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Full Length Article

Providing health checks as incentives to retain blood donors — Evidence from two field experiments

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The collection of blood given by donors has proven to be a substantial societal and a managerial challenge. Consequently, blood donation services seek for incentive mechanisms to retain donors. However, economic or material rewards might entail negative side effects such as motivational crowding out or even attracting "bad blood". In an effort to increase the retention of established blood donors, we conducted two randomized field trials ($N_1 = 53{,}257$, $N_2 = 31{,}522$) in cooperation with the German Red Cross Blood Donation Service and tested the effectiveness of an incentive strategy that is directly related to the blood donation itself: offering a comprehensive blood health check. Contrary to previous related research, we found substantial positive effects of a comprehensive blood health check incentive on donation behavior. In addition, unlike previous studies, we examine effects of repeated exposure to this incentive and do not find any wearout effects. Considering the positive effect of this incentive on donor retention and the relative low cost for providing this service to donors, our findings suggest that offering comprehensive blood health check incentives is a viable and cost-efficient marketing strategy to increase the retention among previous donors even if offered over the longer run.

1. Introduction

Human blood is in high demand. According to the American Cancer Society, in the U.S. alone >1.69 million people were expected to be diagnosed with cancer in 2017; many of which would need blood, sometimes daily, during their chemotherapy treatment (American Cancer Society, 2017). Other than cancer, various serious ailments such as cardiovascular disease or car accidents might necessitate multiple blood transfusions for a single individual (American Red Cross, 2016). It's been estimated that the demand for blood rises up to 8% annually in developed countries (Aravindakshan, Rubel, & Rutz, 2015).

At the same time, in the U.S. only about 10% of the eligible population donates blood (American Red Cross, 2016). Such a shortage in blood supply is common in many Western countries. In fact, many observe a massive decline in blood donations. According to a report from NHS Blood and Transplant from 2016 there has been on average 30% fewer first-time donors in 21 developed countries within a decade (NHS Blood and Transplant, 2016). For England and North Wales, the English NHS reports even 40% fewer new blood donors in 2014 than in 2004 (NHS Blood and Transplant, 2015).

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Blood cannot be produced artificially – it can only be donated. Thus, the collection of a sufficient amount of blood is a significant societal problem making donor management a substantial challenge for nonprofit organizations worldwide (Ferguson, France, Abraham, Ditto, & Sheeran, 2007; Masser, Bednall, White, & Terry, 2012). As the acquisition of new donors is estimated to be more costly than retaining existing ones (Bennett, 2006, 2009; Masser et al., 2012), and established donors donate on a regular basis, the latter group is highly valued by blood donation services (Wildman & Hollingsworth, 2009). Furthermore, the latter group has already passed the registration and medical process in the past and proved to be able to donate. As a result, established donors are less likely to experience side effects (e.g., fainting) and require less service care than first-time donors. Consequently, blood donation services are particularly interested in incentive mechanisms to retain established donors.

Marketing research has provided insights on a wide variety of incentive mechanisms for customer retention (e.g., Leenheer, van Heerde, Bijmolt, & Smidts, 2007; Meyners, Barrot, Becker, & Bodapati, 2017; Viswanathan, Sese, & Krafft, 2017) that have been applied to the blood donation context. For example, blood donation services frequently make use of *economic* incentives that include monetary or material rewards such as giveaways of minor monetary value (e.g., coffee mugs), lotteries, or paid time off work (Chmielewski, Bove, Lei, Neville, & Nagpal, 2012) indicating positive effects on donors' retention rates (Bruhin et al., 2015; Chmielewski et al., 2012; Glynn et al., 2006). However, economic or material rewards might entail negative side effects such as motivational crowding out (Andreoni, 1989; Ariely, Bracha, & Meier, 2009; Lacetera & Macis, 2010; Mellström & Johannesson, 2008; Titmuss, 1970) or even attracting "bad blood" (economic incentives may tempt donors to be untruthful about their health status and prevent their voluntary self-exclusion from donations; Eastlund, 1998). Thus, marketing managers of nonprofit organizations are seeking for appropriate less risky strategies to retain blood donors. What is more, the World Health Organization (2010) defined the objective to achieve 100% voluntary and non-remunerated blood donations in every country of the world by 2020.

In this study, we respond to the call for alternative incentives to increase donor retention and donation rates. In particular, we focused on an incentive that is directly related to the blood donation itself – offering a comprehensive blood health check incentive – and rewarding in particular established (as opposed to potential new, i.e. first-time) blood donors for their contribution (Lacetera, Macis, & Stith, 2014; Sun, Lu, & Jin, 2016). This type of incentive might be attractive in several ways and is supporting WHO's goal: First, blood donors compared to the average population are particularly health-conscious (e.g., they smoke less and are more likely to be moderate drinkers and more physically active, Atsma, Veldhuizen, de Vegt, Doggen, & de Kort, 2011; Shehu, Hofmann, Clement, & Langmaack, 2015) and therefore might be interested to get updates on their health condition. Second, providing a comprehensive blood health check might trigger reciprocal behavior leading to higher response rates (Goette, Stutzer, Yavuzcan, & Frey, 2009). Third, such an incentive is relatively cost-efficient for blood donation services because the donated blood is already being screened as part of the regular procedure. Finally, this type of incentive is non-remunerated.

In blood donation research to date, only a few studies provide some initial insights with respect to a service incentive similar to ours: the effect of a *cholesterol test* incentive (Chmielewski et al., 2012; Glynn et al., 2006; Goette et al., 2009; Kessler et al., 2006; Rzasa & Gilcher, 1988). Interestingly, the evidence of its effect is mixed. While research based on survey studies and in-depth interviews report positive effects on blood donation *intention* (Glynn et al., 2003; Glynn et al., 2006; Kessler et al., 2006; Rzasa & Gilcher, 1988), a large field experiment in Switzerland revealed no significant impact of cholesterol test offerings on individuals' blood donation *behavior* (Goette et al., 2009). In particular, ambiguous outcomes between field and survey experiments in the context of socially desirable and thus biased topics such as blood donation reveal the importance of more evidence from randomized field trials with representative samples.

