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Fear of blood donation among three donor groups reveals overestimation of pain and dizziness: a comparative pre-post study

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Objectives: Fear of blood donation is a major barrier to maintaining an adequate blood supply, with pain and dizziness being the most commonly reported concerns. This study compares fear levels among non-donors, first-time donors, and regular donors, and examines whether pre-donation fear aligns with the experience. The study aims to inform strategies that reduce fear and improve donor retention.

Methods: An observational, prospective, and cross-sectional study was conducted in public spaces and at a blood donation center. A total of 594 volunteers were classified into three groups and completed an online questionnaire assessing fear of pain and dizziness. The donors repeated the questionnaire after donation.

Results: Overall, 75% of the subjects reported fear of pain and 43% reported fear of dizziness. Regular donors expressed significantly less fear of pain than non-donors and first-time donors. Post-donation data indicated that first-time donors overestimated pain. Fear of dizziness differed significantly among the three groups. The intensity was highest among non-donors, followed by first-time donors, and then regular donors.

Conclusion: Fear of blood donation was prevalent in our sample. These findings underscore the need for targeted interventions.

KEYWORDS
blood fear, donor retention, fear of dizziness, fear of pain, needle fear

Introduction

Blood donation remains an essential and irreplaceable public health service. Each year, more than 100 million units of red blood cells are distributed worldwide to save lives by supporting patients with hemorrhages, hematologic conditions, or cancer. A shortage of blood donors is a real global public health risk [1]. Even in high-income countries, the situation is critical and particularly affects blood group O donors [2]. Recruiting and retaining donors is therefore essential to secure the supply and ensure a diverse range of blood groups. To achieve these objectives, continuous efforts are made to inform and engage the population [3]. Additional initiatives using information and communication technologies have also proven effective in expressing appreciation to donors and promoting positive post-donation behavior [4]. Nevertheless, the topic of fear of blood donation is rarely addressed directly. It is understandable to fear needle insertion or the sight

of blood being drawn. People may fear pain during blood collection due to the puncture. A meta-analysis showed that 16% of adults avoided influenza vaccination due to fear of needles [5]. Regarding fear of dizziness during blood collection, a German hemovigilance study of more than 900,000 whole blood donors reported a 0.3% incidence of vasovagal adverse events [6]. The importance of the fear of dizziness during donation has been well documented in recent studies using self-administered questionnaires [7, 8]. Another large European cohort study further confirmed that young age and female gender are associated with more vasovagal reactions [9], with the majority of these occurring during the first donation. Moreover, a clinical study demonstrated the physiological and psychological stress associated with blood donation [10].

Fear of blood donation has two consequences for the blood supply. First, potential donors may avoid donating, an association that has already been demonstrated [11, 12]. One of these studies, including a majority of non-donors, even showed that fear is a greater barrier to blood donation than to other needle-related medical interventions, such as vaccinations [11]. Second, fear can increase the risk of clinical complications during donation, which could consequently reduce the willingness to donate again. Studies have shown that during minimally invasive procedures, pre-procedural anxiety is associated with longer, more painful, and more complicated procedures [13, 14]. In a nested longitudinal retrospective study, a relationship was shown between fear of donation and vasovagal reactions while donating [12]. This study could also demonstrate that vasovagal reactions were associated with decreased willingness to give blood again within 14 months. More generally, donor return rate declines after experiencing complications related to blood collection, such as a donation reaction, a sore arm, and bruising [15].

To assess effective measures to reduce fear of blood donation, we need a better understanding of the issue. Understanding this fear would allow us to tailor mitigation measures for different groups and determine whether these fears are well-founded. Two cross-sectional studies have already evaluated the impact of fear of blood or needles on willingness to donate blood [16, 17]. Those studies are not prospective and therefore do not control for temporality and recall bias. Moreover, the regulatory context of blood donation and socio-educational levels differ across countries, especially where directed donation is not the exception. The lack of comparable data highlights the need for local data.

Our study focuses on fear and aims to assess the extent to which subjects are anxious about the potential adverse effects of whole-blood donation and whether this fear differs according to previous blood donation experience. Second, it prospectively measures whether the expectation of fear aligns with the actual donation experience.

