

Gender differences in presentation rates, deferrals and return behaviour among Norwegian blood donors

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Vox Sanguinis

Background and Objectives Women are under-represented among long-term blood donors. Reasons for this were sought in the donor pool of the Blood Bank of Oslo, Norway, which comprises only voluntary, non-remunerated donors and has a high degree of stability.

Methods Three sources of data were analyzed: (1) the subsequent six-year donation patterns of 17 812 donors who donated at least once in 1999; (2) reasons for predonation deferral of 484 prospect donors in 2004; (3) reasons for deferrals and absence during a 6.5-year period, retrieved from a follow-up study of 1029 donors who took part in a questionnaire study on motivation for blood donation in 2000.

Results Women were over-represented among first-time donors and under-represented among regular donors. Women below the age of 45 years in 1999 were less likely than men to donate regularly throughout the 6-year study period, whereas the donation behaviour of women and men above 45 years of age was similar. Young (18–29 years) female prospect donors were more frequently deferred at first-time donation than males. In the 6.5-year follow-up study, pregnancy was the most frequently reported cause of absence from or termination of donation, and was reported by 32% of the female respondents that were 45 years or younger. Among the donors that reported having been pregnant, 42% stated to have resumed donation and < 4% stated that they no longer were blood donors. Reported termination of donation by female donors was associated with reported practical obstacles and discomfort related to donation, but not with loss of motivation.

Conclusion Most of the gender differences in donation patterns could be ascribed to absence because of pregnancy and lactation. Practical problems and discomfort during donation were important reasons why women reported to have stopped donation. Current deferral criteria pose problems for the recruitment and retention especially of young women.

Key words: blood donor retention, blood donors, donor deferral, female blood donors.

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Introduction

Recruitment and retention of voluntary, non-remunerated blood donors pose major challenges to transfusion services throughout the world. Most studies show that women are under-represented among long-term donors

[1–5]. Better understanding of the reasons for this under-representation may lead to measures facilitating the retention of women as donors and improve the security of blood supply.

Previous research has reported that women experience up to 70% more deferrals from donation than men, in part because of higher frequencies of anaemia, other health problems and of adverse reactions [6–8]. However, women have to refrain from donation during pregnancy and lactation, and their pattern of return to donation afterwards seems not to have been studied.

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We have studied gender-related causes of deferrals and cessation of donation in the blood donor population of Norway's largest blood bank. All these donors are voluntary and non-remunerated and the donor pool is characterized by a high percentage of stable, regular donors [1]. Accordingly, Norwegian donors seem well fit for studies of donation behaviour of voluntary, non-remunerated, blood donors.

Materials and methods

Donor exclusion criteria

Norwegian exclusion criteria are regulated in accordance with EU directives and the recommendations of the Council of Europe [9,10]. Exclusion criteria for temporary deferral of particular importance for the gender differences are: low body weight (below 50 kg), low haemoglobin (cut-off standard 12.5 g/dl for women and 13.5 g/dl for men) and iron depletion. During the study period, pregnant and lactating donors were deferred for 9 months after childbirth (later increased to 12 months). A 6-month deferral is issued after abortion. A more detailed presentation of Norwegian exclusion criteria has been given previously [11,12].

Subjects and sources of data

Three different sources of data were retrieved and analyzed:

- (1) Summary data on the subsequent 6-year (1/1/2000–31/12/2005) donation history (number of donations per year), gender and age of all 18 473 whole-blood donors who donated blood in 1999 was obtained from the BBO's donor management database (ProSang, Databyrån AB, Stockholm, Sweden). The files contained no information that could identify the individual donors. For 661 donors, the database records were ambiguous regarding the status of these donors in 1999. They may have donated elsewhere previously or at the BBO before the introduction of a computerized donor database. These 661 donors were excluded from the analysis.
- (2) Data on gender and reasons for predonation deferral was collected from original screening questionnaires for all 484 prospect donors that were rejected in 2004. In 15 cases, two reasons were reported, each of which would lead to deferral. The reasons for deferral were grouped into 22 subcategories. For comparison, gender and age of all 3061 first-time donors who were accepted for donation in 2004 was retrieved from the donor management database.