We designed two large-scale field experiments ($N_1 = 53{,}257$, $N_2 = 31{,}522$) that we ran in subsequent order in cooperation with the German Red Cross Blood Donation Service Baden-Wuerttemberg and Hessen (GRC). These experiments provide three substantial contributions to the existing literature. First, rather than a "simple" cholesterol test, taking advantage of a growing health consciousness in the society (Bloch, 1984; Crawford, 1987, 2006) and the "explosion of the health care consumerism movement across the globe" (Dutta-Bergman, 2004), we examined the effect of a comprehensive blood test (i.e., blood level test including cholesterol, creatinine and uric acid) on blood donation behavior. More importantly, our incentive was framed and communicated as a "health check" to convey an awareness for the importance of health concerns. Our findings are contrary to the cholesterol test incentives-findings by Goette et al. (2009), as both of our field experiments showed that our comprehensive blood health check increased donation rates.

Second, we studied not only immediate effects on donor response rates but also potential wearout effects of the comprehensive blood health check incentives (Experiment II). Our results indicate no wearout effects after repeated exposure.

Third, our findings are especially interesting as we conducted our study in Germany where the type of the comprehensive blood test that we offered with our "health check" is free (biennially) to any individual 35 years or older when they go to a physician. Yet, even in that age group our blood health check incentive increased donors' response rates.

Overall, the results of our two large scale field experiments provide the clear managerial advice to use blood health checks as a reliable marketing instrument to recruit repeat blood donors for subsequent donations and coincidently enhance their retention. Such blood health checks are effective and cost efficient and, therefore, a useful tool in the pursuit of voluntary and non-remunerated donations worldwide. More important, our findings had direct managerial implications: The German Red Cross has started to implement our comprehensive blood health check incentive. Finally, our findings support the increasing focus of marketing scholars on health care marketing as a new research field (e.g., Cleeren, Geyskens, Verhoef, & Pennings, 2016; Stremersch, 2008).

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2. Donor incentive strategies

Similar to companies from the for-profit sector, blood donation services are looking for strategies to rewarding frequent blood donors for their efforts as the acquisition costs for new, first-time donors are multiple times higher than the retention costs for established donors (Bennett, 2006, 2009; Masser et al., 2012). In addition, retention marketing in the blood donation sector targets established donors in order to stimulate further or more frequent donations (Capizzi & Ferguson, 2005). Diverse incentive schemes have been adapted from the for-profit sector to this non-profit area.

Some organizations rely on *economic and material rewards* to increase the retention of their target group. Although economic and material rewards are common practice in the field of blood donation, previous research inside and outside of the blood donation domain found mixed evidence with respect to the performance of these rewards. Specifically, some results from the blood donation domain suggest to downplay the monetary value of economic rewards or using rewards in a less clear economic connotation (Lacetera, Macis, & Slonim, 2013). For example, Lacetera, Macis, and Slonim (2014) compared the effectiveness of cash and $5, $10, and $15 gift cards of equal monetary value and found gift cards to be more effective to increase blood donation rates. In fact, in a prior study, Lacetera and Macis (2010) found blood donors even declaring to stop donating if given 10 Euros in cash. This effect was absent when a voucher of the same nominal value was offered instead. In addition, findings outside of the blood donation domain have shown, for example, that financial incentives have the potential to invoke market-pricing norms where the amount of compensation directly determines the level of effort (see Heyman & Ariely, 2004, but also Dur, Non, & Roelfsema, 2010 and Wang & Tong, 2015). In addition, cash incentives may attract potentially “undesired” individuals with “bad blood” (Eastlund, 1998) and may be demotivating (Ariely et al., 2009; Jin & Huang, 2014; Wang & Tong, 2015). Thus, managers of non-profit organizations should be aware that although cash is typically highly desirable, there are various possible downsides to offering cash as an incentive for blood donation.

Alternatively, material incentives of minor financial value are common practice to increase donation rates. Chmielewski et al. (2012) for instance found no evidence for crowding-out giving branded tokens and paid time off work for blood donation. However, branded tokens were found to be costly for the blood donation service. Offering the opportunity to participating in a lottery e.g., for winning a long-distance journey is another often-used method to increase donation rates. While authors were able to show promising effects on blood donation behavior in a study in Switzerland (Goette & Stutzer, 2008), in another survey study, tokens or awards of appreciation such as coffee mugs or lotteries were least likely to encourage the intention to return for blood donation (Glynn et al., 2003).

Together, due to the mixed evidence of direct monetary incentives or material gifts on donation behavior and the potential drawbacks, alternative marketing strategies are required. One such strategy is to provide a *special service* to important customers (e.g., access to airport lounges for premium customers; Palmeira, Pontes, Thomas, & Krishnan, 2016). In the context of blood donation services, offering a comprehensive blood test to a donor would be directly related to the service provided by the donor (donating blood). Thus, by offering a blood “health check” to established blood donors, we aim to provide this valuable donor group with such a functional service. This type of incentive might be attractive in several ways: (1) It has the potential to satisfy blood donors' health-consciousness and therefore be highly appreciated by them (Atsma et al., 2011; Shehu et al., 2015), (2) donated blood is always screened as part of the regular procedure so that comprehensive blood health check incentives should be fairly cheap to offer, (3) with the implementation of blood health checks, blood donation services would meet WHO's goal.

3. Experimental design

The goal of two randomized field experiments was to measure the effectiveness of providing a non-remunerated incentive to established donors to motivate them to attend the next available blood drive. Specifically, we offered a comprehensive blood test presented as a “health check” to trigger the donors' third donation within twelve months (52 weeks). In both experiments, the incentive was announced through a coupon (=treatment) that was included in the invitation letter (sent via postal mail or email) that donors receive routinely for upcoming donation drives. In both experiments, we randomly selected donation drives for our treatment and control groups. Thus, the randomization was done on the blood drive level. We relied on the planned future blood drives at the time of the respective field experiments (Experiment I $N = 380$, Experiment II $N = 418$ blood drives). Table 1 (descriptive statistics) in the results section shows that the randomization worked well with respect to age, gender, and donation history. We additionally performed t-test and chi-squared test procedures (see Table 2). Only few differences were significant, marginally though, despite the large sample. Thus, together, based on the rather large number of blood drives and the few and marginal differences presented in Table 2, we consider the samples to be sufficiently randomized.

Fig. 1 illustrates the experimental process for both experiments (Experiments I and II) for the treatment and the control group. As can be seen, we measured the donors' responses in terms of whether they showed up at a donation drive after either receiving a letter with a health check coupon (treatment group) or without (control group). Once at a blood drive, donors continued with the standard donation process except that for the experimental group the medical staff collected a small extra sample of blood during the donation. Afterwards, the extra blood sample got extensively tested in the laboratories of the GRC. Finally, the blood health check results including standard reference blood level results were sent within two weeks after the blood drive via postal mail to the donors. In case of anomalous results, donors were informed by the GRC via postal mail together with the advice to contact their primary care physician for an in-depth physical check-up.