Methods

Design

This observational, prospective, and cross-sectional study was conducted at a university hospital transfusion center in Switzerland. The production of red cell concentrate is regulated by national standards, with a collection volume of 450 mL. Psychology students invited potential donors to participate in the study by completing a questionnaire at the transfusion center. The students invited any donor who arrived at the center while they were present to participate. In parallel, they invited individuals who had never donated blood to complete the same questionnaire in various public places frequented by workers. These places included the neighborhood around the hospital, bus stops, and train stations in the city center. Subjects participated in the study only once.

After giving their informed consent, participants were asked to answer two questions (one about pain and one about dizziness) before and, when applicable, after their donation, within 60 min post-donation. They completed the survey online on their own device by scanning a QR code. The survey was administered in French.

Eligibility

Three groups were compared: subjects who had never given blood (i.e., non-donors), first-time donors, and regular donors.

The inclusion criteria were: willingness to participate in the study; ability to understand the questionnaire; being in (self-reported) good health; and meeting the age requirement for blood donation (18–75).

Power analysis

The outcome variable was the level of fear of experiencing pain or dizziness, measured on a numerical scale. However, the sample size was calculated for the binary outcome of return, because the data reported in this study will be used in another study on donors' return. A detailed power analysis is presented in the Supplementary Material. We aimed to recruit 184 participants in each of the three groups.

In order to obtain information on the minimum effect size that could be detected with our sample, we performed a sensitivity power analysis (with power set at 0.95) in G*Power [18]. This analysis showed that $\eta^2_p = 0.025$ was the minimum required effect size for the between-group difference to be statistically significant. Regarding the repeated-measures comparison, $\eta^2_p = 0.024$ is the smallest effect size possible to detect.

Sample

Study enrollment began in January 2024 and ended in December 2024.

The merged database contained 906 rows, representing 906 participants who answered at least one questionnaire. After applying the exclusion criteria, 312 participants were discarded, yielding a final sample of 594 respondents. Details of the filtering process are presented in the Supplementary Material.

The flowchart in Figure 1 summarizes the study design. Characteristics of each group are presented in Supplementary Table 1.

Measures

The primary outcome was the difference in fear of pain or dizziness between the three groups.

