


## ORIGINAL RESEARCH

## BLOOD DONORS AND BLOOD COLLECTION

# Fear of donation-related stimuli across different levels of donation experience and types of donation (whole-blood and plasma): A cross-sectional study in Italian donors

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## Abstract

**Background:** Donation-related fears are prevalent even among regular donors and can hinder both recruitment and retention. This cross-sectional study aimed to estimate the prevalence of these fears in Italian whole-blood and plasma donors, across different levels of donation experience.

**Study Design and Methods:** A sample of 615 voluntary, unpaid donors from Italy (64.1% male, mean age  $45.42 \pm 11.80$  years) completed an online survey assessing their fear of common donation-related stimuli (fear of blood, needles, pain, and fainting), experience of vasovagal symptoms at the last donation, and their intention to donate again. Donors were grouped based on donation history and their most recent donation type (whole-blood or plasma).

**Results:** A significant negative relationship was found between donation history and most types of donation-related fears, suggesting that greater experience corresponds to reduced fear. Plasma donors reported lower levels of fear across all stimuli compared to whole-blood donors. Despite this, nearly one-third of the most experienced whole-blood donors and 20% of plasma donors still reported some level of fear. Greater fear was associated with increased reports of pain and vasovagal symptoms during donation, regardless of donation type. However, no

**Abbreviations:** AVIS, Associazione Volontari Italiani del Sangue; BDRI, Blood Donation Reactions Inventory.

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significant association emerged between donation-related fears and the intention to donate again.

**Discussion:** Donation-related fear persists even among experienced donors, for both whole-blood and plasma donors. Given its potential to impact donor comfort and retention, the assessment and management of donation-related fears should be integrated into donor care, with appropriate strategies to help donors regulate their fear throughout their donation careers.

#### KEYWORDS

blood and needle fear, intention to donate, motivations, plasma donation, vasovagal symptoms, whole-blood donation

## 1 | INTRODUCTION

Blood and blood products are essential resources for health-care systems worldwide. Among the most significant barriers reported by prospective donors are fears related to the donation process, including fear of seeing blood, needles, pain, or fainting.<sup>1,2</sup> These fears are well-known to impact the retention of first-time and novice donors, with studies indicating that higher levels of donation-related anxiety can predict donor retention rates<sup>3</sup> and vasovagal reactions.<sup>4</sup>

Contrary to common belief, donation-related fears are not exclusive to new donors. A US study revealed that nearly 30% of regular whole-blood donors continue to experience significant fear related to donation stimuli, though these fears tend to decrease with an increasing number of donations.<sup>5</sup> This study remains the only comprehensive investigation into fears among regular blood donors and has yet to be replicated. Furthermore, little is known about the prevalence of these fears among plasma donors, making this a largely unexplored area of research. There are significant process differences between whole-blood and plasma donations.<sup>6</sup> Plasma donation tends to cause more discomfort at the needle site, along with additional side effects such as fatigue, low blood pressure, and feeling cold as the blood cells are returned to the donor's body. Citrate reactions, which can cause tingling sensations or numbness, are another potential side effects unique to plasma donation. Finally, the plasma donation process takes considerably longer time—90 min to 2 h—compared to the 30–45 min typically required for whole-blood donation. Given these distinctions, it is essential to investigate fears specifically associated with plasma donation. The procedure's length and the physiological reactions involved might contribute to different fear patterns compared to whole-blood donation. This is especially relevant considering the increased need for plasma and the increased efforts to promote plasma donation worldwide.<sup>7</sup>

This cross-sectional study aimed to estimate the prevalence of fear related to common donation stimuli (blood, needles, pain, and fainting) in a sample of Italian whole-blood and plasma donors across different levels of donation experience. Additionally, it sought to explore the relationship between these fears and pain experience, vasovagal symptoms, and intentions to donate again, with a focus on possible differences between whole-blood and plasma donors.