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Table 1
Descriptive statistics of experiments I and II.

		Experiment I												Experiment II											
		TG & CG				TG				CG				TG & CG				TG				CG			
		Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
α_1	Response (donor showed up to donation drive)[a]	41.3%		0	1	44.9%		0	1	38.4%		0	1	39.3%		0	1	40.9%		0	1	37.8%		0	1
α_2	**Health check intervention** (**treatment group**)[a]	44.3%		0	1									48.5%		0	1								
α_3	Email[a]	5.3%		0	1	4.9%		0	1	5.6%		0	1	8.9%		0	1	9.4%		0	1	8.5%		0	1
α_4	Number previous donations	28.7.	23.6	2	154	28.6.	23.4	2	154	28.8.	23.7	2	147	28.1.	23.4	1	157	28.3.	23.3	1	157	27.9.	23.5	1	155
α_5	Number previous deferrals	0.7.	1.0	0	14	0.7.	1.0	0	13	0.7.	1.0	0	14	0.5.	0.8	0	12	0.6.	0.8	0	12	0.5.	0.8	0	10
α_6	Number previously failed punctures	0.0.	0.2	0	5	0.0.	0.2	0	4	0.0.	0.2	0	5	0.0.	0.1	0	4	0.0.	0.1	0	4	0.0.	0.1	0	4
α_7	Number previous hemoglobin deferrals[b]													0.2.	0.7	0	19	0.2.	0.7	0	19	0.2.	0.7	0	14
α_8	Number previous nullifications	0.0.	0.1	0	3	0.0.	0.1	0	2	0.0.	0.1	0	3	0.0.	0.1	0	2	0.0.	0.1	0	2	0.0.	0.1	0	2
α_9	Gender (female)[a]	41.0%		0	1	41.2%		0	1	40.9%		0	1	40.8%		0	1	40.6%.		0	1	41.0%		0	1
α_{10}	Age group 18-25[a]	11.6%		0	1	11.1%		0	1	11.9%		0	1	13.1%		0	1	12.7%		0	1	13.4%		0	1
α_{11}	Age group 26-35[a]	12.8%		0	1	12.3%		0	1	13.1%		0	1	13.6%		0	1	13.0%		0	1	14.1%		0	1
α_{12}	Age group 36-45[a]	18.0%		0	1	18.1%		0	1	17.9%		0	1	16.1%		0	1	16.3%		0	1	16.0%		0	1
α_{13}	Age group 46-55[a]	31.4%		0	1	32.2%		0	1	30.8%		0	1	31.4%		0	1	32.0%		0	1	30.9%		0	1
α_{14}	Age group 56-71[a]	26.2%		0	1	26.3%		0	1	26.2%		0	1	25.8%		0	1	26.1%		0	1	25.5%		0	1
α_{15}	Rh negative blood group[a]	20.8%		0	1	20.6%		0	1	21.1%		0	1	20.8%		0	1	20.5%		0	1	21.0%		0	1
α_{16}	Participants of EXP I[a,b]													24.6%		0	1	24.5%		0	1	24.8%		0	1
	N	53,257				23,580				29,677				31,522				15,292				16,230			

EXP = experiment, TG = treatment group, CG = control group.
[a] Dummy variable (0/1).
[b] Information available for EXP II only.

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Table 2
Randomization checks: *t*-test and chi-square test results.

	Experiment I					Experiment II				
	TG	CG		*t*-test	Chi2	TG	EG		*t*-test	Chi2
	Mean	Mean	Diff	*p*	*p*	Mean	Mean	Diff	*p*	*p*
Email[a]	4.9%	5.6%	0.68%		0.000***	9.4%	8.5%	−0.96%		0.003***
Number previous donations	28.6.	28.8.	0.179	0.383		28.3.	27.9.	−0.373	0.158	
Number previous deferrals	0.7.	0.7.	−0.025	0.004***		0.6.	0.5.	−0.014	0.126	
Number previously failed punctures	0.0.	0.0.	−0.001	0.689		0.0.	0.0.	0.001	0.575	
Number previous hemoglobin deferrals[b]						0.2.	0.2.	0.001	0.911	
Number previous nullifications	0.0.	0.0.	0.001	0.220		0.0.	0.0.	0.001	0.567	
Gender (female)[a]	41.2%	4.9%	−0.25%		0.564	4.6%.	41.0%	0.38%		0.495
Age group 18–25[a]	11.1%	11.9%	0.86%		0.002***	12.7%	13.4%	0.76%		0.046***
Age group 26–35[a]	12.3%	13.1%	0.86%		0.003***	13.0%	14.1%	1.06%		0.006***
Age group 36–45[a]	18.1%	17.9%	−0.22%		0.506	16.3%	16.0%	−0.22%		0.588
Age group 46–55[a]	32.2%	3.8%	−1.45%		0.000***	32.0%	3.9%	−1.04%		0.047**
Age group 56–71[a]	26.3%	26.2%	−0.04%		0.912	26.1%	25.5%	−0.56%		0.258
Rh negative blood group[a]	2.6%	21.1%	0.51%		0.149	2.5%	21.0%	0.51%		0.265
Participants of EXP I[a,b]						24.5%	24.8%	0.29%		0.556

t-test = Student's t-test; Chi2 = Chi-squared distribution.
[a] Dummy variable (0/1).
[b] Information available for EXP II only, TG = treatment group (HC intervention), CG = control group (without HC intervention).
*** $p < .01$.
** $p < .05$.

In Experiment I we tested the overall effectiveness of the blood health check with respect to donor response behavior. Experiment II was effectively a replication of Experiment I to test for the effect of repeated exposure to our health check incentive and examined potential wearout effects. Additionally, we examined possible age effects in both Experiments (particularly, if the incentive was effective with the age group 35+ years old that is eligible for comprehensive blood tests for free (biennially) through their primary care physicians).

