

# Development and Validation of the Blood Donor Motivation and Satisfaction (BDMS) Questionnaire

Kristina Kralik<sup>1</sup>, Tena Velki<sup>2</sup> and Vesna Ilakovac<sup>1</sup>

<sup>1</sup> Department of Medical Statistics and Medical Informatics, Faculty of Medicine, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia;  
<sup>2</sup> Faculty of Education, Josip Juraj Strossmayer University of Osijek, Osijek, Croatia

## SUMMARY

The aim of the study was to develop an instrument to examine satisfaction with the institution blood donation services, donor health, emotional state, satisfaction with communication, employees and the institution, as well as motivation and reasons for the first/repeat blood donation. The study was conducted on voluntary blood donors (N=928), who donated their blood at the Clinical Institute of Transfusion Medicine, Osijek University Hospital Center, in the period from December 2019 to September 2020. Data were collected in three phases. The first phase of the research involved 326 blood donors on which the constructive validity, reliability and sensitivity of individual scales and subscales were checked, and items with satisfactory psychometric characteristics selected. The second phase consisted of 310 voluntary blood donors, which tested metric characteristics of the improved instrument and obtained the final version of the Blood Donor Motivation and Satisfaction (BDMS) Questionnaire, which is divided into seven scales (Subjective Health Scale, Scale of general Emotional State, Scale of Discomfort during Donation, Communication Satisfaction Scale, Service Quality Scale, Motivation scale, and Reasons for First or Repeat Donation Scale). During the third phase (N=292), the BDMS was validated. The questionnaire was found to be a valid and reliable measuring instrument, with satisfactory psychometric characteristics.

## KEYWORDS

*Blood donors; Motivation; Validation; Satisfaction with service*

**CORRESPONDENCE TO** Vesna Ilakovac, Department of Medical Statistics and Medical Informatics, Faculty of Medicine, Josip Juraj Strossmayer University, J. Huttlera 4, HR-31000 Osijek, Croatia  
vesna.ilakovac@mefos.hr;  
vesna.ilakovac.os@gmail.com

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## Introduction

Blood donation is still the main source of blood and blood products in the world. Although there is research, there is still no appropriate substitute

for blood and blood products<sup>1</sup>, and donated blood is an indispensable method for treating disease and saving the lives of patients suffering from blood loss, while the medical procedure itself is performed almost routinely, it compensates for blood loss due to surgery, injury, or chemotherapy.

With the development of medical procedures, the demand for blood is increasing. Fifteen percent of transfused blood units are administered daily to hematologic and oncologic patients<sup>2</sup>, and one-third of patients with cardiac disorders will undergo surgery that will require postoperative transfusions<sup>3</sup>. To avoid short-term blood supply, blood banks should develop effective collection of new and retention of existing donors. The availability of blood in a country is defined by the rate of whole blood donation based on samples of 1000 people, which according to the World Health Organization (WHO) is 31.5 donations *per year* in high-income countries, 15.9 donations with higher middle income, and 5 donations with low income. In Croatia, the rate of whole blood donation in 2020 was 18.1/1000 people<sup>4</sup>. The need for blood transfusions and blood-based drugs continues despite the COVID-19 pandemic. As the COVID-19 pandemic affected all medical care fields, it also affected blood donation, especially during the lockdown period. Restrictions on mobility led to reduced donations and fewer blood supplies, causing global concern about potential blood shortages in the future<sup>5</sup>. Concern is also caused by a birth rate decline and aging of the population (due to the impact of chronic diseases that occur with aging) as important factors that negatively affect the balance between the supply and demand of blood<sup>5,6</sup>.

Blood donor satisfaction varies according to demographics and is positively associated with the intention to donate again<sup>7</sup>. Previous research has shown that the experience of a blood donor is important in encouraging others to donate blood or donate again<sup>8</sup>. Research has shown that only blood donation is associated with the intrinsic motivation, which is much more pronounced in regular blood donors compared to new donors (from 1 to 4 donations)<sup>9</sup>.

In order to reduce the nervousness and discomfort of donors when donating blood, a higher frequency of donation is needed because with the

increased frequency donors learn the procedures related to donation and get used to the environment<sup>10</sup>. We also need to pay attention to how negative feelings (anxiety, fear or other feelings) can affect repeat blood donation. Some research suggests that longer donor staying in waiting room to donate blood can lead to increased anxiety and fear and increase the risk of vasovagal reactions, which can influence the decision to donate blood again. Stressful and fearful donors can also affect other people in the room, increasing the risk of vasovagal reactions in other donors<sup>11</sup>. The most common fears of donation-related stimuli are fear of blood, needles, pain, and fainting. Research has shown that at least one-third of the most experienced donors state that fear is present at every donation, which is more associated with pain and vasovagal symptoms<sup>12</sup>. In order to reduce negative feelings related to the blood donation process, it is necessary to create a feeling of trust in the donor in the institution where the blood is donated and encourage her/him to understand that the institution provides superior service. A small number of studies related to blood donation also deal with the impact of service quality on the decision to repeat blood donation<sup>13</sup>.

Positive or negative attitude about the service is influenced by easy access to the institution where the donation is made, cleanliness and comfort of the institution, waiting time at the reception, courtesy of staff at reception, way of dressing employees, perception of trust in employees, modern equipment, fast service, customized time in which blood can be donated, and a way to thank donors after donating blood. From the experience of previous research, it can be concluded that if a donor has bad experience caused by physical causes or is dissatisfied with the service, the likelihood of re-donating blood decreases<sup>8,14-18</sup>. Remembering previous experience is one of the important factors for repeat donation because by remembering the experience

of previous donation, the donor decides whether he/she wants to repeat that experience or not<sup>19</sup>. Motivation and negative factors have the greatest influence on the decision to donate blood again, as well as on whether the donor will become a motivator for others to donate blood<sup>20</sup>.

Experience to date confirms that the experience of donors has a high role in encouraging new and future potential blood donors<sup>21</sup>. Therefore, the aim of this study was to develop an instrument to examine the satisfaction of the institution's service in donating blood, including health and emotional state of the donor, satisfaction with communication, employees and the institution, and motivation for first/repeat blood donation, as well as the reasons for first/repeat donation. Development of this instrument will enable new knowledge in an effort to maintain the number of current donors and at the same time increase the number of new potential blood donors.

