The relation between blood donor recruitment and donor diversity and loyalty in the Netherlands

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Background and Objectives Blood donor populations have been susceptible to change, often showing a trend towards feminization while remaining ethnically homogeneous, leading to an underrepresentation of young men and ethnic minorities. The aim of our study was to examine whether recruitment strategies are related to donor diversity and loyalty of specific demographic groups in the Netherlands.

Materials and Methods Analyses were conducted using the Dutch blood donor database on whole-blood donors registered between 2013 and 2017 (\(n = 155,054\)). Chi-squared tests were used to study relationships between donor characteristics (i.e., sex, age, and Duffy-negative antigen as proxy for donors from African descent) and recruitment strategies; linear and Cox regressions were used to study relationships between recruitment strategies, and number of donations and length of the donor career, respectively.

Results Most donors were recruited via other donors (44\%) or became donor on their own initiative (28\%). Young men were often recruited by other donors and Duffy-negative donors were often recruited via missing minorities campaigns. Donor-recruits-donor was associated with the highest number of donations; telephone recruitment was associated with the lowest number of donations. Although telephone recruitment was associated with the longest donor careers, it also showed the largest proportional stopping prevalence. Student recruitment and missing minorities campaigns were associated with the shortest donor careers.

Conclusion Our results showed proportional differences in how people from different sex, age and ethnicity are recruited, and how recruitment relates to donor loyalty. We advocate for more personalized, evidence-based recruitment and retention strategies.

Key words: blood donation, diversity, donor recruitment, donor retention, evidence-based, loyalty

Introduction

Underrepresentation in the blood donor population

Over the last decades, blood donor populations across Europe and the United States have been susceptible to change. Studies from Germany, the United Kingdom and the Netherlands, among others, show a trend towards
feminization of the donor pool, while remaining ethni-
cally homogeneous across sex and age groups [1–3].
These developments have led to an underrepresentation
of various demographic groups within the blood donor
population compared to the general population, especially
among young men and people from ethnic minorities [4].
Yet, a balanced donor population is important for secur-
ing a safe and sufficient blood supply in future [3].

Compared with older donors, young donors generally
have a longer donor career ahead of them; compared to
female donors, male donors are less likely to be medically
defered, are less likely to experience adverse reactions,
and are allowed to donate more often in most countries
[5, 6]. By the end of 2017, the Dutch donor population
consisted of approximately 38% male and 62% female
active blood donors, while in the general Dutch popula-
tion the sex balance was almost evenly distributed [7].
Based on information from the Dutch blood donor data-
base, the sex imbalance is likely to increase further in the
coming years according to the rates of newly registered
donors (Fig. 1).

With regard to ethnic minorities, their underrepresenta-
tion poses a problem due to different blood type composi-
tions. This is particularly the case for Sub-Saharan
African descendants who substantially differ in extended
blood types compared with people of European descent,
but are also more prone to blood disorders demanding
multiple blood transfusions [8, 9]. Due to growing multi-
culturalism, a diverse blood supply is needed to match
with future transfusion needs [1]. Based on Duffy-negative
phenotyped donors – a proxy for people of Sub-
Saharan African descent [10], as ethnicity is not regis-
tered in the Dutch donor database and this phenotype is
strongly ethno-specific – about 0.05% are found to be
Duffy-negative (Fig. 2). In comparison, it can be esti-
mated that about 165 thousand persons living in the
Netherlands are Duffy-negative, which is approximately
1% of the total population [9, 11].

Previous intervention-based blood donor studies have
investigated methods to assist blood collection agencies
(BCAs) in recruiting new blood donors, for instance pro-
viding educational campaigns, message framing within
BCA brochures, and offering nonmonetary incentives
[12–14]. Despite these efforts, motivating young men and
ethnic diverse nondonors has proven to be challenging
[15, 16]. Hence, the question remains whether and how
these potential blood donors can be effectively recruited
in the near future.

Fig. 1 The number of whole-blood donors in the Dutch donor pool between 2013 and 2017, divided by donor status, sex and age.

Fig. 2 The number of Duffy-negative whole-blood donors in the Dutch donor pool between 2013 and 2017, divided by donor status and sex.
Effectively recruiting and retaining blood donors?

It has been argued that the declining rate of prosocial behaviour (e.g., charitable giving, volunteering, blood donation) is associated with declining altruistic values and lower societal trust over the last 20 years [17]. Also, the growing migrant population lags behind in prosocial participation, as social and economic segregation makes them less willing and capable to commit to the host country’s society [18]. Our paper takes a different perspective, reflecting on the role BCAs play in mobilizing young and ethnically diverse donors. We believe that these groups might be willing to be involved in blood donation, but that they are differently motivated than donors with other demographic characteristics. Our recent systematic reviews showed that motivations and barriers to donate blood differ between men and women, and (non)donors from African backgrounds [19, 20].