## 2 | MATERIALS AND METHODS

### 2.1 | Participants and procedure

As part of a broader cross-sectional study on the impact of facemask wearing on donation practices,<sup>8</sup> all voluntary unpaid whole-blood and plasma donors who donated between September 2022 and February 2023 at the AVIS Provinciale Bergamo blood donation center ( $n = 16,811$ ) were invited to participate via email. AVIS Provinciale Bergamo sent the invitation as part of their monthly newsletter, which included a study description and a link to the Google form for participation. Before completing the survey, participants were required to digitally sign the informed consent form. The average time to complete the survey was 15 min. This study was approved by the Ethical Committee of the University of Milano-Bicocca (protocol n° 624/2021).

### 2.2 | Measures

The survey included the following measures:

- Donation history: age, gender, numbers and types of previous donations (whole-blood and plasma), and

type of last donation done within the previous 6 months.

- Subjective vasovagal symptoms after the most recent donation were assessed using the four-item version of the Blood Donation Reactions Inventory (BDRI)<sup>9</sup>. This inventory includes four sensations (faintness, dizziness, weakness, and lightheadedness) rated on a 6-point Likert scale ranging from 0 “not at all” to 5 “to an extreme degree” with higher values indicating greater symptoms.
- Fear of donation-related stimuli was measured using a subset of questions used by France and France.<sup>5</sup> Participants were asked “How afraid were you of: (1) having blood drawn from your arm? (2) blood donation needles? (3) seeing blood while donating? (4) feeling pain while donating blood? (5) feeling faint or lightheaded while donating blood?” Response options included “not at all,” “somewhat,” “moderately,” “very,” and “extremely.”
- Pain during the donation process was assessed with two questions adapted from France and France<sup>5</sup>: (1) “How painful was the donation needle going into your arm?” and (2) “How painful was the donation needle during the blood draw?” Participants responded using visual analog scales anchored from 0 “no pain” to 100 “pain as bad as you can imagine.”
- Intention to donate again was measured using a single-item question: “How likely is it that you will donate blood or plasma in the next six months?” rated on a 7-point Likert scale ranging from 1 (very unlikely) to 7 (very likely).

## 2.3 | Statistical analysis

Analysis of variance and t-tests were conducted to evaluate age differences between groups of donors. A Chi-square test was run to explore gender distribution across donor groups. The relationship between reported fears and donation history was analyzed using nonparametric Kruskal–Wallis tests, as fear ratings were not normally distributed. Nonparametric Spearman rho statistics were computed to examine the correlations between fear ratings and measures of donation experience (pain and

vasovagal symptoms), as well as future donation intention. The significance level was set at  $p < .05$ , and all statistical analyses were conducted using IBM SPSS Statistics computer software (version 29.0, IBM Corp.).

## 3 | RESULTS

A total of 632 donors—out of the 16,811 donors who received the invitation email—accessed the survey. However, 18 did not provide informed consent, leaving 615 participants (64.1% male) who completed the survey and were included in the analysis (response rate = 3.7%). Of the participants, 67.0% had most recently donated whole-blood, while 33.0% had donated plasma. The mean age of donors was  $45.42 \pm 11.80$  years (range 18–70 years). All participants were Italian.

### 3.1 | Fear, donation history, and most recent donation

To examine the relationship between reported fears and donation history, the sample was divided into five subgroups: donors who had previously donated one or two times (6.8%), three to five times (8.5%), six to 10 times (9.3%), 11 to 20 times (14.8%), and more than 20 times (60.7%). As shown in Table 1, there was a significant age difference between whole-blood and plasma donors ( $t(613) = -2.908$ ,  $p = .004$ ), with plasma donors being older than whole-blood donors. A significant difference in gender distribution was also observed across the donation history subgroups ( $\chi^2(4) = 67.630$ ,  $p < .001$ ) and between whole-blood and plasma donation subgroups ( $\chi^2(1) = 14.156$ ,  $p < .001$ ), reflecting the gender distribution among Italian blood donors.<sup>10</sup>

Nearly 30% of the sample reported experiencing some level of fear during their donation process. As shown in Table 2, the most commonly reported fears were the fear of faintness or lightheadedness (39.5%), followed by fear of feeling pain (36.1%), fear of needles (34.5%), fear of seeing blood (18.1%), and fear of having blood drawn (17.7%).