## Participants and Methods

### Procedure

The research was conducted at the Clinical Institute of Transfusion Medicine, Osijek University Hospital Center, which is an authorized health institution and the Regional Transfusion Center, the second largest in the Republic of Croatia. As an authorized health institution and the Regional Transfusion Center, it supplies blood products to seven health institutions in the region. Blood from voluntary donors is collected in four counties. Annually, the Blood Bank collects more than 30,000 donations, of which more than 62,000 blood products are produced and about 234,000 tests are performed. Clinical Institute of Transfusion Medicine is a teaching base of the Osijek Faculty of Medicine.

**TABLE 1.** Distribution of participants according to research phases and basic characteristics

		1 <sup>st</sup> phase N=326	2 <sup>nd</sup> phase N=310	3 <sup>rd</sup> phase N=292	Total
Age [mean (SD)]		35.5 (10)	35.0 (10)	33.9 (10.4)	
Sex [n (%)]	Male	270 (82.8)	235 (75.8)	223 (76.4)	728 (78.4)
	Female	56 (17.2)	75 (24.2)	69 (23.7)	200 (21.6)
Level of education [n (%)]	Elementary school	2 (0.6)	4 (1.3)	6 (2.1)	12 (1.3)
	High school	183 (56.1)	175 (56.5)	170 (58.2)	528 (56.9)
	College	38 (11.7)	41 (13.2)	37 (12.7)	116 (12.5)
	University	103 (31.6)	90 (29.0)	79 (27.0)	272 (29.3)
Place of living [n (%)]	Rural	93 (28.5)	92 (29.7)	77 (26.4)	262 (28.2)
	Urban	233 (71.5)	218 (70.3)	215 (73.6)	666 (71.8)

SD = standard deviation

## Participants

Voluntary blood donors participated in all three phases of data collection, donating their blood at the Clinical Institute of Transfusion Medicine, Osijek University Hospital Center, in the period from December 2019 to September 2020. All participants in the study signed an informed consent form.

A total of 928 respondents participated, of which 326 in the first, 310 in the second, and 292 respondents in the third phase of data collection. With regard to gender, female donors were represented by 17.2% to 24.2%, which is less than the new global data from 2020<sup>5</sup>, which show women to represent 33% (14 of 111 countries state that the frequency of women as donors is less than 10%). The representation of women in this study is close to the WHO data from 2011, which states that in Croatia, female donors are represented with 17.2%<sup>22</sup> (Table 1).

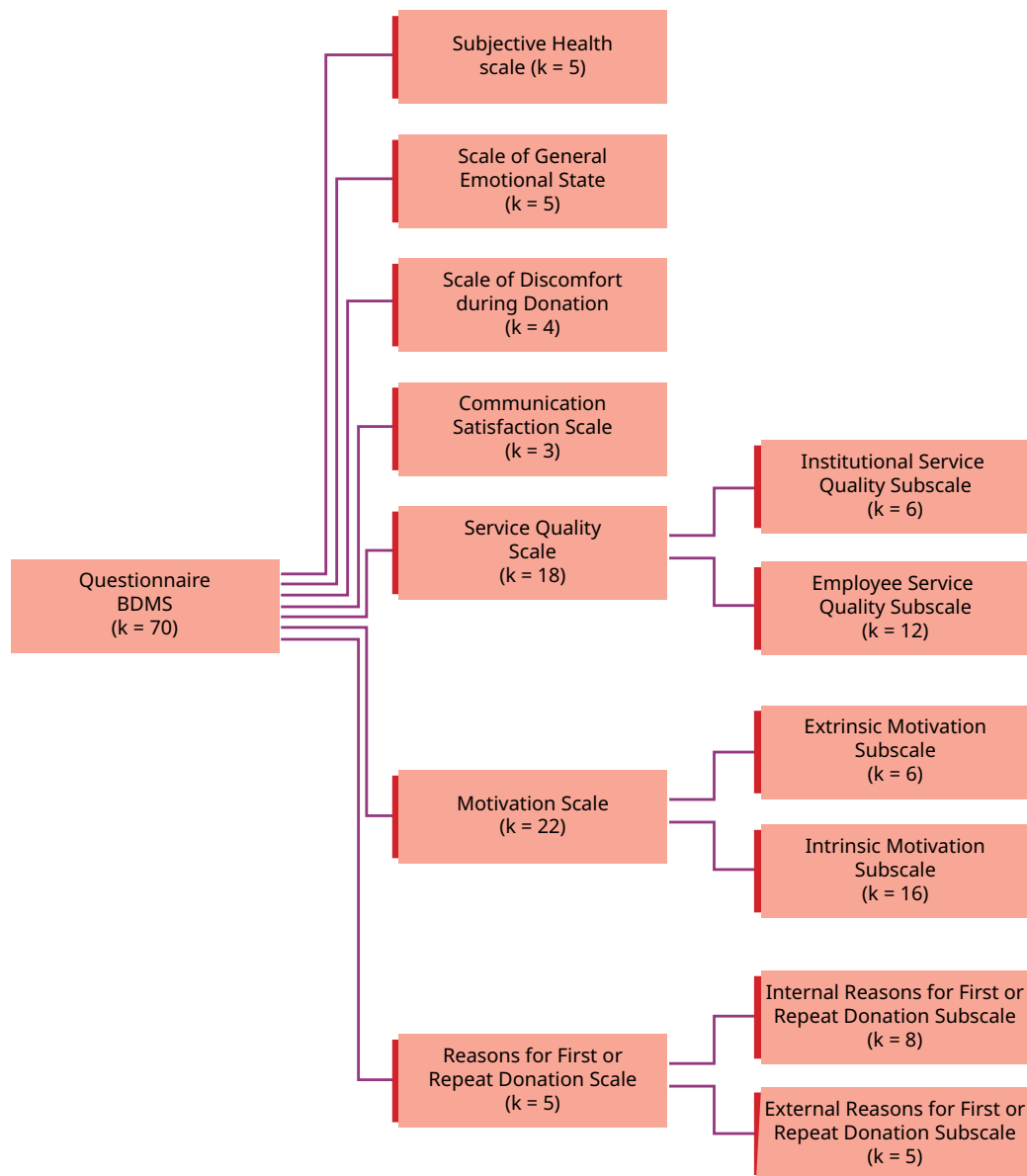
## Research instrument

The initial version of the Blood Donor Motivation and Satisfaction (BDMS) Questionnaire compiled by the authors based on a literature review consisted of 63 items, divided into seven parts. The first part of the Questionnaire consisted of four scales. The first five items examined the donor's health condition in the past month, and the second five items examined the donor's current emotional state (two items were negative). The third scale of the Questionnaire consisted of four items, with which we examined discomfort during blood donation, while the fourth scale consisted of three items, with which donors rated satisfaction with communication when arriving for blood donation. In the final version of the Questionnaire, which consists of 70 items, the first part of the Questionnaire, four scales, remained unchanged. Participants should circle