Due to these motivational differences, we argue that one size does not fit all in recruiting new donors. Without thoroughly understanding motivational differences between diverse groups of (non)donors, and without incorporating these insights into recruitment campaigns, the use of these campaigns might not lead to desired recruitment outcomes. We examined whether recruitment strategies are related to donor diversity and loyalty of specific demographic groups in the Netherlands. Moreover, we discuss and examine the increasingly popular donor-recruits-donor strategy as a specific case of evidence-based donor recruitment to highlight potential unexpected side-effects in implementing intuitively embraced recruitment strategies.

Theory

Mechanisms of altruism underlying recruitment strategies

As opposed to the traditional belief that blood donation is an act of pure altruism [21], it is reasonable to assume that donating blood is not solely driven by altruistic motives [22]. Self-reported motivations from donors include a wide range of other reasons to be involved in blood donation, e.g., responding to feelings of moral responsibility, serving self-interest by getting a health check, or relieving blood donor shortages [20].

The mechanisms of altruism approach [MOA, 23] provides a framework to order the various self-reported blood donor motivations by defining eight broad motivational categories: altruism, indirect reciprocity, warm-glow, self-interest, advantageous inequality aversion, reluctant altruism, direct or social interventions, and personal or organizational context (Table 1). In terms of the MOA approach, we argue that people with different demographic characteristics can generally be defined as different donors. Men, compared to women, more often reported that they donated blood to get a regular health check, because it makes them feel good about themselves, and because they were influenced by friends and family [24, 25]. African minorities more often reported to be motivated by health checks and community-involved recruitment campaigns compared to the Western majority populations [19, 26]. It is reasonable to suggest that these groups need a different recruitment approach than women and people from Western majority populations. Yet, BCAs often design one-size-fits-all campaigns,

| Mechanisms of altruism | Description |
|------------------------|-------------|
| Altruism               | Donating to help others, save lives or because it feels as a duty to do so |
| Indirect reciprocity   | Donating because family, friends or acquaintances received blood |
| Warm-glow              | Donating because it is enjoyable and gives a good feeling about the self |
| Self-interest          | Donating to get something in return, such as a regular free health check |
| Advantageous inequality aversion | Donating to relieve feelings of guilt or to ease the conscience |
| Reluctant altruism     | Donating to relieve a shortage of blood or blood donors |
| Interventions          | Donating because of a recruitment approach by the blood bank |
| Direct                 | Donating because of a personal recruitment approach by another donor |
| Social                 | Donating for practical reasons, e.g., having a donation centre close by |
| Context                | Donating to support the blood bank or to support research |

Adapted from: Ferguson, E., ‘Mechanism of altruism approach to blood donor recruitment and retention: a review and future directions’, Transfusion Medicine, 2015. 25: 219.
potentially leading to a lack of sufficient matching between targeted and recruited donors [27]. We therefore assume some demographic groups to be either underrepresented or overrepresented as a result of the use of current BCA recruitment strategies:

Hypothesis 1. People from different age categories, sexes and people from Sub-Saharan African minorities are different in the way they are recruited as blood donors.

Donor-recruits-donor as specific donor recruitment case

Donor-recruits-donor is a form of social intervention, with active donors recruiting potential donors from their network, and has been praised as the most cost-effective and sustainable recruitment strategy [28]. It has been estimated that the costs for social interventions such as donor-recruits-donor are more than two times lower than for cold recruitment [e.g., direct intervention by BCA; 29]. Moreover, it is suggested that donor-recruits-donor is effective in recruiting new donors. Current donors are generally willing to help with recruiting new donors [30], and when a potential donor is personally asked by another donor, he or she is more likely to register as a donor as well [31]. This might be promising for increasing diversity of the donor pool, as men and African minority populations report social interventions as one of the motivations to start donating blood [19, 32].

This social intervention motivation, however, might also play a counterproductive role in the donor-recruits-donor strategy. Research on prosocial behaviour has shown that people from certain socio-demographic groups are more likely to be solicited for volunteer work and charitable giving than others, especially females, members of religious groups, and the higher-educated [33, 34]. Moreover, those involved in volunteer work in the past are more likely to be asked to engage in voluntary work again: ‘Once on the list of usual suspects, I’m likely to stay there’ [35]. This process may lead to a vicious circle of selective mobilization, increasing the homogeneity of those involved in prosocial behaviour. In the case of blood donation, with an overrepresentation of women and donors from Dutch descent [4], recruitment based on social interventions might reinforce the trend towards feminization and ethnic homogeneity, rather than promoting a balanced donor pool. Based on these competing perspectives, we hypothesized that:

Hypothesis 2a. Donor-recruits-donor strategies enhance heterogeneity in the donor pool in terms of age, sex and ethnicity.

