

Well-being and return rate of first-time whole blood donors

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Vox Sanguinis

Background and objectives Previous studies observed a transient increase in well-being in about one-third of regular donors after blood donation. In addition, personal contact with donors after donation seems to increase return rates. We were interested whether changes in well-being and/or personal contact after the first donation impact return rates of first-time donors (FTDs).

Materials and methods First-time donors were randomized to a questionnaire group (QG), in which questionnaires assessing the well-being had to be filled in, or a control group (CG), which was not contacted with a questionnaire. The QG had to complete the same questionnaire three times at the day of the first donation and then four times over an 8-week period with reminding calls by the study coordinator. Return rates of participants were followed for 12 months.

Results A total of 102 FTDs participated in the QG and 115 in the CG. Changes in well-being after the first donation had minimal impact on the return rates. In contrast, contacting FTDs after their first donation had a significant impact on the return rate of male donors (89.2% in the QG vs. 58.3% in the CG; $P = 0.001$). Females showed no significant difference in return rates between both groups ($P = 0.32$).

Conclusion The well-being of FTDs had no influence on their return rate. The intervention of regular contacts during a research project follow-up resulted in an increased return rate of male but not of female FTDs. The pronounced difference of the impact of this intervention between male and female donors requires further studies.

Key words: first-time donors, intervention, return rate, well-being.

Received: 24 August 2018,
revised 28 December 2018,
accepted 4 January 2019,
published online 29 January 2019

Introduction

Maintenance of a stable blood donor pool becomes increasingly challenging in times of demographic changes. Within the next 10–20 years, the baby boom generation will leave the donor pool, which will likely cause a decrease in blood donation numbers [1–3]. Blood donation services undertake major efforts to motivate the healthy population to donate blood.

Although many blood services are successful in recruiting new donors, donor return rates during the first year

are relatively low, although they differ between countries (52% in Canada and UK, 33% in the United States and 20% in Finland) [4]. Gillet *et al.* showed that only 46.8% of FTDs returned for a second donation and only 25.3% returned for a third donation within a 15-month period without any intervention [5]. Predictors for not returning after the first donation are being young and female [6] and experiencing negative reactions during the first blood donation [5, 7–9]. Increasing the return rate of FTDs would substantially increase the donor pool.

If FTDs donate several times during their first year, they are more likely to become long-term stable donors [10]. Contacting FTDs after their first donation seems to be associated with an increased return rate. Godin *et al.* [11] showed that a recruiting phone call led to a higher return rate in FTDs, while Bruhin *et al.* [12] found that

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regular donors respond differently to recruiting phone calls. They suggest to avoid such interventions in highly motivated donors [12]. Sinclair *et al.* [13] showed that a motivational interview with regular donors one month after their donation led to a higher return rate after twelve months compared to no intervention, indicating that an additional personal contact between staff of the donation centre and the blood donor might influence the return behaviour. Also Gemelli *et al.* [14] performed a study on whole blood donors and found that by using the postdonation messaging service (SMS) when the blood product was dispatched to a hospital lead to a higher return rate in unexperienced blood donors, concluding that SMS reprimed the 'warm glow' felt by the donors after their last donation.

It is already known that blood donation affects the donor physically but also mentally, in former studies described as well-being [15–17]. Well-being is a dynamic process in which the individuals' psychological, physical and social resources are accompanied by the psychological, physical and social challenges. Therefore, a high level of well-being means a positive condition for an individual and vice versa. An actual state of the well-being can be measured by questionnaires [18]. The 'Multidimensional Mood Questionnaire' (MDMQ) is a validated tool to measure psychological well-being [19].

It has been postulated that increased satisfaction and well-being after blood donation positively influence the return behaviour of regular donors [20]. About a third of regular donors experience an increase in well-being after blood donation. A similar proportion of donors describe a decrease in well-being, while one-third of blood donors do not report any changes or mixed effects [15–17].

Other studies addressed motives of returning for blood donation by changes in well-being with the opponent-process theory. This theory states that an aversive stimulus (e.g. first blood donation) elicits a negative state, which is followed by an opposite state (e.g. 'warm glow') after termination of the stimulus. With subsequent blood donations, the negative state becomes weaker and the positive state might even become strengthened [21, 22].

This study was conducted to assess whether FTDs show similar changes regarding well-being as found for regular donors in previous studies and whether these changes in well-being influence the return rates.