the answer on the Likert scale (1 to 5), where the answers offered (depending on the scale) have different meanings (I do not agree at all – strongly agree; extremely dissatisfied – extremely satisfied; constantly – never).

The second part of the Questionnaire, in the initial version, consists of 20 items that examine satisfaction with service, divided into two subscales: one examines how much the institution itself instills security and satisfaction with service, and the other how important employees are in donating blood. The answers are given on the Likert scale (1 – I do not agree at all; 5 – I completely agree). In the final version of the Questionnaire, the second part, satisfaction with the service, consists of 18 items, of which six belong to satisfaction with the service of the institution, and 12 items to satisfaction with the service of employees.

The third part of the Questionnaire examines motivation of donors to donate (and re-donate) blood, and consists of an initial version of 23 items and final version of 22 items, divided into two subscales: external (extrinsic) motivation consisting of six items and internal motivation determined with 16 items. The answers are given on a Likert-type scale (1 – does not apply to me entirely; 5 – applies to me entirely). In the initial version of the Questionnaire, the fourth part consists of two items, which are used to examine the reasons for the first blood donation and reasons why they will continue to donate blood. The answers are multiple choice, and one answer is open. Based on the frequency of individual answers in the initial version, in the second and final version of the Questionnaire, the fourth part consists of 13 items divided into two subscales: internal reasons for the first or repeat donation, which consists of five items, and external reasons for donating blood for the first time or donate it again, which consists of eight items. The answers in the second and final version of the Questionnaire are given on a Likert-type scale



**FIG. 1.** Scales and subscales of the Blood Donor Motivation and Satisfaction Questionnaire. BDMS = Blood Donor Motivation and Satisfaction

(1 – does not apply to me entirely; 5 – applies to me entirely) (Fig. 1).

The result of all scales/subscales is based on arithmetic mean (with the corresponding standard deviation, SD) of certain items, where theoretical values can be from 1 to 5. A higher result

indicates better health, better control of emotions, better assessment of communication, greater discomfort when donating blood, better service and greater motivation, and greater importance of internal and external reasons for first/repeat blood donation.

## Research method

Validation of the Questionnaire was carried out in three phases. In all three steps of the research, participants filled out a Questionnaire upon arrival for voluntary blood donation. In the second phase of the research, an improved version of the Questionnaire was used, and in the third phase the Questionnaire was applied and checked on the third group of participants. We received approval from Ethics Committee of the Osijek University Hospital Center.

## Statistical analysis

Data were described using descriptive statistical methods. To check the factor structure, an exploratory factor analysis of each scale was performed separately, by the method of principal components with oblique rotation. The normality of the distribution of numerical variables was tested by the Shapiro-Wilk test. Differences among continuous variables of three or more groups were tested by ANOVA. The Pearson's  $r$  test was used to determine the association between variables. The level of significance was set at alpha 0.05. Statistical analysis was performed using the SPSS version 23.0 software.

## Results

### Constructive validity

In order to check the factor structure of the first four scales of the Questionnaire, an exploratory factor analysis of each scale was performed separately, by the method of main components with oblique rotation. According to the Guttman-Keiser

criterion and Scree test, the one-factor structure of the Subjective Health scale ( $k=5$ ) (explains 51.7% of variance), Scale of General Emotional State ( $k=5$ ) (explains 49.5% of variance), Communication Satisfaction Scale ( $k=3$ ) (explains 86.1% of variance) and Scale of Discomfort during Donation ( $k=4$ ) (explains 54.9% of variance) was confirmed. According to the criteria of the Scree test of the second part (Service Quality scale), four factors could be distinguished, but two factors explained a smaller part of the total variance (less than 6%). Due to the content of items that we could not meaningfully divide into four factors, only two factors were retained, and one particle was ejected, which if removed increased the internal reliability of the scale. By repeat analysis of the main components with oblimin rotation, according to the Guttman-Keiser criterion, two factors were isolated, with eigenvalues greater than 1, which explained a total of 51.7% of variance. We called the first factor the Satisfaction with the institution ( $k=7$ ) and it explained 8.2% of variance, and the second factor was the Employee Satisfaction Subscription ( $k=12$ ) which explained 43.5% of variance. According to the criteria of the third part of the Scree test (Motivation scale), five factors could be singled out, but three factors explained a smaller part of total variance (less than 6%). Only two factors were retained, and one particle, which had low factor saturation, was ejected. By repeat analysis of the main components with oblimin rotation, according to the Guttman-Keiser criterion, two factors were isolated, with eigenvalues greater than 2, which explained a total of 40.9% of variance. We called the first factor the Intrinsic Motivation Subscale ( $k=15$ ) and it explained 31.7% of variance, and the second factor was the Extrinsic Motivation Subscale ( $k=7$ ) and it explained 9.3% of variance. In the second phase of the research, when the items of the fourth part were included (reasons why they donated blood for the first time and why they will continue to donate blood),

