniente) (p.ej., Hupfer *et al*., 2005; Klinkenberg *et al*., 2018; Yuan *et al*., 2011), otros consideran ambas dimensiones conjuntamente y estudian si donar sangre es “inconveniente” sin especificar las causas de dicha

inconveniencia (p.ej., Schreiber *et al*., 2006; Shaz *et al*., 2010). En el caso de las motivaciones sucede lo mismo. Por ejemplo, cuando se analiza el hecho de donar sin esperar nada a cambio como razón para hacerlo, los autores utilizan términos muy diversos como, entre otros, motivos altruistas (p.ej., Kasraian y Maghsudlu, 2012; Nilsson Sojka y Sojka, 2008), ayudar a otros (p.ej., Nguyen *et al*., 2008; Yuan *et al*., 2011) o sentir que es lo correcto (p.ej., Glynn *et al*., 2002; Shaz *et al*., 2010).

Por otro lado, el enfoque fragmentado del estudio de las barreras y motivaciones también se hace evidente en los trabajos que han agrupado dichos factores en categorías, pues estas clasificaciones varían sustancialmente en la cantidad y el contenido de los ítems incluidos. Considerando las barreras, en el trabajo de Polonsky *et al*. (2015), por ejemplo, la escala de barreras está dividida en tres categorías bien diferenciadas: razones culturales y sociales (p.ej., "Mi cultura me impiden donar sangre", "Mis mayores no aprueban que done sangre"), miedo (p.ej., "Me dan miedo las agujas") y falta de información (p.ej., "No sé a dónde tengo que ir para donar"). Por su parte, la escala propuesta en el trabajo de Zaller *et al*. (2005) está formada por dos categorías: factores individuales y factores de grupo. Además de diferir sustancialmente en el número de ítems en cada una (nueve y dos), los factores individuales incluyen una amplia variedad de barreras de diferente naturaleza: miedo a las agujas, necesidad de ausentarse del trabajo para ir a donar, preocupación por las habilidades del personal de extracción, etc. Nuevamente, estas diferencias también se observan al categorizar las motivaciones. Por ejemplo, Karacan *et al*. (2013) identifican tres categorías: beneficio individual y razones externas (p.ej., "Dono sangre porque me hace sentir bien", "Me siento obligado a donar por presiones sociales"), valores y deber moral (p.ej., "Al donar sangre, estoy salvando una vida) y sentimientos positivos y estima (p.ej., "Donar sangre me hace sentir necesario"). Por su parte, Martín-Santana y Beerli-Palacio (2008) identifican dos categorías, en consonancia con la teoría de la autodeterminación de Ryan y Deci (2000), motivaciones intrínsecas (p.ej., "Dono por la satisfacción personal de ayudar a otros") y extrínsecas (p.ej., "Dono como respuesta a un llamamiento urgente de sangre").

En definitiva, al no existir escalas de medida comunes ni validadas, la comparación de resultados entre estudios resulta compleja. Por tanto, y para que los centros de transfusión puedan conocer de forma fiable cuáles son las barreras y motivaciones que más afectan a su *pool* de donantes, tanto activos como potenciales, y diseñar acciones de marketing diferenciadas y específicas, es imprescindible que cuenten con instrumentos de medida válidos y fiables. Además, dichos instrumentos permitirían pueden ser utilizados por los centros en estudios longitudinales y, de esta forma, conocer cómo evolucionan las barreras y las motivaciones en su mercado de

referencia y actuar en consecuencia en cada momento, permitiéndoles, además, ser más efectivos y eficientes.

3. Objetivos

La presente Tesis Doctoral presentada por compendio de artículos tiene dos objetivos. El primero de ellos es analizar el grado de aplicación del marketing social en el contexto de la donación de sangre mediante la identificación de las principales líneas de investigación existentes en la literatura, así como la propuesta de futuras líneas. La consecución de dicho objetivo ha quedado reflejada en el primero de los tres artículos presentados en esta Tesis. De las conclusiones extraídas de este primer artículo se deriva el segundo objetivo de esta Tesis, que es analizar los factores determinantes del comportamiento de donación en España, concretamente las barreras y motivaciones hacia la donación, cuya naturaleza e intensidad varían entre las diferentes tipologías de donantes. Ahora bien, ante la falta de consenso observada en la literatura sobre la terminología y las categorizaciones utilizadas para analizar dichos factores, como paso previo, ha sido necesario diseñar y validar dos escalas que integran de forma holística la amplia variedad de barreras y motivaciones identificadas en la literatura. Ambas escalas se encuentran disponibles en los Anexos I y II. Los artículos segundo y tercero presentados en esta Tesis responden a este segundo objetivo.

4. Metodología

Para cumplir con el primer objetivo de esta Tesis Doctoral (identificar las principales líneas de investigación existentes en la literatura sobre el comportamiento del donante de sangre desde la perspectiva del marketing social), se ha utilizado la metodología de la minería de texto o *text mining*, operada a través del entorno RStudio (RStudio PBC, Boston, MA). Mediante el *text mining* es posible identificar los elementos subyacentes del marketing social recogidos tanto en la literatura específica de hematología como en la de marketing social, dos campos de conocimiento hasta ahora bastante distantes. Esta técnica consiste en seleccionar, explorar, modificar, modelar y evaluar grandes cantidades de datos de tipo textual con el objetivo de identificar patrones comunes entre ellos. Para ello, el *text mining* utiliza un algoritmo para encontrar información "oculta" en una colección de texto y, posteriormente, aplica métodos de procesamiento del lenguaje natural, técnicas estadísticas y *machine learning* para detectar similitudes

y asociaciones entre los documentos que conforman la colección (He *et al*., 2013; Upshall, 2014).

La metodología del *text mining* comprende tres etapas. En primer lugar, se pre-procesa el texto, lo cual implica transformarlo en una estructura de datos apta para ser leída y procesada automáticamente, con el fin de extraer conceptos principales y obtener una primera impresión sobre su contenido (He *et al*., 2013; Kumar y Ravi, 2016). En segundo lugar, se procesa y analiza el texto con el fin de identificar patrones y tendencias en la estructura de datos (Verma *et al*., 2015). Esto se realiza extrayendo los términos que guardan similitudes entre sí y analizando su frecuencia de aparición en la colección de textos (Guerreiro *et al*., 2016; Thorleuchter y Van den Poel, 2016). Una vez identificados, el *text mining* permite aplicar algoritmos de *clustering* para agrupar los términos según la terminología que comparten y las veces que aparecen en la colección, dando lugar así a temas o tópicos (Kumar y Ravi, 2016; Thorleuchter y Van den Poel, 2016; Verma *et al*., 2015). Dada la naturaleza compleja y multifactorial del comportamiento del donante de sangre, el algoritmo de *clustering* utilizado en este caso ha sido el *fuzzy c-means* (Bezdek *et al*., 1984). Este algoritmo asume que un documento puede pertenecer en diferentes magnitudes a varios *clusters* de forma simultánea, lo cual supone una ventaja sobre los algoritmos de agrupamiento exclusivo o *hard clustering* (p.ej., k-medias), que agrupan los documentos de forma discriminante y, en ocasiones, forzada (Bora y Gupta, 2014). Finalmente, el proceso de *text mining* finaliza con la evaluación y la interpretación de los resultados obtenidos.

Con respecto al segundo objetivo de la Tesis (analizar los factores determinantes del comportamiento de donación en España), la metodología empleada ha sido la encuesta personal, para la cual el instrumento de recogida de información ha sido una encuesta *online,* y el tratamiento de los datos obtenidos mediante técnicas estadísticas avanzadas. El *software* estadístico empleado para este último fin ha sido STATA (StataCorp. College Station, TX), SPSS (IBM Corp. Armonk, NY) y Latent GOLD (Statistical Innovations, Belmont, MA).

En lo que respecta a la obtención de los datos para cumplir el mencionado objetivo, es preciso comentar que esta Tesis Doctoral se encuentra vinculada a una de las líneas de investigación del Proyecto ORCETRASA, un proyecto de I+D+i a nivel nacional titulado “La orientación de los centros de transfusión de sangre españoles hacia sus principales *stakeholders* desde una perspectiva de capital social y su influencia en la *performance*” (ECO2015-64875-R), financiado por el Ministerio de Economía y Competitividad del Gobierno de España (Convocatoria 2015, Modalidad 1)

y cuyo investigador principal es la doctora Josefa Delia Martín Santana. La doctoranda ha formado parte del equipo de trabajo del Proyecto desde el inicio del mismo.

El Proyecto ORCETRASA surge ante la necesidad de equilibrar la oferta y la demanda de sangre y sus derivados en España ya que, a pesar de los esfuerzos de los centros de transfusión para concienciar a la población, las tasas de donación no alcanzan los niveles esperados, tal y como se expuso en el apartado introductorio del presente documento. Según el equipo de investigación de este Proyecto, estos resultados pueden deberse, entre otros factores, a una gestión no sustentada en la orientación al mercado que, para los centros de transfusión, debe concebirse como orientación al donante. Consideran que, al contrario que la orientación al producto, que es el enfoque habitual en el ámbito de la donación de sangre en España, la orientación al donante posiciona a éste como el elemento principal alrededor del cual debe girar la gestión de los centros de transfusión. Para su correcta implementación, en este Proyecto se postula que el estudio del comportamiento del donante activo y potencial es indispensable. Además, se considera que la orientación al mercado como filosofía de gestión, sustentada por dinámicas organizativas adecuadas (p.ej., coordinación interfuncional, conectividad interdepartamental, confianza e identificación con la organización), genera un clima de trabajo que mejora la satisfacción, el compromiso y los comportamientos de ciudadanía organizativa de los empleados de los centros de transfusión, lo cual consecuentemente repercute en la satisfacción y retención de los donantes. Por tanto, el Proyecto ORCETRASA cuenta con dos líneas de investigación: una dedicada al estudio del comportamiento del donante, y la otra dedicada al estudio de la orientación al donante, las dinámicas organizativas que la posibilitan y sus efectos en la *performance* de los centros de transfusión en España. Para lograr los objetivos de ambas líneas de investigación, el Proyecto contó con la colaboración de catorce de los diecisiete centros de transfusión de sangre existentes en España, así como de varias universidades españolas (veinticuatro en total), tanto públicas (p.ej., Universidad Pompeu Fabra, Universidad de La Rioja) como privadas (p.ej., Universidad Alfonso X el Sabio, Universidad Ramón Llull).

Para obtener la información necesaria que permitiese abordar la primera línea de investigación, dirigida a estudiar al comportamiento del donante y a la cual pertenece la presente Tesis Doctoral, en el Proyecto se diseñó un cuestionario *online* cuyo público objetivo eran donantes y no donantes residentes en España, mayores de dieciocho años y de ambos sexos. Dicho cuestionario estaba formado por un total de dieciocho preguntas y una tabla con ocho preguntas adicionales para recoger los

datos sociodemográficos de los encuestados. Antes de ser difundido entre el público objetivo, el cuestionario fue validado por diez expertos adscritos a los centros de transfusión participantes en el Proyecto.

El trabajo de campo abarcó un periodo de aproximadamente casi siete meses, del 2 de marzo al 25 de septiembre de 2018. Para difundir el cuestionario entre el público objetivo, se solicitó a los centros participantes que difundieran la dirección URL del cuestionario, junto con un mensaje de invitación a participar, entre los donantes registrados en sus bases de datos vía correo electrónico. Adicionalmente, y con el objetivo de ampliar la muestra y alcanzar a los no donantes, de los cuales no existe ningún registro formal, se solicitó a los centros que difundieran la URL y el mensaje de invitación en sus redes sociales oficiales (Facebook, Instagram y Twitter), así como en sus canales de comunicación habituales (*newsletter*, blog, notas de prensa, etc.). Paralelamente, y con el objetivo de ampliar la muestra, especialmente de estudiantes universitarios, que constituyen un colectivo de gran interés para los centros de transfusión, el equipo de investigación del Proyecto solicitó también la colaboración de las universidades españolas mediante la difusión de la URL del cuestionario entre sus comunidades universitarias, también por correo electrónico, y en sus redes sociales oficiales. Así, a fecha de 25 de septiembre de 2018, el Proyecto logró la participación de 42.503 individuos. Ahora bien, dada la existencia de encuestas sin finalizar, una vez descartadas, la muestra final comprendía un total de 35.928 participantes, donantes y no donantes, residentes en todo el territorio nacional.

Para poder gestionar de forma óptima el proceso de captación de información y la evolución de los tamaños muestrales, el equipo de investigación consideró necesario que el cuestionario se alojase en una plataforma *online* diseñada *ad hoc* para el Proyecto, en la cual se volcaban todas las encuestas, tanto finalizadas como sin finalizar.

5. Resumen de los artículos publicados

A continuación, se presenta un resumen de cada uno de las tres publicaciones que conforman la presente Tesis Doctoral por compendio de artículos.

5.1. Publicación 1: Lines of scientific research in the study of blood donor behavior from a social marketing perspective

Líneas de investigación científica en el estudio del comportamiento del donante de sangre desde la perspectiva del marketing social.

La sangre como recurso clínico y quirúrgico, indispensable para cualquier sistema sanitario, no puede producirse artificialmente en un laboratorio. Es por ello que el suministro de sangre y productos sanguíneos depende completamente de los donantes de sangre (Devine *et al*., 2007) y, más concretamente, de los donantes voluntarios y no remunerados (Farrugia *et al*., 2010; Organización Mundial de la Salud y Federación Internacional de Sociedades de la Cruz Roja y la Media Luna Roja, 2010; van der Poel *et al*., 2002). Por ese motivo, el estudio de los factores que determinan el comportamiento del donante es fundamental para los centros de transfusión, dada la importancia que el marketing social tiene en el contexto de la donación de sangre (Pereira *et al*., 2016), pues el objetivo principal del marketing social es lograr un cambio en la población que mejoren el bienestar individual y el colectivo (Gordon *et al*., 2016), Sobre esta base, el propósito de este trabajo es identificar las líneas de investigación que se han desarrollado en la literatura sobre el comportamiento del donante de sangre desde esta perspectiva, así como identificar aquéllas que puedan ser de utilidad a los centros de transfusión para definir y evaluar acciones relacionadas con el sistema de donación y con el comportamiento del donante.

Para llevar a cabo la revisión, tal y como se describió en el apartado dedicado a la metodología del presente documento, se aplicó el *text mining* a una colección de 207 documentos publicados entre 1957 y 2017. Dicha colección fue el resultado de consultar en Web of Science y Scopus las principales revistas indexadas en las áreas de marketing, hematología, administración pública y psicología. Para obtenerla, se seleccionaron un total de 50 revistas. Posteriormente, se introdujeron en los buscadores de ambos repositorios la siguiente combinación de palabras clave: "*(blood) donation*", "*(blood) donor*", "*(blood) donor behavior*" y "*(social) marketing*". La colección volcada por los dos repositorios se restringió buscando y seleccionando aquellos documentos (1) cuyos títulos contuvieran alguna de las palabras clave, (2) cuyas palabras clave coincidieran, o al menos fueran similares, con las de referencia, y (3) cuyos *abstract* fuesen acordes al tema estudiado en términos de contenido. Dicho proceso se repitió para cada una de las 50 revistas seleccionadas, obteniendo finalmente una colección de 207 documentos publicados en 27 revistas diferentes.

La aplicación del algoritmo *fuzzy c-means* permitió agrupar la colección de documentos obtenidos en seis *clusters*. Según este algoritmo, el criterio de agrupación es la similitud que cada documento guarda con cada uno de los *clusters* en los que se divide la colección. Dicha similitud, que representa la compartición de los términos más frecuentes, viene expresada mediante la función de pertenencia, la cual puede tomar valores entre 0 y 1. Así, cuanto más cercano sea el valor a 1, mayor es la pertenencia del documento a un *cluster*. Los títulos asignados a los seis *clusters*, los cuales reflejan el tópico que cubre cada uno de ellos, son los siguientes:

- *Cluster* 1 - **Sistema de donación**. Los documentos de este *cluster* (1) analizan la dicotomía entre la donación voluntaria y la remunerada a través de sus ventajas e inconvenientes, (2) defienden la idoneidad de la modalidad voluntaria frente a las demás opciones, y (3) proponen acciones dirigidas a mejorar el sistema de donación voluntaria mediante la puesta en valor de la experiencia del donante, el fomento de la donación desde edades tempranas y la utilización de los donantes como prescriptores de la donación.
- *Cluster* 2 - **Barreras y motivaciones**. Este *cluster* incluye documentos que manifiestan la importancia de estudiar las barreras y las motivaciones como determinantes de la donación de sangre, así como el uso de este conocimiento en el diseño de estrategias de marketing social. Algunos trabajos, particularmente, destacan la importancia de estudiar las barreras presentes en dos colectivos en los que hay una presencia importante de no donantes: las minorías étnicas y los jóvenes.
- *Cluster* 3 - **Seguridad**. Este *cluster* abarca dos líneas de investigación diferenciadas: (1) el establecimiento y aplicación de criterios de selección de donantes, y (2) la importancia de transmitir dichos criterios a la población para su conocimiento y concienciación. Ambas líneas contribuyen a cumplir el principal objetivo de los sistemas de donación de sangre voluntaria, que es garantizar la seguridad de la sangre donada.
- *Cluster* 4 - **Repetición**. Los documentos que conforman este *cluster* abordan los factores sociodemográficos y experienciales que se asocian al comportamiento de repetición de la donación de sangre, los cambios demográficos que repercuten negativamente en el mantenimiento del sistema de donación y la necesidad de que los centros de transfusión diseñen e implanten estrategias diferenciadas dirigidas a retener tanto a los donantes repetidores como a los donantes de primera vez.

