## ORIGINAL PAPER

# Defining and measuring blood donor altruism: a theoretical approach from biology, economics and psychology

R. Evans & E. Ferguson

*Personality Social Psychology and Health (PSPH) Group, School of Psychology, University of Nottingham, Nottingham, UK*

Vox Sanguinis

**Background and Objectives** While blood donation is traditionally described as a behaviour motivated by pure altruism, the assessment of altruism in the blood donation literature has not been theoretically informed. Drawing on theories of altruism from psychology, economics and evolutionary biology, it is argued that a theoretically derived psychometric assessment of altruism is needed. Such a measure is developed in this study that can be used to help inform both our understanding of the altruistic motives of blood donors and recruitment intervention strategies.

**Materials and Methods** A cross-sectional survey ($N = 414$), with a 1-month behavioural follow-up (time 2, $N = 77$), was designed to assess theoretically derived constructs from psychological, economic and evolutionary biological theories of altruism. Theory of planned behaviour (TPB) variables and co-operation were also assessed at time 1 and a measure of behavioural co-operation at time 2.

**Results** Five theoretical dimensions (impure altruism, kinship, self-regarding motives, reluctant altruism and egalitarian warm glow) of altruism were identified through factor analyses. These five altruistic motives differentiated blood donors from non-donors (donors scored higher on impure altruism and reluctant altruism), showed incremental validity over TPB constructs to predict donor intention and predicted future co-operative behaviour.

**Conclusions** These findings show that altruism in the context of blood donation is multifaceted and complex and, does not reflect pure altruism. This has implication for recruitment campaigns that focus solely on pure altruism.

**Key words:** altruism, blood donors, motivation, reciprocity, recruitment.

## Introduction

Without volunteer blood donors, a large proportion of health service provision (e.g. elective surgery) would not be possible. However, only around 5% of the eligible population donates blood at any one time [1] with shortages often reported [2] making blood donor recruitment vital. Recruitment campaigns generally focus on altruism [3, 4] as (1) blood donation is considered an archetypal altruistic act [4] and (2) altruism is the most common self-reported motive for blood donation [5]. However, while altruism reflects a number of related theoretical processes (e.g. reciprocity, warm glow) identified in psychology [6], economics [7] and evolutionary biology [8, 9], in blood donor researcher, it is typically assessed as a single construct. Moreover, generic altruism-based slogans, such as 'Do something amazing: save a life. Give blood', do not reflect these processes, and therefore, the motivational focus of recruitment campaigns may not match donor motives [10, 11]. The main aim of this study, therefore, is to develop more substantive, theoretically informed *multidimensional* index of blood donors' altruistic motivations.

*Correspondence*: Eamonn Ferguson, Personality, Social Psychology and Health (PSPH) Group, School of Psychology, University of Nottingham, Nottingham NG7 2RD, UK
E-mail: eamonn.ferguson@nottingham.ac.uk

## Altruism and blood donation

Although theory indicates that altruistic acts are based on a number of motives, no multidimensional measure of motives underlying altruism exists for blood donation. Seven theory-driven motives for altruistic behaviour can be identified from psychological, economic and evolutionary biological literatures. First, pure altruism describes an individual's ultimate desire to help others at a personal cost, without reward [6]. Second, warm glow describes the personal benefit arising through positive emotional gains from the act of donation [7]. Combining warm glow and pure altruism results in *impure altruism,* whereby the individual donates both to attain warm glow and to benefit others [7]. Psychometric [12] and behavioural economic [13] evidence shows that warm glow motivations underlie blood donor helping preferences. Third, reluctant altruism describes when co-operation occurs due to a lack of trust that others will donate [12]. Fourth, social responsibility [14] reflects a sense of duty to donate blood, which may overcome tendencies to free riding that economic theory proposes occurs with respect to providing public goods like blood [7]. Fifth, hedonism is an egoistic motive, whereby helping is used to increase personal gains without concern for the recipient's welfare [6]. The desire to receive a gift for donating or get free health checks may represent hedonistic motives for blood donation [15]. Sixth, reputation building operates via indirect reciprocity, with people more likely to help those who have a good reputation for helping [8, 9]. Finally, kin selection suggests that individuals show preferential helping towards family members [9].

These seven motives may be differentially related to blood donation. Pure altruism is believed to be the archetypal motivation for blood donation [4]. However, Ferguson *et al.* [12, 16] have shown that warm glow is also a predictor for blood donation. Donations may not be sustained by reputation, as only a small proportion of blood donors seeking social recognition [5, 17]. However, this does not preclude that reputation is part of the multidimensional space for blood donor's altruistic motivations. Kinship, although reported by blood donors as a motive [14], is also unlikely to sustain donation because blood cannot be donated directly to relatives. With respect to hedonism, the typical small rewards (e.g. tea and biscuits) may be insufficient to outweigh the high costs of donation. Consistent with this, Ferguson *et al.* [16] found that such hedonistic motives were not correlated with intentions to donate blood. Finally, moral norms for social duty have been linked directly to the intention to donate blood [18]. However, while blood donors endorse multiple motives [19], motives such as reputation building have never been assessed, due to the lack of a suitable measurement tool. As such, hypotheses concerning reputation building and blood donation cannot be directly tested.

