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The importance of need-altruism and kin-altruism to blood donor behaviour for black and white people

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Abstract

Background: Need-altruism (a preference to help people in need) and kin-altruism (a preference to help kin over non-kin) underlie two hypotheses for voluntary blood donation: (i) Need-altruism underlies motivations for volunteer blood donation and (ii) Black people express a stronger preference for kin-altruism, which is a potential barrier to donation. This paper tests these hypotheses and explores how need- and kin-altruism are associated with wider altruistic motivations, barriers, and strategies to encourage donation.

Methods: We assessed need- and kin-altruism, other mechanisms-of-altruism (e.g., reluctant-altruism), barriers, strategies to encourage donation, donor status, and willingness-to-donate across four groups based on ethnicity (Black; White), nationality (British; Nigerian), and country-of-residence: (i) Black-British people ($n = 395$), and Black-Nigerian people (ii) in the UK ($n = 97$) or (iii) across the rest of the world ($n = 101$), and (v) White-British people in the UK ($n = 452$). We also sampled a Black-Nigerian Expert group ($n = 60$).

Results: Need-altruism was higher in donors and associated with willingness-to-donate in non-donors. Levels of kin-altruism did not differ between Black and White people, but need-altruism was lower in Black-British people. Kin-altruism was associated with a preference for incentives, and need-altruism with a preference for recognition (e.g., a thank you) as well as an increased willingness-to-donate for Black non-donors. Need-altruism underlies a blood-donor-cooperative-phenotype.

Conclusion: Need-altruism is central to blood donation, in particular recruitment. Lower need-altruism may be a specific barrier for Black-British people. Kin-altruism is important for Black non-donors. The blood donor cooperative phenotype deserves further consideration. Implications for blood services are discussed.

KEYWORDS
altruim, barriers, blood donor behaviour, ethnicity, incentives, kin-altruism, motivations, need-altruism, rewards

1 | INTRODUCTION

There is a large literature exploring the mechanisms-of-altruism (MOA) that underly voluntary non-remunerated blood donation (VNRDB).[1–3] Key among these are: (i) reluctant altruism, (ii) impure-altruism, (iii) warm-glow and (iv) reputation building.[1–6] Reluctant altruism refers to a preference to help when others cannot be trusted to help, especially where the number of people helping is low.[1,2,4,6,7] This is critical for first-time donors.[5,6] Warm glow is a preference to help based solely on the positive feelings experienced from helping.[8] Impure-altruism is a preference to help, not only to experience warm-glow but also to make a difference by helping others.[8] Warm-glow and impure altruism are important for donor retention.[1–3,5] Finally, by helping, people can signal a good reputation to others, which is critical to maintaining altruism, as those with good reputations are more likely to be helped by others.[9] As a high-cost behaviour, blood donation offers an ideal reputational signal.[1,6,10] While these mechanisms are critical, two general mechanisms underlying altruism are missing from the analysis of altruism and blood donation: *Kin-altruism* and *need-altruism*.[11] This paper explores people's preferences to help in general based on either kin- or need-altruism, how these predict willingness-to-donate, and their associations with other MOA specific to blood donation.

Kin-altruism is a preference to help family over strangers, and *need-altruism* is a preference to help those in need, irrespective of the relationship to the helper.[11] Both are central mechanisms for sustained altruism and cooperation.[11] However, need-altruism, rather than kin-altruism, *s*hould be the central motivator for VNRDB which encompasses helping *strangers in need*, and not family members. This paper tests the hypothesis (H1) that need-altruism is a central motivator for VNRBD. Furthermore, it has been reported that Black people demonstrate a stronger preference for *kin-altruism* than White people, with the assumption that this preference for *kin-altruism* acts as a potential barrier to VNRBD.[12–19] We test the hypothesis that the expression of kin-altruism is higher in Black people compared to White people (H2). We do this by exploring preferences for kin- and need-altruism across people from different ethnicities and how kin- and need-altruism are related to (i) blood donor status (current, lapsed, non-donor) and (ii) willingness-to-donate.