- *Cluster* 5 - **Modelos predictivos basados en la Teoría del Comportamiento Planificado**. Los documentos integrados en este *cluster* coinciden en que estudian la intención de donar y el comportamiento de donación desde la perspectiva de la Teoría del Comportamiento Planificado. Para ello, emplean tanto el modelo original, que incluye como antecedentes de la intención la norma subjetiva, la actitud y el control percibido de la conducta, como modelos extendidos que incluyen constructos adicionales para predecir mejor la intención y el comportamiento en donación de sangre.
- *Cluster* 6 - **Reacciones vasovagales**. Este *cluster* aborda la experimentación de reacciones físicas adversas, y más particularmente de las reacciones vasovagales, como obstáculo para la retención de donantes. Para hacer frente a este riesgo, algunos documentos han desarrollado y estudiado diferentes intervenciones dirigidas a prevenir y gestionar estas reacciones.

De los resultados del *text mining* se desprende que la atención que los académicos han prestado a estudiar el comportamiento del donante de sangre no se ha visto reflejada en el desempeño de los centros de transfusión, ya que las cifras y tasas de donación siguen sin alcanzar los resultados deseados. Una de las posibles razones ante esta realidad es que los centros de transfusión no hayan utilizado la investigación sobre el comportamiento del donante de sangre a la hora de diseñar sus acciones de promoción. Otra razón que podría explicar esta situación es la estrechez de visión a la hora de llevar a cabo esta investigación. Es necesario ampliar y explorar nuevas líneas de investigación vinculadas al desarrollo del concepto de marketing en la sociedad actual, aplicando los nuevos paradigmas en el ámbito del marketing social. Por ese motivo, este trabajo, basándose en las líneas de investigación identificadas y en los nuevos paradigmas del marketing, propone las siguientes futuras líneas de investigación:

- Estudiar el comportamiento del donante de sangre mediante modelos más holísticos que incluyan todos los determinantes de la donación y que contemplen sus relaciones causa-efecto.
- Analizar la intensidad y tipología de las barreras y motivaciones hacia la donación que afectan de forma simultánea a los donantes, así como las diferencias entre tipos de donantes.
- Evaluar los efectos de intervenciones de marketing social a nivel preventivo (p.ej., utilizar las tecnologías de realidad virtual o la gamificación para mitigar las barreras hacia la donación).

- Aplicar los principios del marketing experiencial (Pintado Blanco *et al*., 2017; Schmitt, 1999) para configurar los elementos que conforman la experiencia de donación.
- Estudiar las barreras hacia la donación mediante el neuromarketing (Cartocci *et al*., 2017; Pintado Blanco *et al*., 2017), lo cual permitiría conocer en términos neurofisiológicos qué estímulos provocan reacciones negativas en los donantes, permitiendo así a los centros de transfusión adaptar sus campañas de mitigación de barreras.
- Estudiar la influencia de la orientación al mercado (Kohli y Jaworski, 1990; Narver y Slater, 1990) en el contexto de la donación de sangre.

5.2. Publicación 2: Segmenting active blood donors according to their barriers to develop retention programs

Segmentando a los donantes de sangre activos según sus barreras para desarrollar programas de retención.

Los donantes activos, individuos que han donado al menos una vez durante los últimos dos años, constituyen un pilar fundamental en el mantenimiento de cualquier sistema de donación. La retención de donantes activos tiene importantes ventajas con respecto a la captación de nuevos donantes y a la recuperación de donantes inactivos. Los donantes activos presentan una menor incidencia de marcadores infecciosos, tienden a donar con mayor frecuencia a lo largo del año y, por su alto nivel de compromiso con la donación, suelen actuar como prescriptores, animando a otros individuos a donar (Gillespie y Hillyer, 2002; Ringwald *et al*., 2010; Schreiber *et al*., 2006). Todo ello se traduce en la reducción de costes para los centros de transfusión (Devine *et al*., 2007; Gemelli *et al*., 2017).

Para optimizar las estrategias de retención, es fundamental que los centros de transfusión conozcan los factores que intervienen en la decisión de donar de forma repetitiva. Entre ellos, las barreras destacan por su potencial de dificultar o impedir cualquier intento de donación (Bednall y Bove, 2011). Aunque las barreras generalmente se han estudiado para los no donantes y los donantes inactivos (Duboz y Cunéo, 2010; Wevers, Wigboldus, De Kort, *et al*., 2014), con el fin de entender por qué estos individuos no donan o han dejado de hacerlo, las barreras también afectan a los donantes activos, influyendo en el número de veces que estos donan al año (Charbonneau *et al*., 2016).

La literatura ha identificado numerosas y diversas barreras hacia la donación de sangre. Sin embargo, su estudio se ha realizado de forma fragmentada y no holística. Los académicos todavía no han consensuado ni validado una escala común de barreras, ni tampoco una agrupación de las mismas en categorías. Además, la terminología empleada en la literatura es tan diversa que es habitual encontrar un mismo concepto de barrera bajo múltiples denominaciones (Bednall y Bove, 2011). Esto hace que la comparación de resultados entre estudios sea compleja.

Por otra parte, las barreras hacia la donación varían sustancialmente entre individuos. Esta heterogeneidad requiere segmentar a los donantes para poder desarrollar, bajo los principios del marketing social, acciones de marketing diferenciadas con las que lograr una mayor eficacia y eficiencia (Charbonneau *et al*., 2016; Martín-Santana y Beerli-Palacio, 2008; Sundermann *et al*., 2017).

Ante todo ello, el trabajo que se resume en este subapartado tiene dos objetivos. El primero es diseñar y validar una escala de barreras, de naturaleza holística e integradora, partiendo de las múltiples y diversas escalas existentes en la literatura. El segundo objetivo es segmentar a los donantes activos españoles utilizando como criterio las diferentes categorías de barreras de la escala propuesta.

La metodología seguida en este trabajo se corresponde con la encuesta *online,* diseñada y utilizada en el Proyecto ORCETRASA, dirigida a los donantes activos registrados en las bases de datos de catorce de los diecisiete centros de transfusión existentes en España que colaboraron en el Proyecto. Todos los individuos de la población objeto de estudio eran mayores de dieciocho años, de ambos sexos y residentes en España. Una vez descartadas las encuestas sin finalizar, la muestra lograda fue de 26.626 donantes activos.

La escala de barreras incluida en esta encuesta estaba formada por un total de veinticinco ítems dicotómicos extraídos de la literatura (Alinon *et al*., 2014; Beerli-Palacio y Martín-Santana, 2015; Boenigk y Leipnitz, 2016; Charbonneau *et al*., 2016; Hupfer *et al*., 2005; James *et al*., 2013; Polonsky *et al*., 2015; Shaz *et al*., 2010; Solomon, 2012), los cuales además fueron testados por una muestra de los colaboradores de los centros de transfusión. Para cada uno de ellos, el encuestado debía responder afirmativa o negativamente si dicha barrera podía impedir que incrementara el número de donaciones que hace al año. Esta escala fue validada estadísticamente mediante un análisis de componentes principales debido a su naturaleza dicotómica (Debelak y Tran, 2013). Del mismo modo, se analizó su

fiabilidad utilizando el coeficiente KR-20 debido, nuevamente, al carácter dicotómico de la escala (Nunnally y Bernstein, 1994). Estos análisis permiten afirmar que la escala propuesta es válida y fiable, ya que:

- Los resultados del análisis de componentes principales explican un 70% de la varianza total.
- Las cargas factoriales, que son las correlaciones entre los ítems y los factores en los que se agrupan, son satisfactorias, pues todos los ítems de la escala, excepto uno, tienen cargas factoriales superiores a 0,5 (Hair *et al*., 2014).
- Las comunalidades, que representan la proporción de varianza explicada por cada ítem, también son satisfactorias porque todos los ítems, excepto dos, tienen un valor de 0,5 o superior (Hair *et al*., 2014).
- Los valores del KR-20, tanto de la escala global como de tres de los cuatro factores identificados, son superiores a 0,7 (Nunnally y Bernstein, 1994).

Con respecto a la multidimensionalidad de la escala, el análisis de componente principales muestra que ésta se divide claramente en cuatro dimensiones o categorías de barerras:

- **Barreras informativas**, relacionadas con la falta de información sobre el proceso de donación, la ubicación y horarios de apertura de los puntos de donación, y/o la necesidad constante de sangre. Adicionalmente, esta categoría incorpora la ausencia de campañas de promoción de la donación y la falta de recordatorios por parte de los centros de transfusión para ir a donar.
- **Barreras intrínsecas**, referidas a los procesos internos de los individuos tales como las creencias y las percepciones (p.ej., opiniones negativas de amigos, familiares, etc. sobre la donación de sangre), así como los miedos asociados al acto de donar (p.ej., miedo a las agujas, a desmayarse).
- **Barreras espacio-temporales**, referidas a los costes de oportunidad en términos de tiempo y espacio que implica donar sangre (p.ej., ubicación inconveniente del lugar de donación, falta de tiempo para ir a donar).
- **Barreras procedimentales**, que aluden a los factores del proceso de donación en sí que desalienta a los individuos a donar (p.ej., duración del proceso completo superior a media hora, obligatoriedad de rellenar el cuestionario de salud en cada donación).

Para segmentar a los donantes activos españoles, se generaron cuatro nuevas variables, correspondiéndose cada una de ellas a la suma de barreras que los encuestados seleccionaron en cada una de las categorías identificadas. Utilizando estas variables-suma como criterio, se aplicó el *clustering* de k-medias como método de segmentación. El k-medias es una metodología no jerárquica que consiste en fraccionar los datos en un número de *clusters* establecido a priori por el investigador y reasignar iterativamente las observaciones (donantes activos) a los *clusters* hasta (1) minimizar la distancia entre las observaciones dentro de un mismo *cluster* y (2) maximizar la distancia entre *clusters* (Hair *et al*., 2014). Así, se identificaron cuatro *clusters* o segmentos de donantes activos en función de sus barreras más predominantes:

- Los **donantes muy inhibidos** (*cluster* 1), que representan el 13,2% de los donantes activos, son los más afectados por las cuatro categorías de barreras, pero especialmente por las barreras intrínsecas, sobre las cuales los centros de transfusión tienen muy poco control. Por estos motivos, los centros no deberían destinar esfuerzos ni recursos a retener a estos donantes.
- Los **donantes desinhibidos** (*cluster* 2) constituyen la contrapartida de los anteriores, pues son los menos afectados por las cuatro categorías de barreras identificadas. Por tanto, y teniendo en cuenta que se trata del *cluster* de mayor tamaño de los cuatro (46,9%), se considera el segmento de donantes activos de mayor interés para los centros de transfusión.
- Los **donantes aprensivos** (*cluster* 3) aglutinan el 16,9% de los donantes activos y están principalmente afectados por las barreras intrínsecas e informativas. Al igual que sucede con los donantes muy inhibidos, las barreras intrínsecas son difíciles de gestionar por parte de los centros de transfusión. Por tanto, retener a los donantes de este *cluster* no debe ser prioritario para los centros.
- Finalmente, los **donantes ocupados** (*cluster* 4), que representan el 23,0% de los donantes, están afectados por las barreras espacio-temporales y las informativas. Dado que este tipo de barreras pueden ser mitigadas en el corto plazo (p.ej., ampliando los horarios de apertura de los puntos de donación), este segmento también resulta atractivo para los centros de transfusión.

Los resultados de este trabajo confirman la existencia de una amplia variabilidad en las barreras que experimentan los donantes activos españoles que, además, contrariamente a lo esperado, no están exentos de experimentarlas. Por ese motivo, y

siguiendo los principios del marketing social, es fundamental que los centros de transfusión diseñen acciones de marketing diferenciadas, dirigidas a cada segmento en particular, con el fin de prolongar su permanencia en el sistema el mayor tiempo posible, así como aumentar el número de donaciones que realizan al año hasta el máximo permitido. Por ejemplo, para retener a los donantes desinhibidos y a los ocupados, el marketing directo, concretamente las llamadas telefónicas y los mensajes personalizados a modo de recordatorio, constituye el instrumento de comunicación más efectivo. Particularmente para los donantes ocupados, cuyas barreras más prevalentes son las espacio-temporales, los centros de transfusión deberían considerar ampliar los horarios de apertura de sus puntos de donación, así como hacer la donación más accesible mediante el incremento de las colectas móviles en lugares concurridos, en los centros de trabajo, etc.

En el caso de los donantes aprensivos, el éxito de las acciones de retención radica en el grado en que éstas sean capaces de modificar sus creencias y actitudes hacia la donación de sangre, pues las barreras más relevantes en este *cluster* son las intrínsecas y las informativas. Por tanto, los esfuerzos de marketing dirigidos a este segmento deben centrarse en mantener a los donantes adecuadamente informados no sólo sobre cuándo y dónde es posible donar, sino también sobre lo inocuo y seguro que es el proceso de donación para los propios donantes, buscando así reducir la aversión hacia ésta. Para ello, se recomienda que los centros de transfusión organicen campañas informativas, pero no de forma esporádica y coincidentes con las épocas de mayor escasez, sino de forma continuada. Sólo de esta forma se logrará el cambio deseado en la conducta de los donantes.

Por último, para eliminar las barreras que impiden que los donantes muy inhibidos donen más frecuentemente a lo largo del año, se sugiere a los centros de transfusión implementar acciones informativas y de concienciación sobre la importancia de donar sangre, preferiblemente en los centros educativos, en aras de fomentar la donación de sangre desde edades tempranas.

5.3. Publicación 3: Recruitment strategies: Non-donor segmentation based on intrinsic and extrinsic stimuli

Estrategias de captación: Segmentación de no donantes según estímulos intrínsecos y extrínsecos.

Si bien la retención de donantes activos tiene sus propias ventajas, los nuevos donantes también juegan un papel esencial en el mantenimiento de cualquier sistema de donación de sangre. Los nuevos donantes son responsables de incrementar el tamaño del *pool*, así como de reemplazar a los donantes que abandonan el sistema, bien voluntariamente o bien por no seguir cumpliendo los criterios de elegibilidad (Beerli-Palacio y Martín-Santana, 2015; Wildman y Hollingsworth, 2009).

Donar sangre por primera vez es una decisión compleja que está afectada por múltiples factores intrínsecos y extrínsecos (Bednall y Bove, 2011). En ese sentido, para que las estrategias de captación de nuevos donantes logren los resultados adecuados, los centros de transfusión deben conocer cuáles son esos factores para diseñar dichas estrategias en conformidad. Así, las barreras y motivaciones hacia la donación son particularmente relevantes porque la interacción que se produce entre ellas determina el comportamiento de donación. De este modo, cuando las barreras prevalecen sobre las motivaciones, los individuos deciden no donar y viceversa (Hupfer *et al*., 2005). Además, teniendo en cuenta que estos factores difieren entre individuos, su mera identificación no es suficiente. Es necesario medir la intensidad con la que las barreras y motivaciones afectan a los donantes potenciales para poder segmentarlos y diseñar acciones diferenciadas y específicas.

La forma en que, hasta la fecha, la literatura ha estudiado las barreras y las motivaciones hacia la donación varían significativamente entre estudios. Pero lo más destacable, con respecto a las motivaciones, es que muy pocos trabajos distinguen entre motivaciones intrínsecas y extrínsecas (France *et al*., 2014; Martín-Santana y Beerli-Palacio, 2008). Esta diferenciación es muy relevante para los centros de transfusión, pues estos pueden generar motivaciones extrínsecas mediante el uso de estímulos de marketing (p.ej., campañas de promoción, programas de fidelización de donantes).