3.1. Field Experiment I

Experiment I (EXP I) was conducted in January 2015 by the GRC Baden-Wuerttemberg/Hessen. We randomly selected 183 donation drives as our treatment group. Donors with their potential third donation within the last 52 weeks received an invitation to the next available blood donation drive including a coupon for a health check. The coupon offered the opportunity for a comprehensive blood test including donors' blood lipid levels (i.e. cholesterol), creatinine, and uric acid by bringing the coupon

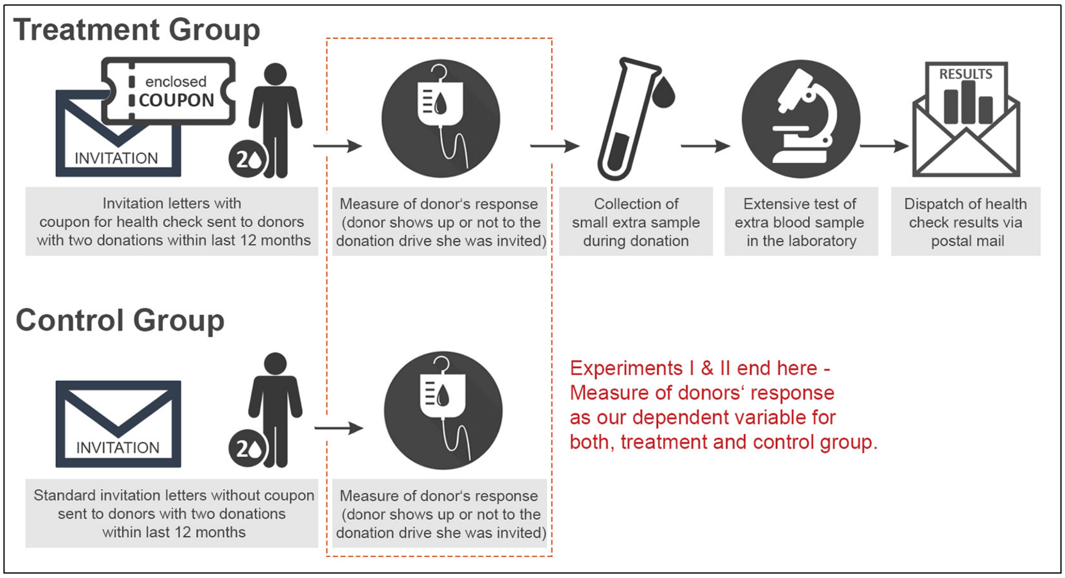

Fig. 1. Experimental process.

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to the blood drive (donors, who received email invitations, received a downloadable coupon that they had to print out and bring with them to the blood drive).

Another randomly selected 197 donation drives represented our control group sample within the same observation period. Here invitations were sent out without any coupon for blood health checks. These donors were invited via "standard" letters and emails to the next possible donation drive. Over both conditions, 53,257 invitations were sent out to donors. No other incentives (e.g., thank-you gifts or lotteries) were used within the experimental phase.

We defined our main dependent variable "response rate" as whether the established donors attended one of the donation drives announced in the invitation letter/email. In Model 1, we controlled for covariates such as donors' demographics: (i) gender (female = 1) and (ii) age in years, as well as donation history: (iii) number of previous donations, (iv) number of previous deferrals, and (v) whether the donor received invitations via email instead of postal mail.

We further controlled for blood groups (Thomas, Feng, & Krishnan, 2015). We specifically controlled for negative blood groups ((vi) Rh negative blood group (=1)) because only 15% of the population fall in this category and that is why the GRC contacts these donors more often (i.e. they are reminded in shorter intervals of blood donation opportunities and perhaps feel a stronger obligation to donate blood; German Red Cross, 2017b).

Finally, we considered for a particularity of the health care system in Germany: People 35 years or older can receive similar comprehensive blood tests as this study's health check incentive biennially at no charge from their primary health care physician. People's health insurances cover their costs entirely. Consequently, attending the blood donation drive is not necessary for this age group to get such a free test. Thus, our health check incentive may be potentially more attractive for the younger age group below 35 years. To examine this, we divided our sample into two sub-groups ((vii) < 35 years; Model 2a and ≥ 35 years; Model 2b) and tested the effect of our health check incentive on both age groups separately. Fig. 2 presents the experimental process in both (treatment and control) groups.

3.2. Field Experiment II

Experiment II (EXP II) was a replication test and, in addition, meant to test for potential wearout effects. The experiment took place in November 2015 at blood donation drives of the GRC Baden-Wuerttemberg. We randomly selected 213 donation drives for our treatment group (invitation with blood health check coupon) and 205 donation drives for our control group (standard invitation without blood health check coupon). Out of 31,522 donors, 49% ($N = 15{,}292$) received the treatment invitation and 51% ($N = 16{,}230$) the control invitation (see Fig. 2). There were no other incentives (e.g., thank-you gifts or lotteries) during the experimental period.

The data comprised donors that were part of either Experiment II only (Model 2) or both Experiments I and II (Model 3). The latter group was divided into two subsamples: Donors that were in the treatment group in Experiment I (Model 3a) and donors that were in the control group in Experiment I (Model 3b). Fig. 3 illustrates all estimated models in Experiments I and II. As can be seen, we tested the effect of the blood health check incentive in Experiment II on both subgroups and analyzed the impact separately to gain information about potential wearout effects. Consistent with Experiment I, we also analyzed subsamples of different age groups (<35 years; Model 4a and ≥35 years; Model 4b).

4. Empirical results

Fig. 2 presents the descriptive response rate results in Experiments I and II by condition. As can be seen, in both experiments the donation response rates were higher for the treatment group that received the blood health check incentive. The relative increase compared to the control group was 16.9% in Experiment I, and 8.2% in Experiment II.

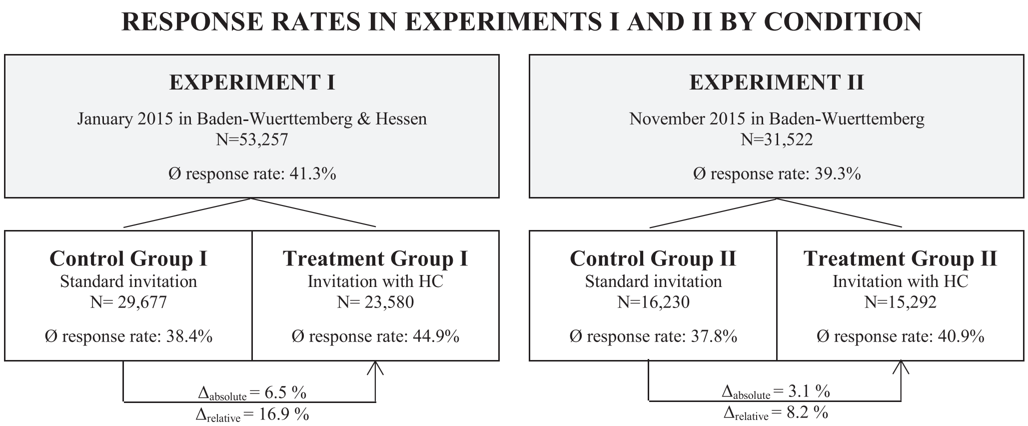

Fig. 2. Response rates in Experiments I and II by condition. HC = Health Check.