**TABLE 1** Demographic characteristics of the sample by donation history (number of previous donations).

	Most recent donation		Number of prior donations					Total sample
	Whole-blood	Plasma	1–2	3–5	6–10	11–20	>20	
Age (m ± s.d.)	44.46 ± 11.97	47.38 ± 11.21	36.36 ± 11.48	36.96 ± 11.76	37.68 ± 11.72	40.30 ± 11.32	50.06 ± 9.39	45.42 ± 11.80
Gender (n, %)								
Female	127 (30.8%)	94 (46.3%)	26 (61.9%)	34 (65.4%)	24 (42.1%)	48 (52.7%)	89 (23.9%)	221 (35.9%)
Male	285 (69.2%)	109 (53.7%)	16, 38.1%	18, 34.6%	33, 57.9%	43, 47.3%	284, 76.1%	394, 64.1%
Total sample	412	203	42	52	57	91	373	615

TABLE 2 Ratings of donation-related fears (for whole-blood and plasma) by donation history (number of previous donations).

Number of prior donations	Whole-blood (n, %)					tot	Plasma (n, %)					Tot
	1-2	3-5	6-10	10-20	>20		1-2	3-5	6-10	10-20	>20	
Fear of having blood drawn												
Not at all	23, 63.9%	31, 77.5%	33, 70.2%	54, 78.3%	185, 84.1%	326, 79.1%	4, 66.7%	9, 75.0%	8, 80.0%	18, 81.8%	141, 92.2%	180, 88.7%
Somewhat	8, 22.2%	8, 20.0%	9, 19.1%	9, 13.0%	30, 13.6%	64, 15.3%	2, 33.3%	3, 25.0%	0, 0.0%	3, 13.6%	8, 5.2%	16, 7.9%
Moderately	4, 11.1%	1, 2.5%	3, 6.4%	3, 4.3%	3, 1.4%	14, 3.4%	0, 0.0%	0, 0.0%	2, 20.0%	1, 4.5%	4, 2.6%	7, 3.5%
Very	1, 2.8%	0, 0.0%	2, 4.3%	2, 2.9%	2, 0.9%	7, 1.7%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%
Extremely	0, 0.0%	0, 0.0%	0, 0.0%	1, 1.4%	0, 0.0%	1, 0.2%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%
Fear of needles												
Not at all	17, 47.2%	23, 57.5%	23, 48.9%	43, 62.3%	155, 70.5%	261, 63.4%	4, 66.7%	6, 50.0%	4, 40.0%	14, 63.6%	114, 74.5%	142, 70.0%
Somewhat	9, 25.0%	6, 15.0%	11, 23.4%	14, 20.3%	42, 19.1%	82, 19.9%	1, 16.7%	5, 41.7%	3, 30.0%	6, 27.3%	27, 17.6%	42, 20.7%
Moderately	5, 13.9%	9, 22.5%	8, 17.0%	6, 8.7%	11, 5.0%	39, 9.5%	1, 16.7%	1, 8.3%	2, 20.0%	2, 9.1%	7, 4.6%	13, 6.4%
Very	3, 8.3%	2, 5.0%	2, 4.3%	4, 5.8%	8, 3.6%	19, 4.6%	0, 0.0%	0, 0.0%	1, 10.0%	0, 0.0%	2, 1.3%	3, 1.5%
Extremely	2, 5.6%	0, 0.0%	3, 6.4%	2, 2.9%	4, 1.8%	11, 2.7%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	3, 2.0%	3, 1.5%
Fear of seeing blood												
Not at all	22, 61.1%	30, 75.0%	35, 74.5%	50, 72.5%	182, 82.7%	319, 77.4%	5, 83.3%	9, 75.0%	8, 80.0%	17, 77.3%	146, 95.4%	185, 91.1%
Somewhat	7, 19.4%	6, 15.0%	3, 6.4%	10, 14.5%	27, 12.3%	53, 12.9%	1, 16.7%	2, 16.7%	1, 10.0%	4, 18.2%	3, 2.0%	11, 5.4%
Moderately	2, 5.6%	1, 2.5%	2, 4.3%	4, 5.8%	6, 2.7%	15, 3.6%	0, 0.0%	1, 8.3%	1, 10.0%	1, 4.5%	3, 2.0%	6, 3.0%
Very	5, 13.9%	1, 2.5%	7, 14.9%	3, 4.3%	4, 1.8%	20, 4.9%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	1, 0.7%	1, 0.5%
Extremely	0, 0.0%	2, 5.0%	0, 0.0%	2, 2.9%	1, 0.5%	5, 1.2%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%
Fear of feeling pain												
Not at all	20, 55.6%	21, 52.5%	25, 53.2%	39, 56.5%	146, 66.4%	251, 60.9%	1, 16.7%	7, 58.3%	4, 40.0%	14, 63.6%	116, 75.8%	142, 70.0%
Somewhat	7, 19.4%	16, 40.0%	13, 27.7%	21, 30.4%	57, 25.9%	114, 27.7%	4, 66.7%	3, 25.0%	4, 40.0%	6, 27.3%	28, 18.3%	45, 22.2%
Moderately	4, 11.1%	3, 7.5%	6, 12.8%	6, 8.7%	14, 6.4%	33, 8.0%	1, 16.7%	2, 16.7%	1, 10.0%	2, 9.1%	7, 4.6%	13, 6.4%
Very	4, 11.1%	0, 0.0%	3, 6.4%	2, 2.9%	3, 1.4%	12, 2.9%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	2, 1.3%	2, 1.0%
Extremely	1, 2.8%	0, 0.0%	0, 0.0%	1, 1.4%	0, 0.0%	2, 0.5%	0, 0.0%	0, 0.0%	1, 10.0%	0, 0.0%	0, 0.0%	1, 0.5%
Fear of feeling faint or lightheaded												
Not at all	15, 41.7%	11, 27.5%	22, 46.8%	38, 55.1%	149, 67.7%	235, 57.0%	2, 33.3%	6, 50.0%	5, 50.0%	14, 63.6%	110, 71.9%	137, 67.5%
Somewhat	6, 16.7%	21, 52.5%	14, 29.8%	21, 30.4%	52, 23.6%	114, 27.7%	3, 50.0%	4, 33.3%	2, 20.0%	6, 27.3%	37, 24.2%	52, 25.6%
Moderately	10, 27.8%	5, 12.5%	5, 10.6%	8, 11.6%	15, 6.8%	43, 10.4%	1, 16.7%	2, 16.7%	2, 20.0%	2, 9.1%	4, 2.6%	11, 5.4%
Very	4, 11.1%	3, 7.5%	6, 12.8%	0, 0.0%	2, 0.9%	15, 3.6%	0, 0.0%	0, 0.0%	0, 0.0%	0, 0.0%	2, 1.3%	2, 1.0%
Extremely	1, 2.8%	0, 0.0%	0, 0.0%	2, 2.9%	2, 0.9%	5, 1.2%	0, 0.0%	0, 0.0%	1, 10.0%	0, 0.0%	0, 0.0%	1, 0.5%