Por todo lo anterior, el objetivo de este trabajo es segmentar a los no donantes españoles según sus barreras y motivaciones conjuntamente. Como paso previo, y para dar respuesta al problema de la falta de consenso sobre los instrumentos de medida de dichos factores, en el Proyecto se han diseñado y validado dos escalas *ad hoc*, una de barreras y otra de motivaciones, que han servido como criterio para realizar la segmentación.

En este caso, la población objeto de estudio son no donantes (individuos que nunca han donado sangre), mayores de dieciocho años, de ambos sexos y residentes

en España. La información objeto de análisis procede también del cuestionario *online* diseñado y utilizado en el Proyecto ORCETRASA. Dado que no existía un registro formal de no donantes, el Proyecto requirió de la colaboración de catorce de los diecisiete centros de transfusión que operan en España, así como de un total de veinticuatro universidades españolas, tanto públicas como privadas. Estas instituciones difundieron la dirección URL que alojaba el cuestionario, junto con un mensaje de invitación a participar en el estudio, a través de sus principales redes sociales y plataformas propias (*newsletter*, blog, notas de prensa…). Paralelamente, las universidades difundieron la URL y la invitación a través de su servicio de correo electrónico institucional. Tras realizar un total de 46 acciones de difusión, se logró una muestra de 2.584 no donantes, que quedó finalmente reducida a 2.383 tras descartar las encuestas incompletas.

La escala de barreras incluida en el cuestionario *online* del Proyecto estaba compuesta por 21 ítems de naturaleza dicotómica extraídos de la literatura (Alinon *et al*., 2014; Beerli-Palacio y Martín-Santana, 2015; Boenigk y Leipnitz, 2016; Charbonneau *et al*., 2016; Hupfer *et al*., 2005; James *et al*., 2013; Polonsky *et al*., 2015; Shaz *et al*., 2010; Solomon, 2012). Cada ítem se correspondía con una barrera referida a la siguiente pregunta. “Por favor, indique para cada uno de los siguientes motivos si puede impedir o no que done sangre por primera vez”. Por su parte, la escala de motivaciones intrínsecas y extrínsecas incluida en el mismo cuestionario estaba formada por veinticinco ítems, también dicotómicos (Beerli-Palacio y Martín-Santana, 2015; Charbonneau *et al*., 2015; Chell y Mortimer, 2014; Chmielewski *et al*., 2012; Gonçalez *et al*., 2013; Hupfer *et al*., 2005; Karacan *et al*., 2013; Shaz *et al*., 2010; Solomon, 2012; Yuan *et al*., 2011). En este caso, la pregunta que se planteaba era la siguiente: “Por favor, indique para cada uno de los siguientes motivos si puede llegar a motivarle a donar sangre por primera vez”. En ambas escalas, los encuestados debían responder Sí o No a cada ítem.

Cuando los ítems son dicotómicos, la validación de escalas debe realizarse mediante un análisis de componentes principales partiendo de la matriz de correlaciones tetracóricas (Debelak y Tran, 2013). Por tanto, se realizó dicho análisis para cada una de las dos escalas propuestas, así como un análisis de fiabilidad, mediante el coeficiente KR-20 (Nunnally y Bernstein, 1994).

Tras el proceso de validación, la escala de barreras se redujo a dieciocho ítems agrupados en cuatro dimensiones:

- **Barreras informativas**, referidas a la falta de información sobre el proceso, los requisitos o los lugares de donación.
- **Barreras actitudinales**, que incluyen aspectos relacionados con las creencias y las percepciones de los individuos (p.ej., religión, falta de confianza sobre el uso que se le da a la sangre donada).
- **Barreras espacio-temporales**, relativas a la inconveniencia del acto de donar.
- **Barreras psicológicas y físicas**, que se asocian a los miedos y a la preocupación por experimentar una reacción adversa al donar, como por ejemplo desmayarse, marearse o sentir náuseas, entre otras.

Además, el análisis de componentes principales para la escala de barreras puede considerarse satisfactorio, pues sus resultados explican el 69,5% de la varianza total; todas las cargas factoriales de los ítems son superiores a 0,7, y todas las comunalidades (excepto una) son mayores a 0,5 (Hair *et al*., 2014). Por tanto, se trata de una escala válida. Además, los valores del KR-20 son mayores o muy cercanos a 0,7 (Nunnally y Bernstein, 1994), excepto para la dimensión de las barreras actitudinales. Por estos motivos, la escala también puede ser condiserada fiable y válida.

Por su parte, la escala de motivaciones quedó reducida a veintiún ítems agrupados en cinco dimensiones:

- **Altruismo impuro**, que es el resultado de combinar el altruismo puro (el deseo de ayudar a otros sin recibir nada a cambio) y el *warm-glow* (la recompensa emocional de ayudar a alguien, p.ej., satisfacción personal).
- **Beneficios para la salud**, materializados principalmente en incentivos médicos tales como los resultados analíticos de la sangre donada, consejos médicos, etc.
- **Reconocimiento**, que incluye tanto incentivos tangibles (p.ej., una taza, un diploma) como intangibles (p.ej., un homenaje público), en ambos casos ofrecidos por los centros de transfusión.
- **Estímulos de marketing**, referidos a las acciones promocionales llevadas a cabo por los centros de transfusión, principalmente a través de medios de comunicación masivos.
- **Influencia social**, que se refiere a la presión ejercida por los grupos de referencia (amigos, familiares, compañeros de trabajo, etc.).

La escala de motivaciones también puede considerarse válida y fiable, pues los resultados del análisis de componentes principales explican el 70% de la varianza total; las cargas factoriales son superiores o muy cercanas a 0,5, y todas las comunalidades (excepto dos) eran mayores a 0,5. Con respecto al análisis de fiabilidad, todos los valores del KR-20 eran mayores o cercanos a 0,7, con la única excepción de la dimensión de influencia social.

Una vez identificadas las dimensiones subyacentes en cada una de las escalas propuestas, éstas se utilizaron como criterio para segmentar a los no donantes españoles. Para ello, se utilizó el análisis de clases y perfiles latentes. A diferencia de las metodologías tradicionales de *clustering*, esta técnica se basa en modelos, y ajusta el modelo estadístico a los datos, clasificando cada observación (en este caso, a cada no donante) según su probabilidad de pertenencer a los diferentes *clusters* (Bond y Morris, 2003; Magidson y Vermunt, 2004; Vermunt y Magidson, 2003). La estimación de la probabilidad parte de un *clustering* jerárquico y continúa al aplicar un algortimo de esperanza-maximixación hasta que la combinación de modelo y número de *clusters* recoja la mayor cantidad de información posible.

En este trabajo, se estimaron un total de ocho modelos, cada uno con un número de *clusters* desde uno hasta ocho. Observando los indicadores de bondad del ajuste pertinentes, el modelo que más información recogía era el de seis *clusters*. Además, todos los indicadores incluidos (es decir, las categorías de barreras y motivaciones) eran estadísticamente significativos *(p*-valores del test de Wald < 0,06), lo cual indica que contribuyen a discriminar entre *clusters*.

De esta forma, se identificaron seis *clusters* de no donantes que se diferenciaban según la prevalencia de barreras y motivaciones:

- **"Altruistas impuros"** (*cluster* 1). Estos individuos conforman el *cluster* de mayor tamaño (25,9% de los no donantes) y están principalmente motivados por altruismo impuro y por los estímulos de marketing. A su vez, la prevalencia de barreras en este *cluster* es baja. Por tanto, los "altruistas impuros" constituyen el segmento de no donantes más desinteresados y, por tanto, el que mayor atractivo tiene para los centros de transfusión.
- **"Quiero, pero pónmelo fácil"** (*cluster* 2). Este *cluster*, que representa al 24,6% de los no donantes, está formado por individuos altamente motivados por altruismo impuro, beneficios para la salud y estímulos de

marketing. Ahora bien, presentan una alta prevalencia de barreras informativas y espacio-temporales. Por tanto, los individuos que forman este *cluster* están motivados para donar, pero carecen de la información y del tiempo necesarios para hacerlo.

- ***"Free-riders"*** (*cluster* 3). Los no donantes pertenecientes a este *cluster* (un 21,8% del total) presenten niveles de motivación bajos en todas las categorías identificadas. A su vez, la prevalencia de barreras es alta en todas las categorías. Por lo tanto, los centros de transfusión no deberían destinar esfuerzos a captar a los "*free-riders"*, ya que se trata de individuos que no están motivados para donar y, aunque lo estuviesen, la alta presencia de barreras lo impediría.
- **"Altruistas recíprocos"** (*cluster* 4). Estos individuos (10,8%) presentan una baja prevalencia de todas las categorías de barreras, así como una alta prevalencia de todas las de motivaciones. Con respecto a las últimas, destacan los altos valores registrados en la categoría de altruismo impuro, pero tambien en las de estímulos de marketing, beneficios para la salud y reconocimiento. Por tanto, los "altruistas recíprocos" están motivados por razones altruistas, pero también buscan ciertas recompensas y beneficios a cambio de donar. Es decir, presentan una combinación de motivaciones intrínsecas y extrínsecas.
- **"No puedo porque tengo miedo"** (*cluster* 5). Este *cluster*, que agrupa al 9,5% de los no donantes, aglutina a individuos altamente afectados por las barreras físicas y psicológicas y, al mismo tiempo, sus niveles de motivación son bajos en todas las categorías. Por ese motivo, este *cluster* no es atractivo para los centros de transfusión, pues además de ser reducido en tamaño y estar poco motivado, experimenta barreras que son más difíciles de eliminar por su naturaleza intrínseca.
- **"Quiero, pero no puedo"** (*cluster* 6). El último de los *clusters* identificados es el más pequeño de los seis (7,43%) y está formado por individuos altamente motivados, pero con una alta prevalencia de barreras. De ahí su denominación, pues sus barreras aparentemente neutralizan sus motivaciones, impidiendo que donen por primera vez.

Los resultados de este estudio confirman la idea de que donar sangre por primera vez es una decisión altamente compleja, afectada por múltiples factores de forma simultánea. Además, la forma en que estos factores afectan al comportamiento de donación varía sustancialmente entre individuos. Esto explica la existencia de seis

clusters entre los no donantes españoles, cuyas diferencias radican en las barreras y motivaciones hacia la donación de sangre que más les afectan. Dada esta heterogeneidad, los centros de transfusión deben priorizar a qué segmentos deben destinar sus recursos, que suelen ser limitados, así como diseñar acciones de marketing específicas para cada uno de ellos.

Así, los centros deberían dirigir sus programas de captación, en orden de prioridad, a los *clusters* de altruistas impuros, "Quiero, pero pónmelo fácil", "Altruistas recíprocos" y "Quiero, pero no puedo", descartando a los "*Free-riders"* y al *cluster* de "Quiero, pero tengo miedo". Los "Altruistas impuros" son los que menos esfuerzos de marketing requieren por su alto nivel de altruismo impuro. Por tanto, y dada su sensibilidad a los estímulos de marketing, para lograr que estos individuos se incorporen al sistema, los centros de transfusión deberían lanzar campañas publicitarias en medios masivos y en las redes sociales, principalmente con mensajes emocionales que pongan en valor los beneficios colectivos de donar sangre. Para captar a los "Altruistas recíprocos", por su parte, los mensajes que guíen las campañas de promoción deberían ser diferentes y destacar no sólo los beneficios que donar sangre tiene para la sociedad, sino también para los propios donantes, tanto tangibles (p.ej., conocer los resultados del análisis de la sangre donada) como intangibles (p.ej., autoestima). Además, dado que estos individuos también valorarían el reconocimiento por su labor como donantes, los centros de transfusión deberían considerar llevar a cabo acciones basadas en dicho reconocimiento como, por ejemplo, entregar certificados formales u organizar homenajes públicos.

Todas las acciones descritas en los párrafos anteriores también son aplicables al *cluster* de "Quiero, pero pónmelo fácil". Ahora bien, puesto que estos individuos presentan altas barreras informativas y espacio-temporales, es recomendable que los centros de transfusión implementen las siguientes acciones: diseñar campañas informativas explicando en qué consiste el proceso de donación, quién puede donar y a dónde es preciso acudir para hacerlo; extender los horarios de apertura de los puntos de donación, y ampliar el número de puntos de donación, tanto fijos como móviles. Finalmente, para captar al *cluster* de "Quiero, pero no puedo", los centros de transfusión deben dirigir sus esfuerzos a eliminar las barreras que impiden a estos individuos donar por primera vez mediante campañas de mitigación.

6. Justificación de la unidad temática

Las tres publicaciones presentadas en esta Tesis Doctoral por compendio de artículos se encuentran enmarcadas dentro de la línea de investigación de donantes del Proyecto ORCETRASA, cuyo investigador principal es la doctora Josefa Delia Martín Santana. De hecho, para realizar los artículos segundo y tercero, se ha empleado la base de datos de donantes del Proyecto, para cuya obtención ha sido esencial la colaboración de catorce de los diecisiete centros de transfusión existentes en España, así como de varias universidades.

Como se comentó anteriormente, esta Tesis persigue dos objetivos, en consonancia con los objetivos establecidos por la línea de investigación del Proyecto ORCETRASA. El primero de ellos es analizar el grado en que el marketing social se ha aplicado en el contexto de la donación de sangre mediante la identificación de las principales líneas de investigación existentes en la literatura, así como la propuesta de futuras líneas de investigación que permitan seguir ampliando este conocimiento. El segundo objetivo es analizar los factores determinantes del comportamiento de donación en España, concretamente las barreras y las motivaciones hacia la donación de sangre. Para ello, y como solución al *gap* detectado durante la consecución del primer objetivo, referido a la forma en que dichos factores se han estado midiendo en la literatura, se diseñaron y validaron dos escalas de medida que pueden servir a los centros de transfusión como instrumento de diagnóstico y segmentación de sus *pools* de donantes. Estas escalas, de hecho, constituyen una de las principales aportaciones de la línea de investigación de donantes del Proyecto ORCETRASA.

7. Artículos originales

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

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Lines of Scientific Research in the Study of Blood Donor Behavior from a Social Marketing Perspective

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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 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

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(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 toward 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 preprocessing 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

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

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 modeling (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.

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 labeled "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 53 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 traveled 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; France 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 (France 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 tests 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; 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; 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; 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; 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 (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 (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 (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 & Reidy, 2008; Armitage & Conner, 2001; 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 (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 (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 (France et al., 2014, 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 (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 (France et al., 2013, 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 toward 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 (France et al., 2014, 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 (France 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 (France 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 (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 tests 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. France 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; 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 (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 toward 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 toward 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.

Notes

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

		Membership values*					
Document code	Document title	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

(*Continued*)

(Continued).

Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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
JavadzadehShahshahani2007	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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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 donation and receipt in Leeds	**0.415508**	0.296438	4.65E-05	0.280299	2.49E-06	0.007707
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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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 differences and motivations to donate	0.144479	**0.387556**	0.000158	0.365081	0.000144	0.10258
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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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, nonremunerated environment	0.202641	**0.308223**	0.000316	0.266287	0.000804	0.221729
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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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 patterns of donation	0.164073	0.158199	0.001681	**0.588921**	0.000479	0.086647
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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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**

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Document code	Document title	Membership values*					
		Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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**

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(Continued).

		Membership values*					
Document code	Document title	Cluster #1	Cluster #2	Cluster #3	Cluster #4	Cluster #5	Cluster #6
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 evaluation of an evidence-based behavior change intervention	0.185866	0.227869	0.001934	0.212223	0.020672	**0.351436**
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.

7.2. Segmenting active blood donors according to their barriers to develop retention programs

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Segmenting Active Blood Donors According to Their Barriers to Develop Retention Programs

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ABSTRACT

Given the lack of a consensus on a catalogue of donation barriers, this study proposes a holistic scale of barriers which was used to segment Spanish active blood donors to define specific retention and loyalty strategies. A sample of 26 626 active donors from 14 of the 17 Spanish blood transfusion centers assessed a total of 25 barriers through an online survey. This scale was validated and 4 barrier categories were defined: Informative, Intrinsic, Time-space and Procedural. Segmentation was performed through k-means clustering. Four active donor clusters were created: (1) "Very Inhibited" (13.2%), who experienced a high number of barriers in all categories; (2) "Uninhibited" (46.9%), which was the largest cluster with fewer barriers; (3) "Apprehensive" (16.9%), whose most prevalent barriers were Informative and Intrinsic in nature; and (4) "Busy" (23.0%), who experienced mainly Time-space and Informative barriers. Afterward, depending on the size of the cluster, the presence of barriers, and the greater ease or difficulty to act on them, the attractiveness of each cluster was established to propose specific marketing actions.