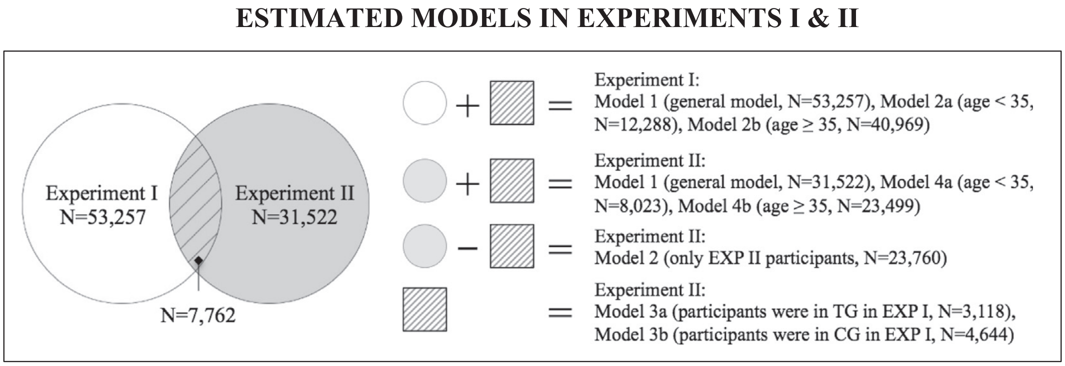

Fig. 3. Estimated models in Experiments I & II. TG = treatment group, CG = control group, EXP = experiment.

We provide model-free evidence in Figs. 4 and 5 across gender and age groups for both experiments. In all groups, donors' response rate was higher for the treatment group (donors, who were invited with a health check coupon) than for the control group (donors, who received the standard invitation without a health check coupon).

4.1. Field experiment I

4.1.1. Descriptives

As can be seen in Tables 1, 44.3% of all donors received the health check invitation (treatment group). 5.3% of the entire sample received the invitation via email (41.1% of those donors received the invitation including the blood health check coupon). The number of lifetime blood donations among participants before the experiment averaged 28.7. On average, the donors had experienced 0.7 deferrals, 0.02 previously failed punctures, and 0.01 nullifications. About 41% of the donors were female. The average age was 45.8 years. >20.8% of donors had the blood group Rh negative. The randomization worked out well (Table 2). Especially the highly relevant variables that are related to previous behavior (e.g., number of previous donations) and to gender (men can donate blood more often per year than women) of blood donors are very well balanced.

4.1.2. Analysis

We ran a logit model to estimate the response rate by treatment while controlling for age effects and other relevant covariates.

$$RESPONSE_i = \alpha + \beta HC_i + \delta AGE_i + \gamma X_i + \varepsilon_i \quad (1)$$

$RESPONSE_i$ indicates whether the donor i attended a blood drive within the experimental phase after receiving the invitation letter. It is equal to 1 if donor i attended and 0 if not.

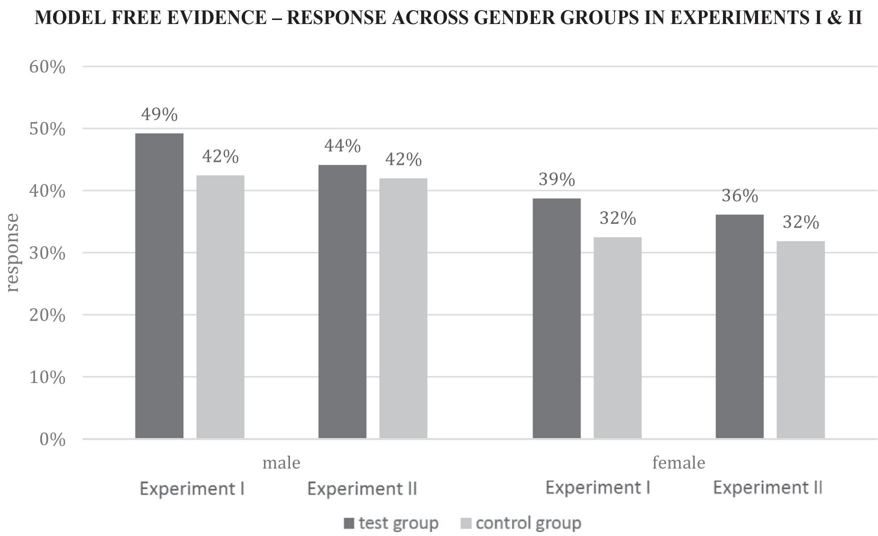

Fig. 4. Model free evidence–response across gender groups in Experiments I & II.

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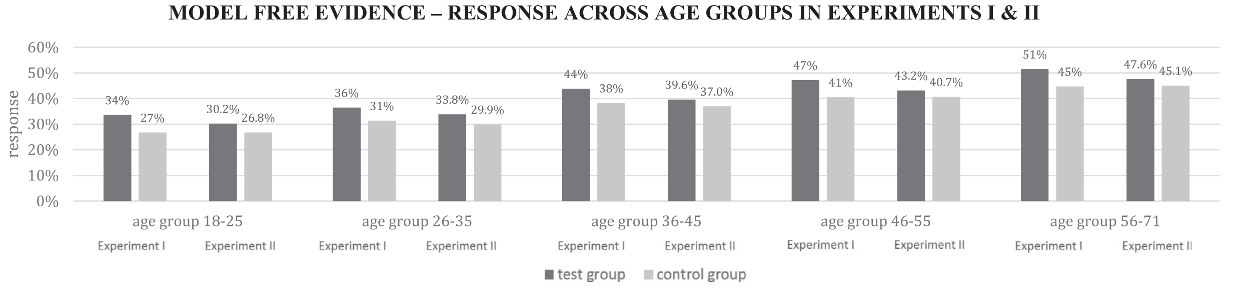

Fig. 5. Model free evidence–response across age groups in Experiments I & II.