About 50% of those with one or two prior donations, and between 20% to 30% of experienced donors (those with more than 10 donations), reported experiencing some fear. Over 40% of whole-blood donors with six or more prior donations reported feeling faint or lightheaded as at least “somewhat” concerning. However, this proportion decreased up to 32% among plasma donors.

It is worth mentioning that plasma donors reported lower fear in response to all donation-related stimuli when compared to whole-blood donors.

When focusing on whole-blood donors, the Kruskal–Wallis test indicated a significant difference across the five donation history groups in the distribution of fear of having blood drawn ( $H(4) = 11.997, p = .017$ ), fear of needles ( $H(4) = 16.288, p = .003$ ), fear of seeing blood ( $H(4) = 11.974, p = .018$ ), and fear of feeling faint or lightheaded ( $H(4) = 34.221, p < .001$ ). No significant difference in the distribution of fear of feeling pain across the five groups of donation history emerged ( $p = .085$ ). Pairwise comparisons showed that the distribution of the >20 group was significantly different from the 1–2 group ( $p = .036$ ) for the fear of having blood drawn; the distribution of the >20 group was significantly different from the ones of the 1–2 group ( $p = .037$ ) and 6–10 group ( $p = .026$ ) for the fear of needles; the distribution of the >20 group was significantly different from that of the 1–2 group ( $p = .026$ ) for the fear of seeing blood; the distribution of the >20 group was significantly different from the ones of 1–2 group ( $p = .001$ ), 3–5 group ( $p < .001$ ), and 6–10 group ( $p = .027$ ) for the fear of feeling faint or lightheaded.