Objectives of the study

- (1) Do FTDs experience changes in well-being after blood donation?
- (2) Do changes in well-being after the first blood donation influence the return rate of FTDs?
- (3) Does the intervention of interviewing FTDs and contacting FTDs by phone after their first donation (within a study) increase the return rate compared to no intervention?

The answers to these questions could help to achieve higher return rates of blood donors and subsequently provide a solution to the blood product shortages.

Materials and methods

This study was conducted at the Department of Transfusion Medicine at the University Hospital Greifswald. Each year about 18 500 whole-blood donations are collected at this donation centre, with 9% of the donor population being FTDs. Both regular blood donors and FTDs receive a remuneration of €20 to cover expenses related to their visit at the donor clinic. The study was approved by the ethical board of University Medicine Greifswald. All participants provided written informed consent.

Participants

All first-time whole-blood donors at the blood donation centre of the Greifswald University underwent the standard procedure of predonation assessment. During three consecutive months, FTDs who were eligible for blood donation according to the National Hemotherapy Guidelines [23] were approached to participate in the study. FTDs were defined as donors having their first blood donation in life [24]. Donors who donated blood for the first time at the Greifswald blood donation centre, but who had already donated blood before at another blood service, were excluded. After study enrolment, we randomized FTDs either to 'group 1' (questionnaire group (QG)) or 'group 2' (control group (CG)) by random assignment. Randomization was performed in sequential blocks of 10 donors per block.

Multidimensional Mood Questionnaire (MDMQ)

The MDMQ [19] measures the well-being and had been used previously [17] to measure well-being of whole-blood donors. We used one of its short forms (MDMQ – A) (see Data S1), which includes three different dimensions: mood (GB, good-bad), vigilance (AT, awake-tired) and agitation (CN, calm-nervous). Donors had to complete the sentence: 'At the moment I feel ...'.

GB – satisfied, good, bad, unwell.

AT – rested, awake, limply, tired.

CN – calm, relaxed, restless, unsettled.

Each dimension contained four adjectives, two in a positive and two in a negative way. The positive adjectives have a scale from 1 (not at all) to 5 (very much),

whereas the negative adjectives have a reverse scale from 1 (very much) to 5 (not at all). For each dimension, the total sum had a minimum of 4 and a maximum of 20 – higher scores indicated a higher level of well-being and lower scores a lower level of well-being [17, 19].

Study design

The study consisted of two parts: the first part was a non-controlled observational study in the questionnaire arm, which assessed the changes in well-being in FTDs and their influence on the return rate of FTDs. The second part was a prospective randomized open trial (intervention vs. no intervention) assessing the impact of contacting FTDs after their first donation on the return rate. The following demographic characteristics of participants were obtained: date of birth, sex and date of first blood donation.

The QG had to fill out the MDMQ at seven different time-points, the first three of them at the day of blood donation at the donation facility (30 min before donation, during donation, 30 min after donation) and the other four after leaving the donation centre (1 day after donation, 3 days after donation, 7 days after donation and 8 weeks after donation) (Fig 1). During the first three time-points, the study coordinator was present to clarify any problems. At the other four time-points, the FTD filled out the questionnaires at home. Each QG-FTD received a standardized telephone call at these four time-points by the study coordinator. Each FTD of the QG received the same amount of telephone contacts at the same time-points. The call was only made to remind the donor to complete the questionnaire and not to recruit

the donor for further donations or to assess whether the questionnaire had already been filled in. Study participants had been informed that they should fill in the questionnaire when they receive the phone call to have a standardized association between the phone call and the answers in the questionnaire. We therefore expect no impact of these short standardized phone calls on FTDs' well-being. We could not control whether participants potentially filled in the questionnaire even before the phone call. If the participants were not reachable by phone at any of the time-points, they were excluded from the study, because we could not be sure that the questionnaire was filled out at the required time-point.

A subset of chosen time-points was based on a previous study (during donation, 30 min and 1 day postdonation) [17]. The other time-points were chosen based on the following rationale; 30 min before donation, as this waiting time period is common before venipuncture, and 3 days, 1 week and 8 weeks postdonation to cover possible late effects on well-being after blood donation. The latter time-point was also the earliest possible time-point a donor could return for a second donation. None of the participating FTDs experienced an adverse reaction during their visit in the donor clinic. FTDs in the QG group received a remuneration of €15 no earlier than 8 weeks after their initial donation for their participation. FTDs randomized to the CG were not contacted after study enrolment and received no additional remuneration.