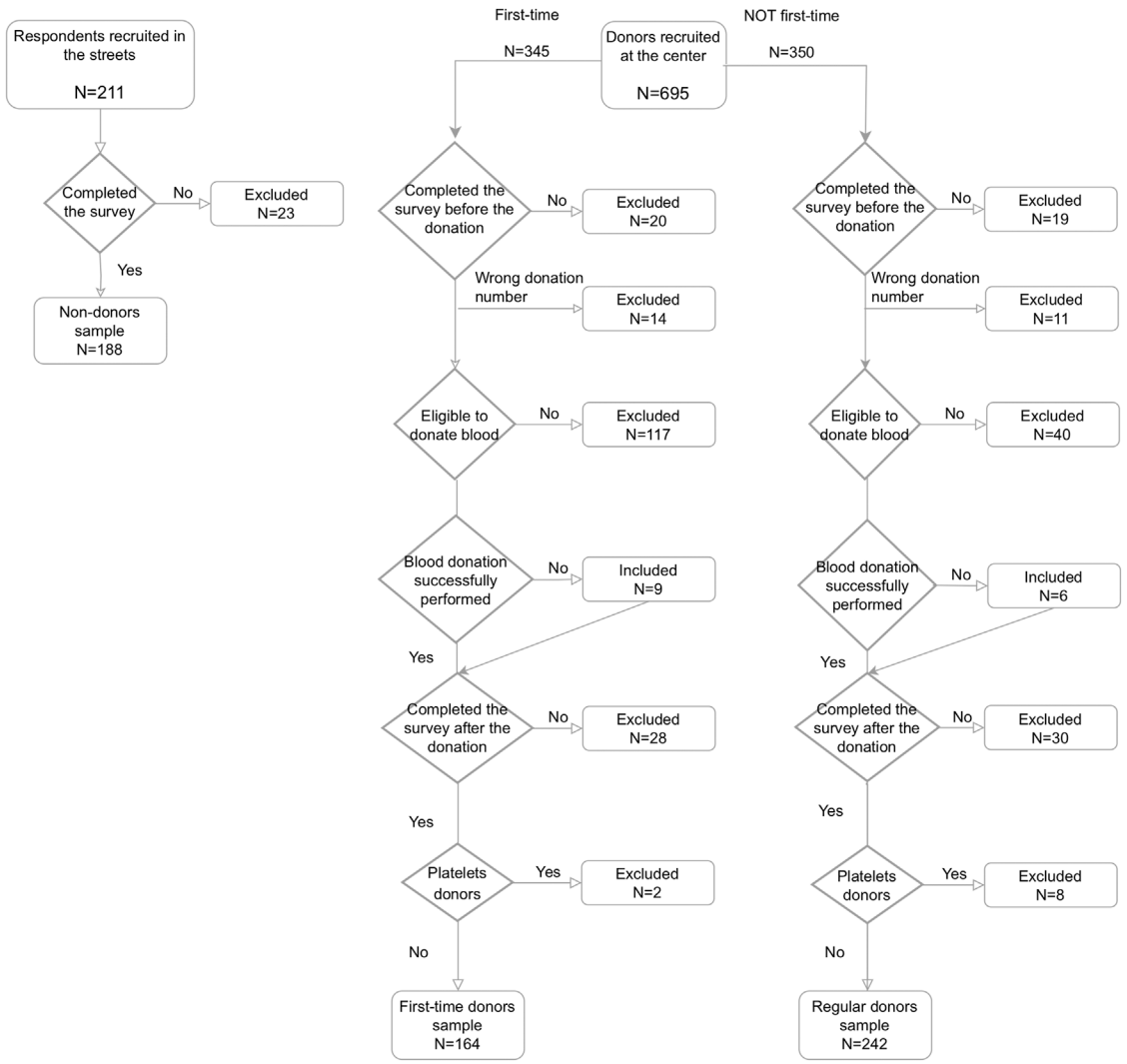


FIGURE 1
Flowchart (Geneva, Switzerland, 2024).

The secondary outcome was the difference between anticipated fear (before donation) and the experience of pain and dizziness after donation, within the two donor groups.

Outcomes were measured using a numerical scale ranging from 1 to 5. The questionnaire's wording was designed to be as neutral as possible, minimizing negative suggestions. Before donation, the questions were [1]: During my donation, I expect to feel: no pain at all (coded 1), mild pain (coded 2), moderate pain (coded 3), severe pain (coded 4), or extremely severe pain (coded 5) [2]. During my donation, I expect to feel: no dizziness at all (coded 1), mild dizziness (coded 2), moderate dizziness (coded 3), severe dizziness (coded 4), or extremely severe dizziness (loss of consciousness) (coded 5). After the donation, the two items were asked again with the instruction "During my donation, I felt: with the same numerical scale.

Additionally, to control for demographic variables, subjects were asked about their age, gender, and weight. The number of donors who suffered donation-related complications (hematoma, persistent nerve damage, dizziness, or loss of consciousness) was also recorded.

Statistical analysis

Skewed distributions occurred for the majority of our variables (graphs in the Supplementary Material, Supplementary Figures 1–4). In addition, Levene's test of equality of variance was significant for fear of pain and fear of dizziness. Because this indicates a violation of the normality and homoscedasticity assumptions, we followed the recommendations of Field and Wilcox [19]. Field and Wilcox recommend performing sensitivity analysis to investigate the impact of data that do not meet the assumptions behind the general linear model. More precisely, the authors recommend using both a modern robust method and a conventional method, then comparing the results. If the results are consistent, it means the impact of violating the assumptions is small, and either result may be reported. If the results differ depending on the method, then Field and Wilcox recommend using the robust method because it means that violations of the assumptions have an effect on the results. For this reason, we used ANCOVAs and robust ANCOVAs (using the nonparametric Kruskal-Wallis test and Dunn's *post hoc* tests) to

TABLE 1 Fear of pain and dizziness by donor group (raw means) (Geneva, Switzerland, 2024).