The blood health check intervention is represented by HC_i and is equal to 1 if donor i received the health check coupon and 0 if the donor did not receive it (control). AGE_i represents a dummy variable for age groups with 18–25 years as the reference group. The remaining dummy variables (gender, Rh negative blood group, invitation via email, and the number of previous blood donations, deferrals, previously failed punctures and nullifications) are represented by X_i. For easier interpretation of the results we used the Odds Ratio (OR) of our coefficients.

4.1.3. Findings

4.1.3.1. Model 1 (general model). The overall results of the logistic regression (see Table 3) revealed significantly positive effects of the health check intervention on the response rate. The health check intervention increased the probability of attending a donation by 33% (OR $\beta_1 = 1.33$, $p < .000$) compared to donors that received the standard invitation.

The GRC sent invitations via postal mail or email. The effect of email versus postal mail ($\beta_2 = 1.01$, $p \geq .1$) was not significant. The number of previous blood donations had a marginally significant, positive effect: they increased the response rate by 2% (OR $\beta_3 = 1.02$, $p < .000$). The influence of deferrals was significant and decreased the response rate by 5% (OR $\beta_4 = 0.95$, $p < .000$), failed punctures significantly reduced the response rate by 12% (OR $\beta_5 = 0.88$, $p < .05$), and nullifications significantly reduced it by 14% (OR $\beta_6 = 0.86$, $p < .05$). Female donors had a 23% lower response rate than males (OR $\beta_7 = 0.77$, $p < .000$); a significant difference. The latter might be in part because females can only donate up to four times per year while males are allowed to donate up to six times per year (German Red Cross, 2017a). The probability of response increased with donor age: The difference among 18–25 (reference group) and 26–35-year-old donors was not significant ($\beta_9 = 1.05$, $p \geq .1$). Compared to donors at the age of 18–25 the response rate was 24% higher for donors at the age of 36–45 (OR $\beta_{10} = 1.24$, $p < .000$), 23% for 46–55-year-old donors (OR $\beta_{11} = 1.23$, $p < .000$) and 28% for donors at the age of 56–71 years (OR $\beta_{12} = 1.28$, $p < .000$). Individuals with Rh negative blood groups did not respond more frequently ($\beta_{13} = 0.97$, $p \geq .1$).

Table 3
Results of the logistic regression in experiment i
response rates depending on health check intervention (odds ratios).

	Dependent variable: Response (donor showed up to donation drive)[a]	Model 1 General model		Model 2a age < 35		Model 2b age ≥ 35	
				Age effects			
	Mean of response for subsamples	41.3%		31.5%		44.2%	
		OR	SE	OR	SE	OR	SE
β_1	**HC intervention** (**treatment group**)[a]	1.33***	0.02	1.32***	0.05	1.33***	0.03
β_2	Email[a]	1.01	0.04	0.82**	0.08	1.04	0.05
β_3	Number previous donations	1.02***	0.00	1.04***	0.00	1.01***	0.00
β_4	Number previous deferrals	0.95***	0.01	0.90***	0.02	0.95***	0.01
β_5	Number previously failed punctures	0.88**	0.05	0.76	0.15	0.90*	0.06
β_6	Number previous nullifications	0.86**	0.06	0.74	0.14	0.87*	0.07
β_7	Gender (female = 1)[a]	0.77***	0.01	0.66***	0.03	0.82***	0.02
β_8	Age group 18–25[a]	*Reference Group*					
β_9	Age group 26–35[a]	1.05	0.04				
β_{10}	Age group 36–45[a]	1.24***	0.04				
β_{11}	Age group 46–55[a]	1.23***	0.04				
β_{12}	Age group 56–71[a]	1.28***	0.05				
β_{13}	Rh negative blood group[a]	0.97	0.02	1.00	0.05	0.96*	0.02
β_{14}	Constant	0.39***	0.01	0.34***	0.01	0.48***	0.01
	N	53,257		12,288		40,969	
	Pseudo R2	0.036		0.035		0.028	

[a] Dummy variable (0/1), ***: $p < .01$, **: $p < .05$, *: $p < .10$, coefficients indicated by Odds Ratios (OR), SE = Standard Error.

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4.1.3.2. Model 2 (age effects). Individuals 35 years and older can receive free blood health checks biennially from their primary care physicians. Thus, we expected lower response rates-effects of our intervention for this older age group. Interestingly, however, we found a positive impact of our health check intervention on both age groups (age < 35 years OR $\beta_1 = 1.32$, $p < .000$ and age ≥ 35 years OR $\beta_1 = 1.33$, $p < .000$). This is in line with our observation in the general Model 1 that response rates significantly increased by age (Model 1; also, for means of response rates: Donors at the age of 34 and below responded at a level of 31.5% whereas older donors responded at a level of 44.2%). That is, while the health check incentive was a successful intervention to attract younger blood donors, it was equally effective among older donors.

4.2. Field Experiment II

4.2.1. Descriptives

As can be seen in Table 1, 48.5% of all donors received the blood health check intervention (treatment group). 8.9% of the entire sample received their invitation via email (51.2% of those donors received the invitation including a health check coupon). Donors on average had 28.1 blood donations in the past, 0.5 deferrals, 0.01 previously failed punctures, 0.2 deferrals because of low hemoglobin, and 0.02 nullifications. The share of female donors was 40.8%, the average age was 45.3 years, and 20.8% had a Rh negative blood group. This sample included 24.6% donors that already participated in Experiment I.

4.2.2. Analysis

Same as in Experiment I, we ran a logit model to estimate the donation response rates as a function of blood health check intervention while controlling for age effects and other relevant covariates assuming eq. (1). In addition, in order to test for wearout effects due to repeat exposure to our health check incentives, in our general model (Model 1, Table 4) we also controlled for whether participants had already participated in Experiment I (no matter if they were part of the treatment or control group in Experiment I).

To analyze the effect of first exposure (novelty) to the blood health check intervention, in Model 2 we focused on donors who had not participated in Experiment I. To test for wearout effects in Model 3a we focused on donors that were previously (in Experiment I) invited with the blood health check coupon and in Model 3b on donor that had previously received the standard (control) invitation (i.e. without health check coupon). In addition, we analyzed age effects for both age groups: <35 years (Model 4a) and ≥35 years (Model 4b).

4.2.3. Findings

4.2.3.1. Model 1 (general model). Same as in Experiment I, we found a significantly positive effect of the blood health check incentive on response rates: they increased by 13% in comparison to the control group (OR $\gamma_1 = 1.13$, $p < .000$). Note that the lower relative

Table 4
Results of the logistic regression in Experiment II response rates depending on health check intervention (Odds Ratios).