While proposed as seven distinct processes, these motives may not be distinct. For example, a sense of social and moral duty may be linked to a sense of warm glow as people may also derive warm glow from meeting societies needs as well as their own [12, 16]. Duty and reluctant altruism may seem similar, with donors acting in the face of others inaction, with both driven by a sense of moral worth in terms of what should be done. However, reluctant altruism is more likely also driven by a sense of frustration with others inaction, whereas duty is likely driven by a sense of pleasing others by doing the right thing. Thus, while correlated they should be distinct motivations. The multidimensional measure of altruism for blood donors will enable such hypotheses to be examined.

## Theory of planned behaviour, blood donation and altruism

The theory of planned behaviour (TPB) [20] has been the main psychological framework applied to study blood donation behaviour [1]. TPB suggests that behaviour is determined by intentions to act, with intentions predicted by subjective norms, attitudes, and perceived behavioural control (PBC) [20]. Intention is the key determinant of blood donation [1, 21]. Evidence suggests that incorporating a single altruistic motive within a TPB framework improves the prediction of blood donor intentions [18]. Therefore, this study aims to extend previous work by (i) examining the associations between multiple motivations underlying altruism and the components of the TPB and (ii) examine whether the various altruistic motives show incremental validity over TPB variables with respect to blood donation intentions.

## Summary

This study aims to develop a theory-driven index of motivations underlying altruism associated with blood donation and examines its validity by demonstrating its ability to (i) show meaningful correlations with TPB variables, especially intentions, (ii) show meaningful differences between blood donors and non-donors, (iii) predict future co-operative behaviour and (iv) show incremental validity over TPB variables with respect to predicting behavioural intentions to donate blood. Secondly, this study aims to explore the impact of recruitment slogans

(altruism vs. benevolence vs. control) on intentions, altruistic motives and co-operative behaviour.[1]

## Materials and methods

### Participants and design

The cross-sectional survey design also incorporated a longitudinal component with participants completing measures of altruism and TPB (including intentions) at time 1 (T1) and a measure of intention at time 2 (T2), 1 month later. At T1, 414 participants provided data (91% response rate: 36 participants either did not return the questionnaire or did not complete the consent form or left a whole section blank). All participants were university students selected through convenience sampling and aged between 17 and 39 years [$M = 20·06$, SD = 2·38, 254 (62% women) and one with sex unspecified]. Two hundred and sixty-six participants provided emails at T1 to be contacted at T2, and at T2, 77 participants responded to the email request [age range = 18–27, $M = 19·93$, SD = 1·84, 55 (71% women)]. Those who replied at T2 were not significantly different in terms of age, sex or donor status from those who did not reply (all $P$s > 0·05).

Participants self-reported their ethnicity (9·5% not providing a description) to the question 'What is your ethnicity?' This resulted in 41 different descriptions (coded verbatim). The majority (43·7%) described themselves as White people British, followed by 19·4% describing themselves as White. We recoded the data as White (=1) if participants explicitly described themselves as White and others (=0) if not. However, this meant that participants describing themselves as just Australian ($N = 1$) or British ($N = 65$) for example were classed as 'other' but could potentially be White. Given the self-report nature of these data and these types of coding concerns, they offer a primarily descriptive account of the sample.[2]

### Measures (Time 1)

Blood donor status: Past blood donation behaviour was assessed by asking participants 'Have you ever successfully donated blood?' (Yes/No) [1, 17], which is a commonly used and reliable measure of blood donor status [3, 23].

Motives for blood donation: To assess the seven altruistic motives, participants indicated on a seven-point Likert-type scale (*1 = strongly disagree* to *7 = strongly agree)* how much they agreed with 24 statements that began with the stem '*I would donate blood because...*'

*Pure altruism:* Pure altruism was measured by three items (e.g. 'by donating blood I could save someone's life') [16].

*Warm glow:* Four items provided a measure of warm glow (e.g. 'I would feel good about myself after donating') [12].

*Reluctant altruism:* Reluctant altruism was measured by three items (e.g. 'I cannot trust others to donate blood') [12].

*Social responsibility:* The strength of social responsibility was measured by four items (e.g. 'if I gave blood I would be fulfilling my duty to society') [16].

*Hedonism:* Hedonism was measured by four items (e.g. 'I can take time off work or lectures') [18].