1.1 | Kin-altruism, need-altruism and voluntary blood donation

It has been argued that a stronger preference for kin-altruism among Black people, as well as people from ethnic minorities, is one reason for reduced levels of voluntary blood donation observed in these communities.[12–19] Indeed, Tran et al.[16] in their discussion of Black people in Montreal, state: 'The gift of blood … is normally destined to a stranger. But … the preferred figure of the receiver might not be that of a complete stranger but that of a community member" [p. 522], with community members often referring to close family.[16] Three potential mechanisms could support the stronger preference for kin-altruism in Black people: (i) the cultural symbolism of blood,[15,16] (ii) discrimination,[13] and (iii) Hamilton's rule.[12,16,20,21]

In terms of cultural symbolism, blood is seen as the main conduit for the transmission of family ties and kinship.[12,13,16] Perceived discrimination leads to a focus on family and community, as does reduced trust in healthcare and the government[7] and supports a stronger preference for kin.[16,17,19] Hamilton's rule $r > \frac{c}{b}$ where r = the genetic relatedness between individuals [ranging from 0 for no degree of relatedness, (i.e., stranger) to 1 (i.e., identical twins)], and $\frac{c}{b}$ is the cost–benefit ratio (where c = the cost to the helper and b = the benefit to the recipient), indicates that to choose to help someone, r must exceed the cost–benefit ratio $\frac{c}{b}$.[20,21] One implication is that people are willing to pay a higher cost, relative to benefits, to help a relative (r is higher) than a stranger (r is lower). Blood donation is seen as high cost,[10] and Tran et al.[14] in their analysis of Black people in Montreal, state that "…giving blood was almost described as a sacrifice that would be worth it if a loved one's life was in danger." (p. 520[14]). Indeed, Black people report that donating blood carries costs in terms of lost vitality[12,22–24] or personal identity.[14] This increased cost means r needs to be higher for members of Black communities to donate, manifesting in a preference for kin over strangers.

The hypothesis that people from Black communities have a stronger preference for kin-altruism is based on qualitative evidence,[12–19] that crucially has not considered the role of need-altruism across different communities or wider motivations and barriers to donation. We, therefore, test the hypothesis (H2) that kin-altruism is endorsed more by Black compared to White people.

1.2 | Blood donor cooperative phenotype: Kin-altruism, need-altruism, motivations/barriers and recruitment strategies

High levels of cooperation are essential for the functioning of human societies, from dyadic relationships and small group settings (e.g., helping family, friends, and strangers) to supporting wider collective social goals (e.g., increasing vaccinations[25]). To be effective across such a wide range of behaviours, the different assessments for cooperative preferences based on trust, generosity, and reputation should all be positively associated with each other forming a domain-general cooperative-phenotype.[26] Indeed, this is the case.[26] Here we explore how domain-general preference to help based on *kin-* and *need-altruism*[11] are associated with the key MOA for blood donation, as well as barriers to donation, and preferences for recruitment strategies. With this in mind (i) reluctant altruism, (ii) impure-altruism (iii) warm-glow, and (iv) reputation building[1–5] should all be positively associated with need-altruism, but not kin-altruism.[2]

These altruistic motivations have their counterpart in barriers to donation.[7,22] In terms of barriers, we focus on common barriers to donation based on health (e.g., feeling faint), fear (e.g., fear of needles), trust in medical professionals, and physical effects (loss of vitality) that have been identified as important within Black communities.[13,23,24] As distrust in the medical profession represents

the negative influence of external agencies, over which the person has little control, distrust should lead to a focus on in-group processes such as protecting family.[27–29] As such, kin-altruism should be associated with greater distrust in the medical profession.

In terms of strategies to encourage blood donation, a wide range of have been documented.[22,28] Conceptually, distinctions can be drawn between incentives (i.e., strategies offered before donating to motivate action: e.g., payment), and rewards/recognitions offered after donating to reinforce warm-glow (e.g., thank you texts,[30]). Kin-altruism is concerned with directing resources to maximise benefits to family (and friends) rather than society generally.[31,32] Thus, kin-altruism should be associated with endorsing financial incentives and gifts as effective ways to encourage blood donation, as these could potentially be distributed to family members or converted to money. However, the intrinsic nature of need-altruism (e.g., a primary focus on the well-being of the recipient, regardless of their relationship to the helper), should be associated with viewing 'recognitions and rewards' as a good recruitment strategy and incentives less positively.[33] Thus, we test the hypothesis (H3) that high levels of kin-altruism are positively associated with viewing incentives as a good recruitment strategy and higher levels of need-altruism associated with viewing rewards and recognitions as a good strategy.