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Most developed countries have implemented a voluntary nonremunerated blood donation system, which is considered the most desirable by the World Health Organization [1]. Consequently, it is a priority for blood transfusion centers (BTCs) to increase the number of donors, to retain them, and to increase their donation frequency. Although less than 40% of the population is eligible to donate blood, it is estimated that only 5%-10% does donate despite the awareness campaigns launched by the responsible bodies [2,3]. Because of the decrease of the donor pool, which sometimes causes issues to satisfy the existing blood demand, BTCs make great efforts to promote donation. To this end, they have 2 alternatives: retaining active donors and/or recruiting new donors [4]. Although the recruitment of new donors contributes to increasing the size of the donor pool and to replacing donors who, either voluntarily or by obligation, cease to donate [5,6], retaining active donors implies lower costs [7,8] because repeat donors are more familiar with the system.

To optimize donor retention strategies, it is essential that BCTs are aware of the factors that intervene in blood donation behavior. Among them, barriers are perhaps those that most affect such behavior, preventing or hindering donation [9]. Although barriers have generally been studied for nondonors and lapsed donors [10,11], they also affect active donors, preventing them from donating more frequently [12].

In the literature, donation barriers of a very diverse nature have been identified, but in a fragmented manner. These barriers are fear [13,14], inconvenience of the donation venue [9,15], lack of time [10,12], physical reactions [16,17], lack of information [18,19], or the absence of a

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personal request to donate [20,21]. A common barrier scale, neither validated nor agreed by academics, does not exist. The same occurs with barrier categorization criteria. Moreover, conceptually similar barriers have been studied, but different labels have been used for the same barrier [9]. This makes it difficult to compare results or to group barriers according to their category. Furthermore, barriers vary among donors. Therefore, it is necessary to segment them to develop differentiated marketing actions [12,22-25].

Hence, the aim of this work is 2-fold. Firstly, it is aimed at designing and validating a holistic barrier scale based on the different scales existing in the literature. The second aim is to segment active donors from Spanish BTCs using the different categories identified in the previously designed scale as criteria. One of the main practical applications of this work could be to create targeted marketing actions to increase donation frequency among the different clusters identified.

1. Material and Methods

The methodological process was based on a survey through an online questionnaire. The population was comprised of active donors (individuals who had donated blood at least once in the last 2 years) registered in the databases of 14 of the 17 regional BTCs, which are the responsible institutions for blood collection in Spain [26]. All active donors in the study population were more than 18 years old, both sexes and residents in Spain. BTCs sent all their registered active donors an e-mail with the URL of the online platform that hosted the questionnaire (http://proyectodonacion.ciber.ulpgc.es/don_bd_cast.php). The initial sample had 31 993 active donors. However, because of unfinished questionnaires, the sample was reduced to 26 626 donors (questionnaire completion rate 83.22%).

To measure donation barriers, a scale was designed based on an extensive review of the literature [5,12,14,27-32]. The 14 participating BTCs contributed to the content validation of the proposed scale. The scale comprised 25 items, each corresponding to a single barrier. By using dichotomous responses—yes or no—an answer to the following question was given: "Please note whether each of the following causes could prevent you from increasing the number of blood donations you make per year."

Before segmentation, it was necessary to determine the different underlying barrier categories in the proposed scale and its multidimensional structure. Based on the study carried out by Debelak and Tran [33], the tetrachoric correlation matrix must be used if variables are binary when a principal component analysis (PCA) is carried out. For this reason, based on such input, a PCA was done for the barrier scale, and its results are shown in Table 1. In addition, the reliability or consistency of the global scale, as well as that of each resulting factor, was determined by calculating the coefficient of Kuder-Richardson Formula 20 (KR-20). This coefficient is equivalent to Cronbach α when variables are binary [34]. Throughout this validation process, the number of final items was still 25.

Based on the findings in Table 1, we could infer the following:

1. The results of PCA could be considered satisfactory because they explained 70.01% of the total variance, thus exceeding the 60.0% threshold indicated by Hair et al [35].
2. The correlations between the factors and the different items, expressed through factor loadings, were very significant. According to Hair and colleagues [35], factor loadings of 0.5 or higher are considered significant. All items in the scale had loadings greater than 0.5, except one, and 19 of 25 items' loadings were higher than 0.6.

Table 1
Results of the PCA of the barrier scale

Barriers		PCA results				
		COM	F1	F2	F3	F4
Informative barriers						
BARR24	Absence of promotional donation campaigns to donate blood (TV, radio, social networks, etc)	0.740	**0.715**	0.434	0.099	0.177
BARR3	Lack of information about the constant need for blood	0.731	**0.682**	0.473	0.193	0.074
BARR1	Lack of information about the donation process or requisites	0.703	**0.570**	0.574	0.222	−0.006
BARR2	Lack of information about the location or opening times of donation venues	0.712	**0.529**	0.270	0.599	−0.017
BARR26	Absence of a reminder from the center to donate	0.504	**0.502**	0.121	0.471	0.126
Intrinsic barriers						
BARR19	General fear and anxiety of donation	0.912	0.220	**0.926**	0.075	0.035
BARR20	Fear of needles and/or pain	0.913	0.250	**0.919**	0.065	0.045
BARR21	Fear of seeing blood	0.873	0.225	**0.903**	0.058	0.052
BARR7	Lack of willingness, interest, and/or motivation to donating blood	0.840	0.397	**0.816**	0.093	0.090
BARR6	Negative experience during a previous blood donation	0.727	0.062	**0.811**	0.170	0.190
BARR23	Negative opinions of friends, relatives, etc, towards blood donation	0.751	0.221	**0.809**	0.154	0.151
BARR5	Cultural, religious or ethical reasons	0.686	0.255	**0.786**	0.047	0.031
BARR17	Suffering physical distress (nausea, vomit, dizziness, etc)	0.711	−0.174	**0.772**	0.275	0.096
BARR22	Fear of suffering anemia	0.582	0.010	**0.738**	0.125	0.144
BARR18	Suffering wounds in arms due to use of needles (hematoma, irritation, etc)	0.664	−0.124	**0.716**	0.194	0.313
BARR8	Mistrust about the possible uses of blood	0.487	0.291	**0.574**	0.140	0.231
Time-space barriers						
BARR12	Inconvenient location of donation venues	0.854	0.123	0.201	**0.885**	0.121
BARR11	Donation venues are located too far away	0.826	0.135	0.179	**0.875**	0.098
BARR10	Schedule incompatibility with donation venues	0.694	−0.015	0.010	**0.814**	0.176
BARR13	Lack of parking space in donation venues	0.557	0.212	0.190	**0.606**	0.329
BARR9	Lack of free time	0.405	−0.103	−0.117	**0.536**	0.307
Procedural barriers						
BARR15	Inconvenience related to having to fill out my personal data at each donation	0.671	0.305	0.010	0.119	**0.751**
BARR16	Duration of blood extraction process longer than half an hour	0.684	−0.007	0.283	0.259	**0.733**
BARR14	Waiting time longer than half an hour	0.673	0.015	0.232	0.401	**0.677**
BARR25	Absence of blood donation incentives (blood tests, gifts, social recognition, tickets to events, etc)	0.604	0.564	0.237	0.033	**0.478**
Factor's eigenvalue			1.645	11.022	3.445	1.391
Partial percentage of explained variance			11.60	32.95	16.05	9.41
Total percentage of explained variance				70.01		
KR-20 of each factor			0.749	0.890	0.740	0.555
KR-20 global scale				0.884		

Table 2
Sample profile

Characteristics	n	%
Sex		
Male	13 007	48.9
Female	13 619	51.1
Age (years)		
18-25	4237	15.9
26-35	5267	19.8
36-45	7421	27.9
>45	9701	36.4
Education		
No formal education or primary	3422	12.9
Secondary	9623	36.1
University	13 581	51.0
Employed		
Yes	20 975	78.8
No	5651	21.2
Total monthly income (euros)		
≤2000	14 331	53.8
2001-4000	9610	36.1
>4000	2685	10.1
Donation frequency in 2017		
Once	10 585	39.7
Twice	8864	33.3
3 or 4 times	7177	27.0
Experience as a donor (years)		
<2	4228	15.9
2-4	5616	21.1
5-10	6643	24.9
11-15	3035	11.4
>15	7104	26.7
Total	**26 626**	**100.0**

3. The proportions of explained variance of each item, expressed by means of communalities (COM), were high given that, in every case (with the exception of BARR8 and BARR9), more than half of the variability of the participants' answers was explained. It is asserted that items with COM values of 0.5 or higher are considered to have sufficient explanation [35].
4. It was a reliable scale. KR-20 values, both at a global level and for each dimension (except one of them), were greater than 0.7, which is an acceptable threshold, as suggested by Nunnally and Berstein [34].

As expected, there were several clearly different dimensions in this scale, which we could call "Informative barriers" (F1), "Intrinsic barriers" (F2), "Time-space barriers" (F3), and "Procedural barriers" (F4). The "Informative barriers" category consisted of barriers related to lack of information about the donation process, location and opening times of donation venues, or the constant need for blood [18,19]. In addition, it also included the absence of promotional campaigns to donate blood [14,31] and the absence of reminders from the centers to donate [12,13]. "Intrinsic barriers" included barriers related to the internal processes of individuals such as beliefs and perceptions [30,37] or fears associated with donation (eg, fear of needles, fear of collapsing) [14,17,31]. "Time-space barriers" were related to the opportunity costs of donating blood in terms of time and space [15,36]. Finally, "Procedural barriers" comprised certain factors of the donation process itself which discourage people from repeating blood donation [12,35,38].

2. Results

The sociodemographic profile of Spanish active blood donors (Table 2) was characterized as homogeneous in terms of sex (48.9% male and 51.1% female), being older than 45 years old (36.4%), and having university education (51.0%). Most of them were employed (78.8%) and had a monthly income lower than 2000 euros (53.8%). Regarding their donation behavior, most of them donated only once or twice a year (73.0%) and had been donating for more than 4 years (63.0%).

According to the PCA results, Table 3 also shows the descriptive analysis of different barriers influencing Spanish active donors. The most frequent barriers were informative, with frequency values between

Table 3
Descriptive analysis of barriers

Barriers		Frequencies	
		n	%
Informative barriers			
BARR2	Lack of information about the location or opening times of donation venues	10 720	40.3
BARR26	Absence of a reminder from the center to donate	9823	36.9
BARR3	Lack of information about the constant need for blood	9770	36.7
BARR24	Absence of promotional donation campaigns to donate blood (TV, radio, social networks, etc)	8753	32.9
BARR1	Lack of information about the donation process or requisites	8109	30.5
Intrinsic barriers			
BARR7	Lack of willingness, interest, and/or motivation to donating blood	9623	36.1
BARR20	Fear of needles and/or pain	8050	30.2
BARR6	Negative experience during a previous blood donation	7479	28.1
BARR17	Suffering physical distress (nausea, vomit, dizziness, etc)	7398	27.8
BARR19	General fear and anxiety of donation	7232	27.2
BARR21	Fear of seeing blood	6650	25.0
BARR5	Cultural, religious or ethical reasons	4831	18.1
BARR18	Suffering wounds in arms due to use of needles (hematoma, irritation, etc)	4217	15.8
BARR8	Mistrust about the possible uses of blood	3491	13.1
BARR22	Fear of suffering anemia	3289	12.4
BARR23	Negative opinions of friends, relatives, etc, towards blood donation	3102	11.7
Time-space barriers			
BARR10	Schedule incompatibility with donation venues	12 064	45.3
BARR9	Lack of free time	10 285	38.6
BARR11	Donation venues are located too far away	8043	30.2
BARR13	Lack of parking space in donation venues	6705	25.2
BARR12	Inconvenient location of donation venues	6185	23.2
Procedural barriers			
BARR14	Waiting time longer than half an hour	6823	25.6
BARR15	Inconvenience related to having to fill out my personal data at each donation	4915	18.5
BARR25	Absence of blood donation incentives (blood tests, gifts, social recognition, tickets to events, etc)	4675	17.5
BARR16	Duration of blood extraction process longer than half an hour	3044	11.4

Table 4
Descriptive statistics for the categories of barriers and cluster centers*[a]

Barriers	Descriptive statistics			Cluster centroids[a]				
	Range	Mean	SD	Cluster 1 Very inhibited	Cluster 2 Uninhibited	Cluster 3 Apprehensive	Cluster 4 Busy	*F* (*P*)
Informative	0.00-5.00	1.77	1.68	3.71	0.57	2.52	2.57	8882.940 (.000)
Intrinsic	0.00-11.00	2.45	3.11	8.37	0.40	5.34	1.15	58 803.900 (.000)
Time–space	0.00-5.00	1.63	1.61	3.03	0.69	1.05	3.15	8246.629 (.000)
Procedural	0.00-4.00	0.73	1.00	1.58	0.30	0.77	1.10	2395.333 (.000)
Cluster size				**3501 (13.2%)**	**12 496 (46.9%)**	**4495 (16.9%)**	**6134 (23.0%)**	

[a] Cluster centroids are the mean values of the observations (active donors) on the variables (the different barrier categories) in the cluster variate [35].

30.5% and 40.3%. The most relevant barriers were "Lack of information about the location or opening times of donation venues" (40.3%) and "Absence of a reminder from the center to donate" (36.9%). However, "Time-space barriers" also showed high percentages, for example, "Schedule incompatibility with donation venues" (45.3%) and "Lack of free time" (38.6%). Among "Intrinsic barriers," the most important ones were "Lack of willingness, interest, and/or motivation to donating" (36.1%) and "Fear of needles and/or pain" (30.2%). Lastly, the results particularly highlight "Waiting time longer than half an hour" (25.6%) as the most frequent barrier in the category of "Procedural barriers."

These results show that BTCs must apply strategies and take actions to eliminate these barriers to increase donation rates. To this end, firstly, it is necessary to segment active donors based on the 4 barrier categories resulting from the PCA. To do this, 4 new variables were created, each corresponding to the sum of barriers that respondents selected in each of the proposed categories. For instance, the "Informative barriers" value was the sum of barriers BARR1, BARR2, BARR3, BARR24, and BARR26. Thus, this variable could have values from 0 to 5 (see Table 4, "Range" column), where 0 meant the respondent did not present any of the suggested barriers and 5 meant that they presented all of them.

Table 4 shows the descriptive statistics of these 4 new variables, which were subsequently used to segment active donors. Table 4 also includes the results of the k-means clustering and shows the centers of each of the 4 identified clusters. K-means is a nonhierarchical clustering analysis model which consists in portioning the data into a user-

Table 5
Presence of barriers (%) in each cluster

Barriers		Global	Cluster 1 Very inhibited	Cluster 2 Uninhibited	Cluster 3 Apprehensive	Cluster 4 Busy
Informative barriers						
BARR24	Absence of promotional donation campaigns to donate blood (TV, radio, social networks, etc)	32.9	74.5	9.7	52.6	41.9
BARR3	Lack of information about the constant need for blood	36.7	79.1	10.5	59.8	48.9
BARR1	Lack of information about the donation process or requisites	30.5	75.0	6.3	55.1	36.1
BARR2	Lack of information about the location or opening times of donation venues	40.3	76.4	13.1	47.9	69.4
BARR26	Absence of a reminder from the center to donate	36.9	66.4	17.1	36.1	61.1
Informative barriers average		**35.5**	**74.3**	**11.3**	**50.3**	**51.5**
Intrinsic barriers						
BARR19	General fear and anxiety of donation	27.2	94.9	1.7	74.7	5.5
BARR20	Fear of needles and/or pain	30.2	97.3	2.9	83.4	8.8
BARR21	Fear of seeing blood	25.0	90.7	1.5	66.9	4.6
BARR7	Lack of willingness, interest, and/or motivation to donating blood	36.1	95.0	7.1	83.8	26.7
BARR6	Negative experience during a previous blood donation	28.1	86.6	6.0	57.0	18.4
BARR23	Negative opinions of friends, relatives, etc, towards blood donation	11.7	60.7	0.3	18.6	1.7
BARR5	Cultural, religious, or ethical reasons	18.1	66.9	1.7	41.8	6.5
BARR17	Suffering physical distress (nausea, vomit, dizziness, etc)	27.8	81.7	9.8	45.5	20.7
BARR22	Fear of suffering anemia	12.4	53.9	3.2	17.1	3.7
BARR18	Suffering wounds in arms due to use of needles (hematoma, irritation, etc)	15.8	60.3	3.7	23.5	9.6
BARR8	Mistrust about the possible uses of blood	13.1	48.5	1.9	22.1	9.2
Intrinsic barriers average		**22.3**	**76.1**	**3.6**	**48.6**	**10.5**
Time-space barriers						
BARR12	Inconvenient location of donation venues	23.2	58.3	2.2	12.1	54.1
BARR11	Donation venues are located too far away	30.2	66.7	6.5	19.7	65.4
BARR10	Schedule incompatibility with donation venues	45.3	69.3	26.1	31.8	80.6
BARR13	Lack of parking space in donation venues	25.2	58.5	6.4	18.9	49.0
BARR9	Lack of free time	38.6	49.9	28.2	22.0	65.6
Time-space barriers average		**32.5**	**60.5**	**13.9**	**20.9**	**62.9**
Procedural barriers						
BARR15	Inconvenience related to having to fill out my personal data at each donation	18.5	31.8	9.5	17.1	30.0
BARR16	Duration of blood extraction process longer than half an hour	11.4	31.2	3.7	10.8	16.4
BARR14	Waiting time longer than half an hour	25.6	54.2	10.9	25.4	39.6
BARR25	Absence of blood donation incentives (blood tests, gifts, social recognition, tickets to events, etc)	17.5	41.0	5.8	23.7	23.6
Procedural barriers average		**18.3**	**39.6**	**7.5**	**19.3**	**27.4**
Total average		**26.3**	**66.8**	**7.8**	**38.7**	**31.9**

specified number of clusters and then iteratively reassigning observations (in this case, active donors) to clusters until some numerical criterion is met. The criterion specifies a goal related to minimizing the distance of observations from one another in a cluster and maximizing the distance between clusters [35].