- (3) A longitudinal study on donation behaviour, reasons for deferral, absence from donation and attitudes and motivation were performed using data from a 6.5-year follow-up (2000–2006) questionnaire-based survey of donors at the Blood Bank of Oslo (BBO). The first survey was conducted in 2000 with 1029 participants during 2½ weeks in March and April 2000. The follow-up questionnaire was mailed in November 2006 to the home address of the 1227 persons who donated whole blood at the BBO the days that the first survey was performed. Both surveys were performed anonymously. A prepaid return envelope was enclosed. In all, 761 persons answered and returned the follow-up questionnaire, giving an overall response rate of 62%. Four respondents failed to indicate their gender and were excluded from the analysis. A detailed presentation of the first questionnaire has been published previously [1]. The follow-up questionnaire also contained self-report questions about current status on donation (regular donor, lapsed donor, has stopped donating, continued donating elsewhere). Furthermore, the questionnaire contained alternatives for main reason for long-term (12 months or more) deferral or absence from donation. These were: pregnancy and lactation, prescribed medication, no time to donate, high blood pressure, travel to high risk area, long-term illness, short-time illness, not called, changed sexual partner, iron depletion, low haemoglobin, spouse/sexual partner born in high TTI risk area, absent due to travel, allergy, taking illegal drugs, other reasons. Respondents were asked to indicate the start and end year for long-term absence from donation. Alternatives for main reason for having stopped donating altogether were given and respondents could check the year they stopped. These alternatives were: health status of donor, change of residency, no time to donate, age limit, pregnancy and lactation, travel to high TTI risk area, spouse/sexual partner born in high TTI risk area, having a body piercing or tattoo, poor service or treatment at the donation centre, other reasons, do not know/remember.

Statistical analysis

Pearson's chi-squared or Fisher's Exact test (depending on cell frequencies) was used to test the significance of observed gender differences in donation behaviour. Analysis of variance was performed to test if there were significant differences between genders in the mean scores on statements on donors' evaluation of the blood bank service and on motives for donating blood. All analyses were performed with SPSS, release 15.0.

Results

Gender differences in donation behaviour during the 6-year period 2000–2005

A summary of the subsequent 6-year donation patterns of blood donors who donated blood in 1999 is shown in Table 1. Females were over-represented among first-time blood donors ($P < 0.001$), but under-represented among regular donors ($P < 0.001$). The percentage of donors who donated at least once every year of the period was significantly higher among male than female donors ($P < 0.001$). This was the case for 1999 first-time donors and regular donors likewise. For both genders, the percentage of donors who donated at least once every year of the period was significantly higher among those who were regular donors in 1999 than among those who donated for the first time that year ($P < 0.001$). A total of 35% (712/2061) of 1999 first-time donors became 'regular donors' as defined by Schreiber *et al.* [13], by donating once in at least 4 of 6 years of follow up. A larger proportion of male (41%, 372/913) than female (30%, 340/1148) first-time donors became regular donors by this definition ($P < 0.001$).

The gender differences in donation patterns were analyzed for three cohorts by donors' birth year (1970–1981, 1955–1969 and 1940–1954). In the two youngest cohorts, a significantly larger proportion of male than female donors donated at least once in each of the 6 years 2000–2005. This was true for both regular and first-time donors. Among 1999 first-time donors, the proportion that donated at least once annually was 14.5% of males and 6.5% of females in the 1970–81 cohort ($P < 0.001$) and 24.6% of males and 16.6% of females in the 1955–69 cohort ($P = 0.011$). However, no significant gender difference was found in the most senior (1940–54) cohort; 27.6% of males and 35.8% of females donated at least once in each of the 6 years 2000–2005. Among 1999 regular donors, the proportion that donated at

least once annually was 20.9% of males and 6.5% females in the 1970–81 cohort ($P < 0.001$) and 35.3% of males and 26.4% of females in the 1955–69 cohort ($P < 0.001$). No significant gender difference was found in the most senior cohort; 43.0% of males and 40.8% of females donated at least once in each of the 6 years 2000–2005.

Figure 1a,b show gender differences in the number of successful whole blood donations for first-time donors and regular donors, respectively, during the 6-year period. Donors with more than 24 donations are not shown (126 males and 56 females). These were probably patients diagnosed with haemochromatosis who had been accepted as blood donors. Figure 1a,b show that female donors predominate among donors with a low total number of donations (1–3), while male donors dominate among those with high number of total donations, during the 6-year period.