1.3 | Cultural diversity and blood collection systems

To better understand associations between ethnicity and donor behaviour, we need to not only consider the person's ethnicity, but also their nationality, and country of residence.[34] Nationality provides a potential marker of the values, beliefs and experiences a person holds with respect to their country of birth or adopted national status. Country of residence indicates the current value system that the person is living in. These parameters are important when considering the role of ethnicity and how blood is collected. For example, the UK, like many countries in the Global North, operates a VNRBD system, however, in many countries in the Global South, family replacement and/or paid donations are the main method of collecting blood.[35] With increased population movement, there will be people who have grown up in a country with a family-replacement/paid system and now live in a country like the UK with a VNRBD system. Assessing ethnicity solely does not allow for this degree of specificity. Thus, we explore ethnicity (Black; White), nationality (British; Nigerian), and country-of-residence (Nigeria, rest-of-the world, UK). We focus on people from Nigeria as a country where family-replacement/paid system is the major method of collection. As well as the voice of lay people, we also explore the perceptions of a Nigerian expert group, made up of Nigerian people living in Nigeria, who had experience and expertise in haematology, healthcare, and volunteer blood donation in Nigeria. Understanding the views and opinions of these Nigerian experts is critical as the opinions of experts are often sought to drive policy (e.g., advisory groups) and can diverge from the opinions of the public.[36] This is important as the WHO has recommended that all countries aim to adopt VRNBD. Thus, information on how experts and laypeople differ allows initial insights into ways to bridge gaps and move policy forward.[37,38]

1.4 | Study aims and rationale

We add to the literature by presenting the first quantitative comparison of preferences for kin- and need-altruism across different ethnicities, blood donor status and willingness-to-donate. We test three main hypotheses: (i) Need-altruism is positively associated with being a blood donor and the willingness-to-donate (H1), (ii) A preference for kin-altruism is greater in Black people compare to White people (H2), and (iii) kin-altruism predicts incentives and need-altruism rewards and recognitions (H3) We also explore the presence of 'blood donor phenotype' by exploring the associations between domain-general kin- and need-altruism and the main MOA for blood donation.

2 | METHODS

2.1 | Samples

The study was conducted between 14th and 28th February 2022 with the general population samples through Prolific (https://www.prolific.co/about/) and the experts sampled through professional societies and volunteer donor organisations in Nigeria. All participants completed an online, unlinked, anonymous survey hosted on Qualtrics (https://www.qualtrics.com/uk/). Samples were defined in terms of their ethnicity (Black; White), nationality (British; Nigerian), and country-of-residence (Supplementary File S1). There were four samples from Black communities. Three are lay Black samples: (i) Black-Nigerian people living in the UK (Black-Nigerian-UK: $n = 97$), (ii) Black-Nigerian people living across the rest of the world (Black-Nigerian-World: $n = 101$), and (iii) Black-British people living in the UK (Black-British-UK: $n = 395$). One is a Black-Nigerian expert group (Nigerian-Expert: $n = 60$). Finally, there is a single lay sample of White-British people living in the UK (White-British-UK: $n = 452$).

The following variables are assessed (Supplementary File S2 for details of all questions).

Demographics: Age (continuous measure [years]), gender (men = 0, women = 1), healthcare worker status (no = 0, yes [current/previous] = 1).

Donor status: People were asked if they had ever donated blood, and if so, how long ago.[7] Non-donors were coded as those who had never donated (=0); lapsed donors were coded as those who had donated 2+ years ago (=1); current donors were coded as those who had donated ≤2 years-ago (=2).

Kin/Need-Based Altruism: Questions were developed based on the theoretical literature to assess kin- (items reflect a direct comparison between a preference to help family or a stranger) and need-altruism (items reflect helping based on need regardless of relation to the person in need).[11] People indicated the extent to which each statement applied to them: 1 = not at all, 7 = completely.

Blood donation focused altruism: These questions were derived from an existing mechanism-of-altruism (MOA) scale to cover, warm-glow, reputation building, and reluctant altruism.[7] People indicated the extent to which they agreed or disagreed with each statement: 1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree or disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree.