Measure	Non-donor			First-time donor			Regular donor				
	M	*IQR*	*SD*	*M*	*IQR*	*SD*	*M*	*IQR*	*SD*	*F* (2, 582)	η^2_p
Fear of pain (scale 1–5)	2.18	2–3	0.82	2.10	2–3	0.67	1.73	1–2	0.59	7.56***	0.026
Fear of dizziness (scale 1–5)	2.17	1–3	1.10	1.67	1–2	0.74	1.34	1–2	0.63	25.31***	0.080

*** <.001.

compare groups. The predictor variable was the group (non-donors, first-time donors, or regular donors). The dependent variables were, respectively, feared pain, fear of dizziness, experienced pain, and experienced dizziness. We used factors that could influence the ability to donate blood and the probability of fainting as covariates: age, gender, and weight [20].

Analyses were performed in JASP *(version 0.19.3)* [21].

Ethical considerations

The Geneva Ethics Commission reviewed this observational study in September 2023 (Req: -2023-01093) and found it to be outside the scope of the Swiss Law on Research on Human Beings. Because the study was a collaboration between the hospital and the university, it was also submitted to the university's ethics board. The project was approved (Decision Form Number: CUREG-20230918-290-2).

Subjects who had never donated blood were anonymous, and blood donors were identified by their donor code, as required by national regulations.

Data availability

The original dataset presented in the study is publicly available. This data can be found here: https://doi.org/10.26037/yareta:abhpm6ywqrehziwx43abdg7cke.

Results

Descriptive results

The data revealed that 81.9% of non-donors, 82.9% of first-time donors, and 65.3% of regular donors anticipate some level of pain. In terms of fear of dizziness, 69.1% of non-donors, 52.4% of first-time donors, and 26% of regular donors anticipate at least some level of dizziness.

Regarding the actual experience, 66.5% of first-time donors reported experiencing at least some level of pain, compared with 57.4% of regular donors. Regarding dizziness, 25% of first-time donors reported at least some level of dizziness, compared with 9.1% of regular donors.

Cross-sectional comparisons: feared pain

The results showed that donor status (non-donor, first-time donor, and regular donor) had a significant effect on the fear of experiencing pain (Table 1). A *post hoc* comparison showed that this difference was mainly driven by regular donors, whose fear of pain level was significantly lower than that of first-time donors (see Supplementary Table 2). It was also significantly lower than the fear of pain among non-donors. However, there was no significant difference between first-time donors and non-donors. A nonparametric analysis confirmed the same pattern: the difference between non-donors and first-time donors was not significant, whereas the difference between regular donors and non-donors, and between regular donors and first-time donors, was statistically significant.

The main effects of weight and age on fear of pain were significant, with individuals with lower weight and those younger in age expressing higher levels of fear of pain (respectively, $F(1, 582) = 7.50$, $p = 0.006$, $\eta^2_p = 0.013$ and $F(1, 582) = 24.59$, $p < 0.001$, $\eta^2_p = 0.041$). The effect of gender was not significant ($F(1, 582) = 0.004$, $p = 0.951$, $\eta^2_p = 0.000$). Figure 2 presents the mean feared pain level by donor type.

Cross-sectional comparison: fear of dizziness

The results showed that donor experience had a significant effect on feared dizziness (Table 1). A *post hoc* comparison showed that the level of feared dizziness was marginally lower among regular donors than among first-time donors (see Supplementary Table 2). Non-donors had a significantly higher level of feared dizziness than both first-time and regular donors. Nonparametric analysis revealed that all group comparisons were statistically significant: regular versus first-time donors, non-donors versus first-time donors, and non-donors versus regular donors.

Fear of dizziness was predicted by age and gender: younger participants and women reported higher levels of fear of dizziness (respectively, $F(1, 582) = 14.60$, $p < 0.001$, $\eta^2_p = 0.024$ and $F(1, 582) = 5.88$, $p = 0.016$, $\eta^2_p = 0.010$). The main effect of weight was not significant ($F(1, 582) = 1.63$, $p = 0.203$, $\eta^2_p = 0.003$). Figure 3 presents the mean level of fear of dizziness by donor type.