Cluster 1, labeled "Very Inhibited," represented 13.2% of donors. It was characterized by a high number of barriers in all categories. Cluster 2, labeled "Uninhibited," was the largest (46.9%) and the one with the least number of barriers in all categories. In cluster 3, which included 16.9% of donors, Intrinsic barriers prevailed, but also Informational barriers. Therefore, this cluster was labeled as "Apprehensive." Finally, cluster 4 was the second in size (23.0%) and was characterized by a high number of Time-space barriers, which suggested labeling it as "Busy."

Table 5 shows the presence of donation barriers in the 4 identified clusters, allowing us to observe which were the most inhibiting in each category and cluster. Such presence was related to the percentage of active donors who stated that the proposed barriers could prevent them from increasing the number of donations they make per year. The average presence values of all barriers, both at a global level and in each cluster (see Table 5, "Total average" row), confirmed the denomination that was assigned to the 4 clusters. Thus, cluster 1 showed a total average of 66.8%, whereas the total average of cluster 2 was only 7.8%. On the other hand, the other 2 clusters had values lower than 40.0%, although the incidence of the barrier categories was different.

Having seen Table 5, we can infer that the "Very Inhibited" cluster showed the greatest affected proportion of any cluster within each barrier, excepting only BARR10. In fact, the average values of the 4 barrier categories were very high, ranging from 39.6% to 76.1%, unlike the average values of the global sample, ranging from 18.25% to 35.5%. The barriers that affected this cluster the most were Intrinsic barriers and Informative barriers (76.1% and 74.3%, respectively). At the other end of the spectrum, the "Uninhibited" cluster was the least affected by all barrier categories, with average values ranging from 3.6% to 13.9%. Time-space barriers had the greatest influence in this cluster. In the middle of the scale, we could find the "Apprehensive" cluster, characterized by a greater prevalence of Intrinsic barriers (48.6%), and the "Busy" cluster, where the most relevant barriers were Time-space barriers (62.9%). However, these 2 clusters also showed a large percentage of Informative barriers (50.3% "Apprehensive" and 51.5% "Busy").

From these results, it can be firstly inferred that the "Uninhibited" cluster is the most attractive both for its size and for being the one with fewer barriers. Therefore, it would be the priority cluster for directing marketing action programs. Secondly, the "Busy" cluster also has some appeal not only because of its size but also because its most prevalent barriers—Time-space—can be mitigated in the short term with actions that facilitate donation (ie, by expanding opening hours of donation venues). Third, the "Apprehensive" cluster has less interest than the previous ones because one of the most prevalent barriers in it, the Intrinsic ones (eg, fear of needles or of the sight of blood, cultural/ethical reasons), are more difficult to eliminate. Finally, the "Very inhibited" cluster is very unattractive because it is small in size and its high number and range of barriers make it unworthy of devoting efforts and resources to it.

To develop differentiated strategies, it is essential to know the profile and donation behavior of each cluster. For this purpose, Tables 6 and 7 show the sociodemographic characteristics and donation behavior of active donors in each cluster, observing statistically significant differences among them. According to the P value of the χ^2 statistic, all sociodemographic and donation behavior characteristics were statistically significant (all P values are less than .000), thus meaning that there were differences among clusters according to them. However, among all variables analyzed, the "Employed" and the "Total monthly income" variables presented the lowest χ^2 values, which mean that the differences among clusters were less pronounced.

The disproportionate representation of some sociodemographic characteristics compared to the global donor sample allows to establish the sociodemographic profiles of the identified clusters. Thus, comparing the clusters results with the global sample data, the "Very inhibited" cluster and the "Uninhibited" cluster presented most differences in terms of sociodemographic characteristics (see Table 6). Thus, in the "Very inhibited" cluster, a greater presence of women (59.4%) and younger age groups (48.5% between 18 and 35 years old) was observed, as well as individuals with university education (57.2%) and unemployed individuals (26.8%). The "Uninhibited" cluster presented more men (51.9%), higher age intervals (73.6% older than 35 years old), more donors with primary and secondary education (52.7%), more individuals currently working (80.8%), and slightly higher income levels than the other clusters (48.0% higher than 2000 euros).

Finally, regarding donation behavior, statistically significant differences were also observed among clusters. Comparing the clusters results with the global sample data, results also indicated that the "Very inhibited" cluster and the "Uninhibited" cluster presented most differences. Thus, the "Uninhibited" cluster was the one with donors who had the highest frequency of donations in 2017 (64.1% donated 2-4

Table 6
Cluster profiles according to sociodemographic characteristics

Characteristics	Global		Cluster 1 Very inhibited		Cluster 2 Uninhibited		Cluster 3 Apprehensive		Cluster 4 Busy		χ^2 (P)
	n	%	n	%	n	%	n	%	n	%	
Sex											
Male	13 007	48.9	1412	40.6	6483	51.9	1999	44.5	3105	50.6	184.401
Female	13 619	51.1	2081	59.4	6013	48.1	2496	55.5	3029	49.4	(.000)
Age (years)											
18-25	4237	15.9	937	26.8	1247	10.0	943	21.0	1110	18.1	1246.881
26-35	5267	19.8	759	21.7	2048	16.4	1042	23.2	1418	23.1	(.000)
36-45	7421	27.9	829	23.7	3624	29.0	1149	25.6	1819	29.7	
>45	9701	36.4	976	27.9	5577	44.6	1361	30.3	1787	29.1	
Education											
No formal education or Primary	3422	12.9	265	7.6	1991	15.9	494	11.0	672	11.0	274.525
Secondary	9623	36.1	1235	35.3	4602	36.8	1624	36.1	2162	35.2	(.000)
University	13 581	51.0	2001	57.2	5903	47.2	2377	52.9	3300	53.8	
Employed											
Yes	20 975	78.8	2564	73.2	10 093	80.8	3442	76.6	4876	79.5	108.890
No	5651	21.2	937	26.8	2403	19.2	1053	23.4	1258	20.5	(.000)
Total monthly income (euros)											
≤2000	14 331	53.8	1940	55.4	6501	52.0	2531	56.3	3359	54.8	38.523
2001-4000	9610	36.1	1206	34.4	4733	37.9	1536	34.2	2135	34.8	(.000)
>4000	2685	10.1	355	10.1	1262	10.1	428	9.5	640	10.4	
Total	**26 626**	**100.0**	**3501**	**13.2**	**12 496**	**46.9**	**4495**	**16.9**	**6134**	**23.0**	

Table 7
Cluster profiles according to donation behavior

Characteristics	Global		Cluster 1 Very inhibited		Cluster 2 Uninhibited		Cluster 3 Apprehensive		Cluster 4 Busy		χ^2 (P)
	n	%	n	%	n	%	n	%	n	%	
Donation frequency in 2017											
Once	10 585	39.7	1496	42.7	4478	35.8	1758	39.1	2853	46.5	284.304
Twice	8864	33.3	1157	33.0	4265	34.1	1429	31.8	2013	32.8	(.000)
3 or 4 times	7177	27.0	848	24.2	3753	30.0	1308	29.1	1268	20.7	
Experience as a donor (years)											
<2	4228	15.9	758	21.7	1574	12.6	859	19.1	1037	16.9	497.658
2-4	5616	21.1	807	23.1	2357	18.9	1062	23.6	1390	22.7	(.000)
5-10	6643	24.9	853	24.4	3067	24.5	1130	25.1	1593	26.0	
11-15	3035	11.4	330	9.4	1547	12.4	464	10.3	694	11.3	
>15	7104	26.7	753	21.5	3951	31.6	980	21.8	1420	23.1	
Total	**26 626**	**100.0**	**3501**	**13.2**	**12 496**	**46.9**	**4495**	**16.9**	**6134**	**23.0**	

times), whereas the "Busy" cluster and "Very inhibited" cluster had the lowest frequencies (46.5% and 42.7%, respectively, donated only once). Regarding donor experience, most differences were observed between the "Very inhibited" cluster and the "Uninhibited" cluster. The former included the least experienced donors (44.8% had been donors for less than 5 years), and the latter included the most experienced donors (44.0% had a donor history of more than 10 years).

3. Discussion and conclusions

The first aim of this work was to design and validate a donation barrier scale, taking into account a wide range of different barriers. The results of the study conclude that there are 4 barrier categories: "Informative barriers," "Intrinsic barriers," "Time-space barriers," and "Procedural barriers." This classification is similar to some barrier typologies that have been previously identified in the literature. For example, "Informative barriers" are quite close to the "No information" categories detected in the work of Martín-Santana and Beerli-Palacio [23] and the "Lack of knowledge" category found in the meta-analysis of Bednall and Bove [9]. Having said that, the classification proposed in the present study includes other barriers that are also relevant for BTCs, for example, the absence of promotional campaigns and the absence of reminders from the centers to donate. On the other hand, "Intrinsic barriers" comprise the majority of the items that Schreiber and others [15] included in the "Physical factors" and "Fear" categories, as well as the barriers that Bednall and Bove [9] grouped under the "Fear" and "Personal values" denominations in their meta-analysis. As for "Time-space barriers," although the inconvenience related to donation has already been analyzed by many authors [9,10,14,38], none of them have considered the time and space dimensions jointly. In the same way, "Procedural barriers" complement the "Lengthy process" category devised by Schreiber and others [15] because it incorporates other barriers such as waiting times, the obligation to fill in a health questionnaire at each donation, and the absence of donation incentives. For these reasons, we can conclude that the scale designed and validated in this study provides a more integrative option for analyzing donation barriers.

Contrary to what was expected, the results of this study have verified that active donors face important barriers that prevent them from donating more frequently. Therefore, it is necessary to eliminate these barriers to increase their number of donations per year. This is especially so because the retention of active donors presents important advantages over both the recovery of inactive donors and the recruitment of new donors, which are mainly lower costs for BTCs due to their lower incidence of contagious diseases, their generalized tendency to donate more frequently, and their higher level of commitment to blood donation, so they may also act as advocates [13,15,24].

Given the BTCs' scarcity of economic resources, their management should be oriented toward developing differentiated programs aimed at the highest investment-return donor clusters, which will be those including donors with fewer barriers or whose barriers are easier to eliminate. For this reason, this study, applying the different categories of barriers as criteria, has identified 4 clusters of active donors which require differentiated marketing strategies to eliminate these barriers: (1) "Uninhibited" donors, who present very few barriers; (2) "Busy" donors, whose most prevalent barriers are Time-space and Informative; (3) "Apprehensive" donors, whose barriers are mostly Intrinsic and Informative; and (4) "Very inhibited" donors, who experience a high number of barriers in all categories.

Taking into account the characteristics of the 4 clusters, the present study suggests a series of practical applications that BTCs can use in programs to promote donation and retain active donors. First and foremost, the results indicate that BTCs must establish differentiated marketing strategies, prioritizing firstly the "Uninhibited" cluster, then the "Busy" and "Apprehensive" clusters, and lastly the "Very inhibited" cluster. With respect to the specific marketing actions to be implemented, direct marketing would be the most effective communication action for both the "Uninhibited" and the "Busy" clusters. To that end, telephone calls or messages could be used to remind donors that they can give blood again after the interdonation period, given that both clusters present a slight predominance of male donors who, following the results of Charbonneau and colleagues [14], tend to forget when they can redonate more frequently than female donors. In the particular case of the "Uninhibited" cluster, the success in using direct communication channels may be greater than in the other clusters because these donors have the greatest commitment to blood donation in terms of annual donation frequency in 2017. Therefore, it is expected that, in the "Uninhibited" cluster, the rate of negative responses to a telephone call or a direct message will be lower. In the case of the "Busy" cluster, because the most relevant barriers in it are related to lack of time and time incompatibility, which is consistent with the predominance donors of older ages (≥36 years old), with university education, who are currently working, and had an annual donation frequency of only 1 donation in 2017, BTCs should consider extending donation times as well as increasing the frequency of visits for blood donation mobile units.

In the "Apprehensive" cluster, advertising campaigns would be more advisable and should aim to change beliefs and attitudes toward blood donation, given that the most prevalent barrier categories among "Apprehensive" donors are Informative and Intrinsic barriers. The prevalence of Intrinsic barriers in this cluster is consistent with the predominance of female donors, who have been frequently reported as individuals especially affected by this barrier typology [14,17]. However, and given that the "Apprehensive" cluster did not show an exaggerated prevalence of any age interval and that almost 90.0% of donors had, at least, university studies, it is surprising that Informative barriers were the most prevalent barrier category, taking into account that most developed countries have access to information and ICT. That is why BTCs should strive to design advertising campaigns. With regard to

social marketing campaigns, they should be carried out across a significant period of time to achieve the intended changes in belief systems and attitudes.

Lastly, because the "Very Inhibited" cluster consists of younger subjects, it would be advisable to use social media with factual messages or testimonials (eg, "Blood is perishable," "There is a constant need for blood at hospitals") instead of messages appealing to action (eg, "Donate blood," "Come give blood at…"). Additionally, to educate teenagers, who will be future donors, it would also be advisable to implement informative and awareness actions on the importance of blood donation at educational centers, especially high schools. For that, virtual reality and augmented reality technologies could be integrated in the design of campaigns and educational materials aimed at diminishing intrinsic barriers among the young.

This work has some limitations. The first one is basically related to the study population—Spanish active donors. For this reason, it would be advisable to replicate this work in other geographical contexts. Additionally, the methodological procedure followed could be a second limitation, as it is possible that the answers obtained came more or less exclusively from donors which were more committed to blood donation. Finally, the differentiated marketing actions proposed in this work are just proposals based solely on the results of the cluster analysis. To verify their effectiveness and suitability, it would be ideal for BTCs to apply some of them.

Declaration of Interest

None.

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7.3. Recruitment strategies: Non-donor segmentation based on intrinsic and extrinsic stimuli

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Recruitment strategies: non-donor segmentation based on intrinsic and extrinsic stimuli

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Background and objectives Non-donor behaviour can be influenced by many variables, both intrinsic and extrinsic, which differ among individuals. The aim of this study was therefore to segment Spanish non-donors based on criteria such as barriers and motivations, which influence the decision to donate for the first time, with the aim of improving the efficiency and effectiveness of recruitment actions.

Materials and methods A total of 2383 non-donors residing in Spain evaluated 21 barriers and 25 motivations through an online self-administered survey distributed by blood transfusion centres, which are responsible for donations in Spain, and several Spanish universities. After validating these scales and determining the underlying categories in each of them, latent class/profile analysis was performed to segment non-donors.

Results Spanish non-donors were divided into six clusters. According to their barriers and motivations, the following labels were assigned: (1) 'Impure altruists', (2) 'I want to, but make it easy for me', (3) 'Free-riders', (4) 'Reciprocal altruists', (5) 'I can't because I'm scared' and (6) 'I want to, but I can't'. Specific marketing actions were proposed for each cluster based on their characteristics, prioritizing them depending on their attractiveness.