Relation between recruitment strategies and donor loyalty

Specific recruitment strategies may not only appeal differently to certain demographic groups, but may also influence how newly recruited donors interpret and appreciate their donor career. For instance, direct or social interventions may make a potential donor feel pressured to sign up, negatively influencing donor loyalty over the long term. From the social desirability theory [36], it is assumed that people are more likely to conform to perceived societal norms when confronted with a solicitation to become a donor. Sargeant and Jay [37] showed that, after a direct intervention for charitable giving, lapsed donors were more likely than active donors to report feeling pressured to donate money. Although these people are more likely to sign up, they are not more likely to become loyal donors. We would expect recruitment strategies based on direct and social interventions, such as donor-recruits-donor or on-site recruitment by the BCA, to be less effective in donor retention than donors who started donating on their own initiative because of altruistic motivations.

On the other hand, a personal recruitment approach may result in higher feelings of commitment and responsibility, which may positively affect donor loyalty. This might especially be the case for social interventions, when being recruited by family, friends or colleagues. Misje and colleagues [29] reported that short-term donors were more often recruited by mass media, while long-term donors were more often recruited by social interventions. To further explore the possible relation between recruitment strategies and donor loyalty, we formulated the following hypotheses:

Hypothesis 3a. Donors recruited via different recruitment strategies differ in their number of subsequent blood donations.

Hypothesis 3b. Donors recruited via different recruitment strategies differ in their subsequent stopping prevalence.

Materials and methods

Data and procedure

To test our hypotheses, we used information from the Dutch blood donor database [eProgesa, 38], containing
information on all Dutch blood donors and their donations, such as deferral reasons, return rates, and blood groups. For our analyses, we selected all whole-blood donors who entered the donor pool within a 5-year time frame (January 2013 to December 2017) and for whom the recruitment strategy was registered. Our final sample consisted of 155,054 blood donors.

**Measures**

**Recruitment strategies**

During the online registration, each donor is asked to indicate why they decided to sign up as a donor by presenting a list of all possible recruitment strategies. eProgesa keeps a record of the specific recruitment strategy for each donor, with 30 different strategies being registered between 2013 and 2017. Based on previous categorizations by the department of Donor Relations of the Dutch BCA, the authors independently categorized the strategies according to type of recruitment. Individual categorizations were compared in a meeting, whereas disagreements on categorizations were resolved by discussion with the department of Donor Relations to define the final set of 10 clustered recruitment strategies (Table 2 and Appendix S1).

**Donor loyalty**

To explore the relation between recruitment strategies and donor loyalty, we included two indicators of donor loyalty in the model: the total number of whole-blood donations, based on registry data from eProgesa, and the length of the donor career until stopping, i.e., whether the donor deregistered from the donor database for any medical or nonmedical reason.