	Dependent variable: Response (donor showed up to donation drive)[a]	Model 1 general model		Model 2 only EXP II participants		Model 3a EXP I TG		Model 3b EXP I CG		Model 4a Age < 35		Model 4b Age ≥ 35	
						Wearout effects				Age effects			
	Mean of response for subsamples	39.3%		39.0%		41.1%		39.8%		29.9%		42.5%	
		OR	SE	OR	SE	OR	SE	OR	SE	OR	SE	OR	SE
γ_1	**HC intervention (treatment group)[a]**	**1.13*** **	**0.03**	**1.08*** **	**0.03**	**1.41*** **	**0.11**	**1.25*** **	**0.08**	**1.15*** **	**0.06**	**1.12*** **	**0.03**
γ_2	Email[a]	1.01	0.04	1.04	0.05	0.90	0.12	0.99	0.11	1.06	0.09	0.99	0.05
γ_3	Number previous donations	1.01***	0.00	1.01***	0.00	1.01***	0.00	1.01***	0.00	1.03***	0.00	1.01***	0.00
γ_4	Number previous deferrals	0.96***	0.01	0.96**	0.02	0.97	0.04	0.95	0.03	0.91**	0.04	0.96**	0.01
γ_5	Number previously failed punctures	0.89	0.10	0.98	0.12	0.37**	0.16	0.90	0.27	0.93	0.24	0.88	0.10
γ_6	Number previous hemoglobin deferrals[b]	0.99	0.02	1.00	0.02	0.99	0.06	0.95	0.04	0.95	0.06	0.99	0.02
γ_7	Number previous nullifications	0.91	0.08	0.83*	0.09	0.84	0.28	1.30	0.26	0.92	0.20	0.90	0.09
γ_8	Gender (female)[a]	0.79***	0.02	0.81***	0.02	0.67***	0.06	0.78***	0.05	0.68***	0.04	0.84***	0.02
γ_9	Age group 18-25[a]	*Reference Group*											
γ_{10}	Age group 26-35[a]	1.05	0.05	1.05	0.06	1.10	0.19	0.95	0.13				
γ_{11}	Age group 36-45[a]	1.22***	0.06	1.25***	0.07	1.20	0.20	1.05	0.14				
γ_{12}	Age group 46-55[a]	1.28***	0.06	1.32***	0.06	1.20	0.18	1.07	0.13				
γ_{13}	Age group 56-71[a]	1.38***	0.06	1.40***	0.07	1.39**	0.22	1.17	0.15				
γ_{14}	Rh negative blood group[a]	0.96	0.03	0.95	0.03	1.01	0.09	1.01	0.07	0.94	0.06	0.97	0.03
γ_{15}	Constant	0.39***	0.02	0.39***	0.02	0.39***	0.06	0.41***	0.05	0.37***	0.02	0.50***	0.02
	N	31,522		23,760		3118		4644		8023		23,499	
	Pseudo R2	0.029		0.029		0.033		0.029		0.022		0.020	

Coefficients indicated by Odds Ratios (OR), SE = Standard Error.
[a] Dummy variable (0/1).
[b] Information available for EXP II only, TG = treatment group (HC intervention), CG = control group (without HC intervention).
*** $p < .01$.
** $p < .05$.
* $p < .10$.

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increase in response rates in Experiment II in comparison to Experiment I might have been due to the fact that only donors from Baden-Wuerttemberg were part of Experiment II; Baden-Wuerttemberg has a higher degree of urbanization, and urban areas typically have lower donation rates compared to rural areas (Bekkers and Veldhuizen (2008); Greinacher, Fendrich, and Hoffmann (2010)). In addition, there might have been seasonal effects at play as Experiment I was conducted in January, while Experiment II was conducted in November were donation rates are typically lower (we analyzed the average donation rates across 12 months in 2014 from GRC data in the same regions and found that the donation rate in November 2014 was 14% lower than in January 2014).

The other covariates' effects were equally similar to what we had observed in Experiment I. In particular, there was no significant impact of whether the donor received the invitation via postal mail or email ($\gamma_2 = 1.01$, $p \geq .1$). Further, the previous donation history influenced the response rate positively but by only 1% (OR $\gamma_3 = 1.01$, $p < .000$). Previous deferrals had a minor negative impact of 4% (OR $\gamma_4 = 0.96$, $p < .000$). There was no significant influence of the other deferral types (γ_5–γ_7). Females' response rate was 21% lower than the response rate of male donors (OR $\gamma_8 = 0.79$, $p < .000$). Older individuals revealed higher response rates: The difference among 18–25 (reference group) and 26–35-year-old donors was not significant ($\gamma_{10} = 1.05$, $p \geq .1$). Compared to the age group of 18–25 years older donors (reference group) donors at the age of 36–45 responded with a rate of 22% (OR $\gamma_{11} = 1.22$, $p < .000$), 46–55-year-old donors responded with a rate of 28% (OR $\gamma_{12} = 1.28$, $p < .000$), and 56–71-year-old donors responded with a rate of 38% (OR $\gamma_{13} = 1.38$, $p < .000$). The Rh factor of the blood had no significant impact on response rates (γ_{14}).

4.2.3.2. Model 2 (Experiment II participants only). As can be seen, we replicated our findings from Experiment I: The health check intervention significantly increased the response rate by 8% (OR $\gamma_1 = 1.08$, $p < .000$). The effects of the covariates in Model 2 were similar to our general Model 1 for Experiment I.

4.2.3.3. Model 3 (Experiment I treatment group versus Experiment I control group). In Model 3, we focused on donors who had previously participated in Experiment I to test for potential wearout and longer-term effects. We separately analyzed the subsample of donors who were in the treatment group (Model 3a) and control group (Model 3b) in Experiment I respectively. In Model 3a we found that exposing donors to the blood health check incentive for a second time within 10 months significantly increased the response rate by 41% (OR $\gamma_1 = 1.41$, $p < .000$). In Model 3b, donors received a standard invitation in Experiment I and thus, were exposed to the health check incentive only for the first time in Experiment II. Here we found that the first-time exposure significantly increased the response rate by 25% (OR $\gamma_1 = 1.25$, $p < .000$). Consequently, our data confirms that repeated exposure reinforced the positive impact of the blood health check incentive (+16%) instead of resulting in a wearout effect.