**TABLE 2.** Factor loadings of the BDMS Questionnaire for all scales in the third sample of respondents

		Item	Communi- nality	Factor loading		Eigen- value	% of Variance
				Factor 1	Factor 2		
Subjective Health scale SH (k=5)		SH1	0.40			2.63	52.60
		SH2	0.56				
		SH3	0.52				
		SH4	0.59				
		SH5	0.57				
Scale of General Emotional State SGE (k=5)		SGE1	0.58			2.82	56.04
		SGE2	0.66				
		SGE3	0.38				
		SGE4	0.62				
		SGE5	0.57				
Scale of Discomfort during Donation SDD (k= 4)		SDD1	0.67			2.53	63.15
		SDD2	0.61				
		SDD3	0.65				
		SDD4	0.60				
Communication Satisfaction Scale CSS (k = 3)		CSS1	0.84			2.54	84.69
		CSS2	0.88				
		CSS3	0.82				
Service Quality Scale SQS (k = 18)	Institutional Service Quality Subscale ISQ (k = 6)	ISQ1	0.57	0.84		1.41	7.83
		ISQ2	0.63	0.72			
		ISQ3	0.50	0.35			
		ISQ4	0.54	0.54			
		ISQ5	0.46	0.58			
		ISQ6	0.74	0.54			
Service Quality Scale SQS (k = 18)	Employee Service Quality Subscale ESQ (k = 12)	ESQ1	0.54		0.76	10.30	59.07
		ESQ2	0.74		0.80		
		ESQ3	0.71		0.85		
		ESQ4	0.70		0.80		
		ESQ5	0.76		0.93		
		ESQ6	0.70		0.81		
		ESQ7	0.78		0.92		
		ESQ8	0.79		0.86		
		ESQ9	0.77		0.90		
		ESQ10	0.58		0.62		
		ESQ11	0.78		0.76		
		ESQ12	0.76		0.91		
						Total	66.90

TABLE 2 [Continued]

		Item	Communi- nality	Factor loadings		Eigen- value	% of Variance
				Factor 1	Factor 2		
Motivation scale MS	Extrinsic Motivation Subscale EM (k = 6)	EM1	0.28	0.49		2.39	10.9
		EM2	0.34	0.46			
		EM3	0.37	0.60			
		EM4	0.37	0.61			
		EM5	0.67	0.78			
		EM6	0.58	0.77			
	Intrinsic Motivation Subscale IM (k = 16)	IM1	0.32		0.58	6.68	30.4
		IM2	0.37		0.62		
		IM3	0.34		0.60		
		IM4	0.57		0.77		
		IM5	0.60		0.73		
		IM6	0.53		0.65		
		IM7	0.45		0.64		
		IM8	0.21		0.37		
Motivation scale MS	Intrinsic Motivation Subscale IM (k = 16)	IM9	0.43		0.62	6.68	30.4
		IM10	0.21		0.70		
		IM11	0.35		0.61		
		IM12	0.31		0.55		
		IM13	0.27		0.52		
		IM14	0.42		0.51		
		IM15	0.54		0.35		
		IM16	0.59		0.56		
Total						41.30	

TABLE 2 [Continued]

		Item	Communi- nality	Factor loadings		Eigen- value	% of Variance
				Factor 1	Factor 2		
Reasons for First or Repeat Do- nation Scale RFRDS (k = 13)	Internal Reasons for First or Repeat Donation Subscale IFRD (k = 5)	IFRD1	0.55	0.74		4.33	33.27
		IFRD 2	0.75	0.86			
		IFRD 3	0.39	0.62			
		IFRD 4	0.73	0.86			
		IFRD 5	0.30	0.52			
	External Reasons for First or Repeat Donation Subscale EFRD (k = 8)	EFRD1	0.27		0.52	2.74	21.1
		EFRD 2	0.54		0.74		
		EFRD 3	0.62		0.78		
		EFRD 4	0.53		0.73		
		EFRD 5	0.65		0.81		
		EFRD 6	0.55		0.45		
		EFRD 7	0.63		0.78		
		EFRD8	0.56		0.72		
Total							54.37

BDMS = Blood Donor Motivation and Satisfaction; SH = Subjective Health Scale; SGE = Scale of General Emotional state; SDD = Scale of Discomfort during Donation; CSS = Communication Satisfaction Scale; SQS = Service quality scale; SQI = Institutional Service Quality Subscale; ESQ = Employee Service Quality Subscale; MS = Motivation scale; EM = Extrinsic Motivation Subscale; IM = Intrinsic Motivation Subscale; RFRDS = Reasons for First or Repeat Donation Scale; IFRD = Internal Reasons for First or Repeat Donation Subscale; EFRD - External Reasons for First or Repeat Donation Subscale

four factors could be distinguished according to the Scree test criteria; however, due to the content of particles that we could not meaningfully divide into four factors, only two factors were retained. Two items with low factor saturation (<0.3) were ejected. By repeat analysis of the main components with oblimin rotation, according to the Guttman-Keiser criterion, two factors were isolated, with eigenvalues greater than 2, which explained a total of 53.4% of variance. We called the first factor the External Reasons for First or

Repeat Donation Subscale ( $k=5$ ) and it explained 32.6% of variance, and the second factor was the Internal Reasons for First or Repeat Donation Subscale ( $k=8$ ) and it explained 20.8% of variance.

The results of the second and third samples, when the improved version of the Questionnaire was applied, did not differ in the number of factors after analysis of the main components with oblique rotation. The factor saturations of the Questionnaire items in the third sample are shown in Tables 2 and 3.

**TABLE 3.** Reliability coefficients (Cronbach alpha) for the BDMS Questionnaire on all three research samples

	Number of items	Reliability coefficient Cronbach alpha		
		1 <sup>st</sup> phase	2 <sup>nd</sup> phase	3 <sup>rd</sup> phase
<b>Subjective Health scale SH</b>	5	0.762	0.800	0.772
<b>Scale of General Emotional State SGE</b>	5	0.738	0.766	0.798
<b>Scale of Discomfort during Donation SDD</b>	4	0.721	0.733	0.803
<b>Communication Satisfaction Scale CSS</b>	3	0.916	0.962	0.910
<b>Service Quality Scale SQS</b>	18	0.883	0.917	0.946
Institutional Service Quality Subscale ISQ	6	0.715	0.911	0.807
Employee Service Quality Subscale ESQ	12	0.907	0.917	0.960
<b>Motivation scale MS</b>	22	0.875	0.878	0.855
Extrinsic Motivation Subscale EM	6	0.741	0.767	0.729
Intrinsic Motivation Subscale IM	16	0.887	0.888	0.871
<b>Reasons for First or Repeat Donation Scale RFRDS</b>	13	-	0.731	0.824
Internal Reasons for First or Repeat Donation Subscale IFRD	8	-	0.741	0.744
External Reasons for First or Repeat Donation Subscale EFRD	5	-	0.878	0.874