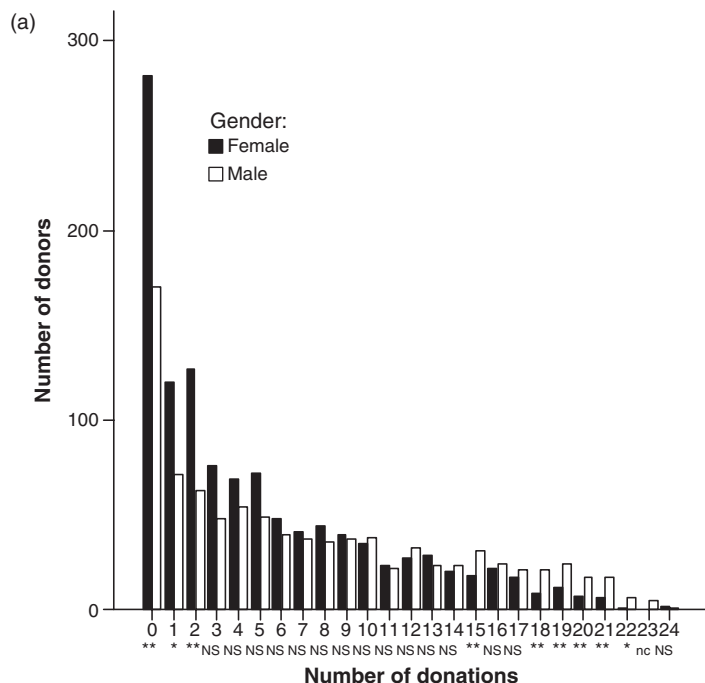
Gender differences in deferral of prospect donors

Fourteen per cent of prospect donors were deferred at predonation screening at the BBO in 2004. The deferral rate at first-time presentation was significantly higher among young females than males, 17% (228/1357) vs. 10% (69/712), $P < 0.001$. By contrast, the deferral rate was almost identical among females and males that were 30 years or older at presentation for first-time donation, 13% (107/811) vs. 12% (80/665). We therefore restricted our analysis of gender-related differences in deferrals of prospect donors to the youngest cohort. For both genders, the most frequent cause of deferral of prospect donors was donor health-related reasons. Among young prospect donors, such medical reasons (excluding low haemoglobin, iron depletion and low blood pressure) accounted for 43% of deferrals, with no significant gender difference. Some donor deferral criteria were found to apply much more frequently to young women than men. These were:

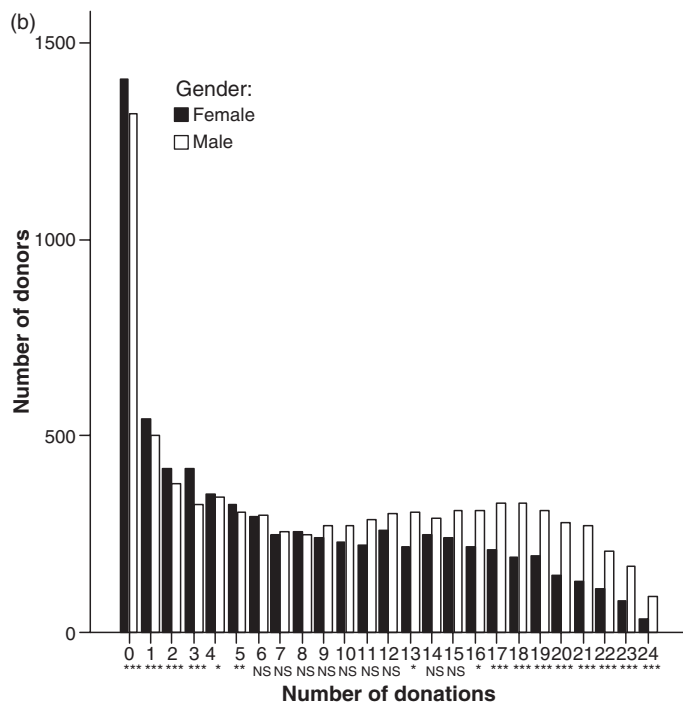
Table 1 Subsequent donation history of 17 812 blood donors who donated blood in 1999