4.2.3.4. Model 4 (age effects). In Model 4a, we analyzed the effect of the blood health check incentive on donors younger than 35 years (who do not get free comprehensive blood tests through their primary care physicians); in Model 4b, we focused on donors 35 years and older (who biennially get those free comprehensive blood tests). Same as in Experiment I, we found a positive effect of our blood health check incentive for both age groups (age <35 years OR $\gamma_1 = 1.15$, $p < .000$ and age ≥35 years OR $\gamma_1 = 1.12$, $p < .000$).

5. General discussion

The blood donation of an average adult at a blood drive can save up to three lives (American Red Cross, 2016). However, blood donation services worldwide are facing the challenge of providing blood banks and hospitals with a stable supply of blood. For this purpose, volunteers are needed to donate their blood on a regular basis.

Established marketing strategies (such as economic or material rewards) to incentivize blood donors and to enhance their retention to the blood service might entail negative effects such as crowding out or attracting "bad blood" while additionally not meeting the WHO's goal of non-remuneration. In an effort to leverage these problems, alternative marketing strategies are required. In two randomized controlled field trials (RCTs), we tested the effectiveness of a service-based marketing intervention that takes advantage of the growing health consciousness in society while being relatively cheap/costless for blood donation services: offering a comprehensive blood test to retain established blood donors. In particular, in both of our experiments, donors received an invitation to an upcoming blood drive either with or without a coupon for a free blood "health check" to be performed at the donation site. Unlike to a previous experiment by Goette et al. (2009), we offered a much more comprehensive examination of donors' blood, labeling it as a health check (rather than offering a simple cholesterol test). In addition, we tested for a second exposure to the same incentive within a 10-months period to test for potential wearout effects. Contrary to the field trial in Switzerland, where the cholesterol test-incentive did not have a significant effect on donor response rates (Goette et al., 2009), we found significantly positive effects of the comprehensive blood health check incentive on donor response rates in both of our Experiments. Specifically, donors who received invites with our health check incentive were 33% (EXP I) and 13% (EXP II) more likely to attend a third donation within 12 months compared to donors invited without the incentive.

In addition, our Experiment II findings provide evidence that the effect of the comprehensive blood health check intervention remains positive even after two exposures, albeit weaker compared to the first-time exposure. Thus, the repeated exposure to our blood health check incentive further strengthened the effect on donors' response rates. These findings suggest that established donors might be interested in regular updates on their health status.

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In Germany, where we ran our RCTs, individuals ages 35 years or above can get comprehensive blood level tests biennially through their primary care physician free of charge. We therefore analyzed whether our intervention was more attractive to the younger age group below 35 years. However, in both experiments we found a significant positive impact of our blood health check intervention on donors' response rates irrespective of age. Thus, offering a blood health check incentive can be a successful marketing instrument to attract and retain established blood donors of all age groups.

More generally, we tested the effectiveness of an incentive scheme that was meant to avoid a crowding out of donors' number one reason to give blood: their intrinsic motivation to help others (see American Red Cross, 2016). Previous research has discussed in detail when and why extrinsic incentives are likely to avoid crowding out effects (see Gneezy, Meier, & Rey-Biel, 2011) and have shown that their design (e.g., value/cost of the stakes) and the form in which they are given (in particular remunerated or non-remunerated) matter in terms of how they interact with intrinsic motivations. The key is to not change the nature of the behavior from a social to a business frame or transaction (Gneezy & Rustichini, 2000a, 2000b; Heyman & Ariely, 2004), which we tried to avoid by offering a non-monetary reward that is directly related to the expertise of blood donation services and relatively costless (as to not take away from the main goal of helping others). In addition, some evidence from education suggests that it is beneficial to have incentives be well-specified and targeted as in our case (e.g., "give blood at the next drive" rather than "give blood"). As long as these general guiding principles are followed, there should be various possible incentive designs other than the one that we tested to effectively increase donations without driving crowding out effects (e.g., use of prosocial incentive schemes; see Imas, 2014).

Based on our findings and the limitations of our study, we suggest three avenues for further research. First, we tested a two-time exposure to the blood health check incentive within a 10-month period. As such, we cannot rule out longer-term wearout effects. Therefore, future research may want to examine more exposures and their effects over a longer period of time.

Second, our study was conducted in Germany. Although we replicate the findings from Experiment I in Experiment II, further studies in different countries may be useful to learn about the generalizability of our findings.

Third, blood donation services highly value established blood donors because the acquisition of new donors is estimated to be more costly (in terms of money and time; Bennett, 2006, 2009; Masser et al., 2012; Wildman & Hollingsworth, 2009). Consequently, we focused our study on the former group. An important practical question that arises from our focus is to what extent do our findings extend to non-donors (i.e. potential new, first-time donors). Previous research suggests that the reasons for donating are substantially different across the two groups and has identified various determinants of initial donation, the most prominent of which are (in comparison to repeat donors): donation anxiety (i.e. fear of needles or pain (Masser, White, Hyde, Terry, & Robinson, 2009; Robinson, Masser, White, Hyde, & Terry, 2008) and more external influences or rational as opposed to internal and affective factors such as social norms/pressure, time demands, or perceived rewards for donating (see Godin et al., 2005; Lemmens et al., 2005; Piliavin & Callero, 1991; Reid & Wood, 2008). Of these determinants, we would expect our comprehensive blood health check to primarily address rational consideration — to the extent that non-donors value health. However, established blood donors have been found to be relatively more health-conscious than the average population (e.g. Atsma et al., 2011; Shehu et al., 2015). Thus, depending on the importance weights of the various determinants, we hypothesize that our comprehensive blood health check incentive would be relatively less (or even non-) effective for non-donors than for established donors; particularly among the group of 35+ year-olds, who can biennially get comprehensive blood health checks for free from their primary care physicians (unless the time-efficiency of the comprehensive blood test is significantly superior at a blood drive than at a primary care physician's office). Given the motivational differences and the fact that we can only speculate, future research may want to systematically examine the generalizability of our findings across non-donor and donor groups.

6. Conclusion

The results from two large-scale RCTs find significant and substantial positive effects of a comprehensive blood test marketed as "health check" on the response rates of the most valuable donor group: established blood donors. This service incentive is in line with WHO's goal to avoid remunerated incentives. In addition, it is an incentive that is relatively costless for blood services because every potential donor's blood has to be analyzed anyways — the additional cost of offering a more extensive test is estimated at about EUR 1 only; largely, for administration and communicating of the results. Due to its benefits, our blood health check incentive has been adopted and is currently being rolled out in different regional blood donation services of the GRC.

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