Barriers: A wide range of barriers to donation were derived from the existing literature[7,22] and selected based on discussions with colleagues who have knowledge of encouraging blood donation for Black communities in the UK and Nigeria. These focus on common barriers to donation based on health (e.g., "I worry that I might faint"), fear (e.g., "I do not like needles"), trust in medical professionals (e.g., "I do not trust medical professionals or systems"), and physical effects (e.g., "If I donate blood, I will become physically weak").[22] These are responded to using the following scale (1 = strongly disagree, 2 = disagree, 3 = somewhat disagree, 4 = neither agree nor disagree, 5 = somewhat agree, 6 = agree, 7 = strongly agree).

Strategies: A wide range of strategies to encourage blood donation were derived from the existing literature,[39] and we selected strategies based on the distinction between incentives (e.g., "Being paid to donate blood"), and rewards/recognitions (e.g., "Being sent a text/email to say thank you after donating blood")[30] through discussion with colleagues who have knowledge of encouraging blood donation for Black communities in the UK and Nigeria. People indicated the extent to which they perceive each strategy as encouraging: 1 = not at all, 7 = very encouraging.

Willingness-to-donate: A dichotomous index is used as it has been shown to be a reliable predictor of future donation behaviour[40,41]: Yes = 1, No = 0.

2.2 | Ethical approvals

Ethical approvals were received from the University of Nottingham, School of Psychology (F1326) and the National Health Research Ethics Committee of Nigeria (NHREC/01/01/2007–04/02/2022). All participants provided full informed consent to participate in the studies reported.

2.3 | Pre-registration

The study was pre-registered (https://osf.io/72dj9).

2.4 | Data analysis

Continuous measures for all the predictor variables were created by summing the items that make up each scale. Continuous data were analysed in SPSS-28, Stata-18, and M*Plus* 8.4, with all *p*-values two-tailed. To explore the psychometric structure of kin- and need-altruism, we applied principal axis (PAF) factor analysis with varimax rotation. Path models in M*Plus* 8.7 were used to test general support for Hypotheses 1–3 directly. Seemingly-Unrelated-Regression (SUR) models were used to explore Hypotheses 1–3 in more detail. SUR models were used as the continuous outcome measures are correlated with each other, and the SUR models account for this overlap in the residual error across the outcome measures.

Power analysis: Power calculations were conducted to achieve 0.80 power with an α of 0.05 (two-tailed). As there are no existing quantitative data on kin- and need-altruism by ethnicity, we based calculations on variation in trust in individuals by ethnicity reported by Ferguson et al.[7] Trust in individuals was seen as an appropriate index as it underlies altruism and cooperation generally.[42] The effect size for the comparison across the four ethnic groups (Asian, Black, Mixed, White) reported in Ferguson et al.[13] equates to a Cohen's d of 0.4871, indicating that for a comparison across the five groups, 66 people are required per group. Based on Ferguson et al.,[7] the effect size comparing a White and overall Ethnic minority sample was a Cohen's d of 0.363, indicating that 120 people per group are required for these comparisons reported in studies 1 and 2. For EFA sample size of 300 is needed, and the participants-to-items ratio to be ≥10:1.[43,44] These conditions were met.

3 | RESULTS

3.1 | Samples

Sample characteristics (Table 1).

3.2 | The latent structure of kin- and need-altruism

PAF analyses (Table 2 Panel A: Supplementary File S3 for details) showed that kin- and need-altruism formed two distinct factors. The three items representing kin-altruism and the three items representing need-altruism were summed to create two scales.

3.3 | Mechanisms of altruism, barriers, and strategies

The results of the PAF analyses of the blood-specific measures of altruism (mechanisms-of-altruism: MOA), barriers and strategies are summarised in Table 3 (Supplementary File S3 for full analytic details). Corresponding to previously reported distinctions,[5,6] the MOA items formed three factors: (i) impure-altruism, (ii) reputation building, and (iii) reluctant-altruism. There were three barrier factors: (i) negative health effects, (ii) lack of trust in medical professionals and healthcare systems, and (iii) fear of the donation process, corresponding to extant literature.[12–18,22] Mapping onto distinctions drawn between incentives (i.e., strategies offered before donating to motivate action), and rewards or recognitions (offered after donating to reinforce feelings of warm-glow), two strategy factors emerged: (i) 'incentives', and

TABLE 1 Demographic details.