BDMS = Blood Donor Motivation and Satisfaction; SH = Subjective Health Scale; SGE = Scale of General Emotional state; SDD = Scale of Discomfort during Donation; CSS = Communication Satisfaction Scale; SQS = Service quality scale; SQI = Institutional Service Quality Subscale; ESQ – Employee Service Quality Subscale; MS = Motivation scale; EM = Extrinsic Motivation Subscale; IM = Intrinsic Motivation Subscale; RFRDS = Reasons for First or Repeat Donation Scale; IFRD = Internal Reasons for First or Repeat Donation Subscale; EFRD – External Reasons for First or Repeat Donation Subscale

## Reliability

In all three study phases, satisfactory internal reliability of all scales and subscales was obtained (from minimum  $\alpha=0.721$  to maximum  $\alpha=0.962$ ) (Table 3).

## Sensitivity

Measures of mean and scatter (arithmetic mean and standard deviation), internal reliability coefficient Cronbach alpha ( $\alpha$ ) and results of Shapiro-Wilk test of the normality of distribution of individual scales are described for the third sample of participants on which final validation was performed. Only the Internal Reasons

for First or Repeat Donation Subscale did not have full range of responses on the third sample (it had a range of 1-5 on the second sample). All other scales and subscales in all three samples had a full range of responses. By testing the

normality of distribution with the Shapiro Wilk test, we noticed that distributions deviated from the normal. Positively asymmetric were the Scale of General Emotional State, Scale of Discomfort during Donation, Extrinsic Motivation Subscale,

**TABLE 4.** Measures of mean, coefficient of internal reliability and Shapiro-Wilk test values of all scales and subscales on the third sample of participants (n=292)

	Number of items	Mean	Standard deviation	Range	Cronbach alpha	W* (p value)	Kurtosis	Skewness
<b>Subjective Health scale SH</b>	5	3.80	0.7	1-5	0.772	0.98 (<0.001)	0.24	-0.38
<b>Scale of General Emotional State SGE</b>	5	2.20	0.6	1-5	0.798	0.97 (<0.001)	0.35	0.53
<b>Scale of Discomfort during Donation SDD</b>	4	1.38	0.6	1-5	0.803	0.65 (<0.001)	11.1	2.91
<b>Communication Satisfaction Scale CSS</b>	3	4.68	0.6	1-5	0.910	0.58 (<0.001)	15.9	-3.24
<b>Service Quality Scale SQS</b>								
Institutional Service Quality Subscale ISQ	6	4.71	0.4	1-5	0.807	0.73 (<0.001)	4.14	-1.93
Employee Service Quality Subscale ESQ	12	4.87	0.3	1-5	0.960	0.42 (<0.001)	56.9	-6.06
<b>Motivation scale MS</b>								
Extrinsic Motivation Subscale EM	6	3.18	0.9	1-5	0.729	0.98 (<0.001)	-0.67	0.08
Intrinsic Motivation Subscale IM	16	4.47	0.5	1-5	0.871	0.87 (<0.001)	1.04	-1.21
<b>Reasons for First or Repeat Donation Scale RFRDS</b>								
Internal Reasons for First or Repeat Donation Subscale IFRD	5	4.65	0.5	2-5	0.744	0.72 (<0.001)	4.18	-1.88
External Reasons for First or Repeat Donation Subscale EFRD	8	2.66	1.1	1-5	0.874	0.96 (<0.001)	-0.64	0.35

\*Shapiro-Wilk test; BDMS = Blood Donor Motivation and Satisfaction; SH = Subjective Health Scale; SGE = Scale of General Emotional state; SDD = Scale of Discomfort during Donation; CSS = Communication Satisfaction Scale; SQS = Service quality scale; SQI = Institutional Service Quality Subscale; ESQ – Employee Service Quality Subscale; MS = Motivation scale; EM = Extrinsic Motivation Subscale; IM = Intrinsic Motivation Subscale; RFRDS = Reasons for First or Repeat Donation Scale; IFRD = Internal Reasons for First or Repeat Donation Subscale; EFRD = External Reasons for First or Repeat Donation Subscale

and External Reasons for First or Repeat Donation Subscale, while other scales and subscales were negatively asymmetric (Table 4).

Differences in the results of individual scales and subscales of the Questionnaire according to participant gender, level of education, and income (excluding income – students, unemployed; permanent income – retirees and employees) were checked by analysis of variance. According to gender, extrinsic motivation was more pronounced in women, and so were internal

and external reasons for the first/repeat blood donation compared to men ( $p=0.04$ ) (Table 5).

Regarding the level of education, there were no significant differences in the results of the Questionnaire (Table 6). In relation to income, participants with permanent income had a more pronounced extrinsic motivation ( $p=0.006$ ) of the first/repeat donation compared to participants without permanent income (Table 7).

Donors donating blood for the first time rated the level of communication and quality of service

**TABLE 5.** Results of individual scales and subscales of the BDMS Questionnaire according to participant gender

	Mean (SD*)		F <sub>(1,290)</sub>	p <sup>†</sup>
	Male	Female		
<b>Subjective Health scale SH</b>	3.84 (0.7)	3.67 (0.7)	3.45	0.06
<b>Scale of General Emotional State SGE</b>	2.17 (0.6)	2.29 (0.6)	2.21	0.14
<b>Scale of Discomfort during Donation SDD</b>	1.36 (0.6)	1.46 (0.7)	1.27	0.26
<b>Communication Satisfaction Scale CSS</b>	4.67 (0.6)	4.74 (0.4)	0.83	0.36
<b>Service Quality Scale SQS</b>	4.69 (0.4)	4.8 (0.3)		
Institutional Service Quality Subscale ISQ	4.85 (0.4)	4.92 (0.2)	3.72	0.06
Employee Service Quality Subscale ESQ	3.24 (1.0)	2.97 (1.0)	1.88	0.17
<b>Motivation scale MS</b>	4.46 (0.5)	4.5 (0.5)		
Extrinsic Motivation Subscale EM	4.61 (0.5)	4.77 (0.4)	4.16	<b>0.04</b>
Intrinsic Motivation Subscale IM	2.78 (1.1)	2.28 (1.0)	0.21	0.65
<b>Reasons for First or Repeat Donation Scale RFRDS</b>				
Internal Reasons for First or Repeat Donation Subscale IFRD	2.17 (0.6)	2.29 (0.6)	5.51	<b>0.02</b>
External Reasons for First or Repeat Donation Subscale EFRD	1.36 (0.6)	1.46 (0.7)	10.72	<b>0.001</b>