*Reputation*: Three items were used to measure reputation building (e.g. 'I would want to let members of the opposite sex know I am a good, kind person') [24].

*Kinship*: Three items measured kinship (e.g. 'if I gave blood there is more of a chance of close relatives receiving it if they need it') [16].

*TPB constructs*: The TPB constructs were scored such that high scores equated to higher intention, positive attitudes, subjective norm and PBC (all items were scored on seven-point Likert-type scales).

*Intentions:* Four items measured intention (e.g. 'I plan to donate blood at the next possible opportunity').

*Attitudes:* Attitudes were measured by four bipolar adjectives with the stem '*My donating blood at the next possible opportunity would be...*' (e.g. '*bad–good*') [18].

*Subjective norm:* Subjective norm composed of two items (e.g. 'It is expected of me that I donate blood at the next possible opportunity').

*PBC*: PBC was measured by two items (e.g. 'My donating blood at the next possible opportunity is up to me').

---

[1]A secondary aim of this study was to explore experimentally, if manipulating an altruistic recruitment slogan influenced intentions to donate blood. As such, participants were randomly allocated to one of three conditions (control, altruism slogan and benevolence slogan: 150 per cell). The altruism slogan [22] stated 'Do something amazing: save a life. Give blood' and the warm-glow slogan [12, 13] 'So save a life: give blood. It will make you feel good' [14, 19], and the control condition no slogan. Chi-square tests revealed that the participants in the control, altruism and benevolence condition did not significantly differ in terms of sex (woman = 58%, 66% and 61·7%) or blood donor status (blood donor = 26·6%, 24·4% and 26·2%), all $P$s > 0·05. Manipulation checks revealed that participants in the standard (altruism) condition reported that the slogan focused more on saving a life ($M = 6·05$, SE = 0·09) than those in the benevolence condition [$M = 5·25$, SE = 0·12, $t(254·23) = 5·29$, $P < 0·001$]. As there were no significant effects of recruitment slogans on either TPB variables or altruism motives, these results are not reported here and the sample collapsed across conditions.

[2]When we entered the White vs other categories into the analyses reported, it did not significantly alter the results.

*Co-operative Behaviour*: A validated behavioural index of co-operation was assessed [25] in terms of a positive response to the request to leave an email to be contacted for the follow-up (email co-operation) (coded 1 if they left and email and 0 if they did not).

### Follow-up at 1 month (Time 2)

*Intentions*: Participants who provided their email were contacted 1 month later and asked 'To what extent do you intend to give blood in the future?' measured on a seven-point Likert scale from 1 = *not likely* to 7 = *highly likely*.

*Co-operative Behaviour*: A positive behavioural response (reply) to the email request 1 month later (behavioural co-operation) indexed behavioural co-operation [25]. This was coded 1 if they replied to the email and 0 if they did not. Thus, all those who provided an email but did not reply were coded as zero.

### Procedure

Participants were approached to take part individually or in groups, by a single experimenter (blind to condition and donor status) at lecture halls, cafes and social spaces. The study gained approval from the university ethics board.

### Statistical analysis

Imputation procedures were used to deal with any missing data [26, 27]. If less than 10% of the data are missing and no more than 10% of data are missing for a single variable, then single imputation (SI) is sufficient [28]. A sensitivity analysis will be conducted comparing the analyses on the imputed data with the data set with missing data listwise-deleted. If the results are the same and conform to the theoretical predictions, then confidence can be expressed in the results [29]. A number of the altruism scales have only three items as such the mean interitem correlations (MICs) are the appropriate index of reliability and should be >0·30 [30].

## Results

### Missing data

For the 24 altruistic motives, there was 0·2–0·7% missing data on any one variable. For TPB variables, the figures were 0·5–5·1%. These data were not missing completely at random [Little's $\chi^2(1181, N = 410) = 1322\cdot01$, $P < 0\cdot05$]. However, the pattern of missingness was not significantly associated with the auxiliary variables of age and sex, indicating that these data were potentially missing at random [28].

With <10% missing data, a single imputation was conducted for the altruism motives first. To achieve this, fully conditional specification MI was used with 10 replications (age and sex as auxiliary variables) and one of the ten MI replications data sets chosen at random. This single data set was then used to MI the missing TPB variables (again 10 replications) and again one of the 10 data sets selected at random. While the results based on the imputed data are reported in this study, they are the same for the *listwise*-deleted data.

### Descriptive Statistics

Of the 414 participants, four incorrectly answered a knowledge question, pertaining to the slogan manipulation. These were excluded from data analysis.[3] In the final sample of 410, 75% had never donated blood ($N = 307$) and 25% reported having donated blood ($N = 103$).