Donors status in year 1999	Gender	Number and percentage of donors who donated at least once in the calendar year							Donated at least once in every year of the period 2000–2005
		1999	2000	2001	2002	2003	2004	2005	
First-time donor	Female	1148 (100%)	770 (67%)	545 (47%)	438 (38%)	365 (32%)	310 (27%)	263 (23%)	137 (12%)
	Male	913 (100%)	689 (75%)	559 (61%)	448 (49%)	371 (41%)	325 (36%)	271 (30%)	183 (20%)
	Total	2061 (100%)	1459 (71%)	1104 (54%)	886 (43%)	736 (36%)	635 (31%)	534 (26%)	320 (16%)
Regular donor	Female	7299 (100%)	5234 (72%)	4427 (61%)	3904 (53%)	3447 (47%)	3107 (43%)	2823 (39%)	1944 (27%)
	Male	8452 (100%)	6620 (78%)	5825 (69%)	5167 (61%)	4659 (55%)	4280 (51%)	3818 (45%)	3026 (36%)
	Total	15 751 (100%)	11 854 (75%)	10 252 (65%)	9071 (58%)	8106 (51%)	7387 (47%)	6641 (42%)	4970 (32%)

Number and percentage of donors who donated at least once per calendar year and at least once in every year of the period 1/1/2000–31/12/2005.



Overall Pearson $\chi^2 = 84.3$, d.f. = 24, $P < 0.001$. Asymptotic significance for χ^2 -tests performed on the differences between genders: ** $P \leq 0.01$, * $P \leq 0.05$, NS = non-significant, nc = non-computable



Overall Pearson $\chi^2 = 271.7$ d.f. = 24, $P < 0.001$. Asymptotic significance for χ^2 -tests performed on the differences between genders: *** $P \leq 0.001$, ** $P \leq 0.01$, * $P \leq 0.05$, NS = non-significant.

Fig. 1 (a) Number of successful donations from year 1999 first-time donors in the 6-year period 2000–2005, gender comparison ($N = 2058$). Overall Pearson $\chi^2 = 84.3$, $df = 24$, $P < 0.001$. Asymptotic significance for chi-squared tests performed on the differences between genders: ** $P \leq 0.01$, * $P \leq 0.05$, NS, non-significant, nc, non-computable. (b) Number of successful donations from year 1999 regular donors in the 6-year period 2000–2005, gender comparison ($n = 15\,572$). Overall Pearson $\chi^2 = 271.7$, $df = 24$, $P < 0.001$. Asymptotic significance for chi-squared tests performed on the differences between genders: *** $P \leq 0.001$, ** $P \leq 0.01$, * $P \leq 0.05$, NS = non-significant.

having a body piercing (26 females, 6 males), low haemoglobin/iron depletion (17 females, no males), low blood pressure (14 females, 2 males), dizziness/faint (12 females, 1 male), problems with venous puncture (5 females, no

males), low body weight (3 females, no males). Altogether, these deferrals accounted for most of the difference in deferral rate between young female and male prospect donors.

Gender differences in self-reported reasons for deferral, long-term absence from donation and termination of donation

The gender distribution among respondents to the year 2006 follow-up questionnaire was almost equal to that of the initial year 2000 sample (49 and 47% females respectively). A significantly lower proportion of female than male respondents (45% [166/370] vs. 57% [220/387], $P = 0.001$) stated that they were still regular donors at the BBO. Conversely, a significantly larger proportion of women than men (21% [76/370] vs. 11% [42/387], $P < 0.001$) stated that they still were blood donors, but that they had not donated blood during the preceding 12 months. There was no significant difference between the number of female and male respondents who stated that they no longer were blood donors (86 women, 78 men) or that they had continued donating blood elsewhere (12 women, 19 men). A total of 54 donors (27 of each gender) reported that none of the alternatives described their blood donor status or left the question unanswered.

Respondents were asked whether they had been absent from donation for at least 12 months by two sets of questions – one addressing the cause and the other addressing the duration of absence. A cause of long-term absence during the period from March/April 2000 to November 2006 was reported by 43% (322/757) of the respondents. The majority were women (182/370 vs. 140/387, $P < 0.001$). Among these, the most frequently stated reason for absence was pregnancy and lactation, reported by 55 donors. All but one of these were 45 years or younger in November 2006. Among the other alternatives for long-term absence from donation, a significant gender difference was found in two stated reasons: Males reported more frequently to have been deferred due to prescribed medication (20/140 vs. 10/182; $P = 0.01$) and claiming not to have been called for donation (12/140 vs. 5/182, $P = 0.024$).