Prospective design: comparison between feared and experienced pain

Another objective of the study was to evaluate whether donors' anticipated fear of pain and dizziness matched their experience. To answer this question, a repeated-measures ANOVA was conducted with feared pain and experienced pain as the repeated measures and donor type (first-time vs. regular) as the grouping factor. The main effect comparing feared and experienced pain was statistically significant ($F(1, 404) = 22.28$, $p < 0.001$, $\eta^2_p = 0.052$), indicating that feared pain was higher than experienced pain. The main effect of donor type was also significant ($F(1, 404) = 20.51$, $p < 0.001$, $\eta^2_p =$

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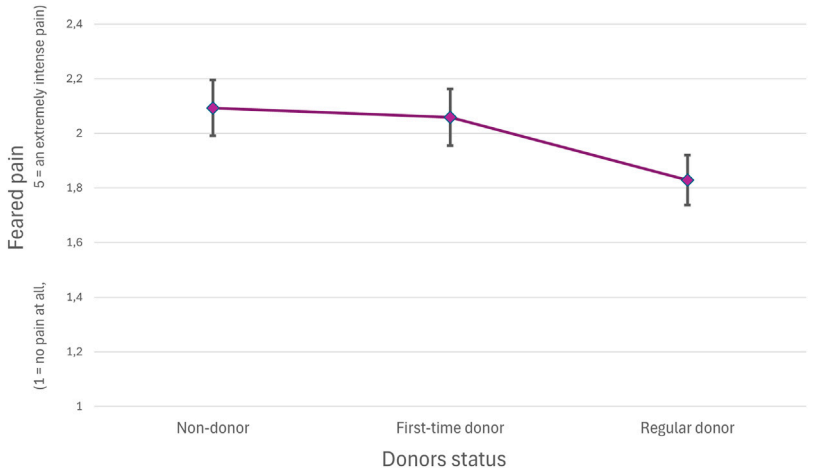


FIGURE 2
Mean levels of fear of pain by donor type with 95% confidence intervals (marginal means) (Geneva, Switzerland, 2024).

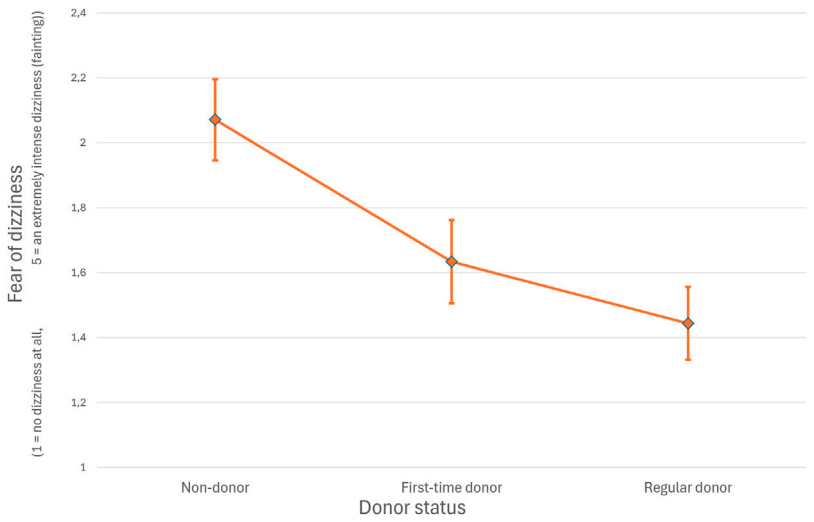


FIGURE 3
Mean levels of fear of dizziness by donor type with 95% confidence intervals (marginal means) (Geneva, Switzerland, 2024).

0.048), with first-time donors reporting higher levels of pain than regular donors. The interaction between the two effects was also statistically significant ($F(1, 404) = 10.73$, $p < 0.001$, $\eta^2_p = 0.026$). A test of simple effects showed that the difference between feared and experienced pain was only statistically significant among first-time donors ($F = 20.82$, $p < 0.001$) and not among regular donors ($F = 1.60$, $p = 0.207$). When comparing donor types, the level of feared pain differed between first-time and regular donors ($F = 34.61$, $p < 0.001$), as did the level of experienced pain ($F = 4.34$, $p = 0.038$). Figure 4 presents the interaction patterns.