	Black-British-UK		Black-Nigerian-UK		Black-Nigerian-World		Black-Nigerian-Experts		White-British-UK	
	N	Mean (SD)	*N*	Mean (SD)	*N*	Mean (SD)	*N*	Mean (SD)	*N*	Mean (SD)
Age	383	32.76 (9.95)	96	32.86 (7.91)	99	28.57 (8.10)	50	34.86 (9.10)	450	36.73 (10.62)
	N	%	*N*	%	*N*	%	*N*	%		
Gender										
Male	129	32.8%	36	37.5%	40	40.4%	37	61.7%	174	38.8%
Female	264	67.2%	60	62.5%	59	59.6%	23	38.3%	274	61.2%
Blood donor status										
Non-donor	277	71.4%	64	66.0%	51	53.7%	27	49.1%	284	62.8%
Lapsed	69	17.8%	26	26.8%	27	28.4%	4	7.3%	118	26.1%
Current	42	10.8%	7	7.2%	17	17.9%	24	43.6%	50	11.1%
Healthcare worker										
Yes	110	28.4%	55	58.5%	42	43.8%	36	62.1%	80	17.8%
No	277	71.6%	39	41.5%	54	56.3%	22	37.9%	370	82.2%

TABLE 2 Exploratory factor analysis of kin- and need-altruism.

Item	Need	Kin	Factor	Donor cooperative phenotype	Barriers	Kin-altruism incentives
If a stranger was in need, I would help them	**0.546**	−0.046	Impure altruism	**0.729**	**−0.385**	−0.060
I would help the person who needs help the most whether that be my family, a friend, or a stranger	**0.715**	−0.115	Rewards, recognitions & benefits	**0.606**	−0.135	0.106
I would try and help family, friends, and strangers equally	**0.774**	−0.241	Reputation building	**0.554**	0.047	0.108
If I had to choose, I would help my family and friends rather than people I do not know	−0.155	**0.743**	Need-altruism	**0.450**	−0.172	**−0.485**
I would rather help a family member I do not like than a stranger	−0.133	**0.567**	Reluctant-altruism	**0.398**	−0.003	−0.058
If it was between helping my family or a friend, I would help my family	−0.056	**0.617**	Fear of negative health effects	−0.018	**0.870**	0.076
			Lack of trust in medical professionals and systems	−0.170	**0.549**	0.096
			Process	−0.012	**0.527**	0.068
			Kin-altruism	−0.005	0.046	**0.519**
			Incentives	0.261	0.101	**0.385**
Eigenvalue	2.410	1.411		2.660	1.751	1.232
% Total variance	40.162	23.513		26.599	15.512	12.323
Cronbach's alpha	0.725	0.679		0.669	0.681	.302[a]
Mean (SD)	15.20 (3.70)	14.87 (3.65)		95.86 (15.53)	28.05 (10.17)	
n	1077			1018		

Note: Extraction was with Principal Axis Factoring (PAF) with Varimax Rotation. Number of factors to extract is determined by both Scree tests and Parallel Analyses. Items/scales with a loading greater the 0.30 were classed as being a meaningful marker of a factor (in bold).[43]

[a]Mean inter-item correlation as the factor only has two items.

TABLE 3 Factor analyses of indices of motivators (altruism), barriers and strategies to encourage donors.