BDMS = Blood Donor Motivation and Satisfaction; SD = standard deviation; <sup>†</sup>ANOVA; Bold values denote statistical significance; SH = Subjective Health Scale; SGE = Scale of General Emotional state; SDD = Scale of Discomfort during Donation; CSS = Communication Satisfaction Scale; SQS = Service quality scale; SQI = Institutional Service Quality Subscale; ESQ – Employee Service Quality Subscale; MS = Motivation scale; EM = Extrinsic Motivation Subscale; IM = Intrinsic Motivation Subscale; RFRDS = Reasons for First or Repeat Donation Scale; IFRD = Internal Reasons for First or Repeat Donation Subscale; EFRD = External Reasons for First or Repeat Donation Subscale

**TABLE 6.** Results of individual scales and subscales of the BDMS Questionnaire according to the level of education

	Mean (SD*)				F <sub>(3,290)</sub>	p <sup>†</sup>
	Elementary school	High school	College	University		
<b>Subjective Health scale SH</b>	3.43 (0.9)	3.86 (0.7)	3.57 (0.6)	3.82 (0.7)	2.52	0.06
<b>Scale of General Emotional State SGE</b>	1.87 (0.7)	2.15 (0.6)	2.34 (0.6)	2.25 (0.6)	1.74	0.16
<b>Scale of Discomfort during Donation SDD</b>	1.13 (0.1)	1.34 (0.6)	1.51 (0.7)	1.44 (0.6)	1.38	0.25
<b>Communication Satisfaction Scale CSS</b>	4.67 (0.5)	4.64 (0.6)	4.61 (0.7)	4.81 (0.4)	1.79	0.15
<b>Service Quality Scale SQS</b>						
Institutional Service Quality Subscale ISQ	4.66 (0.4)	4.75 (0.4)	4.67 (0.5)	4.67 (0.4)	0.84	0.47
Employee Service Quality Subscale ESQ	4.78 (0.5)	4.88 (0.3)	4.79 (0.7)	4.88 (0.3)	0.87	0.46
<b>Motivation scale MS</b>						
Extrinsic Motivation Subscale EM	3.61 (1.0)	3.2 (1.0)	3.38 (1.1)	2.99 (1.0)	1.86	0.14
Intrinsic Motivation Subscale IM	4.57 (0.3)	4.51 (0.5)	4.48 (0.6)	4.37 (0.6)	1.35	0.26
<b>Reasons for First or Repeat Donation Scale RFRDS</b>						
Internal Reasons for First or Repeat Donation Subscale IFRD	4.63 (0.4)	4.71 (0.5)	4.49 (0.8)	4.58 (0.5)	2.44	0.06
External Reasons for First or Repeat Donation Subscale EFRD	2.28 (1)	2.71 (1.2)	2.84 (1.2)	2.49 (1)	1.18	0.32

**TABLE 7.** Results of each scale and subscale of the BDMS Questionnaire according to permanent income of the participants

	Mean (SD*)		F <sub>(1,291)</sub>	p <sup>†</sup>
	No income (students, unemployed) (n=59)	Permanent income (retirement, employees) (n=232)		
<b>Subjective Health scale SH</b>	3.72 (0.8)	3.82 (0.7)	1.20	0.27
<b>Scale of General Emotional State SGE</b>	2.26 (0.7)	2.18 (0.6)	0.76	0.39
<b>Scale of Discomfort during Donation SDD</b>	1.35 (0.5)	1.39 (0.6)	0.18	0.68
<b>Communication Satisfaction Scale CSS</b>	4.7 (0.5)	4.68 (0.6)	0.06	0.80
<b>Service Quality Scale SQS</b>				
Institutional Service Quality Subscale ISQ	4.65 (0.4)	4.73 (0.4)	1.88	0.17
Employee Service Quality Subscale ESQ	4.83 (0.3)	4.88 (0.3)	0.98	0.32

TABLE 7. [Continued]

	Mean (SD*)		F <sub>(1,291)</sub>	p <sup>†</sup>
	No income (students, unemployed) (n=59)	Permanent income (retirement, employees) (n=232)		
<b>Motivation scale MS</b>				
Extrinsic Motivation Subscale EM	3.16 (1)	3.18 (1)	0.03	0.87
Intrinsic Motivation Subscale IM	4.39 (0.6)	4.49 (0.5)	1.80	0.18
<b>Reasons for First or Repeat Donation Scale RFRDS</b>				
Internal Reasons for First or Repeat Donation Subscale IFRD	4.57 (0.7)	4.67 (0.5)	1.66	0.20
External Reasons for First or Repeat Donation Subscale EFRD	2.30 (0.9)	2.75 (1.1)	7.63	<b>0.006</b>

TABLE 8. Results of each scale and subscale of the BDMS Questionnaire in relation to whether it was the first or repeat donation