At T1, 266 (65%) of participants left their email address, of these 219 were contacted 1 month later (not all were contactable due to illegible email addresses or emails that no longer were operational) for follow-up questions, with 77 (35%) replying to the email. Consistent with previous research, [16, 31] blood donors were more likely than non-blood donor to leave their email address, $\chi^2(1, N = 410) = 4\cdot79$, $P < 0\cdot05$. There were no significant differences between blood donors and non-blood donors in terms of sex, $\chi^2(1, N = 410) = 1\cdot86$, $P > 0\cdot05$ (56·3% vs. 63·8%) or age (20·47 vs. 19·93).

### Exploratory factor analysis

The suitability of the 24 altruistic motives for EFA (principal axis factoring with oblique rotation) was indicated by a Kaiser–Meyer–Olkin of 0·84 and a significant Bartlett's test of sphericity [$\chi^2(276) = 4606\cdot82$, $P < 0\cdot01$]. Parallel analysis, with 100 replications, indicated a five-factor solution (Table 1). The first factor reflected a blend of items measuring pure altruism, social responsibility and warm glow. This factor was termed 'impure altruism'. The second factor included all the items measuring reputation and hedonism; thus, it was termed 'self-regarding'. All three items measuring kinship and friendship loaded onto the third factor. The fourth factor included all three items measuring reluctant altruism.

---

[3]This is so the sample contained only those who were deemed to have engaged with the study, including these subjects did not alter the results.

Table 1. Factor pattern matrix

| | Impure altruism | Self–regarding | Kinship | Reluctant altruism | Egalitarian warm glow |
|---|---|---|---|---|---|
| Save someones life | **0·76** | −0·07 | −0·05 | −0·06 | −0·02 |
| Help others | **0·74** | −0·07 | −0·01 | −0·10 | 0·06 |
| Right thing to do | **0·62** | 0·04 | −0·02 | 0·18 | −0·10 |
| Feel proud by helping | **0·62** | 0·11 | −0·03 | −0·16 | *−0·32* |
| Responsible for helping others | **0·60** | 0·01 | −0·11 | 0·21 | −0·04 |
| World would be a better place if everyone who could gave blood | **0·50** | −0·01 | −0·13 | *0·35* | −0·07 |
| Feel good about myself | **0·38** | 0·30 | −0·06 | −0·21 | −0·20 |
| Show people that I am a good, kind person | 0·08 | **0·80** | −0·07 | −0·26 | −0·04 |
| Let my friends know that I am a good, kind person | 0·05 | **0·79** | −0·04 | −0·16 | −0·10 |
| Free tea and biscuits | 0·04 | **0·65** | 0·08 | 0·16 | 0·12 |
| Let members of the opposite sex know I am a good, kind person | −0·21 | **0·63** | 0·02 | 0·05 | −0·11 |
| Receive stickers, badges and pins | −0·05 | **0·60** | 0·01 | 0·15 | 0·03 |
| Time off work or lectures | *−0·33* | **0·46** | −0·04 | 0·10 | −0·10 |
| Free blood tests/blood typing | 0·08 | **0·44** | −0·04 | 0·14 | 0·03 |
| Chance of family receiving it | −0·06 | −0·03 | **−0·99** | −0·07 | 0·08 |
| Close relatives receive it | −0·04 | −0·01 | **−0·87** | −0·01 | −0·03 |
| Friends receiving it | 0·05 | 0·00 | **−0·77** | 0·07 | 0·02 |
| Someone has to | 0·11 | −0·05 | −0·11 | **0·63** | −0·20 |
| Other people cant, I would have to | 0·12 | 0·19 | −0·08 | **0·47** | −0·01 |
| Cannot trust others | −0·17 | 0·12 | −0·03 | **0·38** | −0·06 |
| Personally rewarding experience | 0·30 | 0·02 | 0·03 | −0·10 | **−0·65** |
| Make me feel physically good | −0·16 | 0·05 | −0·05 | 0·03 | **−0·63** |
| Duty to society | 0·04 | −0·01 | −0·02 | 0·22 | **−0·62** |
| Give back to the community | *0·32* | −0·12 | −0·12 | 0·02 | **−0·54** |
| α | 0·83 | 0·83 | 0·89 | 0·64 | 0·75 |
| MIC | 0·44 | 0·41 | 0·74 | 0·38 | 0·45 |

Coefficients greater than 0·30 (in bold) indicate that the item loads on the designated factor. Four minor cross-loading are indicated with italicized coefficients.

The fifth factor was a blend of the remaining items from the social responsibility and warm glow scales. This factor was termed 'egalitarian warm glow'. The coefficient alphas and MICs (Table 1) indicate that these were reliable factors.

## Donor history

Three logistic regression analyses (Table 2) examined the associations between donor history and TPB variables and the altruistic motives. The initial analyses explore the TPB variable on their own, the second explore the motives on their own, and the third examined their joint effect. Across these analyses, intentions and attitudes from TPB and impure and reluctant altruism from the motives are positively associated with being a blood donor.