The duration of absence was estimated by requesting the respondents to indicate the start year and end year of absence from donation. In all, 259 respondents indicated a start year of a long-term absence. Of these, 68 indicated the year that they had resumed donation. An additional four donors indicated a year of resuming donation, without having indicated a start year. Among the 191 donors that reported a start year of long-term absence, but no year of resuming donation, 11 donors reported having donated at the BBO within the last 12 months and two donors reported having resumed donation elsewhere. Taken together, the data indicate that 85 of 263 donors had returned after a long-term absence. Women were significantly over-represented among the donors who had had a long-term absence (150/370 women, 113/387 men, $P = 0.001$). The gender difference was accounted for by the fact that 49 of the

females reported having been absent due to pregnancy and lactation. Women were also significantly over-represented among the donors who reported having returned after a long-term absence (56/150 women, 29/113 men, $P < 0.05$). Twenty-four of the women who had returned, reported having been absent because of pregnancy. Eighteen of these were still active at the time of the survey. The median duration of absence among those who indicated both a start and end year of absence was 2 years.

Among the 167 donors who reported having stopped donation permanently, 164 reported a main reason for stopping. Only two reported doing so because of pregnancy. There was no significant gender difference in the other stated reasons for terminating donation. Therefore, overall percentages of indicated reason for having stopped donation are presented: health status of donor (45%; 73/164), change of residency (21%; 34/164), age limit (8%; 13/164), no time or too busy (7%; 12/164), spouse/sexual partner born in high TTI risk area (4%; 7/164), travel to high TTI risk area (2%; 4/164), poor service or treatment at the donation centre (1%; 2/164), having a body piercing or tattoo (0.6%; 1/164), other reasons (9%; 14/164), do not know/remember (1%; 2/164).

Thus, only 4% (2/57) of the donors, who reported having been pregnant in the study period, stated that they no longer were blood donors and 42% (24/57) stated that they had resumed donation. A long term-absence from donation or termination of donation because of pregnancy was reported by 32% (56/174) of female donors 45 years or younger.

The follow-up questionnaire contained 11 statements on the donors' evaluation of the blood bank service and facilities and 19 statements on motives for donating. Respondents were asked to rate the statements according to a five-point Likert scale from full disagreement to full agreement. To test if there were significant differences between genders, the mean scores of male and female donors for each item were compared by analysis of variance. First, donors who stated having stopped donation were compared (89 women and 78 men). A significant gender difference in the mean score was only found in one of the 30 items. Women who had stopped donation were significantly more likely than men to disagree with the statement; 'I think the compensation I receive for donating should be better' (mean \pm SD, women vs. men; 1.67 ± 1.2 , 2.18 ± 1.3 , $P \leq 0.05$). Then, mean responses of female donors who stated having stopped donation were compared with female regular donors. Table 2 reports that a significant difference was found in four items. Women who stated having stopped donation were significantly more likely to agree with statements highlighting problems related to: donation facilities, finding a parking lot, finding donation unpleasant, but less appreciative on receiving a donor gift

Table 2 Questionnaire-based survey of views on services and facilities at the donation centre; a comparison between the responses of women reporting to have permanently stopped donating blood and female regular donors

Statements in questionnaire	Reported donor status (female donors only)				F-values for comparison between groups (df = 1)	P-values
	Permanently stopped donating		Regular donors			
	Mean \pm SD ^a	N	Mean \pm SD	N		
It really bothers me filling out forms and screening questionnaires before donation	1.67 \pm 1.11	88	1.59 \pm 0.97	164	0.34	NS
I think the atmosphere at the blood centre is really pleasant	4.70 \pm 0.75	88	4.64 \pm 0.79	165	0.44	NS
Blood bank staff are very competent	4.81 \pm 0.97	88	4.78 \pm 0.71	165	0.11	NS
Facilities at the blood centre should be better equipped for receiving blood donors	2.17 \pm 1.32	86	1.70 \pm 0.99	160	10.17	0.002
I find it hard to find a parking lot when I donate	1.98 \pm 1.35	56	1.28 \pm 0.72	109	17.86	< 0.001
I spend too much time waiting when donating blood	2.20 \pm 1.26	86	2.27 \pm 1.36	164	0.16	NS
I think the compensation I receive for donating should be better	1.67 \pm 1.18	89	1.98 \pm 1.32	165	3.36	NS
Coming to the blood bank takes a lot of effort	1.98 \pm 1.27	88	1.95 \pm 1.29	164	0.02	NS
I think donating is really unpleasant	1.85 \pm 1.20	89	1.48 \pm 0.91	164	7.91	0.005
The blood bank should have longer opening hours	2.75 \pm 1.49	84	2.84 \pm 1.47	164	0.18	NS
I appreciate receiving a small token 'gift' for having donated blood	3.84 \pm 1.43	87	4.35 \pm 1.04	164	10.42	0.001

^aLikert scale 1–5 from full disagreement (1) to full agreement (5). 'Don't know'-answers were coded as 3.

for donation, than female regular donors. This suggests that practical obstacles related to donation and discomfort during donation are associated with the tendency to stop donating blood among female donors.