Prospective design: comparison between feared and experienced dizziness

Another repeated-measures ANOVA was run on fear of dizziness and experienced dizziness, with donor type as the grouping factor. The main effect of comparing feared and experienced dizziness was statistically significant ($F(1, 404) = 44.77$, $p < 0.001$, $\eta^2_p = 0.100$), indicating that the level of fear of dizziness was higher than the level of experienced dizziness. The main effect of donor type was also significant ($F(1, 404) = 37.38$, $p < 0.001$, $\eta^2_p = 0.085$), with first-time donors scoring higher on the dizziness items than regular donors. However, in contrast to pain, the interaction between the two effects was not significant ($F(1, 404) = 0.32$, $p = 0.570$, $\eta^2_p = 0.000$). All simple effects were statistically significant: the comparison between feared vs. experienced dizziness was significant among both first-time donors ($F = 13.01$, $p < 0.001$), and among regular donors ($F = 43.96$, $p < 0.001$). Conversely, the level of fear of dizziness was statistically different between first-time and regular donors ($F = 23.31$, $p < 0.001$), as was the level of experienced dizziness ($F = 25.12$, $p < 0.001$). Figure 5 presents the interaction pattern.

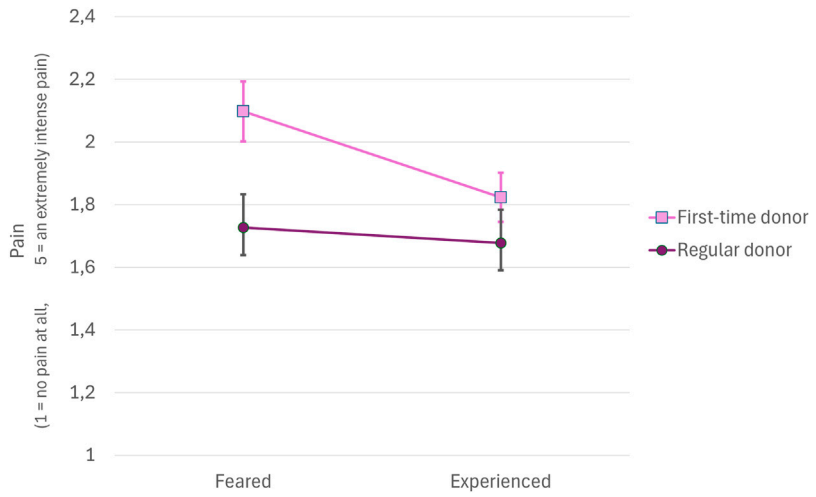


FIGURE 4
Interaction between donor type and pain items (feared vs. experienced) with 95% confidence intervals (marginal means) (Geneva, Switzerland, 2024).

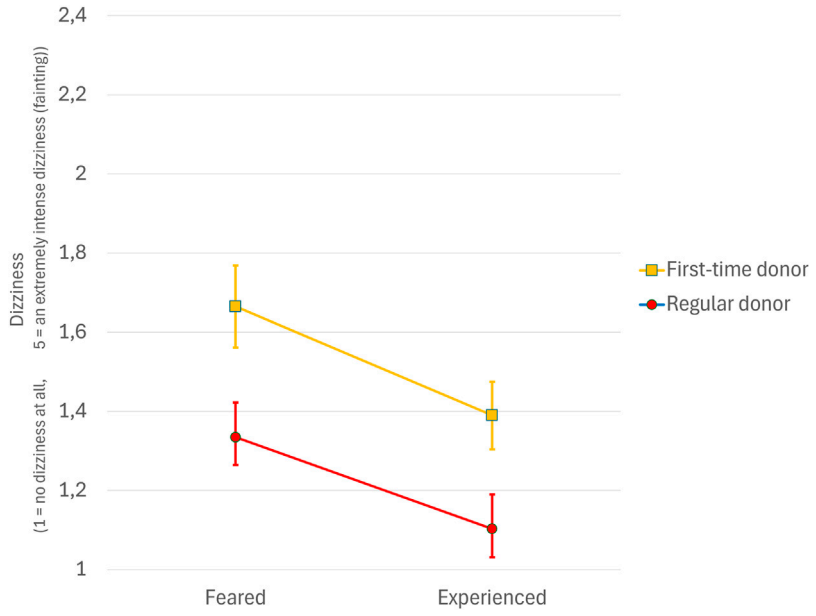


FIGURE 5
Interaction between donor type and dizziness items (feared vs. experienced) with 95% confidence intervals (marginal means) (Geneva, Switzerland, 2024).