Twelve months after study inclusion, the return visits of each FTD to the blood donation centre were assessed, independently whether the donor was eligible for blood donation at that time or had to be deferred for any reason. We did not document the reason of deferral as this

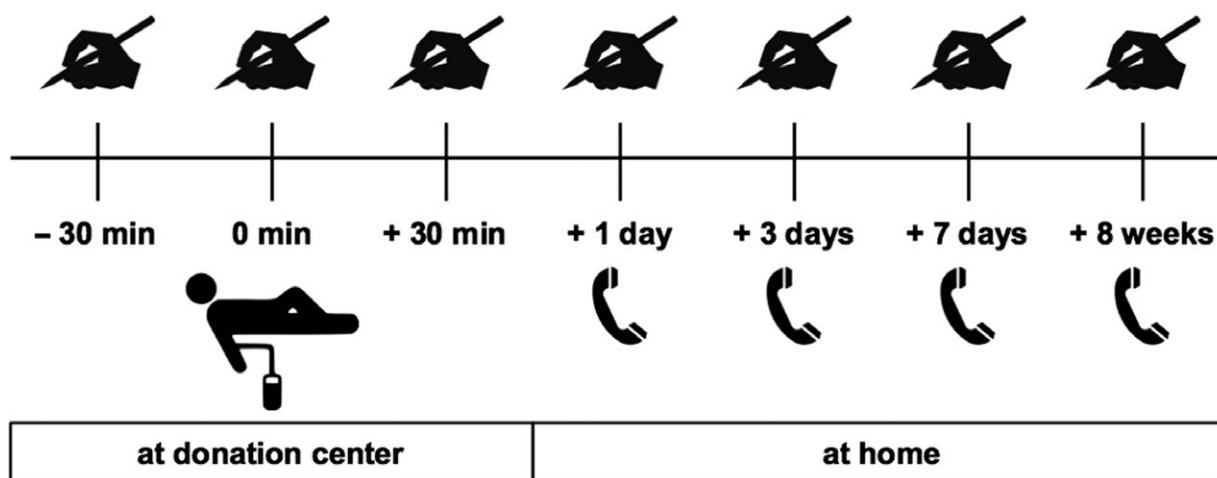


Fig. 1 Data collection process: 30 min prior donation (–30 min), during donating blood (0 min) and 30 min after donation (+30 min), the QG filled in the questionnaires at the donation facility; 1 day (+1 day), 3 days (+3 days), 7 days (+7 days) and 8 weeks (+8 weeks) after donation, the questionnaires were filled in by the donor at home, accompanied by a short phone call of the study coordinator.

was not included in the informed consent at study enrolment.

Number of participants

The study was exploratory as no data on well-being in connection with return rates in FTD had been available in the literature at that time. The number of participants required in our study was based on a similar study with regular blood donors [17]. This study recruited about 110 participants of which 30% showed an increase in well-being. We considered the enrolment of about 100 FTDs should allow finding a 30% relative difference (10% absolute difference) in well-being in comparison to regular donors. We expected a dropout rate of 20% and therefore aimed to enrol 125 FTDs in each study group.

Statistics

The questionnaire data were entered into a database by single entry with second review. The statistical analyses were performed with SPSS Statistics 24.0 (IBM, Armonk, NY). Categorical data are represented as counts and percentages of the total group size. Minimum and maximum, mean and standard deviation values are used as descriptive statistics for continuous data.

The well-being of all FTDs is represented by mean values for each time-point for the three dimensions mood, vigilance and agitation. Logistic regression was used to assess an association between the return rates in dependence to the well-being and the sex. We have looked for associations for each single item of the questionnaire, at each time-point. *P*-values less than 0.05 were considered statistically significant.

The donation frequencies of all participants within 12 months after enrolment were determined by using the database of the blood donation centre. Donors were separated into three groups for analysis; donors who returned only one time ($R = 1$) and donors who returned more than once ($R \geq 2$) during the twelve-month follow-up period. Donors who did not return to our donation site were listed as 'non-returner' ($R = 0$).