As for plasma donors, the Kruskal–Wallis test indicated a significant difference across the five groups of donation history in the distribution of fear of seeing blood ( $H(4) = 13.934, p = .008$ ), fear of feeling pain ( $H(4) = 15.877, p = .003$ ), fear of feeling faint or lightheaded ( $H(4) = 9.618, p = .047$ ). No significant difference across the five groups of donation history emerges in the distribution of fear of having blood drawn ( $p = .079$ ) and fear of needles ( $p = .073$ ). Pairwise comparisons showed that: the distribution of the >20 group was significantly different from that of the 1–2 group ( $p = .030$ ) for the fear of feeling pain. No significant differences among the five groups of donation history emerged from pairwise comparisons for fear of seeing blood and fear of feeling faint.

### 3.2 | Relationship between fear, pain, vasovagal symptoms, and donation intention

Tables 3 and 4 provide the results of the Spearman correlations between respondents' fears, pain ratings, vasovagal

TABLE 3 Spearman's correlations between donation-related fears, donation-related pain, vasovagal symptoms, and future donation intention according to gender (Whole-blood group).

Fear	Blood drawn						Needles			Seeing blood			Pain			Feeling faint		
	F		M		All	F		M	All	F		M	All	F		M	All	
Pain (needle insertion)	.202*	.247***	.224***	.358***	.323***	.334***	.306***	.279***	.280***	.448***	.351***	.386***	.296***	.235***	.251***			
Pain (needle in the arm)	.147	.224***	.191***	.357***	.252***	.286***	.269**	.193***	.213***	.433***	.297***	.342***	.311***	.228***	.250***			
BDR1	.241**	.279***	.272***	.320***	.281***	.300***	.208*	.232***	.244***	.277**	.309***	.292***	.597***	.371***	.460***			
Donation intention	-.026	-.129*	-.094	-.145	-.091	-.113*	-.076	-.043	-.064	-.151	-.053	-.087	-.228**	-.006	-.088			

Abbreviations: BDR1, Blood Donation Reactions Inventory; F, females ( $n = 127$ ); M, males ( $n = 285$ ).

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

TABLE 4 Spearman's correlations between donation-related fears, donation-related pain, vasovagal symptoms, and future donation intention according to gender (Plasma group).

Fear	Blood drawn			Needles			Seeing blood			Pain			Feeling faint		
	F	M	All	F	M	All	F	M	All	F	M	All	F	M	All
	Pain (needle insertion)	.221*	.214*	.210**	.340***	.352***	.347***	.141	.141	.133	.383***	.260**	.318***	.428***	.055
Pain (needle in the arm)	.362***	.117	.234***	.418***	.138	.271***	.251*	.064	.156*	.400***	.140	.259***	.380***	-.059	.153*
BDRI	.246*	.016	.162*	.395***	.080	.242***	.127	-.166	.039	.412***	.066	.249***	.507***	.140	.344***
Donation intention	.077	-.003	.038	.058	-.020	.019	-.010	.037	.006	.012	-.046	-.019	.030	-.014	.007

Abbreviations: BDRI, Blood Donation Reactions Inventory; F, females ( $n = 94$ ); M, males ( $n = 109$ ).

\* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

symptoms during their most recent donation, and their intention to donate again within the next 6 months.

The analysis revealed that the relationships between fear and pain were consistent across both men and women for whole-blood donors. Among plasma donors, the same pattern is confirmed for the pain related to needle insertion and the intention to donate again; however, for BDRI and pain related to the needle in the arm, the correlation emerged only for women. In the overall sample, all donation-related fears were significantly associated with higher pain ratings during the insertion of the donation needle, for both whole-blood and plasma donation procedures. The strongest correlation was found between fear of pain and the reported level of pain experienced during the draw procedure when the needle was in the arm. Additionally, fear was linked to an increase in vasovagal symptoms, with the strongest correlation with feeling faint or lightheaded, both for whole-blood and plasma donors. No significant correlation between any of the donation-related fears and the intentions to donate again was found in whole-blood or plasma donors, except for fear of needles among whole-blood donors.