Post-donation complications

Of the 406 blood donations, nine reported adverse events (2%) to the national hemovigilance division. All of these adverse events, except for one related to a hematoma, were vasovagal in origin. Seven cases of dizziness were moderate and resolved spontaneously, and one case was associated with loss of consciousness. The donors involved were all first-time donors, with a male-to-female ratio of 1: 2 and a mean age of 24 years.

The percentage of adverse events was calculated on a sample composed of half first-time donors (which we oversampled, as opposed to regular donors, to obtain groups of equal sizes). For this reason, this percentage cannot be compared with data from the general blood donor population, such as the 0.3% reported in German hemovigilance data, as first-time donors generally represent approximately 10% of all blood donors.

Discussion

This observational, prospective, and cross-sectional study showed that both fear of pain and fear of dizziness were present

across all three groups. Overall, 75% of participants reported fear of pain, and 43% reported fear of dizziness. A recent cross-sectional study showed that such fears persist even among the most experienced donors: nearly one-third of the most regular whole-blood donors and one-fifth of regular plasma donors still reported concerns about the adverse effects of donation [7].

Regarding fear of pain, its intensity was significantly lower among regular donors than among non-donors and first-time donors. The effect size is modest, but, as discussed by several authors, even effect sizes that are considered small (e.g., according to Cohen's benchmarks) can be meaningful in practice [18, 22]. This finding related to group differences is in line with a previously mentioned survey [7] that showed an inverse correlation between donation experience and fear of adverse events. Our results suggest that inexperienced donors could be reassured about pain, for example, by providing them with testimonials from regular donors on social media. Interestingly, fear of pain was not significantly different in intensity between non-donors and first-time donors. An additional psychological element appears to encourage first-time donors and mitigate their initial apprehension. Assessment of fear of pain carried out within 60 min following donation showed that first-time donors overestimated the pain generated by their blood collection. This simple observation is worth communicating to encourage individuals who have never given blood by reinforcing their confidence in their ability to cope with needle fear. An interventional study of young blood donors also showed that addressing the issue of pain before donation, through a brochure that provided advice, reduced pain during donation [23]. Additionally, efforts to minimize painful experiences remain essential by ensuring that procedures are performed by skilled personnel who can also use simple communication tools such as hypnosis-based therapeutic communication [24]. It has been shown that inadequate communication can have a negative impact on anxiety and pain perception, including during venipuncture [25]. In contrast, appropriate communication has positive effects on anxiety and pain perception [13, 24].

The adverse event of dizziness is more complex, as it is not limited to needle puncture. Factors such as the sight of blood, the clinical environment, room temperature, or the donor's physical condition on the day of collection can all contribute to it. In addition, dizziness during donation remains partially unpredictable and uncontrollable, often leaving donors with a perceived lack of self-efficacy. The current study shows that the intensity of fear of dizziness before donation was significantly different between the three groups (non-donors, first-time donors, and regular donors), with non-donors reporting the highest level of fear, and regular donors reporting the lowest level. Potential donors may be aware of their vulnerability, suggesting that collection procedures could be adapted, for example, by minimizing the visibility of blood bags and avoiding a medical appearance. According to a retrospective questionnaire assessment, fear of seeing a large bottle of one's own blood was a strong predictor of donation intention [11]. In addition to ensuring product and donor safety, blood center healthcare professionals could also be trained to prevent donor fear and complications. It has been shown that addressing the subject of fear of dizziness during the suitability assessment does not increase the risk of a vasovagal reaction [26]. In fact, it allows for the identification of donors who are prone to vasovagal reactions. Interestingly, in this study, all dizziness episodes occurred in first-time donors, consistent with data from the German hemovigilance system [6], which also identifies first-time donors as a risk group and reports dizziness as the most common donation-related complication. Healthcare staff should therefore pay particular attention to first-time donors, discussing this possibility beforehand, anticipating the management of any discomfort during donation, and including measures to prevent secondary injuries from falls. Furthermore, in our study, fear of dizziness was overestimated in both groups, as indicated by the post-donation questionnaire (first-time and regular donors). Indeed, the data showed a significant difference between feared and experienced levels, suggesting that reinforcing self-efficacy may be less applicable to the fear of dizziness than to the fear of pain. Before donation, the reasons for the fear of dizziness could be addressed, and donors could be informed about the low actual risk. During donation, distraction, relaxation, and appropriate communication, as mentioned above, could help mitigate this risk.