	Panel A				
	General altruism kin vs. need		Mechanism of Altruism for blood donation		
	Kin-based	Need-based	Impure altruism	Reputation building	Reluctant altruism
	3 items on a preference to help kin over strangers. (e.g., 'I would rather help a family member I do not like than a stranger')	3 items on helping based on need. (e.g., 'If a stranger was in need, I would help them')	8 items on donating blood to help others and feel 'warm-glow'. (e.g., 'I would be doing something to help others')	2 items on donating blood to boost reputation. (e.g., 'I would want to show people that I am a good, kind person')	2 items on donating blood because others do not. (e.g., 'I cannot trust others to donate blood, so I must')
Mean (SD) range, [mid-point]	15.20 (3.70) 3–21, [12]	14.86 (3.65) 3–21, [12]	45.48 (7.22) 8–56, [32]	8.23 (3.03) 2–14, [8]	6.80 (2.70), 2 to 14, [8]
Interpretation	Higher scores indicate strong Kin-Altruism	Higher scores indicate strong Need-Altruism	Scores over 32 indicate Impure-altruism motivates blood donation	Scores over 8 indicates reputation building motivates blood donation	Scores over 8 indicates reluctant altruism motivates blood donation
Cronbach's α	0.683	0.728	0.893	0.795	0.694
	Panel B				
	Strategies		**Barriers to voluntary blood donation**		
	Rewards, recognitions & benefits	**Incentives**	**Fear of negative health effects**	**Fear of donation process**	**Lack of trust in medical professionals and systems**
	4 items on the impacts of blood donation for donors and others and tokens of appreciation (e.g., 'Being sent a text/email to say thank you after donating blood')	3 items on tangible compensation for donating. e.g., 'Being given a small gift when you donate blood', 'being paid)	4 items on fears of the health impacts of donation. (e.g., 'If I donate blood, I will become physically weak')	3 items on fears of the blood donation process (e.g., 'I worry that I might faint')	3 items on lack of trust in medical professionals and systems. (e.g., 'If I donate blood, my blood will be sold for profit')
Mean (SD) range [mid-point]	20.62 (5.51) 4–28, [16]	13.63 (5.83), 3–21, [12]	10.17 (4.53), 4–28, [16]	9.25 (4.66), 3–21 [12]	8.63 (3.81), 3–21 [12]
Interpretation	Higher scores indicate greater perceived effectiveness	Higher scores indicate greater perceived effectiveness	Scores over 16 indicate that fear of negative health effects	Scores over 12 indicate fears of the donation process	Scores over 12 indicate a lack of trust in medical professionals and systems
Cronbach's α	0.845	0.839	0.768	0.719	0.718

(ii) 'rewards, recognitions & benefits'.[30] The items making up each factor were summed to create continuous scales.

Figure 1 (Panel A) details the correlations between the main study variables for the whole sample. Need- and kin-altruism are negatively associated with each other, while the three MOA factors, the barriers and strategies are positively associated with one-another (Supplementary Files S4 for means and SDs by ethnicity; Supplementary File S5 for associations by donor status).

3.4 | Hypotheses 1 to 3: Path models

The path model in Figure 2 (Panel A) is for the full sample, predicting if people have ever donated blood, and Figure 2 (Panel B) shows the models predicting willingness-to-donate for non-donors (upper coefficients, not in parentheses) and those who have ever donated (current and lapsed: lower coefficients, in parentheses). These models test hypotheses 1–3. In support of H1, Figure 2 (Panel A) shows that need-altruism, not kin-altruism, predicts being a previous donor, and Figure 2 (Panel B) shows that need-altruism, not kin-altruism, predicts willingness-to-donate in non-donorsi. There is no support for H2, as ethnicity does not predict a preference for either need- or kin-altruism. There is some support for H3, as kin-altruism predicts viewing, not only incentives as a good strategy but also, 'rewards and recognitions,' whereas need-altruism predicts viewing 'rewards and recognitions' as a good strategy, but not incentives (Panel A). Figure 2 (Panel B) shows that viewing incentives and 'rewards and recognitions' as a good strategy is