## 4 | DISCUSSION

To the best of our knowledge, this is the first study to compare whole-blood and plasma donors while exploring the prevalence of donation-related fears among them. The results partially confirmed those from France and France<sup>5</sup> on US blood donors,<sup>5</sup> which found that nearly 30% of donors reported experiencing donation-related fears. As in the US study, novice donors (with 1–2 previous donations) in our sample reported higher levels of fear during the donation process than more experienced donors. The most common fear was fear of fainting, followed by fear of pain and fear of needles.

Overall, the prevalence of donation-related fears in this study was lower than those reported by France and France.<sup>5</sup> However, differences in recruitment methods must be considered. In the present study, donors were contacted if they had donated within the last 6 months, compared to 1 month in the France and France study.<sup>5</sup> This longer interval may have reduced the recall of the donation experiences, explaining the lower proportion of donors reporting fear.

It is interesting to note that while fears decrease with the donor experience, even among the most experienced donors (with more than 20 donations), 10% to 20% still report some level of fear. This extends the findings of France and France,<sup>5</sup> confirming that donation-related fears are not necessarily incompatible with repeated and

continued donation behavior. For this reason, donation-related fears should not be considered exclusion criteria but rather as modifiable factors that can be addressed and monitored throughout a donor's career. Different interventions should be implemented at different stages of the donor journey to help manage and reduce these fears.<sup>11</sup>

It is interesting to note that both whole-blood and plasma donors reported donation-related fears; however, plasma donors generally exhibited lower levels of fear across all items considered. This difference may be influenced by the fact that, in Italy, donors are invited to donate plasma only after having donated whole-blood at least one time. Plasma donation is a first-choice option only for AB blood type donors and for those ineligible for whole-blood donation, such as individuals with anemia or low ferritin levels. Furthermore, donors are excluded from plasma donation if they have difficult vascular access or have previous vasovagal reactions during whole-blood donations. For these reasons, the study sample has a limited number of plasma donors, particularly those with 1–2 or 3–5 donations. A larger sample of plasma donors is needed to gain a more comprehensive understanding of their donation-related fears.

Consistent with France and France,<sup>5</sup> we found a strong positive correlation between donation-related fears and experiencing lightheadedness at the last donation, as well as a correlation between the perceived pain of needle insertion and the sensation of having the needle in the arm for both whole-blood and plasma donations. However, unlike previous findings,<sup>5</sup> in our sample, the intention to donate again was not directly related to fears, except for a small negative correlation with fear of needles among whole-blood donors. This suggests that fear alone may not be the primary driver of donor dropouts; other factors, such as self-efficacy, may play a role and were not considered in this study.

The study has several limitations that need to be considered. First, the sample is restricted to a single blood collection center, which may not fully represent the broader Italian donor population. Additionally, the study had a low response rate, which could affect the generalizability of the findings. A further limitation is the recruitment of participants who donated within the last 6 months, which may have introduced recall bias. Additionally, the cross-sectional design hinders our ability to fully understand how donation-related fears evolve over time, and we are unable to verify if the decline in fear is related to repeated exposure to donations and feared stimuli, the dropout of the most fearful donors from the donor pool (as suggested by France and France<sup>5</sup>), or a natural remission process.<sup>12</sup> However, considering that a significant proportion of regular donors still report

some level of fear—even after more than 10 or 20 donations—it seems unlikely that avoidant behaviors will take so many years to develop. A longitudinal study is needed to clarify this pattern and provide more definitive insights, as well as the inclusion of different types of donations, such as plateletpheresis or multicomponent donations.

Despite these limitations, the results confirmed that donation-related fears are common among Italian donors and tend to decline with experience, though they persist even after more than 20 donations. Plasma donors, in particular, reported lower levels of donation-related fears compared to whole-blood donors.

Considering the European efforts toward achieving self-sufficiency<sup>13</sup> in blood and plasma supplies, this study results can contribute to inform strategies that account for psychosocial factors in plasma donor recruitment and retention.

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