Conclusion The scales which were designed to evaluate barriers and motivations make a solid contribution to the existing literature due to their holistic, integrative nature. The existence of differentiated clusters and the lack of resources of blood transfusion centres make it clear that there is a need to define and implement targeted marketing strategies.

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Key words: barriers, blood donation, donor segmentation, motivations, recruitment strategies.

Introduction

Blood transfusion is a vital service that helps save and improve millions of lives every year [1]. In spite of that fact, factors such as an ageing population, increasing medical procedures, rigorous donor screening criteria and the perishability of blood cause an alarming imbalance between blood supply and demand [1–3]. In order to satisfy the increasing demand, blood transfusion centres make serious efforts to sustain a stable, safe pool of voluntary donors by combining specific strategies to recruit new donors and retain regular donors [4]. Although retention has its own advantages [5–8], recruiting new donors also plays a fundamental role. New donors increase the pool size and replace donors who drop out or are forced to abandon the system [9,10].

Successful strategies to recruit new donors require blood transfusion centres to know the different intrinsic and extrinsic factors which are involved in the decision to donate blood for the first time [11]. Donation barriers and motivations are particularly relevant because the interaction among them influences donation behaviour.

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Therefore, when motivations prevail over barriers, individuals decide to donate and vice versa [5,12]. Moreover, taking into account that these factors differ among individuals, simply identifying them is not enough. It is necessary to segment non-donors according to the extent that these factors influence their behaviour.

On the one hand, the literature has identified the following main barriers to donate: fear [12], inconvenience of donation venues [13], lack of time [14], physical reactions [7], lack of information [15] and lack of an explicit request to donate [16]. On the other, the main motivation to donate has been traditionally altruism, which can be defined as the desire to help others with no prospect of any compensation [6,12,17]. The mechanism of altruism approach, however, states that altruism is a more complex construct and includes multiple aspects, which extend the concept of altruism beyond its most selfless dimension (pure altruism). Thus, blood donors also seek certain emotional benefits when donating blood (e.g. personal satisfaction of helping others), which is called impure altruism [18,19]. At the same time, other studies identify other motivations such as peer pressure or receiving blood analysis results, among others [20,21].

Nevertheless, the way in which these factors have been measured and defined varies substantially among studies. Different terms have been used to name the same barrier or motivation. That is the case, for instance, of altruism, which has been called in different studies as 'Saving lives', 'Helping others' and 'Human solidarity' [20,22,23]. This terminological inconsistency makes it more difficult to compare results among studies, as well as to group these factors into categories. Furthermore, in most studies the number of factors analysed differs significantly. Finally, very few studies have distinguished between intrinsic and extrinsic motivations [23,24]. This distinction is interesting because creating extrinsic motivations to donate is largely a role of blood transfusion centres by virtue of using marketing stimuli (e.g. promotion campaigns, donor loyalty programmes).

For all these reasons, in order to achieve the aim of this study, first of all two holistic scales were designed to assess the prevalence of barriers and motivations identified in the literature. Spanish non-donors were segmented using these two scales in order to design and apply targeted marketing actions with the aim of incorporating non-donors into the system.

Materials and methods

Study population and data collection

The study population comprised non-donors (individuals who have never given blood) who were older than 18 years, from both sexes and who lived in Spain. Data were collected with an online self-administered questionnaire from March to September 2018. Since there is no specific non-donor register, the collaboration of existing Spanish blood transfusion centres and public and private universities was needed in order to reach the study population. These institutions spread the URL of the questionnaire along with an invitation message through their main social media accounts (especially Facebook and Twitter) and their own platforms (e.g. official website, newsletter, blog). Additionally, universities also spread the invitation to the whole university community through their institutional e-mail service. A total of 46 dissemination campaigns (22 actions carried out by blood transfusion centres and 24 carried out by universities) gathered an initial sample of 2584 non-donors. Some questionnaires remained unfinished; however, so the final sample was reduced to 2383 non-donors. For this reason, the questionnaire completion rate was 92·2%. Out of the final sample, 1,261 questionnaires (52·9%) came from blood transfusion centres social media, and 1122 (47·1%) came from universities.

Study variables

To measure barriers, motivations and marketing stimuli of non-donors, two scales were designed. The barrier scale comprised 21 items adapted from previous studies [9,12,22,25–30]. Each item corresponded to a barrier related to the question, 'Please note whether each of the following causes can or cannot prevent you from donating blood for the first time'. Respondents could answer Yes or No to each item. On the other hand, the intrinsic and extrinsic motivations scale was made up of 25 items adapted from the literature [9,12,20,22,29,31–35]. In these scales, respondents also answered Yes or No to the question, 'Please note whether each of the following causes can motivate you to donate blood for the first time'.

Statistical analysis

The data were analysed using SPSS (IBM Corp. Armonk, NY), Stata (StataCorp. College Station, TX) and Latent GOLD (Statistical Innovations, Belmont, MA).

- Univariate tests were used to describe the non-donor sample.
- A principal component analysis was performed to validate both barrier and motivation scales.
- Latent class/profile analysis was requested to segment the non-donor sample according to their barriers and motivations.

Results

The final Spanish non-donor sample (see Table 1) had a higher rate of women (74·3%) than men. Most respondents were younger than 36 years of age (68·3%), had a university degree (60·4%), were employed (57·0%) and earned less than 2000 EUR a month (53·2%).

These results prove that first-time blood donation is a complex decision determined by a large number of diverse factors. The heterogeneous nature of human beings and their behaviour requires blood transfusion centres to define targeted strategies to recruit new donors. To this end, blood centres need to segment non-donors according to the factors influencing their decision to donate blood.

Before segmenting, it was indispensable to determine the different underlying barrier and motivation categories in the two proposed scales. As stated by Debelak and Tran [36], the tetrachoric correlation matrix should be used when variables are dichotomous when a principal component analysis (PCA) is performed. For this reason, based on such input, a PCA was carried out for both the barrier and the motivation scale, and its results are shown in Tables 2 and 3, respectively. Additionally, the reliability of both scales, as well as that of each resulting factor, was determined by calculating the coefficient of Kuder Richardson Formula 20 (KR-20), which is the equivalent measure to Cronbach's alpha when variables are dichotomous [37]. Throughout this validation process, the number of final items was 18 in the barrier scale and 23 in the motivation scale. To determine the number of components (categories) to extract, the latent root criterion was used. This technique establishes that only the factors having eigenvalues greater than 1 are considered significant, as stated by Hair et al. [38].

Table 1 Sample profile

Characteristics	N	%
Sex		
Male	613	25·7
Female	1770	74·3
Age (years)		
18 25	1136	47·7
26 35	490	20·6
36 45	396	16·6
>45	361	15·1
Education		
No formal education	3	0·1
Primary	86	3·6
Secondary	855	35·9
University	1439	60·4
Employed		
Yes	1359	57·0
No	1024	43·0
Total monthly income (EUR)		
≤2000	1269	53·2
2001 4000	799	33·5
>4000	315	13·3
Total	2383	100·0

The results in Table 2 allow us to make the following statements: (1) the PCA can be considered satisfactory, since its results explained 69·49% of the total variance; (2) factor loadings (see FB1-FB4 columns) were very significant, as all of them were higher or close to 0·7, which is indicative of a well-defined structure [38] and (3) communalities (see COM column) presented high values, given that in every item more than 50% of the variability of the respondents' answer was explained (except BARR18). Additionally, the KR-20 values were greater (FB3 and FB4) or very close (FB1) to 0·7, being FB2 the only exception. This means that this is a reliable scale. As expected, there were clearly different barrier categories which could be labelled as 'informative barriers' (FB1), 'attitudinal barriers' (FB2), 'time-space barriers' (FB3) y 'psychological and physical barriers' (FB4).

Table 2 also shows the descriptive analysis of different barriers influencing Spanish non-donors (see Frequencies column). The most frequent barriers were psychological and physical in nature, namely, 'Fear of needles and/or pain' (41·8%), 'General fear of donating blood' (39·7%) and 'Suffering physical distress' (36·5%). Among informative barriers, the most important ones were 'Lack of information about the location and opening times of donation venues' (34·7%) and 'Lack of information about the donation process and requisites' (33·4%). The most important attitudinal barrier was 'Lack of willingness, interest and/or motivation to donating' (24·5%). Lastly, the findings of the study particularly highlighted 'Lack of free time' (31·9%) and 'Schedule incompatibility' (30·6%) as the most frequent barriers in the category of time-space barriers.

Regarding the motivation scale, Table 3 allow us to make the following statements: (1) the PCA can be considered satisfactory, since its results explained 70·03% of the total variance; (2) factor loadings (see FM1-FM5 columns) were very significant, as they were higher or close to 0·7 and (3) communalities presented values higher than 0·5 (except MOT3 and MOT16). Moreover, this scale is reliable because the KR-20 values were greater (FM2, FM3 and FM4) or very close (FM1) to 0·7 (except FM5). In this case, multiple categories were also found. They were called 'Impure altruism' (FM1), 'health benefits' (FM2), 'appreciation' (FM3), 'marketing stimuli' (FM4) and 'social influence' (FM5).

Motivations included in the Impure altruism category showed the largest percentages, and five of them registered values higher than 80·0%. In fact, 'Human solidarity, helping others and saving lives' was the most

Table 2 Results of PCA of barrier scale and frequencies

		PCA results					Frequencies	
Barriers		**COM**	**FB1**	**FB2**	**FB3**	**FB4**	**N**	**%**
Informative barriers								
BARR3	Lack of information about the constant need for blood	0·715	**0·812**	0·155	0·140	0·105	588	24·7
BARR24	Absence of promotional donation campaigns to donate blood (TV, radio, social networks, etc.)	0·662	**0·748**	0·114	0·286	−0·085	493	20·7
BARR2	Lack of information about the location or opening times of donation venues	0·776	**0·730**	0·073	0·486	−0·040	827	34·7
BARR1	Lack of information about the donation process or requisites	0·628	**0·710**	0·254	0·215	0·117	795	33·4
Attitudinal barriers								
BARR23	Negative opinions of friends, relatives, etc., towards blood donation	0·700	0·098	**0·793**	0·212	0·132	81	3·4
BARR8	Mistrust about the possible uses of blood	0·658	0·217	**0·746**	0·226	0·054	220	9·2
BARR7	Lack of willingness, interest and/or motivation to donating blood	0·578	0·122	**0·709**	0·058	0·239	585	24·5
BARR5	Cultural, religious or ethical reasons	0·698	0·297	**0·637**	0·150	0·426	90	3·8
Time-space barriers								
BARR10	Schedule incompatibility with donation venues	0·781	0·171	0·102	**0·861**	−0·013	729	30·6
BARR11	Donation venues are located too far away	0·822	0·319	0·130	**0·839**	0·017	486	20·4
BARR12	Inconvenient location of donation venues	0·790	0·350	0·183	**0·796**	0·017	359	15·1
BARR9	Lack of free time	0·573	−0·021	0·042	**0·753**	−0·063	759	31·9
BARR13	Lack of parking space in donation venues	0·624	0·139	0·196	**0·753**	0·008	361	15·1
Psychological and physical barriers								
BARR20	Fear of needles and/or pain	0·816	0·007	0·057	−0·067	**0·899**	995	41·8
BARR21	Fear of seeing blood	0·787	0·065	0·010	0·012	**0·885**	668	28·0
BARR19	General fear and anxiety of donation	0·816	0·001	0·191	−0·086	**0·879**	946	39·7
BARR17	Suffering physical distress (nausea, vomit, dizziness, etc.)	0·618	0·015	0·217	0·091	**0·750**	870	36·5
BARR18	Suffering wounds in arms due to use of needles (haematoma, irritation, etc.)	0·467	−0·049	0·336	0·193	**0·561**	394	16·5
Eigenvalue			1·441	1·251	6·106	3·711		
Partial percentage of explained variance			14·98	13·89	20·98	19·65		
Total percentage of explained variance		69·49						
KR-20 of each factor			0·692	0·471	0·761	0·759		
KR-20 of global scale		0·758						

Bold values correspond to the factorial loadings of the most relevant items in each barrier category.

prevalent motivation among all the motivations which were studied (97·7%). Extrinsic motivations derived from marketing stimuli carried out by blood transfusion centres were highly valued by non-donors, especially highlighting 'An urgent call for blood donations' (90·3%), 'Mobile units near home, workplace/academic centre or in crowded places' (74·4%) and 'Knowing the testimony of people who have received a blood transfusion' (64·6%). Health benefits were also highly appreciated by non-donors, since three out of the four motivations forming that category showed values higher than 55·0%. On the other hand, motivations included in the other categories (appreciation and social influence) were much less significant, with values ranging from 12·9% and 38·2%.

In order to segment non-donors, nine variables were created, each corresponding to the proposed categories of barriers and motivations. Each new category was created based on the sum of barriers and motivations comprised by previous categories and chosen by the survey respondents. Table 4 collects descriptive statistics for the new variables. Since these new variables had different ranges (from 3 to 7), the percentage of the prevalence that each respondent had in each motivation and barrier categories was calculated in order to carry out a comparative analysis. Based on these percentages, means and quartiles for each category were calculated. The results suggest that the most prevalent barriers were psychological and physical (M = 32·51%) followed by informative barriers (M = 28·36%) and time-space barriers (M = 22·61%). The most frequent motivations were markedly Impure altruism (M = 82·82%), marketing stimuli (M = 68·01%) and health benefits (M = 53·99%).

Subgroups of non-donors were identified using latent class/profile analysis (LC/PA) for nine variables (six of barriers and five of motivations), which are not mutually exclusive. Unlike traditional cluster analysis, LC/PA is a model-based method that fits a statistical model to the data, classifying each case (non-donor) in the most probable group based on responses to a set of observed variables. An important advantage of LC/PA over other

Table 3 Results of PCA of motivation scale and frequencies

		PCA results						Frequencies	
Motivations		COM	FM1	FM2	FM3	FM4	FM5	N	%
Impure altruism									
MOT1	Human solidarity, helping others or saving lives	0·934	**0·843**	−0·025	0·068	0·461	−0·069	2328	97·7
MOT5	Personal satisfaction derived from helping others	0·729	**0·772**	0·161	0·130	0·256	0·158	2220	93·2
MOT4	Since blood cannot be artificially made, we must all collaborate	0·693	**0·770**	0·147	−0·005	0·202	0·193	2007	84·2
MOT2	Fulfilling social duties or moral obligation of helping other people	0·604	**0·697**	−0·032	0·148	0·154	0·269	1920	80·6
MOT7	Giving blood makes me feel needed and useful for society	0·664	**0·643**	0·171	0·165	0·131	0·421	1683	70·6
MOT3	Donating blood is no effort	0·441	**0·629**	0·107	−0·160	0·078	0·050	1471	61·7
MOT9	Perhaps I or my relatives could need blood in the future	0·579	**0·571**	0·350	0·068	0·350	−0·060	2187	91·8
Health benefits									
MOT11	Knowing if I have an infectious disease	0·929	0·069	**0·925**	0·239	0·096	0·046	1344	56·4
MOT10	Getting blood test results	0·915	0·034	**0·910**	0·258	0·110	0·082	1404	58·9
MOT12	Getting medical advice about my health	0·913	0·125	**0·898**	0·259	0·140	0·063	1511	63·4
MOT6	It can be good for my health	0·590	0·335	**0·456**	−0·043	0·019	0·517	887	37·2
Appreciation									
MOT15	Getting symbolic rewards for my history as a blood donor	0·903	0·059	0·243	**0·910**	0·046	0·098	379	15·9
MOT14	Getting symbolic gifts for donating blood (t-shirts, pins, towels, mugs, etc.)	0·859	0·027	0·268	**0·883**	0·073	0·036	406	17·0
MOT13	Gaining the social recognition associated to being a regular donor (public events, diplomas, medals, certificates, etc.)	0·795	0·107	0·401	**0·725**	−0·008	0·310	308	12·9
MOT16	Having 1 2 hours of free time at work to go donate blood	0·469	0·022	0·278	**0·581**	0·233	−0·014	910	38·2
Marketing stimuli									
MOT19	Seeing or listening to an advertising campaign on TV, the radio or the social media	0·743	0·322	0·167	0·107	**0·765**	0·121	1316	55·2
MOT18	An urgent call for blood donations	0·641	0·318	0·076	−0·038	**0·729**	−0·013	2151	90·3
MOT20	Getting a call or message from a blood donation centre	0·647	0·260	0·111	−0·072	**0·716**	0·223	1325	55·6
MOT22	Mobile units near home, workplace/academic centre or in crowded places	0·642	0·254	0·224	0·192	**0·695**	0·087	1772	74·4
MOT21	Knowing the testimony of people who have received a blood transfusion	0·548	0·251	0·177	0·164	**0·642**	0·119	1539	64·6
Social influence									
MOT24	Donating blood is a tradition in my family	0·636	0·129	0·073	0·228	0·218	**0·717**	338	14·2
MOT23	My religion or beliefs encourage me to donate blood	0·568	0·102	0·021	0·261	0·419	**0·560**	561	23·5
MOT8	Others will have a good opinion of me	0·668	0·345	0·270	0·442	−0·017	**0·529**	423	17·8
Eigenvalue			8·498	3·543	1·475	1·587	1·004		
Partial percentage of explained variance			18·33	15·16	13·75	14·52	8·27		
Total percentage of explained variance		70·03							
KR-20 of each factor			0·660	0·792	0·713	0·707	0·475		
KR-20 of global scale		0·824							

Bold values correspond to the factorial loadings of the most relevant items in each motivation category.

traditional segmentation methods is that its classification is based on probability. Cases are assigned to groups according to probabilities of belonging estimated directly from the model [39–41]. The estimation method starts with a hierarchical cluster and carries on with an iterative algorithm (expectation-maximization), until the combination of model and number of conglomerates allows more information to be collected. Because the number of latent classes is unobservable and cannot be estimated directly from a given data set, model fit statistics and indices are applied to assess the goodness-of-fit of the mixture model [42]. Latent GOLD, which was used in the current study, provides such statistics.