| Characteristic                        | All donors (n = 155,054) | Men (n = 48,167; 31.1%) | Women (n = 106,887; 68.9%) | Duffy-negative (n = 240; 0.2%) |
|---------------------------------------|--------------------------|-------------------------|----------------------------|-------------------------------|
| Age                                   | 29.2 (±11.1)             | 30.7 (±11.2)            | 28.5 (±11.0)               | 29.9 (±10.5)                  |
| 18-25 years                           | 76,862 (49.6%)           | 74,303 (49.5%)          | 78,359 (53.7%)             | 79 (40.4%)                    |
| 26-40 years                           | 49,773 (32.1%)           | 43,659 (38.7%)          | 55,114 (32.9%)             | 95 (39.6%)                    |
| 41-55 years                           | 23,031 (14.9%)           | 17,965 (16.5%)          | 15,088 (14.1%)             | 41 (17.1%)                    |
| 55+ years                             | 5,388 (3.5%)             | 2,062 (4.3%)            | 3,326 (3.1%)               | 7 (2.9%)                      |
| Number of donations                   | 3.5 (±4.6)               | 4.4 (±5.8)              | 3.1 (±3.8)                 | 2.5 (±3.1)                    |
| Stopped donors                        | 47,683 (30.8%)           | 15,645 (32.5%)          | 32,038 (30.0%)             | 82 (34.2%)                    |
| Recruitment strategy                  |                          |                         |                            |                               |
| Donor-recruits-donor                  | 69,168 (44.6%)           | 23,968 (49.8%)          | 45,200 (42.3%)             | 80 (33.3%)                    |
| Own initiative                        | 44,024 (28.4%)           | 12,743 (26.9%)          | 31,281 (29.3%)             | 79 (32.9%)                    |
| Patient-recruits-donor                | 11,312 (7.3%)            | 3168 (6.6%)             | 8,144 (7.6%)               | 21 (8.8%)                     |
| Telephone recruitment                 | 6877 (4.4%)              | 2092 (4.3%)             | 4,785 (4.5%)               | 7 (2.9%)                      |
| Promotion team                        | 6725 (4.3%)              | 1333 (2.8%)             | 5,392 (5.0%)               | 13 (5.4%)                     |
| Offline media                         | 5315 (3.4%)              | 1,474 (3.1%)            | 3,841 (3.6%)               | 5 (2.1%)                      |
| Online media                          | 4480 (3.1%)              | 1,179 (2.4%)            | 3,661 (3.4%)               | 10 (4.2%)                     |
| Businesses and organizations          | 3160 (2.0%)              | 1,114 (2.3%)            | 2,046 (1.9%)               | 6 (2.5%)                      |
| Students and education                | 3148 (2.0%)              | 866 (1.8%)              | 2,282 (2.1%)               | 11 (4.6%)                     |
| Missing minorities                    | 485 (0.3%)               | 230 (0.5%)              | 255 (0.2%)                 | 8 (3.3%)                      |
| Years donor                           | 2.1 (±1.3)               | 2.1 (±1.3)              | 2.1 (±1.3)                 | 1.7 (±1.1)                    |
| Blood group                           |                          |                         |                            |                               |
| O-negative                            | 13,692 (8.8%)            | 4,179 (8.7%)            | 9,513 (8.9%)               | 22 (9.2%)                     |
| O-positive                            | 55,229 (35.6%)           | 17,432 (36.2%)          | 37,797 (35.4%)             | 112 (46.7%)                   |
| A-negative                            | 11,087 (7.2%)            | 3,342 (6.9%)            | 7,745 (7.2%)               | 7 (2.9%)                      |
| A-positive                            | 49,740 (32.1%)           | 15,546 (32.3%)          | 34,194 (32.0%)             | 53 (22.1%)                    |
| B-negative                            | 2,489 (1.6%)             | 752 (1.6%)              | 1,737 (1.6%)               | 9 (3.8%)                      |
| B-positive                            | 12,088 (7.8%)            | 3,991 (8.3%)            | 8,097 (7.6%)               | 26 (10.8%)                    |
| AB-negative                           | 1,032 (0.7%)             | 324 (0.7%)              | 708 (0.7%)                 | 3 (1.3%)                      |
| AB-positive                           | 4,623 (3.0%)             | 1,502 (3.1%)            | 3,121 (2.9%)               | 7 (2.9%)                      |
| Unknown                               | 5,074 (3.3%)             | 1,099 (2.3%)            | 3,975 (3.7%)               | 1 (0.4%)                      |

aData reported as mean (±SD) or number (%).

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Demographic characteristics
Regarding donor demographics, we looked at the donors’ sex, age – divided into four categories, i.e., 18-25, 26-40, 41-55, 55+ – and the prevalence of Duffy-antigens as a proxy for people from Sub-Saharan African descent [9].

Control variables
The number of invitations to donate, the year the donor was recruited (with 2013 as reference category) and the ABO/D blood groups were included as control variables, as these can be strongly related to the dependent variables and can alter the outcomes if not controlled for.

Statistical analyses
Statistical analyses were conducted using IBM SPSS 23 (Chicago, IL, USA). Chi-Squared tests were performed to examine whether donors from different demographic groups were recruited via specific recruitment strategies and Phi-coefficients were calculated to further examine differences. We then examined whether recruitment strategies were related to donor loyalty, looking at the total number of donations and stopping prevalence within the 5-year time frame using linear and Cox regression analyses, respectively.

Results
Descriptive statistics
The majority of the 155 054 included whole-blood donors were women (68.9%) and people aged 25 years or younger (49.6%). These donors had a total average of 3.5 whole-blood donations, with women and Duffy-negative donors having a lower average donation frequency (Table 2). More than 30% of the registered donors stopped within this same 5-year time frame, with a higher proportion of stopped donors among men and Duffy-negative donors. Most donors were recruited by the donor-recruits-donor strategy (44.6%), followed by becoming a donor on own initiative (28.4%) and being recruited by a patient (7.3%).

Demographic differences in recruitment strategies
The results showed that recruitment strategies differ for men and women (χ²(9, n = 155 054) = 1190), for donors from different age categories within men and women (X²(63, n = 155 054) = 17 563), and for donors who do or do not have the Duffy-negative phenotype (X²(9, n = 155 054) = 91). Women were less likely than men to be recruited by the donor-recruits-donor strategy (φ = −0.07), but were more likely than men to be recruited by the BCA promotion team (φ = 0.05). With regard to the various age groups, subdivided by sex, men aged 25 and younger were most likely to be recruited by the donor-recruits-donor strategy (φ = 0.06), while women aged between 26 and 40 were least likely to be recruited by other donors (φ = −0.06). Duffy-negative donors were more likely to be recruited by missing minority campaigns (φ = 0.02). All Phi-coefficients between the study measures can be found in Appendix S2.