	Mean (SD*)		F <sub>(1,291)</sub>	p <sup>†</sup>
	First donation (n=24)	Repeat donation (n=267)		
<b>Subjective Health scale SH</b>				
Subjective Health scale SH	3.73 (0.7)	3.81 (0.7)	0.33	0.57
<b>Scale of General Emotional State SGE</b>				
Scale of General Emotional State SGE	2.20 (0.8)	2.20 (0.6)	0.001	0.97
<b>Scale of Discomfort during Donation SDD</b>				
Scale of Discomfort during Donation SDD	1.63 (0.8)	1.36 (0.6)	4.07	0.05
<b>Communication Satisfaction Scale CSS</b>				
Communication Satisfaction Scale CSS	4.92 (0.2)	4.66 (0.6)	4.30	<b>0.04</b>
<b>Service Quality Scale SQS</b>				
Institutional Service Quality Subscale ISQ	4.88 (0.2)	4.70 (0.4)	4.45	<b>0.04</b>
Employee Service Quality Subscale ESQ	4.98 (0.1)	4.86 (0.4)	2.70	0.10
<b>Motivation scale MS</b>				
Extrinsic Motivation Subscale EM	3.36 (1.1)	3.16 (1)	0.84	0.36
Intrinsic Motivation Subscale IM	4.51 (0.6)	4.47 (0.5)	0.12	0.74
<b>Reasons for First or Repeat Donation Scale RFRDS</b>				
Internal Reasons for First or Repeat Donation Subscale IFRD	4.58 (0.7)	4.65 (0.5)	0.39	0.54
External Reasons for First or Repeat Donation Subscale EFRD	2.78 (1.2)	2.65 (1.1)	0.28	0.60

BDMS = Blood Donor Motivation and Satisfaction; SD = standard deviation; <sup>†</sup>ANOVA; Bold values denote statistical significance; SH = Subjective Health Scale; SGE = Scale of General Emotional state; SDD = Scale of Discomfort during Donation; CSS = Communication Satisfaction Scale; SQS = Service quality scale; SQI = Institutional Service Quality Subscale; ESQ – Employee Service Quality Subscale; MS = Motivation scale; EM = Extrinsic Motivation Subscale; IM = Intrinsic Motivation Subscale; RFRDS = Reasons for First or Repeat Donation Scale; IFRD = Internal Reasons for First or Repeat Donation Subscale; EFRD = External Reasons for First or Repeat Donation Subscale

**TABLE 9.** Correlation of individual scales and subscales (Pearson correlation coefficient)

		Pearson's correlation coefficient <i>r</i> (p value)								
		SH	SGE	SDD	CSS	ISQ	ESQ	EM	IM	IFRD
Subjective Health scale SH	Scale of General Emotional State SGE	<b>-0.520</b> ( <b>&lt;0.001</b> )	-							
	Scale of Discomfort during Donation SDD	<b>-0.158</b> ( <b>0.007</b> )	<b>0.236</b> ( <b>&lt;0.001</b> )	-						
	Communication Satisfaction Scale CSS	0.043 (0.47)	-0.064 (0.28)	0.017 (0.78)	-					
Service Quality Scale SQS	Institutional Service Quality Subscale ISQ	<b>0.134</b> ( <b>0.02</b> )	<b>-0.121</b> ( <b>0.04</b> )	-0.026 (0.66)	<b>0.384</b> ( <b>&lt;0.001</b> )	-				
	Employee Service Quality Subscale ESQ	0.027 (0.65)	-0.025 (0.68)	-0.014 (0.81)	<b>0.518</b> ( <b>&lt;0.001</b> )	<b>0.710</b> ( <b>&lt;0.001</b> )	-			
Motivation scale MS	Extrinsic Motivation Subscale EM	-0.046 (0.44)	-0.021 (0.72)	<b>0.121</b> ( <b>0.04</b> )	-0.012 (0.84)	0.069 (0.24)	0.017 (0.78)	-		
	Intrinsic Motivation Subscale IM	0.035 (0.56)	-0.064 (0.28)	0.008 (0.89)	0.104 (0.08)	<b>0.293</b> ( <b>&lt;0.001</b> )	<b>0.206</b> ( <b>&lt;0.001</b> )	<b>0.422</b> ( <b>&lt;0.001</b> )	-	
Reasons for First or Repeat Donation Scale RFRDS	Internal Reasons for First or Repeat Donation Subscale IFRD	<b>0.120</b> ( <b>0.04</b> )	-0.031 (0.60)	0.075 (0.20)	0.080 (0.18)	<b>0.245</b> ( <b>&lt;0.001</b> )	<b>0.189</b> ( <b>0.001</b> )	<b>0.217</b> ( <b>&lt;0.001</b> )	<b>0.695</b> ( <b>&lt;0.001</b> )	-
	External Reasons for First or Repeat Donation Subscale EFRD	-0.052 (0.38)	0.019 (0.75)	<b>0.160</b> ( <b>0.007</b> )	-0.042 (0.48)	0.037 (0.53)	-0.059 (0.32)	<b>0.575</b> ( <b>&lt;0.001</b> )	<b>0.139</b> ( <b>0.02</b> )	0.055 (0.35)

BDMS = Blood Donor Motivation and Satisfaction; Bold values denote statistical significance; SH = Subjective Health Scale; SGE = Scale of General Emotional state; SDD = Scale of Discomfort during Donation; CSS = Communication Satisfaction Scale; SQS = Service quality scale; SQI = Institutional Service Quality Subscale; ESQ – Employee Service Quality Subscale; MS = Motivation scale; EM = Extrinsic Motivation Subscale; IM = Intrinsic Motivation Subscale; RFRDS = Reasons for First or Repeat Donation Scale; IFRD = Internal Reasons for First or Repeat Donation Subscale; EFRD = External Reasons for First or Repeat Donation Subscale

of the institution ( $p=0.04$  both) significantly higher than the repeat donors (Table 8).

Pearson's correlation coefficient was used to assess the connection between individual scales and subscales of the Questionnaire. Significantly stronger was the significant and negative correlation between the Subjective Health scale (SH) and Scale of General Emotional State (SGE) ( $r=-0.520$ ), i.e., participants who rated their health better assessed less negative emotions. The Communication Satisfaction Scale (CSS) was in a positive significant relationship with the Employee

Service Quality Subscale (ESQ) ( $r=0.518$ ), i.e., persons who were subjectively more satisfied with communication were also more satisfied with the quality of service. The correlation between the Institutional Service Quality Subscale (ISQ) and Employee Service Quality Subscale (ESQ) ( $r=0.710$ ), as well as the Internal Reasons for First or Repeat Donation (IFRD) subscales and the intrinsic motivation (IM) subscales ( $r=0.695$ ) was also positive and significant. That is, people who were more satisfied with the quality of the institution service were also more satisfied with the

quality of employee service, and people with more pronounced intrinsic motivation had more pronounced internal reasons for the first/repeat donation (Table 9).