Our study has some limitations. The first relates to the composition of the study groups. There was a gender imbalance, with a higher proportion of women in the non-donor group. This imbalance may have led to an overestimation of the overall fear of dizziness, as women reported significantly higher scores than men on this item. Similarly, the regular donor group was, on average, 10 years older than the other two groups. While this is not surprising (to be a regular donor, individuals have logically donated several times), this limits the interpretation of the between-groups comparison. It is impossible to rule out the possibility that what we interpret as a difference in donor experience is influenced by a difference in sociodemographics. However, these variables were used as controls in the analysis to mitigate this problem.

The exclusion rate due to donation ineligibility was higher among first-time donors (33%) than among experienced donors (11%). While this could be perceived as a factor creating imbalanced groups, we believe that these rates reflect the highest ineligibility rate among first-time donors. Moreover, given that eligibility criteria refer to elements such as travel history, medical history, medication use, and sexual risk-taking, they are unlikely to be associated with a fear of donating blood and therefore should not bias comparisons between groups. Given the study's design comparing three groups with different levels of blood donation experience, a selection bias was inevitable in the regular donor group, which consists of participants who have donated repeatedly despite their fear. It is nevertheless very important to note that some level of fear remains among regular donors.

Our measurement instrument constitutes another limitation. We constructed the items to avoid inducing fear through wording, given studies showing the impact of word choice on pain perception [25]. As a result, their validity is unknown. Furthermore, to minimize dropout, we kept the survey as concise as possible, using only one item per construct. With one item, random error cannot be controlled by calculating a score to average the answers. Another aspect to consider is the risk of repeated measurement bias. By answering nearly the same survey twice within a short time

frame, participants may have attempted to answer consistently. However, we chose this timeframe because we wanted to capture donors' feelings as closely as possible to the actual situation, i.e., immediately before donation and shortly thereafter, thus limiting recall bias. Donors had a 60-min time period to answer the post-donation survey. Some noise may have been introduced into the data if some donors answered very shortly after the donation, and if some did at the very end of the resting period. However, both donor groups received the same instructions to answer the survey; thus, this does not represent a systematic bias. It could be argued that we are comparing anxiety among non-donors with fear among donors. In their study, France et al. [12] suggested that responses obtained outside the transfusion center (e.g., on the street) reflect anxiety (a more general apprehension), whereas responses collected at the transfusion center reflect fear of a more specific stimulus. One strength of our study is that we used the same survey items with non-donors recruited on the street and first-time donors at the transfusion center, which allowed us to compare their responses. The two groups did not differ in their fear/anxiety toward pain, but they differed in their anticipation of dizziness. This comparison would not have been possible to test if we had used different items to measure fear and anxiety.

Furthermore, we did not record the causes of the experienced pain and fear of dizziness that participants declared after donation, which is a limitation that should be addressed in future studies. Finally, the participants included in the study represent a convenience sample, as we did not use a sampling frame or randomization strategy. Thus, the generalizability of our findings is limited to this sample and cannot be extrapolated beyond the study setting. It is also important to note that the first-time donor group did not reach the planned sample size (n = 164 instead of 184).

In conclusion, fear of giving blood affects both the supply and donor wellbeing. This study revealed that fear varies in intensity across our study sample, particularly with respect to donation experience or willingness to donate. Fear of pain is not comparable to fear of dizziness and is often overestimated. Our findings provide valuable guidance on how and with whom to test mitigation actions.

Data availability statement

The original dataset presented in the study is publicly available. This data can be found here: https://doi.org/10.26037/yareta:abhpm6ywqrehziwx43abdg7cke

Ethics statement

The studies involving humans were approved by the Geneva Ethics Commission (Req: -2023-01093) and university ethical board (CUREG-20230918-290-2). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

LM, IP, AB, and SW designed the protocol of the study and collected data. LM, IP, AB, MF, and SW wrote the manuscript. LM performed the statistical analyses.

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Conflict of interest

The authors declare that they do not have any conflicts of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.ssph-journal.org/articles/10.3389/ijph.2026.1609439/full#supplementary-material

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