Results

Of 258 consecutive FTDs, 235 participated, while 23 refused to participate or did not meet study requirements. A total of 120 FTDs were enrolled into the QG and 115 into the CG. Of the 120 participants in the QG, 18 were not regularly reachable by phone during the 8-week study period and therefore excluded from the analysis. Of the remaining 102 participants (mean age: 25.0 ± 7.4 years; range 18–51 years), 37 (36%) were male and 65 (64%) female. Of the

115 participants in the CG (mean age 27.2 ± 10.0 years; range 18–63 years), 60 (52%) were male and 55 (48%) female. In general, the study population was younger than the standard donor population at our donor centre (average donor age in the year of this study: 37.6 years). This was expected as FTDs are typically young donors. The study population reflected the age structure of the FTD-population in the study centre.

Well-being of FTDs in the QG

Table S2 presents detailed results of all three dimensions. Dimension mood: FTDs were in a satisfied mood before and during the donation process; the satisfaction level increased slightly 30 min after donation (Fig 2). One week after donation, FTDs felt significantly more unsatisfied compared to 30 min before donation ($P = 0.046$, Bonferroni-adjusted *post hoc* analysis: mean score before donation 17.20; mean score seven days after donation 16.51). Eight weeks after donation, FTDs were satisfied at the same level as before donation. At the time-points 'during donation' and '8 weeks after donation', men showed significantly higher mood scores than women (*t*-test; mean score male 17.62; mean score female 16.95; $P = 0.036$; mean score male 17.78; mean score female 16.83; $P = 0.043$).

Dimension vigilance: FTDs reported to feel rested 30 min before and during donation. Thirty minutes after donation, participants felt already more tired and this increased significantly at day one after donation ($P = 0.01$, Bonferroni-adjusted *post hoc* analysis: mean score before donation 15.74; mean score 1 day after donation 14.23). No sex differences were observed.

Dimension agitation: 30 min before donation, FTDs were significantly more anxious and agitated compared to 30 min after donation ($P < 0.01$, Bonferroni-adjusted *post hoc* analysis: mean score before donation 14.66; 30 min after donation 16.35). For the rest of the follow-up period, participants stated that they were calm and well adjusted. No sex differences were observed.

Association between well-being and return rate

In the logistic regression, no association between the scores in the MDMQ and the return rate was found, except for the dimension 'agitation'. A higher score for calmness 7 days after donation was associated with a 19% higher return rate ($P = 0.01$) (Table S1).

Return behaviour

Participants of the QG had an overall return rate of 68.6% after one-year follow-up compared to 54.8% in

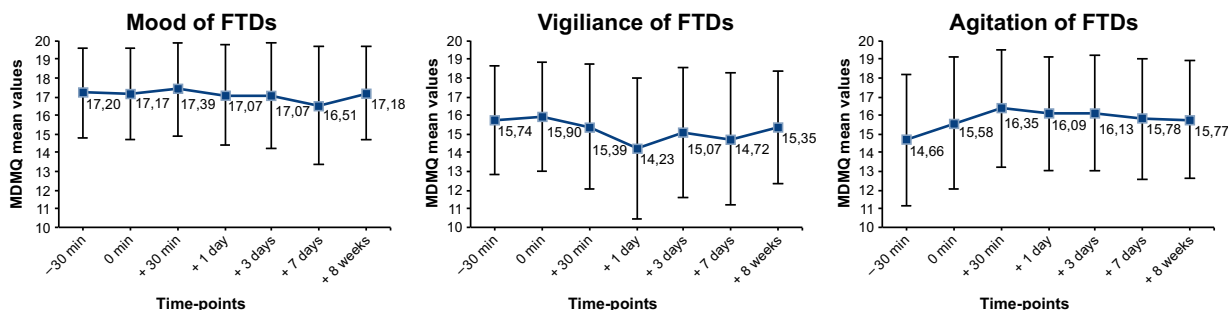


Fig. 2 Results of the Multidimensional Mood Questionnaire. The three dimensions mood, vigilance and agitation are shown for 102 participants over 8 weeks at seven time-points as mean values and standard deviation (SD). The MDMQ scale ranged from 4 to 20. Dimension mood = good/bad (GB), dimension vigilance = awake/tired (AT), dimension agitation = calm/nervous (CN). Time-points: 30 min before donation (-30 min), during donation (0 min), 30 min after donation (+30 min), 1 day after donation (+1 day), 3 days after donation (+3 days), 7 days after donation (+7 days), 8 weeks after donation (+8 weeks) [Colour figure can be viewed at wileyonlinelibrary.com]