## Associations with TPB variables at time 1

Table 3 shows that for non-donors intention to donate blood at time 1 was positively correlated with impure altruism, egalitarian warm glow and kinship. For blood donors, intentions were positively correlated with impure altruism and reluctant altruism. Intentions at T1 was also positively correlated with intentions at T2 ($r = 0.80$,

**Table 2** Logistic regression predicting blood donor status

|  | Donor status | Donor status | Donor status |
|---|---|---|---|
| Step 1 | $R^2 = 0.16$, Step $\chi^2 = 48.36$ ($P < 0.001$) |  | $R^2 = 0.16$, Step $\chi^2 = 48.38$ ($P < 0.001$) |
| Intentions | 0.06** |  | 0.06** |
| Attitudes | 0.10** |  | 0.10** |
| Subjective norm | 0.03 |  | 0.03 |
| PBC | 0.01 |  | 0.01 |
| Step 2 |  | $R^2 = 0.08$, Step $\chi^2 = 23.67$ ($P < 0.001$) | $R^2 = 0.20$, Step $\chi^2 = 9.93$ ($P = 0.07$) |
| Impure altruism |  | 0.10*** | 0.06* |
| Self-regarding |  | −0.01 | −0.002 |
| Kinship |  | −0.04 | −0.03 |
| Reluctant altruism |  | 0.08** | 0.07* |
| Egalitarian warm glow |  | −0.02 | −0.05 |

*$P < 0.05$, **$P = < 0.01$, ***$P = < 0.001$.

$N = 410$. Coefficients are unstandardized coefficients values.

Blood donor status (0 = non-donor; 1 = donor).

$P < 0.001$), indicating a high degree of stability in behavioural intentions.

### Incremental validity: behavioural co-operation at times 1 and 2

Logistic regression (Table 4) was used to explore whether blood donor altruistic motives predict who is likely to perform a behavioural act of co-operation (1) leaving their email address for follow-up ($N = 266$ who did vs. 144 who did not) and (2) of those who left their email who actually responded to the email at T2 (219 were contacted and 77 replied).[4] These analyses explore whether motives have effects over and above sex and intentions assessed at T1. Analyses were conducted separately for donors and non-donors. The results show that intentions predict initial co-operation at time 1 but not at time 2. However, at T2, behavioural co-operation was positively associated with both self-regarding motives and egalitarian warm glow for blood donors.

### Incremental validity: intentions at time 1

Table 5 shows the results for incremental validity of the altruism motivations over TPB variables, with respect to predicting intentions for blood donors and non-donors. For non-donors, all TPB variables predicted intention at time 1. There was no significant improvement in prediction when altruistic motives were added in step two. For blood donors, all three TPB variables predicted intentions at time 1. At step two, there was a significant improvement in prediction by altruistic motives, with impure altruism positively contributing to the prediction

[4]Data on sex were missing for one participant.

of intentions to donate and kin motives inhibiting intentions.

## Discussion

This study identified five motives underlying altruism associated with blood donation: reluctant altruism, kinship, impure altruism, self-regarding motives and egalitarian warm glow. These five altruistic motives not only showed factorial validity, but differentiated blood donors from non-donors, showed incremental validity over TPB constructs and predicted future co-operative behaviour. As such, the measure shows good initial psychometric properties. Furthermore, these altruistic motives were differentially related to intentions to donate blood, with a different pattern shown for blood donors and non-donors.

### Blood donation and altruism

The finding that blood donation is not motivated solely by *pure altruism* is not to imply that the act of blood donation is selfish. Indeed, *impure altruism*, whereby individuals donate to both benefit others and gain emotional warm glow, was a predictor of blood donation intentions [7, 12, 13, 16]. The additional pairing of 'warm glow' with 'social responsibility' is compatible with the conception of an egalitarian blood donor [13], with the blood donor driven by a desire to contribute to society, coupled with a sense of personal satisfaction from donating. This combination of motives represents *unconditional* helping [32], where it is the act of helping, to gain warm glow, that is crucial, rather than the characteristics of the recipient. This type of helping motivation, based on warm glow, is a key concept for blood