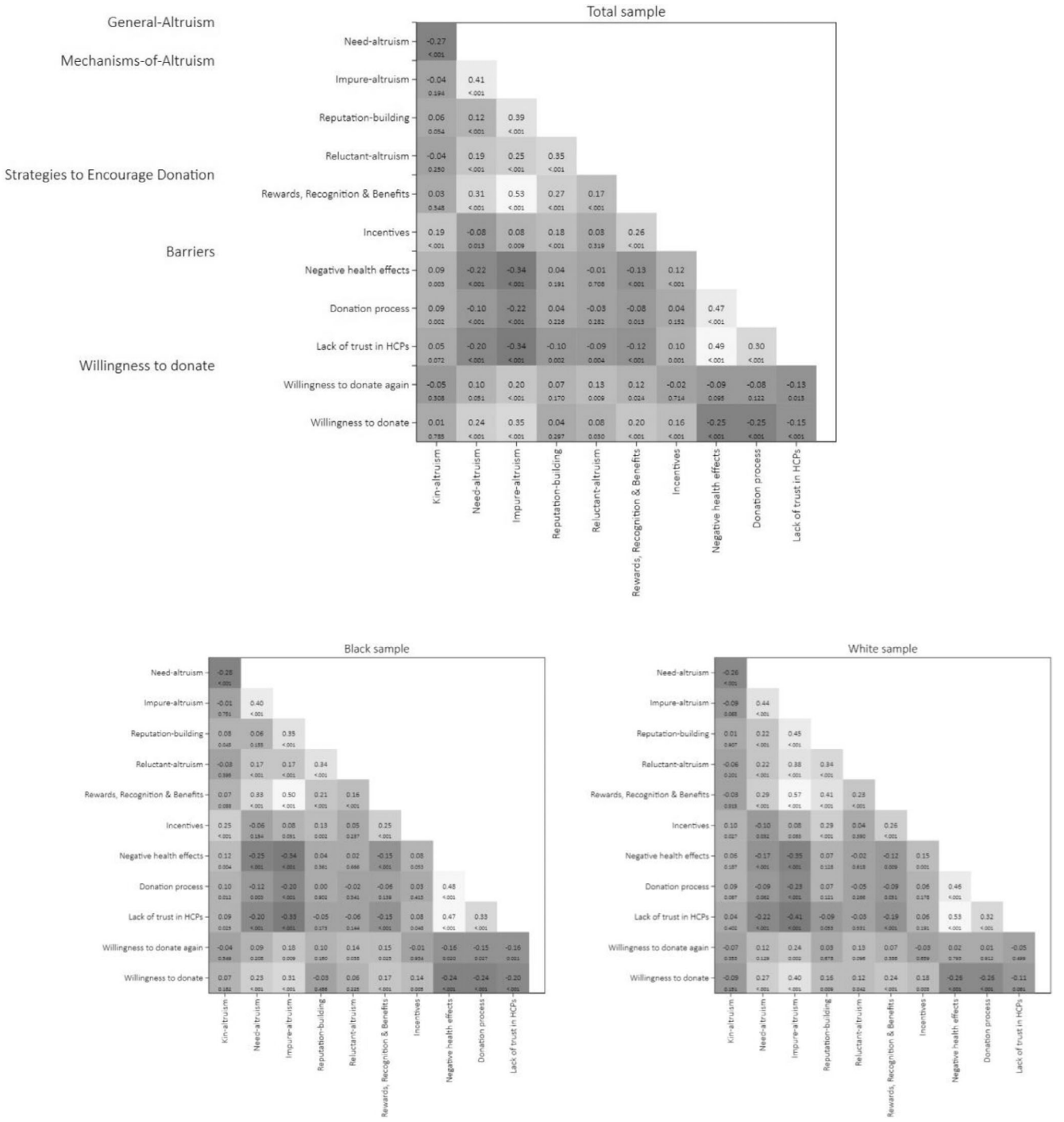

FIGURE 1 Pearson correlation coefficients for main study variables for the total sample and Black and White People separately. Exact p-values are shown. Panel A: Total sample; Panel B: Black (left) and White (right) samples.

positively associated with willingness-to-donate in non-donors only. Whereas seeing 'rewards and recognitions' as a good strategy is positively associated with willingness-to-donate, for those who have ever donated, but incentives are negatively associated with willingness-to-donat (Panel A). With these broad conclusions in place, we will now explore the influence of ethnicity and donor status in more detail.

3.5 | Altruism, barriers, and strategies: effects of ethnicity and donor status

Table 4 provides a summary of the SUR models exploring the role of ethnicity and donor status with respect to altruism, barriers, and strategies (Supplementary File 6 provide the detailed model information, including exact p-values and 95% CIs).