To determine the optimal number of classes in the model, a series of latent profile analyses models with increasing number of latent classes are fit and the number of classes is determined by comparing the k-class model with the (k-1)-class model iteratively. The Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC) are usually applied as goodness-of-fit measures. The best model is the one that presents the lowest AIC and BIC values. In the current study, eight models were

Table 4 Descriptive statistics of barrier and motivation categories

Categories	Min	Max	Mean	SD	Mean (%)	Q1 (%)	Q2 (%)	Q3 (%)
Barriers								
Informative	0·00	4·00	1·13	1·29	28·36	0·00	25·00	50·00
Attitudinal	0·00	4·00	0·41	0·72	10·24	0·00	0·00	25·00
Time-space	0·00	5·00	1·13	1·47	22·61	0·00	0·00	40·00
Psychological and physical	0·00	5·00	1·63	1·64	32·51	0·00	20·00	60·00
Motivations								
Impure altruism	0·00	7·00	5·80	1·44	82·82	71·43	85·71	100·00
Health benefits	0·00	4·00	2·16	1·53	53·99	25·00	75·00	75·00
Appreciation	0·00	4·00	0·84	1·16	21·01	0·00	0·00	25·00
Marketing stimuli	0·00	5·00	3·40	1·52	68·01	40·00	80·00	100·00
Social influence	0·00	3·00	0·55	0·81	18·49	0·00	0·00	33·33

identified. Table 5 presents the fit indices of these eight models, and it is evident that the seven-cluster model had the lowest AIC and BIC values. The six-cluster model, however, had indices that were similar to the former, although slightly higher. Taking into account that the Dissimilarity Index in both cases was practically the same, we decided on the six-cluster model for sake of economy.

The six-cluster model was very satisfactory, given that it had a standard R-squared value of 0·6014 and an entropy *R*-squared value of 0·6548. Entropy *R*-Squared is a complementary goodness-of-fit measure which indicates, on a range from 0 to 1, how well the observed responses can predict the class (cluster) membership. The closer to 1, the more discriminating the clusters are [43].

All the indicators included in the model (barrier and motivation categories) were significant, since *P*-values of the Wald test were lower than 0·05 (see Table 6). This proves that all indicators significantly contribute to the capacity to discriminate between clusters. The R^2 of each indicator points out how much of its variance is explained by the six-cluster model.

The use of covariates (sociodemographic characteristics), which influence latent variables, but have no direct effect on indicators (barriers and motivations), allowed us to describe each cluster's members. Sex, age, education and level of income were significant in the analysed model (see Table 7). This was not the case with the 'Employed' variable, which is why it was eliminated.

Table 8 shows the size of clusters and profiles associated to each one, using the mean values of indicators (barrier and motivation categories). The three first clusters accounted for more than 70·0% of the sample.

Based on the results of Table 8, the identified clusters are described according to prevalence of the different barrier and motivation categories. Cluster 1 (C1), denominated as 'impure altruists', is the largest cluster (25·86%) and it consists of individuals whose main motivation to donate was Impure altruism (M = 6·30). They presented lower values than the global average in the other motivation categories, except marketing stimuli. Barrier values in this cluster were simultaneously low their average rates were lower than the global average throughout all barrier categories. The value found in this cluster in regards to marketing stimuli sensitivity was close to the global average (M = 3·60 vs. M = 3·40). Therefore, this group is made up of the most selfless individuals.

Cluster 2 (C2), called 'I want to, but make it easy for me', is the second largest cluster (24·61%). These individuals showed high levels of Impure altruism and health benefits, as well as high sensitivity to marketing stimuli. However, they presented a higher rate of Informative and Time-space-related barriers than the average (respectively, M = 2·00 and M = 1·97). Therefore, these respondents are motivated to donate, but they do not have the time or the necessary information to actually do it.

Cluster 3 (C3), labelled as 'free-riders', comprises 21·75% of non-donors. Individuals comprised in this cluster experienced significant barriers at higher levels than the global average. Moreover, they showed lower motivation levels than the global average in all categories. For these reasons, individuals in this cluster are not motivated to donate, and even if they were, the barrier prevalence would prevent them from donating.

Cluster 4 (C4), labelled as 'reciprocal altruists', represents 10·82% of non-donors. It is characterized by barrier levels that were relatively low throughout all categories, and high motivation values in all categories. It should be noted that these individuals showed the highest rates concerning Impure altruism (M = 6·71) and that they were very sensitive to marketing stimuli (M = 4·55), to health benefits (M = 3·72) and to appreciation (M = 2·35). Therefore, this cluster would donate blood for altruistic reasons, but they also seek some personal benefits at the same time.

Cluster 5 (C5), called 'I can't because I'm scared', represents 9·54% of non-donors. It is mainly characterized as

Table 5 Data fit of models

Models	1	2	3	4	5	6	7	8
Degrees of freedom (df)	2342·00	2325·00	2308·00	2291·00	2274·00	2257·00	2240·00	2223·00
L-squared (L^2)	39 295·59	37 621·58	36 997·90	36 528·94	36 231·72	36 079·16	35 942·92	35 841·48
X-squared	984 828 211·00	2 353 514 857·00	1 416 273 463·00	1 099 932 458·00	287 775 433·00	375 103 992·00	343 386 800·00	269 020 387·00
Cressie-Read	8 834 653·89	10 064 814·90	7 363 669·88	6 703 782·69	4 405 016·55	4 536 884·06	4 401 896·22	4 071 623·88
BIC (based on L^2)	21 083·93	19 542·11	19 050·62	18 713·86	18 548·84	18 528·47	18 524·42	18 555·18
AIC (based on L^2)	34 611·59	32 971·58	32 381·90	31 946·94	31 683·72	31 565·16	31 462·92	31 395·48
AIC3 (based on L^2)	32 269·59	30 646·58	30 073·90	29 655·94	29 409·72	29 308·16	29 222·92	29 172·48
CAIC (based on L^2)	18 741·93	17 217·11	16 742·62	16 422·86	16 274·84	16 271·47	16 284·42	16 332·18
Dissimilarity Index	1·00	1·00	0·99	0·99	0·99	0·99	0·99	0·99

AIC, Akaike Information Criterion; AIC3, Akaike Information Criterion with 3 as penalty factor; BIC, Bayesian Information Criterion; CAIC, Consistent Akaike Information Criterion.
L^2: the lower the value, the better the fit.
X-squared and Cressie-Read: alternative measures to L^2.
BIC, AIC, AIC3 and CAIC: information criteria. They weigh fit and parsimony (model simplicity). The lower the value, the better the model.
Dissimilarity index: proportion of the sample which would need to be re-classified to improve the model fit [40].

having high psychological and physical barriers (e.g. fear of needles, fear of seeing blood) and the lowest motivation levels throughout all categories. For this reason, it is an unattractive segment due to its reduced size, lack of motivation, aversion to and fear of donation.

Finally, Cluster 6 (C6), labelled as 'I want to, but I can't', is the smallest segment (7·43%). It presents both motivation and barrier levels that were very high in all categories. Moreover, this cluster was highly sensitive to marketing stimuli. Hence its denomination, since its barriers seemingly neutralize its motivations.

The results obtained from the study suggest that the impure altruists cluster (C1) is the most attractive. It is also the largest cluster in size, comprising a quarter of the sample (25·86%). Reciprocal altruists' (C4) characteristics are similar to those of impure altruists'. However, this cluster's individuals, which comprise 10·82% of the non-donor sample, are highly sensitive to both internal and external stimuli (i.e. health benefits, appreciation, marketing stimuli and social influence). Therefore, blood transfusion centres will have to allocate economic resources to design promotion campaigns and to provide incentives to reciprocal altruists in order to recruit them. Conversely, despite its size (21·75%), the 'free-riders' (C3) is the least attractive of all segments, since it presents low motivation levels (average values below global averages) and many different donation barriers (average values over global averages). The 'I can't because I'm scared' cluster (C5) is also unattractive because it has the lowest motivation levels throughout all categories, and the only relevant barriers are psychological and physical barriers, which are hard to overcome. Additionally, this cluster is small in size (9·54%). An intermediate scenario is represented by the 'I want to, but make it easy for me' (C2) and 'I want to, but I can't' (C6) clusters, which are highly motivated by Impure altruism and marketing stimuli. However, members of the 'I want to, but I can't' cluster are highly motivated due to a range of factors related to appreciation and social influence. For that reason, the 'I want to, but make it easy for me' cluster is more attractive although it has Time-space-related and informative barriers, these are easier to eliminate and do not require large economic efforts (e.g. extending the centres' opening times, using the social media to inform people about organizing mobile blood collection campaigns, etc.). Moreover, it comprises a higher proportion of non-donors (24·61%). On the other hand, the 'I want to, but I can't' cluster, apart from being the smallest cluster (7·43%), experiences the highest psychological and physical barriers, which are harder to eliminate. For all these reasons, blood transfusion centres should target their recruitment programmes at the 'impure altruists', 'I want to, but make it easy for me', 'reciprocal altruists' and 'I want to, but I

Table 6 Wald test for indicators (barriers and motivations)

Models for indicators	C1	C2	C3	C4	C5	C6	*Wald*	*P*	R^2
Barriers									
Informative	−0·854	0·830	0·275	0·031	−1·675	1·392	167·747	0·000	0·410
Attitudinal	−1·912	−0·099	0·800	−0·584	−0·113	1·906	152·103	0·000	0·336
Time-space	−0·645	0·574	0·234	−0·001	−1·006	0·845	166·988	0·000	0·291
Psychological and physical	−0·311	−0·268	0·006	−0·127	0·104	0·595	89·593	0·000	0·144
Motivations									
Impure altruism	0·295	0·344	−0·837	1·147	−1·090	0·142	188·583	0·000	0·371
Health benefits	−0·283	0·030	−0·174	1·539	−1·408	0·297	129·656	0·000	0·292
Appreciation	−0·540	0·582	0·480	1·430	−2·993	1·041	162·943	0·000	0·327
Marketing stimuli	0·055	0·456	−0·570	0·976	−1·423	0·507	219·644	0·000	0·427
Social influence	0·042	0·247	−0·926	1·796	−1·755	0·596	196·609	0·000	0·341

Table 7 Wald test for covariates (sociodemographic characteristics)

Covariates	C1	C2	C3	C4	C5	C6	*Wald*	*P*
Sex								
Male	−0·528	−0·155	0·388	0·007	0·158	0·130	77·087	0·000
Female	0·528	0·155	−0·388	−0·007	−0·158	−0·130		
Age (years)	0·275	−0·145	−0·154	−0·215	0·470	−0·231	94·020	0·000
Education								
No formal education	−1·828	2·131	−1·601	2·848	−0·876	−0·673	30·224	0·011
Primary	0·407	−0·383	0·497	−0·498	0·162	−0·185		
Secondary	0·788	−0·746	0·514	−0·996	−0·016	0·456		
University	0·634	−1·003	0·590	−1·354	0·730	0·402		
Total monthly income (EUR)	0·051	0·134	−0·042	−0·114	0·285	−0·314	11·793	0·038

Table 8 Barriers and motivations according to cluster (expressed in mean values)

Indicators	Global	C1 Impure	C2 Easy	C3 Free-rider	C4 Reciprocal	C5 Fear	C6 Want but can't
Barriers							
Informative	1·13	0·29	2·00	1·17	0·88	0·11	2·80
Attitudinal	0·41	0·05	0·30	0·68	0·19	0·30	1·67
Time-space	1·13	0·31	1·97	1·19	0·82	0·19	2·71
Psychological and physical	1·63	1·13	1·21	1·88	1·53	2·15	3·42
Motivations							
Impure altruism	5·80	6·30	6·34	4·77	6·71	4·03	6·19
Health benefits	2·16	1·81	2·45	2·04	3·72	0·31	2·89
Appreciation	0·84	0·26	0·91	0·80	2·35	0·02	1·59
Marketing stimuli	3·40	3·60	4·13	2·46	4·55	1·20	4·19
Social influence	0·55	0·46	0·56	0·18	1·79	0·08	0·76
Cluster size (%)		25·86	24·61	21·75	10·82	9·54	7·43

can't' clusters, in descending order of importance. Furthermore, more than half the non-donor sample (61·29%) could be activated by just targeting the three most relevant, attractive clusters.

In order to design segment-targeted strategies, blood transfusion centres must also know their respective sociodemographic profiles (see Table 9). Along this line, statistically significant differences were found among the six identified clusters throughout four out of five variables considered. As regards sex, the main differences related to proportion of women can be found between the 'impure altruists' and 'free-riders' clusters (88·1% vs. 57·7%). Concerning age, the youngest people (18 25 years old) were more prone to donating most of them could be found in the following clusters: 'Reciprocal altruists' (59·2%), 'I want to, but make it easy for me'

(57·0%) and 'I want to, but I can't' (57·0%), unlike the 'free-riders' and 'impure altruists' clusters, where the proportion of 18 25 year-old people is lower (20·9% and 37·2%, respectively). Results further suggest that education significantly determined which cluster a respondent was included in. In fact, the 'I can't because I'm scared', 'impure altruists' and 'free-riders' clusters had the highest shares of individuals with university education (82·9%, 63·8% and 61·1%, respectively). Finally, a difference in monthly income was due to the fact that the 'I can't because I'm scared' cluster comprised a higher proportion of respondents who earned more than 4000 EUR (21·3%). On the other hand, the 'I want to, but I can't' and 'reciprocal altruists' clusters had a higher share of people who earned less than 2000 EUR (64·8% and 61·4%, respectively).

Discussion

Recruiting new donors is essential for the donation system, as it is the only way to increase the pool size and replace those individuals who leave the pool, either for personal reasons or because they no longer comply with the donation requirements. The decision to donate for the first time is influenced by many intrinsic and extrinsic factors. This study focused on non-donor barriers and motivations. As suggested by the results, the influencing power of these factors differs among individuals, both regarding numbers and intensity. For this reason, if blood transfusion centres want to make use of their resources efficiently and effectively, they should differentiate non-donors according to how barriers and motivations affect them. Based on this differentiation, blood transfusion centres will be able to prioritize the most useful non-donor segments and design targeted marketing actions.

One of the ways that this study contributes to the literature is by designing holistic scales to measure the prevalence of donation barriers and motivations, which can be used as criteria for segmentation. Firstly, the barrier scale consisted of four categories: (1) Informative barriers, related to lack of information about the donation process, requisites or venues; (2) Attitudinal barriers, including aspects related to individuals' beliefs and perspectives (e.g. religion, lack of trust); (3) Time-space-related barriers, related to the inconvenience of donating blood; and (4) Psychological and physical barriers, associated with fear and concerns about suffering negative physical consequences due to donating.