the CG ($P = 0.03$ [t -test]; QG-numbers (N): 70/102; CG-N : 63/115). The intervention of filling in the questionnaires and being contacted by the study coordinator had an impact on the return rate of male FTDs, but had no impact on the return rate of female FTDs. In the QG, the return rate for males was 89.2% compared to 58.3% of the CG ($P = 0.001$ [t -test]; QG-N: 33/37, CG-N: 35/60). 70.3% of male participants in the QG returned at least twice during the study year compared to 40.0% of male participants in the CG ($P = 0.003$ [t -test]; QG-N: 26/37, CG-N: 24/60). In the QG, the return rates of female FTDs were 56.9% compared to 50.9% in the CG ($P = 0.32$ [t -test]; QG-N: 37/65, CG-N: 28/55). 36.9% of female participants in the QG returned at least twice during the study year compared to 38.2% of female participants in the CG ($P = 0.078$ [t -test]; QG-N : 24/65, CG-N: 21/55) (Table 1).

Logistic regression analysis showed that male donors of the QG are six times more likely to return than female donors of the QG in the first twelve months after their initial donation (OR: 6.24; 95% CI: 1.98–19.68; $P = 0.002$). Both well-being score and sex were considered in logistic regression.

Discussion

The study provides two main findings. Firstly, changes in well-being of FTDs after their first blood donation had only a minor – if any – impact on their return rates. Secondly, the intervention of filling in the questionnaires and being contacted by the study coordinator on FTDs after their first blood donation showed an impact on the return rate of male but not of female FTDs.

Well-being and its impact on FTDs return rates

Well-being of FTDs as indicated by good mood does not decrease after their first blood donation. FTDs reported to

feel significantly more tired starting as soon as 30 min after donation. This is likely related to the loss of oxygen carriers. Thirty minutes before donation, FTDs stated to be nervous, which resolved quickly within 30 min after donation. In general, FTDs seem not to suffer negative effects on their well-being after their first blood donation. Our findings are in line with those of Masser *et al.* [8], who found that FTDs did not experience psychological reactions (e.g. stress, anxiety, fear of needles) after their first blood donation. This conclusion might be useful for a more targeted recruiting of FTDs being scared of their first blood donation [4, 25, 26]. Furthermore, this study partly supports the opponent-process theory of Piliavin *et al.* [21], stating that the pre-donation negative affects disappear quickly after the termination of the donation process. This is especially reflected by changes in the dimension 'agitation'.

Of all dimensions measured, only 'feeling more relaxed 1 week after donation' was associated with a higher return rate of FTDs in a logistic regression analysis. This correlation is difficult to explain because the well-being in terms of feeling relaxed after 1 week might be influenced by many other factors than the first blood donation. Future studies should include longer lasting effects like agitation after the first blood donation to assess the reproducibility of this observation.

Impact of the interventions 'filling in the questionnaire and being contacted by the study coordinator' on FTDs return rates

Our finding that the intervention of filling in a questionnaire at several time-points and having additional personal contact with the study coordinator is associated with increased return rates of FTDs is in line with previous studies. Gemelli *et al.* [14] showed that a postdonation SMS informing the donor when his blood was used leads to a higher return rate in FTDs. Also Bagot *et al.*

Table 1 Return rates of FTDs enrolled into the questionnaire group and the control group

	Questionnaire group				Control group			
	Total; <i>n</i> = 102 (%)	Female; <i>n</i> = 65 (%)	Male; <i>n</i> = 37 (%)	Significance (two-tailed)	Total; <i>n</i> = 115 (%)	Female; <i>n</i> = 55 (%)	Male; <i>n</i> = 60 (%)	Significance (two-tailed)
Non-returner	32 (31.4)	28 (43.1)	4 (10.8)		52 (45.2)	27 (49.1)	25 (41.6)	
Returner	70 (68.6)	37 (56.9)	33 (89.2)	<i>P</i> = 0.001 ^a	63 (54.8)	28 (50.9)	35 (58.3)	<i>P</i> = 0.424 ^b
Returned once	20 (19.6)	13 (20.0)	7 (18.9)		18 (15.7)	7 (12.7)	11 (18.3)	
Returned ≥2	50 (49.0)	24 (36.9)	26 (70.3)	<i>P</i> = 0.002 ^a	45 (39.1)	21 (38.2)	24 (40.0)	<i>P</i> = 0.842 ^b

^a*P*-values from Fisher's exact test due to small group size for comparison of return behaviour of female and male donors in the QG

^b*P*-values from chi-square test for comparison of return behaviour of female and male donors in the CG

[26] summarized in a systematic review that a personalized interview may increase donor retention. Especially contacting FTDs with a personalized interview before, during and after their donation has been shown to be a promising strategy to improve the return rates [26].