## Discussion

Satisfactory reliability coefficients of the type of internal consistency of different Questionnaire subscales support the results of factor analysis and justify the formation of different scales and subscales of the Questionnaire.

Questionnaire sensitivity was checked by the range of results obtained in total result for each scale and subscale of the Questionnaire, where the range of total results shows whether we can distinguish small differences in estimates of individual scales and subscales. Only one subscale in the Reasons for First or Repeat Donation Scale, i.e., Internal Reasons for First or Repeat Donation (IFRD) subscale did not have full response range for each particle on the third measured sample, while the second sample had full response range.

Distribution of results is also one of the indicators of the Questionnaire sensitivity, and by testing the normality of distribution (Shapiro-Wilk test), it was determined that the distributions did not follow the normal. Positively asymmetric (results tended to be grouped according to lower values) were the Scale of General Emotional State, Scale of Discomfort during Donation, Extrinsic Motivation Subscale, and Reasons for First or Repeat Donation Scale, while other scales and subscales were negatively asymmetric (results tended to grouping according to higher values), less expressed emotions, discomfort during blood donation, and less expressed extrinsic motivation. This result corresponds to previous studies in which extrinsic motivation was negatively correlated with intrinsic motivation, although some studies

showed that extrinsic motivation was sometimes expressed in blood donors<sup>23</sup>. As this was a population that is assumed to be healthy, the subjective assessment of health in all respondents was high, so the explained variance was lower. In scales with strong asymmetry (Communication Satisfaction Scale, Employee Service Quality Subscale, Scale of Discomfort during Donation), most of the variance was explained by less frequent extreme deviations than by frequent values with a lower deviation than the mean value.

Furthermore, we conducted an analysis of variance to test whether the results differed on different scales and subscales of the Questionnaire with respect to some general characteristics of participants, or whether we could distinguish different groups of survey participants and BDMS subscales based on the results. With regard to gender, extrinsic motivation was more pronounced in women, and so were internal and external reasons for the first/repeat blood donation compared to men, which can be explained by the still traditional division of roles between men and women because a large number of women in Croatia still contribute financially to total household income, so in some way they perceive some forms of extrinsic motivation (e.g., paid supplementary insurance after a certain number of blood donations) as savings in total household expenses. In previous research, there was no difference in the motivation to donate blood according to gender, or if there was, the extrinsic motivation in men was more pronounced than in women<sup>24</sup>. With regard to the level of education, there were no significant differences in scales and subscales, although the level of education is important, as evidenced in previous studies, where blood donors with a higher level of education were more likely to donate blood<sup>25</sup>. Significantly more pronounced external reasons for the first/repeat donation were evident in donors who had a steady income (pensioners, employees) compared to donors without income (pupils,

students, unemployed), which can be explained by the fact that 76% of respondents without income were students financed by parents, and therefore their external reasons for blood donation were not so pronounced. Some research has shown that employees donate blood more often in exchange for something, and the unemployed are less likely to donate blood than employees, although it is assumed that the unemployed have more time<sup>26-28</sup>.

Participants who donated blood for the first time in relation to the participants of repeat donation were significantly more satisfied with the Communication Satisfaction Scale and the subtypes of service quality because donors who donated blood for the first time were more burdened by the act of donation (fear, curiosity) rather than assessing communication with employees and quality of the institution service. These results are consistent with previous research where poor communication with staff was one of the main barriers to repeat blood donation, emphasizing that effective and friendly communication with staff could motivate donors and remove barriers to repeat donation<sup>29</sup>.

## Conclusion

Validation of the BDMS Questionnaire indicates its satisfactory metric characteristics. The application of the Questionnaire will provide better understanding of blood donors, and related to satisfaction with the institution service when donating blood, their satisfaction with communication, employees and the institution, as well as motivation for the first and/or repeat blood donation.

The study had some limitations. Due to cultural differences and different social norms in other countries, it is likely that some of the claims in the Questionnaire were not applicable, and the Questionnaire with changed claims no longer had the same measurement feature and therefore needs to be revalidated.

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## SAŽETAK

### Razvoj i validacija upitnika motivacije i zadovoljstva darivatelja krvi

Kristina Kralik, Tena Velki i Vesna Ilakovac

Cilj istraživanja bio je razviti instrument kojim bi se ispitalo zadovoljstvo uslugom ustanove prilikom darivanja krvi, uključujući zdravstveno i emocionalno stanje darivatelja, zadovoljstvo komunikacijom, zaposlenicima i ustanovom te motivacijom za prvo/ponovljeno darivanje krvi, kao i razloge koji su doveli do prvog/ponovljenog darivanja. Istraživanje je provedeno na dobrovoljnim darivateljima krvi (N=928) koji su svoju krv darivali na Kliničkom zavodu za transfuzijsku medicinu Kliničkog bolničkog centra Osijek u razdoblju od prosinca 2019. godine do rujna 2020. godine. Podatci su se prikupili u tri faze. Prva faza istraživanja je uključila 326 darivatelja krvi na kojima je provjerena konstruktna valjanost, pouzdanost i osjetljivost pojedinih ljestvica i podljestvica te su odabrane čestice sa zadovoljavajućim psihometrijskim karakteristikama. Druga faza je uključila 310 dobrovoljnih darivatelja krvi, a na njima su provjerene metrijske karakteristike poboljšanog instrumenta te je dobivena konačna inačica upitnika Motivacije i zadovoljstva darivatelja krvi (*Blood Donor Motivation and Satisfaction*, BDMS) ( $k=70$ ) koja se dijeli na sedam ljestvica (Subjektivno zdravlje; Opće emocionalno stanje; Nelagoda tijekom darivanja; Zadovoljstvo komunikacijom; Kvaliteta usluge; Motivacija; Razlog prvog/ponovljenog darivanja). U trećoj fazi istraživanja ( $n=292$ ) validiran je upitnik BDMS. Dobivena je dobra konstruktna valjanost, sve ljestvice i podljestvice imale su zadovoljavajuću pouzdanost i osjetljivost. Upitnik predstavlja valjan i pouzdan mjerni instrument zadovoljavajućih psihometrijskih karakteristika.

#### KLJUČNE RIJEČI

*Darivatelji krvi; Motivacija; Validacija; Zadovoljstvo uslugom*