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Piersma, T.W.

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SUMMARY

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Annually, four million patients in Europe are treated with blood-derived products, used in saving lives after traumatic events as well as in treatments of cancer, hemophilia and autoimmune diseases. To ensure a sufficient blood supply, hospitals heavily rely on donors who voluntarily donate blood to help anonymous recipients. Currently, only three to four percent of all people eligible for blood donation is actually registered as a donor – a European-wide average of approximately 29 blood donors per 1000 inhabitants – causing a vulnerable balance between blood supply and demand. Moreover, the percentage of registered blood donors has been declining slowly over the past decade. The general demand for blood has also been declining, but as the need for blood product diversity is increasing, blood donor recruitment is still a challenge. The dissertations' first and introductory chapter discusses how blood banks keep being challenged to work towards sufficient and healthy donor populations to match future demands of all needed blood types. Understanding blood donors is key. What motivates and hinders people to donate blood? And how can these donors be more effectively recruited and retained?

By means of a systematic literature review presented in Chapter 2, we outline how economists, psychologists and sociologists studied a wide range of individual donor characteristics and donation motivations. While we show that the likelihood to be involved in blood donation varies within persons and among different socio-demographic categories, these studies lack theoretical and empirical knowledge on whether and how blood donor behaviour is susceptible to change over the life course. Social scientific theories previously used to examine other forms of prosocial behaviour (i.e., charitable giving and volunteering) can be applied to blood donation in order to investigate diverging donation motivations and to provide a better understanding of blood donor careers, that is blood donor behaviour over the life course. By adopting a life course perspective on blood donation, this dissertation aims to answer the following research question:

> Which individual, social and contextual factors are associated with blood donor behaviour, and what influence do these factors have across the blood donor career?

Research design and data: combining longitudinal registers and surveys

To answer the dissertation's research question, we conducted a number of observational studies and reported on natural variations of blood donation centres. These studies used a unique combination of data from representative blood donor surveys and two national blood donor registers from the Netherlands (i.e., Donor InSight and the Dutch blood donor database) and Denmark (i.e., Statistics Denmark and the Scandinavian Donations and Transfusions database).

By using these large-scale, longitudinal datasets we were able to analyse dynamic blood donor careers of approximately 500 thousand donors while examining actual blood donations instead of self-reported donation intentions. As the data included individual and social blood donor information (e.g., available time, perceived health and social connections), as well as contextual information about blood bank policies (e.g., locations and opening times of donation centres) across several years, we could provide a life course perspective on blood donor behaviour.

Main findings: factors associated with the blood donor career

Chapter 3 shows how the donation decision is susceptible to change across the blood donor career as a result of life events. Childbirth, losing a job and starting a job increased the likelihood of donor lapse, while health-related events (i.e., blood transfusion in a family member, death of a family member) decreased the likelihood of donor lapse. At the individual level, practical concerns play a role in the donation decision. Decreased available time after childbirth and starting a job, as well as lower self-perceived health in combination with losing a job are reasons for donors to lapse. Moreover, at the social level, having fewer other blood donors in the social network partly explains why donors are more likely to lapse after they lost their job. Given donor's behavioural change after experiencing a life event, we advise blood collection agencies to design promotional materials addressing relevant barriers to donate blood and motivate donors to keep donating blood at decisive moments during their donor career.

As these results concluded on blood donor careers in the Netherlands only, without taking into account potential contextual differences between countries, the study presented in Chapter 4 examined the repeatability of these findings among blood donors in Denmark. From the analyses we conclude that life events are indeed associated with donor lapse of Danish donors. These results are comparable to our findings from the Netherlands, with two thirds of the associations being in the same direction (i.e., childbirth and labour market transitions increased lapsing risk; health-related events decreased lapsing risk). However, some differences emerged between the study findings, mainly related to donor sample compositions and the magnitude of effect sizes. These differences might either be the results of contextual differences between blood collection agencies, with blood collection in the Netherlands being rooted in voluntary, religious organizations, therefore attracting fewer but more loyal donors compared to Danish blood banks, or the result of data differences, with the sole use of register data in Denmark providing more accurate estimations of true effect sizes. As a result of cross-country variations in blood donors and their behaviour, blood collection agencies need to be careful in implementing international practices to their own donor management policies by taking into account empirical studies' context.