**Table 3** Correlations between measures, means and standard deviations for non-donors and blood donors

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | ND M | ND SD | BD M | BD SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Impure altruism | **0·83** | 0·19 | 0·38** | 0·17 | 0·52** | 0·24* | 0·01 | 0·17 | 0·14 | 41·54 | 5·79 | 43·87 | 5·17 |
| 2. Self–regarding | 0·04 | **0·83** | 0·15 | 0·17 | 0·34** | 0·08 | 0·00 | 0·09 | 0·07 | 20·67 | 8·83 | 20·47 | 8·49 |
| 3. Kinship | 0·38** | 0·13* | **0·89** | 0·32** | 0·41** | 0·03 | 0·07 | 0·23* | 0·12 | 14·88 | 4·70 | 15·05 | 4·87 |
| 4. Reluctant altruism | 0·19** | 0·37** | 0·28** | **0·64** | 0·29** | 0·28** | 0·17 | 0·27** | 0·16 | 10·44 | 3·78 | 11·71 | 4·37 |
| 5. Egalitarian warm glow | 0·55** | 0·21** | 0·35** | 0·28** | **0·75** | 0·14 | 0·18 | 0·18 | −0·01 | 19·27 | 4·86 | 20·02 | 4·66 |
| 6. Intention | 0·27** | −0·00 | 0·12* | 0·10 | 0·25** | **0·97** | 0·31** | 0·65** | 0·46** | 14·99 | 7·12 | 20·04 | 7·80 |
| 7. Attitude | 0·34** | −0·10 | 0·15** | 0·01 | 0·29** | 0·50** | **0·71** | 0·16 | 0·09 | 16·68 | 4·86 | 19·82 | 4·42 |
| 8. Subjective norm | 0·23** | 0·07 | 0·15** | 0·22** | 0·24** | 0·50** | 0·20** | **0·30** | 0·33** | 8·35 | 2·56 | 9·50 | 2·94 |
| 9. PBC | 0·15* | −0·00 | 0·10 | −0·01 | 0·04 | 0·24** | 0·13* | 0·17** | **0·03** | 10·28 | 2·96 | 11·02 | 3·08 |

*$P < 0.05$, **$P < 0.01$.

Cronbachs alpha is shown in bold on the diagonal. Zero-order correlations for non-donors (ND: $N = 307$) are presented below the diagonal, and correlations for blood donors (BD: $N = 103$)) are presented above the diagonal. For all scales, higher scores indicate greater endorsement on the construct.

**Table 4** Logistic regression predicting co-operation measures

| | Time 1 Email co-operation Blood donors ($N = 103$: 74% provided their email) | Time 1 Non-blood donors ($N = 307$: 62% provided their email) | Time 2 Behavioural co-operation Blood donors ($N = 69$: 38% replied) | Time 2 Non-blood donors ($N = 149$: 38% replied) |
|---|---|---|---|---|
| Step 1 | $R^2 = 0.14$, Step $\chi^2 = 10.7$ ($P = 0.005$) | $R^2 = 0.09$, Step $\chi^2 = 20.2$ ($P < 0.001$) | $R^2 = 0.009$, Step $\chi^2 = 0.44$ ($P = 0.80$) | $R^2 = 0.01$, Step $\chi^2 = 1.25$ ($P = 0.53$) |
| Sex (1 = male) | −1·070* | −0·469 | −0·223 | −0·407 |
| Intentions to donate blood (T1) | 0·081** | 0·070*** | 0·020 | −0·003 |
| Step 2 | $R^2 = 0.30$, Step $\chi^2 = 12.9$ ($P = 0.024$) | $R^2 = 0.13$, Step $\chi^2 = 9.7$ ($P = 0.08$) | $R^2 = 0.22$, Step $\chi^2 = 11.4$ ($P = 0.045$) | $R^2 = 0.04$, Step $\chi^2 = 3.3$ ($P = 0.64$) |
| Impure Altruism (T1) | 0·078 | 0·020 | 0·115 | −0·036 |
| Self-regarding (T1) | 0·012 | 0·035* | 0·082* | −0·008 |
| Kinship (T1) | −0·038 | 0·026 | −0·055 | 0·011 |
| Reluctant altruism (T1) | 0·089 | −0·029 | 0·088 | −0·057 |
| Egalitarian warm glow(T1) | 0·115 | 0·019 | 0·234* | 0·000 |

*$P < 0.05$, **$P \leq 0.01$, ***$P < 0.001$.

Coefficients are unstandardized beta values.

donation, as the characteristics of recipients are always unknown to the donor.

For non-donors, both egalitarian warm glow and impure altruism were associated with the intention to donate; however, for blood donors, only the latter was a significant predictor. This is generally consistent with previous work [12] and indicates that different motivates associated with altruism have different predictive value for donors and non-donors. Indeed, reluctant altruism (i.e. the desire to

donate blood due to a lack of trust that others will donate) is a newly defined aspect of altruism with specific relevance to blood donation and requires further study [12].

The dimensions of impure altruism and kinship added incremental predictive power, with respect to intentions for blood donors only. Interestingly, believing that kin/friends would benefit reduces intention to donate. Thus, potentially educating people to correct this erroneous belief may help sustain blood donation.