Our study contributes an additional, interesting finding. We found a significant difference in the return rates of men and women in the QG (89.2% vs. 56.9%; *P* = 0.001), but not in the CG. Men were obviously more attracted by the questionnaire intervention, the additional personal contact and/or phone calls and therefore returned more often during the first year. Our results do not differentiate, which of the interventions (personal contact during first blood donation, filling in the questionnaire at several time-points or the phone calls of the study coordinator), or a combination of two or more interventions raised the return rate. The sole fact to participate in a research study can be excluded, as FTDs of both the QG and the CG had been enrolled into the study, including the informed consent procedure.

Referring to Boulianne [27], men are more responsive to higher remunerations than women and therefore might return more often. Potentially, the remuneration after each donation was also a motivator in men.

We are not aware about other studies reporting such a difference in response between male and female donors and suggest to specifically assess any sex differences in response in future studies on interventions to increase the return rates of FTDs.

In the CG, the return rate of male donors (58.3%) was slightly higher than the return rate of female donors (50.9%; *P* = 0.458), which reflects findings of other studies that male FTDs have a higher return rate than female FTDs [28–31]. As an example, in the study of Kheiri and Alibeigi [10], 50% of male FTDs and only 30% of female FTDs returned within a 5-year follow-up period. A motivational intervention increases the likelihood of men becoming regular donors; this has a positive effect on the available donor pool.

Our study was not aimed to assess the effectiveness of contacting a FTD four times after the first donation by regular phone calls. This scheme of contacting the donor was required to measure the dynamics in the changes in well-being. The next question to be assessed is whether a more practicable intervention of a single contact with FTDs after their first donation is also increasing the return rate and whether this contact should be rather a phone call or a contact by electronic text message.

Limitations

There was an unequal sex distribution in our study with 36% males in the QG but 52% males in the CG, as we did not stratify randomization according to sex.

A bias might have been introduced by the remuneration for participating in the study. This remuneration was paid after returning the completed questionnaires and might have influenced the return rate in the QG compared to the control group. However, this bias should not influence the most interesting finding of the present study, which is the difference of higher return rates in males in the QG compared to females in the QG, as both received the remuneration. Furthermore, we could only track the number of returns to our donation centre; we do not know whether participants donated at another blood donation service. A potential bias could be caused by the fact that 18 of the participants in the questionnaire group (i.e. 15%) were excluded from the analyses because they 'were not regularly reachable by phone during the 8-week study period'. Given that there was no opportunity for similar attrition in the control group, it might be that the participants who had been excluded from the analyses are the least motivated and least likely to respond to social pressure. Furthermore, we did not document the reason for deferral when FTDs were not accepted for blood donation when they returned again after their first blood donation. Some deferral reasons might have excluded further blood

donations within the follow-up period (e.g. travelling to a malaria region).

Our final sample size of about 100 donors per group is relatively small, but is similar to the size in comparable studies [17]. Furthermore, contacting the study participants is time-consuming, so the sample size was also limited for practical reasons.

Conclusion

First-time donors do not seem to experience major changes in well-being after their first blood donation. Well-being is unlikely to influence the return rate of FTDs.

The intervention of questionnaires and/or contacting the FTDs after their first donation led to a higher return rate in male donors. Further studies should specifically

assess potential differences in response rates of male and female FTDs as well as to see if the increased return rates are caused by the combination of these interventions or if it is one single intervention.

Acknowledgements

We thank Professor Thomas Kohlmann, University of Greifswald, for valuable discussions during statistical analysis and Julia Eekels, University of Greifswald, for her useful and constructive recommendations on this manuscript.

Conflict of interest

All authors declare to have no conflict of interests.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Regression table providing detailed information about the results of the used logistic regression with the dependent variable “return rates” and the independent variables “sex”.

Table S2. Mean and standard deviation of the dimension mood (S2a), vigilance (S2b) and agitation (S2c).

Data S1. Multidimensional Mood Questionnaire (MDMQ), used by us to investigate the well-being.

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