Recruitment strategies and donor loyalty
The first model demonstrates the effect of sex, age and ethnicity on the number of blood donations, controlled for the length of the donor career, number of invitations and the ABO/D blood groups (Table 3). Women (B = −0.69, 95% CI = −0.73, −0.66) and Duffy-negative donors (B = −0.61, 95% CI = −1.05, −0.17) make less donations compared with the reference group, while older donors make more donations (B = 0.02, 95% CI = 0.02, 0.03). In the second model, the donor-recruits-donor strategy and becoming a donor on own initiative was added. Both had a positive effect on the number of donations compared with the other strategies, although the effect was larger for the donor-recruits-donor strategy (B = 0.41, 95% CI = 0.37, 0.45) compared with own initiative (B = 0.22, 95% CI = 0.17, 0.27). In the last model, the different recruitment strategies were added with becoming a donor on own initiative as reference category. Those who were recruited via the donor-recruits-donor strategy had the highest number of subsequent donations (B = 0.17, 95% CI = 0.13, 0.21). Telephone recruitment showed the strongest negative relation with the number of subsequent donations (B = −1.04, 95% CI = −1.14, −0.95).

As shown in Table 4, the Cox regression analysis showed that women were less likely to end their donor career (HR = 0.78, 95% CI = 0.77, 0.80) while Duffy-negative donors were more likely to stop (HR = 1.54, 95% CI = 1.24, 1.91). No differences were found for age. Controlled for the other determinants, telephone recruitment (HR = 0.89, 95% CI = 0.85, 0.93) and promotion team recruitment (HR = 0.90, 95% CI = 0.86, 0.94) were associated with the longest donor careers, while student recruitment (HR = 1.32, 95% CI = 1.23, 1.42) and missing minorities recruitment (HR = 1.30, 95% CI = 1.14, 1.49) were associated with the shortest donor careers. However, the actual stopping rate over the whole sample is the highest for telephone recruitment (52.0%) and missing...
Table 3 Results of multivariate linear regression analyses on the number of total donations \((n = 155\ 054)^a\)

| Variables                        | Model I          | Model II         | Model III         |
|----------------------------------|------------------|------------------|-------------------|
|                                  | B (SE)           | 95% CI           | P-value           | B (SE)           | 95% CI           | P-value           | B (SE)           | 95% CI           | P-value           |
| Women                            | -0.69 (0.02)     | -0.73, -0.66     | <0.001            | -0.67 (0.02)     | -0.70, -0.63     | <0.001            | -0.67 (0.02)     | -0.71, -0.63     | <0.001            |
| Age                              | 0.02 (0.001)     | 0.02, 0.03       | <0.001            | 0.03 (0.001)     | 0.02, 0.03       | <0.001            | 0.03 (0.001)     | 0.02, 0.03       | <0.001            |
| Duffy-negative                   | -0.61 (0.22)     | -1.05, -0.17     | 0.006             | -0.58 (0.22)     | -1.01, -0.14     | 0.010             | -0.57 (0.22)     | -1.01, -0.13     | 0.011             |

Recruitment strategy
- Donor-recruits-donor: \(0.41 (0.02) \quad 0.37, 0.45 \quad <0.001\)
- Own initiative: \(0.22 (0.02) \quad 0.17, 0.27 \quad <0.001\)
- Patient-recruits-donor: \(-0.14 (0.04) \quad -0.06, 0.80 \quad <0.001\)
- Promotion team: \(-0.12 (0.05) \quad -0.21, -0.03 \quad 0.011\)
- Offline media: \(-0.07 (0.05) \quad -0.17, 0.03 \quad 0.145\)
- Online media: \(-0.06 (0.05) \quad -0.16, 0.04 \quad 0.268\)
- Businesses and organizations: \(-0.04 (0.07) \quad -0.16, 0.09 \quad 0.556\)
- Students and education: \(-0.10 (0.07) \quad -0.23, 0.02 \quad 0.103\)
- Missing minorities: \(-0.79 (0.16) \quad -1.10, -0.48 \quad <0.001\)
- Telephone recruitment: \(-1.04 (0.05) \quad -1.14, -0.95 \quad <0.001\)

Intercept: \(-3.20 (0.07) \quad -3.33, -3.07\)

\(F\): 6634.55

Adjusted \(R^2\) (%): 42.1%

\(^a\)All models are controlled for the length of the donor career, number of donation invitations, year of recruitment and ABO/D blood groups.

minorities recruitment (46.4%), while lowest for recruitment at businesses and organizations (22.7%) and recruitment via online media (23.2%). The actual cumulative survival rate per recruitment strategy for the length of the donor career between registration and stopping is presented in Fig. 3.