Secondly, the motivation scale was made up of five categories: (1) Impure altruism, which is derived from the combination of pure altruism (a desire to help others receiving nothing in return) and warm-glow (emotional rewards derived from the act of donation); (2) Health benefits, that is medical incentives such as blood test results, medical advice, etc.; (3) Appreciation, which included tangible and intangible incentives provided by blood transfusion centres; (4) Marketing stimuli, which are promotion actions carried out by blood transfusion centres, mainly through mass media; and (5) Social influence, which comprehended motivations related to the influence of reference groups.

These barrier and motivation categories are similar to other categories existing in the literature. For instance, informative barriers are similar to the 'No information' typology coined by Martín-Santana and Beerli-Palacio [23]. Attitudinal barriers are similar to 'Personal values' proposed by Bednall and Bove [11], and psychological and physical barriers comprise and expand the items suggested by Schreiber et al. [13] in the 'Fear' and 'Physical factors' categories. Concerning motivations, the so-called health benefits have been specifically studied in previous works [44] independently from traditional incentives [35,45], which in this study have been gathered under the designation 'appreciation'. Finally, both marketing stimuli and social influence include and expand the 'Interventions' and 'Reputation building' categories proposed by Ferguson [18] in the framework of the mechanism of altruism approach.

It is therefore possible to state that both designed scales constitute a more holistic, integrative option to analyse the behaviour of non-donors in terms of donation barriers and motivations.

By applying these two scales, six non-donor clusters were identified:

(1) 'Impure altruists'. This label was assigned due to the fact that the most prevalent motivations in this cluster were referred to the notion of impure altruism proposed by Andreoni [45] and included in the mechanism of altruism approach [18,19]. These impure altruists would donate blood to get warm-glow and help others [46].
(2) 'I want to, but make it easy for me'. This cluster comprised individuals who, despite being highly motivated, would not donate due to their informative and time-space barriers.
(3) 'Free-riders', where individuals were not prone to donate at all (they were not motivated, and were highly deterred), matching Abásolo and Tsuchiya's [47] free-rider definition.
(4) 'Reciprocal altruists'. These individuals, who match the definition suggested by Fong [48], are set apart from 'impure altruists' due to the fact that, besides from being motivated by Impure altruism, they would also appreciate receiving some rewards in exchange for donating blood, as long as these compensations are not monetary in nature [34].

Table 9 Sociodemographic profiles of non-donor clusters

Covariates	Global	C1Impure	C2Easy	C3Free-rider	C4Reciprocal	C5Fear	C6Want but can't
Sex							
Male	25·7	11·9	20·5	42·3	25·3	36·7	29·3
Female	74·3	88·1	79·5	57·7	74·7	63·3	70·7
Age (years)							
18 25	47·7	37·2	57·0	52·4	59·2	20·9	57·0
26 35	20·6	21·3	19·0	20·7	19·9	19·5	25·1
36 45	16·6	20·2	13·8	17·2	13·3	22·7	9·0
>45	15·1	21·3	10·2	9·7	7·7	36·9	8·9
Education							
No formal education	0·1	0·0	0·2	0·0	0·7	0·0	0·0
Primary	3·6	2·8	5·0	2·9	6·2	2·1	1·9
Secondary	35·9	33·3	41·5	36·0	44·5	15·0	40·1
University	60·4	63·8	53·3	61·1	48·6	82·9	58·0
Total monthly income (EUR)							
≤2000	53·2	51·8	52·9	54·7	61·4	36·7	64·8
2001 4000	33·5	35·2	33·0	33·3	28·1	42·0	27·1
>4000	13·3	13·0	14·1	12·0	10·5	21·3	8·1

(5) 'I can't because I'm scared' were those individuals whose fears and concerns towards donation were so high that they had the lowest motivation to donate.
(6) 'I want to, but I can't', where individuals were highly motivated and highly sensitive to marketing stimuli, but have not donated yet due to their high barriers.

Based on the proposal made by France et al. [24], who applied the self-determination theory of Ryan and Deci [49] on motivations towards blood donation, these six clusters could be represented in a continuum, ranging from amotivation (the individual does not or is not willing to donate because they do not consider or value blood donation) to intrinsic motivation (the individual donates blood because of the interest and satisfaction that they get from it). Therefore, the representation in a continuum would take into account the prevalence of external *vs* internal motivations in each cluster. Thus, clusters C5 ('I can't because I'm scared') and C3 ('free-riders') could be located at the left end of the spectrum (amotivation), since the individuals that constitute them presented average values that were lower than the mean in every motivation category that has been analysed. At the opposite end of the continuum (intrinsic motivation), we would find C1 ('impure altruists'), having the highest Impure altruism levels and being the least motivated by external factors (e.g. health benefits, appreciation). The other three clusters could be organized in the following order, from left to right: C4 ('reciprocal altruists'), C2 ('I want to, but make it easy for me') and C6 ('I want to, but I can't). Like this, the 'reciprocal altruists' cluster would require the strongest stimulation by blood transfusion centres, given that it shows the greatest external motivation levels, whereas the 'impure altruists' cluster would require the least efforts due to the prevalence of internal motivations.

Blood transfusion centres should carry out specific marketing actions, depending on the cluster which they are targeting. As mentioned above, they should discard the 'free-riders' and 'I can't because I'm scared' clusters, as they are not attractive. This decision was supported by self-determination theory, which states that intrinsically motivated subjects are more inclined towards a behaviour [49] and therefore more sensitive to marketing actions.

The bigger size of the 'impure altruists' cluster is favourable for blood transfusion centres, given that great marketing efforts are apparently not needed to encourage the members of that cluster to donate for the first time. In order to recruit individuals in this cluster, it is suggested that blood transfusion centres launch advertising campaigns in the mass and social media given their high sensitivity to marketing stimuli. Emotional messages should be used, highlighting humanitarian values, social duty and the personal satisfaction derived from helping others through blood donation. These messages would be specially indicated to recruit women, who are prominent in this cluster, since women tend to report the latter as donation motivations more than men [17]. However, blood transfusion centres must consider the challenges associated to the recruitment of female blood donors, that is higher deferral rates due to insufficient weight, low haemoglobin and pregnancy/labour conditions [50,51] or the propensity to experience adverse reactions [7,52]. Regardless of sex, that this type of non-donors (who have not become a part of the system yet, despite their good predisposition) exists can perhaps be explained by

insufficient Spain public resources aimed at promoting donation. Moreover, there is no donation culture that tells people from their infancy onward that everyone must collaborate to maintain the donation system. If we include the lack of campaigns aimed at eliminating potential barriers on top of that, the 'impure altruists' cluster may be discouraged from donating by psychological and physical barriers, which are not only its most prevalent barriers, but also the most difficult to overcome.

Such campaigns can also be used to recruit 'reciprocal altruists' because they are also sensitive to promotion campaigns. However, it is highly recommended to rely on messages emphasizing the personal benefits which people can receive by donating, both tangible (e.g. clinical analysis, medical advice) and intangible (e.g. self-esteem, a socially positive image), as well as designing testimonial-based campaigns. Finally, since appreciation derived from donating blood was of much importance to this cluster, it is advised to carry out actions that are based on such recognition (e.g. certificates, public events, symbolic gifts).

Along this line, all the previously mentioned actions would be also valid for the 'I want to, but make it easy for me' cluster. Having said that, this cluster was influenced by Informative and Time-space-related barriers, so the following actions are recommended: (1) design informative campaigns explaining the donation process in general, the constant need for blood, donation venues and their opening times; (2) extend opening times of donation venues; and (3) increase the number of both fixed and mobile donation venues.

Lastly, actions targeting the 'I want to, but I can't' cluster should be aimed at eliminating the barriers preventing people from donating blood despite their high motivation levels. To this end, it is recommended to create barrier mitigation campaigns underscoring the personal and social benefits in spite of existing barriers. Additionally, it is necessary to implement these campaigns at early stages of life, in schools.

To sum up, the results of this study show the individuals' heterogeneity with regard to intrinsic and extrinsic factors influencing their decision to donate blood for the first time. Therefore, this requires segmenting non-donors based on the prevalence of such factors, as well as designing specific, targeted marketing actions which help eliminate barriers and/or highlight the most important motivations. To achieve the latter objective, and considering the relationship that this work has established between the clusters and the self-determination theory, a potential future line of research is proposed. It would be interesting to perform another segmentation LC/PA using the six regulatory styles proposed by the theory, thus defining more in detail the differences in motivations among the non-donor clusters. In this way, blood transfusion centres will incorporate people who have never donated blood into the system and make them stay for the longest possible time.

Study limitations

The main limitation of this study is the geographical context where it was carried out (Spain). In order to validate the results, it needs to be replicated in other different contexts. In the same vein, since volunteering is the only way to legally donate blood in Spain, it would be especially interesting, for comparative purposes, that the study be repeated in countries with different blood donation systems (e.g. remunerated or mixed systems). Finally, the methodology conditioned the configuration of the sample. The fact that respondents voluntarily decided whether to fill in the questionnaire might influence the generalization of results, as there might be differences between the subjects who chose to participate in the study and those who did not. For this reason, it could be advisable to replicate the study while using other sampling systems which guarantee a sample distribution that is identical to the study population.

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Competing interests

The authors have no competing interests.

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8. Conclusiones

La presente Tesis Doctoral presentada por compendio de artículos abarca un tema de vital importancia no sólo para el sistema sanitario español, sino para cualquier sistema sanitario en el mundo: el comportamiento del donante de sangre. Hasta que se desarrolle un sustituto artificial de la sangre, la calidad y la esperanza de vida de muchos pacientes dependen por completo de la disposición de los donantes voluntarios.

El estudio del comportamiento del donante de sangre desde la perspectiva del marketing social nace de una realidad preocupante, y es que, aunque la mayor parte de la población afirma tener una buena predisposición a donar, ésta no se traduce en donaciones reales, lo cual agrava el desequilibrio que de por sí el sistema de donación experimenta por el lado de la oferta debido al envejecimiento de la población. El marketing social aplicado al contexto de la donación de sangre persigue que los individuos donen sangre de forma prolongada y repetitiva para asegurar no sólo que ellos mismos dispongan de sangre suficiente en caso de necesitarla, sino que cualquier persona pueda acceder a ella en cualquier momento.

Para lograr este cambio, es fundamental conocer los factores que determinan el comportamiento de donación. Los artículos presentados en esta Tesis muestran que el comportamiento del donante de sangre es sumamente complejo, pues está afectado por múltiples factores que varían sustancialmente entre tipologías de donantes. Por ese motivo, las campañas de promoción indiferenciadas, con un único mensaje del tipo “Dona sangre, salva vidas”, dirigido a la totalidad del público cuando hay un periodo de escasez, no obtienen los resultados esperados. Los centros de transfusión, como instituciones responsables, deben identificar qué factores motivan a sus donantes a donar sangre, pero también qué factores impiden que lo hagan. Una vez conozcan estos factores y en qué grado afectan a su *pool* de donantes, los centros podrán diseñar acciones y estrategias efectivas de captación de nuevos donantes, retención de donantes activos y recuperación de donantes inactivos y aplazados. La clave para lograr que la población done, de acuerdo con los principios del marketing social, es eliminar las barreras que obstaculizan la donación y, al mismo tiempo, ensalzar las motivaciones hacia la misma.

Por tanto, existe una necesidad real de que los centros de transfusión abandonen la gestión orientada al producto y adopten un enfoque hacia el donante, que es también uno de sus principales *stakeholders*, pues si las necesidades de los

donantes no están adecuadamente satisfechas, difícilmente podrán satisfacer las de los pacientes receptores. Para ello, es imperativo que dejen a un lado la reticencia a aplicar los principios del marketing en su gestión e implementen acciones de captación, retención y recuperación de donantes basándose en la investigación sobre el comportamiento del donante bajo la óptica del marketing social.

Las aportaciones de esta Tesis Doctoral, tanto a literatura del marketing social aplicado a la donación de sangre como a los centros de transfusión españoles, se pueden concretar principalmente en dos. Por un lado, se ofrece una reseña sobre las principales líneas de investigación abarcadas en la literatura sobre el comportamiento del donante de sangre desde la perspectiva del marketing social. Este conocimiento, junto con el que podría generarse a partir del desarrollo de las líneas futuras propuestas, puede ser aplicado por los centros de transfusión para diseñar sus estrategias y acciones de promoción de la donación de sangre entre la población. Por otro lado, se han diseñado dos escalas, válidas y fiables, que pueden ser utilizadas por los centros de transfusión para (1) medir las barreras y motivaciones hacia la donación de sangre más prevalentes en sus *pools* de donantes, y (2) segmentar a sus donantes según esta prevalencia. Dichas escalas responden a la necesidad de contar un con instrumento de medida que englobe todas las barreras y motivaciones para donar identificadas por la literatura y que permita la comparación de resultados. Finalmente, se ha realizado una segmentación de los donantes activos y los no donantes a nivel nacional según sus barreras y motivaciones, con el objetivo de confirmar que el comportamiento de donación no es homogéneo y que, por tanto, el marketing social es imprescindible para lograr el correcto funcionamiento del sistema de donación de sangre.

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Anexo I. Escala de barreras

B01. Falta de información del proceso de donación de sangre o requisitos para donar
B02. Falta de información de los lugares u horarios de los centros o puntos de donación
B03. Falta de información sobre la necesidad constante de sangre
B04. No ser apto para donar (medicación, anemia, enfermedad, haber viajado a determinados países, tener tatuajes o piercings recientes, peso mínimo, embarazo, etc.)
B05. Razones culturales, religiosas o éticas
B06.* Tener una experiencia negativa en alguna donación de sangre anterior
B07. Falta de voluntad, interés y/o motivación hacia la donación de sangre
B08. Desconfianza sobre el uso que se le puede dar a mi sangre
B09. Falta de tiempo libre
B10. Incompatibilidad de horarios con los centros o puntos de donación
B11. Lejanía de los centros o puntos de donación
B12. Mala ubicación de los centros o puntos de donación
B13. Dificultad para aparcar en los centros o puntos de donación
B14.* Tiempo de espera superior a media hora
B15.* Volver a rellenar mis datos personales en cada donación
B16.* Duración del proceso de extracción de sangre superior a media hora
B17. Sufrir malestar físico (náuseas, vómitos, mareos, etc.)
B18. Sufrir heridas en los brazos derivadas de la punción con la aguja (hematomas, irritación, etc.)
B19. Miedo general y ansiedad hacia la donación de sangre
B20. Miedo a las agujas y/o al dolor
B21. Miedo a la visión de la sangre
B22. Miedo a sufrir anemia
B23. Opiniones negativas hacia la donación de sangre de amigos, familiares, etc.
B24. Ausencia de campañas de promoción para donar sangre (TV, radio, redes sociales, etc.)
B25. Ausencia de incentivos a la donación de sangre (análisis de sangre, regalos, reconocimiento social, entradas a eventos, etc.)
B26.* Ausencia de un recordatorio del centro para ir a donar

Las barreras señaladas con un asterisco (*) no aplican a no donantes

Anexo II. Escala de motivaciones

M01. Solidaridad humana, ayudar a alguien o salvar vidas
M02. Cumplir con el deber social o la obligación moral de ayudar a otros
M03. Donar sangre no supone un esfuerzo
M04. Puesto que la sangre no se fabrica, todos debemos colaborar
M05. Satisfacción personal de ayudar a otros
M06. Puede ser bueno para mi salud
M07. Donar sangre me hace sentir necesario y útil ante la sociedad
M08. Los demás tendrán una buena opinión de mí
M09. Podría llegar a ser yo o un familiar el que necesitase sangre
M10. Conocer los resultados del análisis de mi sangre
M11. Conocer si padezco alguna enfermedad infecciosa
M12. Recibir consejos médicos sobre mi estado de salud
M13. Recibir un reconocimiento social por ser donante habitual (acto público, diplomas, medallas, certificados, etc.)
M14. Recibir regalos simbólicos por donar (camisetas, *pins*, toallas, tazas, etc.)
M15. Premiar mi trayectoria como donante con regalos simbólicos
M16. Disponer de 1-2 horas libres en el trabajo para ir a donar
M17. Tener un grupo sanguíneo poco común o muy demandado
M18. Un llamamiento urgente de necesidad de sangre
M19. Ver u oír una campaña publicitaria en TV, radio o redes sociales
M20. Recibir una llamada o mensaje del centro de donación
M21. Conocer el testimonio de personas que hayan recibido una transfusión de sangre
M22. Encontrarme con unidades móviles cercanas al domicilio, lugar de trabajo/estudio o en lugares concurridos
M23. Mi religión o mis creencias me animan a donar sangre
M24. Donar sangre es una tradición en mi familia
M25. Ayudar a un familiar o amigo que necesita sangre

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