**Table 5** Hierarchical multiple regression analysis predicting intention to donate blood at time 1 for non-donors and blood donors

| | Non-donors (N = 307) | | | Blood donors (N = 103) | | |
|---|---|---|---|---|---|---|
| | B | SE B | β | B | SE B | β |
| Step 1 | | | | | | |
| Constant | −7·02 | 1·60 | | −7·93 | 3·10 | |
| Attitude | 0·58 | 0·07 | 0·40** | 0·36 | 0·12 | 0·20** |
| Subjective norm | 1·12 | 0·12 | 0·40** | 1·43 | 0·19 | 0·54** |
| PBC | 0·29 | 0·101 | 0·12** | 0·66 | 0·18 | 0·26** |
| | | $R^2 = 0.43$ | | | $R^2 = 0.54$ | |
| Step 2 | | | | | | |
| Constant | −7·70 | 2·53 | | −15·94 | 5·09 | |
| Attitude | 0·565 | 0·07 | 0·39** | 0·36 | 0·12 | 0·21** |
| Subjective norm | 1·10 | 0·13 | 0·40** | 1·43 | 0·19 | 0·54** |
| PBC | 0·29 | 0·11 | 0·12** | 0·61 | 0·18 | 0·24** |
| Impure altruism | 0·01 | 0·07 | 0·01 | 0·29 | 0·12 | 0·19** |
| Self-regarding | −0·00 | 0·04 | −0·00 | 0·00 | 0·07 | 0·00 |
| Kinship | −0·05 | 0·07 | −0·04 | −0·35 | 0·12 | −0·22** |
| Reluctant altruism | 0·01 | 0·09 | 0·01 | 0·19 | 0·13 | 0·10 |
| Egalitarian warm glow | 0·07 | 0·08 | 0·04 | −0·05 | 0·15 | −0·03 |
| | | $\Delta R^2 = 0.00$ | | | $\Delta R^2 = 0.05$ | |
| | | $\Delta F = 0.24$ | | | $\Delta F = 2.51*$ | |

*$P < 0.05$, **$P < 0.001$.
PCB, perceived behavioural control.

These results indicate that a more complete understanding of the psychological antecedents of blood donation requires consideration of the multidimensional nature of altruistic motives. This will benefit not just in terms of measurement but also the interpretation of motives and how they are linked to interventions. For example, Farrugia et al. [33] suggest that nine of the American Red Cross's 'Top 10 Reasons to Donate Blood' focus on benevolence (impure altruism). However, items such as 'you will get free juice and cookies' and 'you will be someone's hero' may represent hedonistic and reputation building motives rather than benevolence.

Furthermore, increasing the correspondence between the motive advocated by recruitment campaigns and the primary motive of the target audience is important to increase the effectiveness of recruitment campaigns [10]. This clearly emphasizes why it is important to understand and differentiate motivations/processes underlying altruism to ensure that the appropriate motivation is being targeted. The multiitem index developed here provides a reliable and valid measurement tool to support such work.

## Caveats

The primary limitation of this study is a convenience sampling of university students, which means that the findings cannot be generalized to the wider population [18]. However, the theory-driven nature of these altruistic motivations and their overlap and correspondence with motives reported in both qualitative [14, 34] and quantitative work [12, 16] with blood donors suggests that these five altruistic motives should have generality for blood donation.

A second limitation concerns the cross-sectional nature of the data pertaining to motivations, blood donor status and intentions. This precludes any statement about causality [35]. However, the study was designed to be descriptive and explore structure and initial psychometric properties of blood donors' altruistic motives. We feel that this aim is achieved.

## Authors contributions

RE and EF devised the study, RE collected the data, and RE and EF analysed the data. RE and EF drafted and revised article.

## Conflict of interests

None of the authors has any conflict of interests.

## Source of funding

## References

1 Ferguson E: Predictors of future behaviour: a review of the psychological literature on blood donation. Br J Health Psychol 1996; 1:287–308

2 Simon TL: Where have all the donors gone? A personal reflection on the crisis in America's volunteer blood program. Transfusion 2003; 43:273–279

3 Ferguson E, France CR, Abraham C, et al.: Improving blood donor recruitment and retention: integrating social and behavioral science agendas. Transfusion 2007; 47:1999–2010

4 Titmuss RM: The Gift Relationship: From Human Blood to Social Policy. New York, Pantheon, 1971

5 Glynn SA, Kleinman SH, Schreiber GB, et al.: Motivations to donate blood: demographic comparisons. Transfusion 2002; 42:216–25

6  Batson CD: *The Altruism Question: Toward a Social Psychological Answer.* Hillsdale, NJ, Erlbaum, 1991

7  Andreoni J: Impure altruism and donations to public goods: a theory of warmglow giving. *Econ J* 1990; **100**:464–477