Table 4 Results of Cox regression analyses on ending the donor career \((n = 155\ 054)^a\)

| Variables                        | Model I          | Model II         | Model III         |
|----------------------------------|------------------|------------------|-------------------|
|                                  | HR (SE)          | 95% CI           | P-value           | HR (SE)          | 95% CI           | P-value           | HR (SE)          | 95% CI           | P-value           |
| Women                            | 0.78 (0.01)      | 0.77, 0.80       | <0.001            | 0.78 (0.01)      | 0.77, 0.80       | <0.001            | 0.78 (0.01)      | 0.77, 0.80       | <0.001            |
| Age                              | 1.00 (0.00)      | 0.999, 1.000     | 0.333             | 1.00 (0.00)      | 0.999, 1.001     | 0.627             | 1.00 (0.00)      | 1.000, 1.002     | 0.034             |
| Duffy-negative                   | 1.56 (0.11)      | 1.26, 1.94       | <0.001            | 1.56 (0.11)      | 1.26, 1.94       | <0.001            | 1.54 (0.11)      | 1.24, 1.91       | <0.001            |

Recruitment strategy
- Donor-recruits-donor: \(1.02 (0.01) \quad 1.00, 1.05 \quad 0.029\)
- Own initiative: \(1.02 (0.01) \quad 0.99, 1.04 \quad 0.168\)
- Patient-recruits-donor: \(1.02 (0.02) \quad 0.99, 1.06 \quad 0.268\)
- Promotion team: \(0.90 (0.02) \quad 0.86, 0.94 \quad <0.001\)
- Offline media: \(0.93 (0.03) \quad 0.88, 0.98 \quad 0.005\)
- Online media: \(1.07 (0.03) \quad 1.01, 1.14 \quad 0.031\)
- Businesses and organizations: \(0.96 (0.04) \quad 0.89, 1.04 \quad 0.292\)
- Students and education: \(1.32 (0.04) \quad 1.23, 1.42 \quad <0.001\)
- Missing minorities: \(1.30 (0.07) \quad 1.14, 1.49 \quad <0.001\)
- Telephone recruitment: \(0.89 (0.02) \quad 0.85, 0.93 \quad <0.001\)

Chi-square (df): 132 426 (17)

\(^a\)All models are controlled for the number of blood donations, number of donation invitations, year of recruitment and ABO/D blood groups.
Discussion

Recruitment campaigns impact donor diversity and loyalty

In line with the expectations derived from the MOA approach [23], our results showed that there are proportional differences in how people from different age categories, sexes and ethnic groups are recruited. For instance, the donor-recruits-donor strategy might add to creating a balanced donor pool, as relatively more young men were recruited by other donors. These results are in line with studies reporting men to be motivated to donate blood because they were convinced by friends, family and colleagues [20]. Social interventions might therefore be effective in reaching out to young, male nondonors, while direct interventions from the BCA might be more effective in recruiting female blood donors. However, social interventions, and more specifically the donor-recruits-donor strategy, might not be as effective in increasing the number of blood donors of African descent, as fewer Duffy-negative donor were recruited by other donors. It might be the case that donating blood or talking about blood donation is generally not embraced in the community due to taboos and symbolic beliefs, restricting possibilities to recruit new donors [39]. Rather, recruitment strategies focused around reluctant altruism and raising the awareness of need for specific blood products, as is the case with missing minority recruitment, might be more effective in recruiting these nondonors.

Donor loyalty, in terms of the number of blood donations and the length of the donor career, differs between donors and between the various recruitment strategies. Next to recruitment, our results showed that retention of young men and African donors is difficult as well. Although male donors donate more frequently than women, male donors and Duffy-negative donors have shorter donor careers. With regard to recruitment strategies, the donor-recruits-donor strategy has the strongest positive relation with subsequent donations, supporting findings from Misje [29] and Lemmens [28] who advocated the importance of friends, families and colleagues. Although there are differences between recruitment strategies and length of donor careers, we do not find clear differences when looking at the potential role of social desirability in blood donor behaviour over the long term. Recruitment based on direct interventions, social interventions, or donating on own initiative do not differ from each other in a clear direction. For instance, recruitment by offline media, donor-recruits-donor, or the promotion team shows marginal differences in their donor career survival rate (Fig. 3).