Discussion

This study was performed to explore why women are underrepresented among long-term blood donors. To study long-term blood donor behaviour, a stable donor pool is needed and the donors in this study showed high return rates compared to international data. A total of 35% of first-time donors became 'regular donors' as defined by Schreiber *et al.* [13], by donating once in at least 4 of 6 years of follow-up. In comparison, Schreiber *et al.* found that 8% of American first-time donors became regular donors.

When studying donation patterns over a 6-year period, we found that the presence of a gender difference depended on the age of the donors. In donors that were younger than 45 years in 1999, a lower proportion of females than males donated at least once annually during the 6-year period 2000–2005. However, in the most senior cohort (birth year 1940–54), male and female donors showed similar donation patterns. Thus, most of the under-representation of female donors among long-term donors could be explained by a higher deferral rate and lower return rate in women younger than 45 years.

The blood donor database contains little information about the donors' reasons for absence from donation or termination of donation. We addressed this problem by conducting a 6.5-year follow-up questionnaire study of 1227 donors who donated blood in March and April 2000. Approximately one-third of female donors below the age of

45 years reported a long-term absence from donation or termination of donation due to pregnancy and lactation during a 6.5-year period. Thus, childbirth is a major reason for the under-representation of females in blood donors below the age of 45. However, more than 40% of the donors who reported a long-term absence due to pregnancy or lactation had resumed donating. How many of the remainder that will resume donation, cannot be determined from our data, but these women represent a potentially important additional source of donor blood. It is encouraging that < 4% of the females who reported having been pregnant in the study period, stated pregnancy as the main reason for having stopped donating. This suggests that many are likely to return.

The information from the follow-up survey about reasons and length of absence from donation depends on the respondents' truthfulness and memory of past events. Remembering events that happened several years ago may be difficult. However, we believe that women's recollection of deferral due to pregnancy is likely to be accurate. The response rate of the follow-up questionnaire survey was acceptable, about 62%. Also, the gender distribution was almost equal between the initial survey and the follow-up indicating that no gender bias was present.

To study the reasons for deferral of prospect donors, we reviewed the original screening questionnaires of all prospect donors that were deferred at the BBO in 2004. In prospect donors that were 30 years or older at first-time presentation, there was no significant gender difference. However, in prospect donors younger than 30 years, females were deferred much more frequently than males. Some eligibility criteria were found to apply more frequently to young females than to other donors. These included low haemoglobin or iron depletion, low blood pressure, having a body piercing, dizziness/faint, problems with venous puncture and low body weight. The findings are in accordance with other studies, which also have found that eligibility criteria may explain why female donors are more frequently deferred than males [6,7]. The high deferral rate of young females presenting for first-time donation, indicates that the shift towards male over-representation among blood donors begins even before first donation takes place.

Finally, to understand the reasons why female donors stop donating, we compared the questionnaire responses of female regular donors and female donors who had permanently stopped donating. Practical obstacles related to donation and discomfort during donation were associated with a tendency of female donors to stop donating blood. There was no significant difference in motivational statements for donation, whether altruistic ones or others, between female regular donors and those who reported to have stopped donating permanently. This indicates that

the likelihood of becoming a regular committed donor is not determined by stated motivations, but rather a combination of the probability of being deferred, practical obstacles related to donation and discomfort during donation.

Our results thus indicate that absence from donation among young female blood donors was primarily associated with deferrals due to pregnancy and lactation, and not due to reduced motivation for donation. However, when analyzing reasons why female donors stop donating, we found that practical obstacles related to donation and discomfort during donation were associated with the tendency to stop donating blood. Reducing women's discomfort during donation may therefore increase return rates [5,7]. Our findings are also in agreement with previous research that the blood supply could be increased by lowering the haemoglobin acceptance standard for women, providing iron replacements and improving the physical experience for female donors [14].

With an increasing shortage of long-term blood donors, it therefore seems relevant to revise selection criteria applied to young women and to approach selectively women with long-term absence from donation to motivate them to return. A strategy of approaching a selected group is in line with our previous finding that there is a large number of potential donors among young individuals and that specific motivating campaigns for young individuals may prove efficient [15].

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