8  Milinski M, Semmann D, Krambeck HJ: Donors to charity gain in both indirect reciprocity and political reputation. *Proc Biol Sci* 2002; **269**:881–883

9  Nowak MA: Five rules for the evolution of cooperation. *Science* 2006; **314**:1560–1563

10 Clary EG, Snyder M, Ridge RD, et al.: Understanding and assessing the motivations of volunteers: a functional approach. *J Pers Soc Psychol* 1998; **74**:1516–1530

11 Mayer ND, Tormala ZL: "Think" versus "feel" framing effects in persuasion. *Pers Soc Psychol Bull* 2010; **36**:443–454

12 Ferguson E, Atsma F, de Kort W, et al.: Exploring the pattern of blood donor beliefs in first-time, novice and experienced donors: differentiating reluctant altruism, pure altruism, impure altruism and warm glow. *Transfusion* 2011; **52**:343–355

13 Ferguson E, Taylor M, Keatley D, et al.: Blood donors' helping behavior is driven by warm glow: more evidence for the blood donor benevolence hypothesis. *Transfusion* 2012; **10**:2189–2200

14 Kuruvatti J, Prasad V, Williams R, et al.: Motivations for donating blood and reasons why people lapse or never donate in Leeds, England: a 2001 questionnaire-based survey. *Vox Sang* 2011; **101**:333–338

15 Glynn SA, Williams AE, Nass CC, et al.: Attitudes toward blood donation incentives in the United States: implications for donor recruitment. *Transfusion* 2003; **43**:7–16

16 Ferguson E, Farrell K, Lawrence C: Blood donation is an act of benevolence rather than altruism. *Health Psychol* 2008; **27**:327–336

17 Ferguson E, Chandler S: A stage model of blood donor behaviour: assessing voluntary behaviour. *J Health Psychol* 2005; **10**:359–372

18 Lemmens KP, Abraham C, Ruiter RA, et al.: Modelling antecedents of blood donation motivation among non-donors of varying age and education. *Br J Psychol* 2009; **100**:71–90

19 Sojka BN, Sojka P: The blood donation experience: self reported motives and obstacles for donating blood. *Vox Sang* 2008; **94**:56–63

20 Ajzen I. The theory of planned behaviour. *Organ Behav Hum Dec* 1991; **50**:179–211

21 Giles M, Cairns E: Blood donation and Ajzen's theory of planned behaviour: an examination of perceived behavioural control. *Br J Soc Psychol* 1995; **34**:173–188

22 Macrae CN, Johnston L: Help, I need somebody: automatic action and inaction. *Soc Cognition* 1998; **16**:400–417

23 Bertalli NA, Allen JK, McLaren CE, et al.: A comparison of self-reported and record-linked blood donation history in an Australian cohort. *Transfusion* 2011; **51**:2189–2198

24 Birkás B, Bereczkei T, Kerekes Z: Generosity, reputation and costly signaling: a preliminary study of altruism toward unfamiliar people. *J Cult Evol Psychol* 2006; **4**:173–181

25 Van Lange PA, Schippers M, Balliet D: Who volunteers in psychology experiments? An empirical review of prosocial motivation in volunteering. *Pers Indiv Differ* 2011; **51**:279–284

26 Schafer JL, Graham JW: Missing data: our view of the stat of the art. *Psychol Methods* 2002; **7**:147–177

27 Schafer JL, Yucel RM: Computational strategies for multivariate linear mixed effects models with missing values. *J Comput Graph Stat* 2002; **11**:437–457

28 Jaccard J: *ZumaStat Statistical Methods. Applied Scientific Analysis.* Miami, FL, (www.zumastat.com), 2006

29 Newgard CD, Haukoos JS: Advanced statistics: missing data in clinical research- Part 2: multiple imputation. *Acad Emerg Med* 2007; **14**:669–678

30 Robinson JP, Shaver PR, Wrightsman LS: *Criteria for Scale Selection and Evaluation in Measure of Personality and Social Psychological Attitudes.* California, Academic Press, 1991

31 Otto PE, Bolle F. Multiple facets of altruism and their influence on blood donation. *J Socio Econ* 2011; **40**:558–563

32 Fong CM: Evidence from an experiment on charity to welfare recipients: reciprocity, altruism and the empathic responsiveness hypothesis. *Econ J* 2007; **117**:1008–24

33 Farrugia A, Penrod J, Bult JM: Payment, compensation and replacement-the ethics and motivation of blood and plasma donation. *Vox Sang* 2010; **99**:202–211

34 Suárez BIM, Fernández-Montoya A, Fernández AR, et al.: How regular blood donors explain their behaviour. *Transfusion* 2004; **44**:1441–1446

35 Ferguson E: Non-compliance and instrumental variables in behavioral medicine: a commentary on van Dongen et al. *Annals Behav Med* 2013; **45**:137–138