Strengths and limitations

One of the strengths of this study is that the Dutch donor database provides a lot of information over a long period of time. Instead of surveying a sample of donors, we were able to use the information of all Dutch donors recruited between 2013 and 2017, including the specific

Fig. 3 Cumulative percentage of registered blood donors per recruitment strategy within the 5-year time frame (2013-2017).
recruitment strategy in play. Moreover, this is one of the first studies in blood donor research that examines the role of BCAs in the relation with donor demographics, recruitment strategies and donor loyalty.

However, this study has some limitations. First, the recruitment strategies were mainly self-reported by blood donors during registration. It may be that the donor is not fully aware of the reason for registration or multiple cues led to the decision to register. Second, as the recruitment and retention of ethnic minority donors becomes more urgent, we used the Duffy-negative phenotype as a proxy for African background. Although this phenotype is exceedingly rare in people of European descent, this proxy does not fully correspond with ethnicity. Also, not all donors have been fully phenotyped, making it possible that a small number of donors from African descent are still unknown to the BCA. Finally, the actual effect sizes of recruitment strategies were small, suggesting that demographic characteristics are more important predictors of donor loyalty. Nonetheless, we found relations between donor recruitment, diversity and loyalty, stressing the added value of thoughtful decision making in deploying specific recruitment strategies.

Future directions in blood donor studies and recruitment

More fundamental research on donor recruitment and their effects on the donor career are needed to better understand how targeted (non)donors can best be recruited and retained. Systematically adjusting recruitment interventions and performing field experiments to test new strategies might increase our understanding of donor motivations in specific target groups. Possible underlying individual, network and contextual motivations to donate blood, such as warm-glow giving, experienced social pressure, or feelings of moral responsibility, should be taken into account.

For BCAs it would be worthwhile to further facilitate social interventions such as donor-recruits-donor recruitment. However, solely focusing on the donor-recruits-donor strategy will probably not be enough to recruit the much needed Duffy-negative donors. Personalized, evidence-based recruitment strategies should be designed, tested and evaluated to effectively motivate African minorities.

While we advocate the development of more personalized recruitment strategies, we also stress the importance of personalized donor retention. As we have shown, donors recruited by direct interventions, such as recruitment among students and ethnic diverse donors, may need more support in continuing their donor careers and becoming loyal donors over time. Donor careers are highly person-specific and attention needs to be paid to the role of BCAs in evidence-based recruitment and retention of our blood donors.

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Conflict of interest

The authors declare no conflict of interests.

References

1 Lattimore S, Wickenden C, Brailsford SR: Blood donors in England and North Wales: demography and patterns of donation. Transfusion 2015; 55:91–99
2 Laeijendecker D: Donor database analysis, 2008 vs. 2013: a younger database due to feminization and the consequences for donor recruitment. 2014
3 Greinacher A, Fendrich K, Alpen U, et al.: Impact of demographic changes on the blood supply: Mecklenburg-West Pomerania as a model region for Europe. Transfusion 2007; 47:395–401
4 Atsma F, Veldhuijen LT, De Vegt F, et al.: Cardiovascular and demographic characteristics in whole blood and plasma donors: results from the Donor InSight Study. Transfusion 2011; 51:412–420
5 Newman BH, Pichette S, Pichette D, et al.: Adverse effects in blood donors after whole-blood donation: a study of 1000 blood donors interviewed 3 weeks after whole-blood donation. Transfusion 2003; 43:598–603
6 France CR, Rader A, Carlson B: Donors who react may not come back: analysis of repeat donation as a function of phlebotomist ratings of vasovagal reactions. Transfus Apheres Sci 2005; 33:99–106
7 CBS: Bevolking: kerncijfers. Centraal Bureau voor de Statistiek (CBS), 2017 https://opendata.cbs.nl/statline/#/CBS/nl/data set/37296ned/table?ts=1522220927973 (Last accessed 10/09/2018)
8 Miller ST, Kim H-Y, Weiner DL, et al.: Red blood cell alloimmunization in sickle cell disease: prevalence in 2010. Transfusion 2013; 53:704–709
9 Reid ME, Lomas-Francis C, Olsson ML: The Blood Group Antigen Facts Book. 3rd Edn. San Diego, CA: Academic Press, 2002
10 Levinson W: Medical Microbiology & Immunology: Examination & Board Review. 8 Edn. New York: Lange Medical Books/McGraw-Hill, 2004
11 Statistics Netherlands: CBS Statline - Bevolking; generatie, geslacht, leeftijd en herkomstgroepering, 1 januari. 2016 http://
statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=37325&D1=06&D2=af&D3=06&D4=06&D5=0-5,65,75-76,163,251,253&D6=af&HDR=G5,T,G3,G2,G4&STB=G1&VW=T (Last accessed 10/09/2018)