The study reported in Chapter 5 shifted the focus from individual and social factors to the role of blood banks to further explore their role in the donation decision. We concluded that blood donors are clearly sensitive to price changes imposed by the blood bank. Donors whose nearest blood donation centre closed were 53% more likely to lapse than donors whose nearest donation centre remained open. Moreover, changing the opening days of donation centres also influenced the donor's donation decision: the percentage of donor lapse increased as the number of opening days decreased. We found some evidence of altruistic motivations among blood donors in the Netherlands: donors with the universal, O-negative blood group were less likely to lapse compared to donors with other blood groups. We might assume that these donors are driven by altruistic motivations as their blood can be used more efficiently and thus has a larger public benefit. Yet no interaction effects were found between O-negative donors and the distance to the nearest donation centre. While O-negative donors in general are more likely to continue donating blood compared to blood donors with other blood groups, they are not willing to make an additional sacrifice as the price of donating blood increases. In conclusion, blood collection agencies need to be careful in changing donation centre locations and openings day, and timely communication about upcoming changes is important in donor retention. Presenting donors with alternatives for their next donation might reduce perceived barriers associated with new locations and different opening days, which increases the likelihood for donor return.

To further explore the role of blood banks in the donation decision, the study presented in Chapter 6 moved away from the physical presence of blood banks to the role recruitment strategies play in creating diverse and loyal donor populations. While most donors were recruited via other blood donors (i.e., the donor-recruits-donor strategy) or registered with the blood bank on their own initiative, we could assess proportional differences in how people from different sex, age and ethnicity were recruited as donors. For instance, the donor-recruits-donor strategy was especially reported by donors aged 35 or younger. Among older donors, the blood bank promotion team was the most commonly reported recruitment method. Moreover, our results show that recruitment methods are associated with the length of the blood donor career. While 70% of the donors recruited by other donors were still actively donating blood after five years, this ranged from a high 80% for recruitment via organizations and online media to a low 50% for missing minority campaigns and telephone recruitment. Given the wide variety of motivations for registration as a blood donor (e.g., altruistic feelings, warm-glow, moral responsibilities, or conforming to the family tradition), subsequent blood donor careers are highly person-specific, and some donors could use more support in becoming loyal donors over time.

Conclusion: considerations and future outlook

In the seventh and concluding chapter, aside from summarizing the dissertations' key findings, we describe methodological considerations, discuss theoretical implications, and conclude by elaborating on practical applications of our findings in recruitment and retention of blood donors. Regarding data and methods, we describe how extensive surveys and registers do not fully safeguard from any methodological limitations. While our longitudinal survey data was prone to recall bias and self-selection bias – potentially underestimating reported effect sizes – the registers used to provide a broader, long-term picture of the blood donor career were limited by their lack of completeness and in-depth, qualitative information.

Despite and because of these considerations, the concluding chapter is offering multiple directions for researchers aiming for a broader theoretical understanding of blood donor behaviour, hereby moving beyond basic descriptions of donor characteristics and motivations. For instance, we discuss the role of altruistic values in blood donation, both from a psychological and an economical perspective, and propose how perceived individual resources and social influence from other blood donors shape the donor career beyond altruistic motivations. Moreover, we recommend future donor studies to examine actual donation behaviour instead of self-reported blood donations and donation intention, as the relation between intention and behaviour is relatively weak. We discuss the great potential of combining the results of online field experiments with register data to identify (non-)donor motivations and track donor behaviour over time (e.g., designing and evaluating online recruitment campaigns to increase diversity of the donor population).

Given the studies' societal relevance, this chapter concludes with a number of practical recommendations for more effective blood donor management. First, we advocate the development of personalized recruitment strategies targeted to specific groups of non-donors, instead of the common one-size-fits-all strategies. While it might be tempting to make more general use of the donor-recruits-donor strategy in light of its low costs and easy implementation, our results indicate that this is not effective in motivating diverse groups of new blood donors. Second, we stress the importance of personalized donor retention by responding to changing donation motivations and strategically placing donation centres throughout the country. However, lacking data-driven campaign evaluations makes it difficult to determine on the impact of retention strategies on donor loyalty. Implementation of a Customer Relationship Management (CRM) system in the form of an online blood donor portal is an accessible option to collect real-time data on blood donors while making it easier to communicate with targeted subgroups of the donor population. From a donor perspective this allows for an easy way to share information relevant for the blood bank (e.g., childbirth, change of address), retrieve information about individual resources needed for the next donation, link up with other blood donors and share donation experiences. From a blood bank perspective this allows for targeted motivational messages, triggering the right donation motivations at the right times across the blood donor career.

In conclusion, our results show how, without adequate interventions from the blood bank, a vast percentage of donors is at risk to stop donating blood. Yet in the light of societal and demographic developments, as well as a result of advanced knowledge on iron depletion in frequent blood donors, larger and more diverse donor populations are required to meet future blood demands despite decreased blood usage. Designing personalized interventions, taking in mind individual, social and contextual factors associated with the blood donation decision, is key in working towards evidence-based recruitment and retention. Successfully increasing the number of blood donations from a more diverse and loyal donor population guarantees a stable, adequate and sufficient blood supply which saves lives.