12 Chou EY, Murnighan JK: Life or death decisions: framing the call for help. PLoS ONE 2013; 8:e57351

13 Lacetera N, Macis M, Slonim R: Rewarding volunteers: a field experiment. Manage Sci 2014; 60:1107–1129

14 Frye V, Caltabiano M, Kessler DA, et al.: Evaluating a program to increase blood donation among racial and ethnic minority communities in New York City. Transfusion 2014; 54:3061–3067

15 Wevers A, Wigboldus DHJ, De Kort WLAM, et al.: Characteristics of donors who do or do not return to give blood and barriers to their return. Blood Transfus 2014; 12:s37–s43

16 van Dongen A, Mews M, de Kort W, et al.: Missing minorities? a survey based description of the current state of minority blood donor recruitment across 23 countries. Divers Equal Health Care 2016; 13:138–145

17 Bekkers R, de Wit A, Wiepking P: Twintig jaar Geven in Nederland 2017. Amsterdam, the Netherlands, Len-thef, 2017:61–94

18 Schelling T: Models of segregation. Am Econ Rev 1969; 59:488–493

19 Klinkenberg EF, Huis in’t Veld EMJ, De Wit PD, et al.: Blood donation barriers and facilitators of Sub-Saharan African migrants and minorities in Western high-income countries: a systematic review of the literature. Transfus Med 2018 https://doi.org/10.1111/tme.12517

20 Piersma TW, Bekkers R, Klinkenberg EF, et al.: Individual, contextual and network characteristics of blood donors and non-donors: a systematic review of recent literature. Blood Transfus 2017; 15:382–397

21 Titmuss RM: The Gift Relationship: From Human Blood to Social Policy. New York: Pantheon, 1971

22 Ferguson E, Farrell K, Lawrence C: Blood donation is an act of benevolence rather than altruism. Health Psychol 2008; 27:327–336

23 Ferguson E: Mechanism of altruism approach to blood donor recruitment and retention: a review and future directions. Transfus Med 2015; 25:211–226

24 Glynn SA, Kleinman SH, Schreiber GB: Motivations to donate blood: demographic comparisons. Transfusion 2002; 42:216–225

25 Bani M, Strepparava MG: Motivation of Italian whole blood donors and the role of commitment. Psychol Health Med 2011; 16:641–649

26 Polonsky MJ, Ferdous AS, Renzaho AMN, et al.: Factors leading to health care exclusion among African refugees in Australia: the case of blood donation. J Public Policy Mark 2017, in press. https://doi.org/10.1509/jppm.13.036

27 Carver A, Chell K, Davison TE, et al.: What motivates men to donate blood? A systematic review of the evidence Vox Sang 2018; 113:205–219. in press.

28 Lemmens KP, Ruiter RA, Abraham C, et al.: Motivating blood donors to recruit new donors: experimental evaluation of an evidence-based behavior change intervention. Health Psychol 2010; 29:601–609

29 Misje AH, Bosnes V, Gáisdal O, et al.: Motivation, recruitment and retention of voluntary non-remunerated blood donors: a survey-based questionnaire study. Vox Sang 2005; 89:236–244

30 Lemmens KP, Abraham C, Ruiter RA, et al.: Identifying blood donors willing to help with recruitment. Vox Sang 2008; 95:211–217

31 Gillespie TW, Hillyer CD: Blood donors and factors impacting the blood donation decision. Transfus Med Rev 2002; 16:115–130

32 Bani M, Giussani B: Gender differences in giving blood: a review of the literature. Blood Transfus 2010; 8:278–287

33 Wiepking P, Maas I: Resources that make you generous: effects of social and human resources on charitable giving. Soc Forces 2009; 87:1973–1995

34 Bekkers R, Schuyt TNM: And who is your neighbor? Explaining denominational differences in charitable giving and volunteering in the Netherlands Rev Religious Res 2008; 50:74–96

35 Putnam RD: Bowling Alone: The Collapse and Revival of American Community. New York: Simon and Schuster, 2000

36 Steenkamp J-BEM, De Jong MG, Baumgartner H: Socially desirable response tendencies in survey research. J Mark Res 2010; 47:199–214

37 Sargeant A, Hudson J: Donor retention: an exploratory study of door-to-door recruits. Int J Nonprofit Volunt Sect Mark 2008; 13:89–101

38 Sanquin: Dutch blood donor database. Amsterdam, the Netherlands, 2018

39 Grassineau D, Papa K, Ducourneau A, et al.: Improving minority blood donation: anthropologic approach in a migrant community. Transfusion 2007; 47:402–409

Supporting Information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1. Recruitment strategies.
Appendix S2. Correlation matrix.