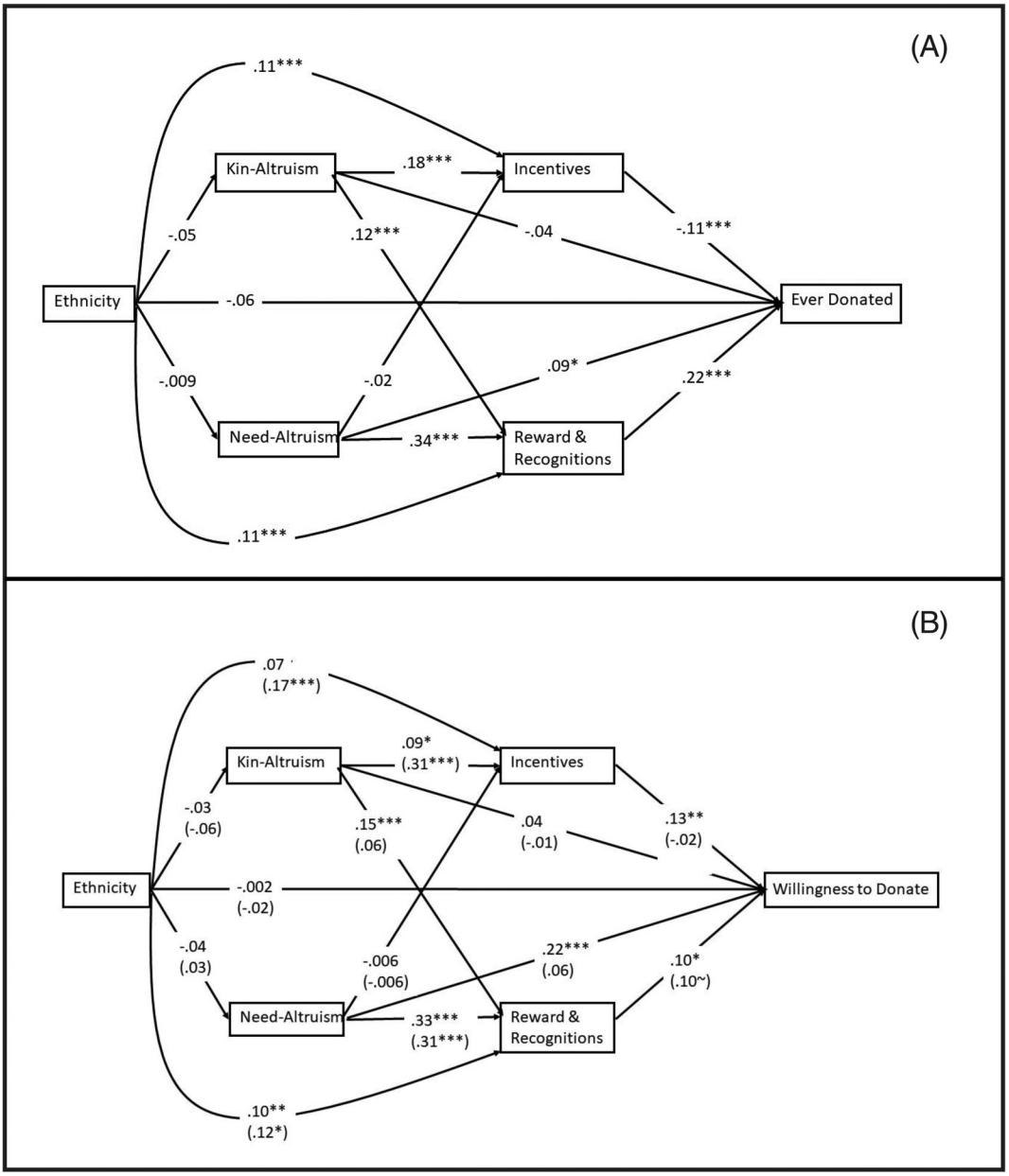

FIGURE 2 Saturated Path Models. Panel A (whole sample, $n = 1053$) predicts having ever donated blood, estimated using diagonally weighted least with mean and variance adjustment to account for the mix of continuous and dichotomous outcomes. Panel B predicts willingness-to-donate for the first time in non-donors ($n = 658$: coefficients on top not in parentheses) and to donate again for previous donors ($n = 365$: coefficient below in parentheses), estimated using maximum likelihood as all outcomes are continuous. Ethnicity (0 = White, 1 = Black), Ever Donated (0 = no, 1 = yes). All coefficients are standardised. $\sim p = 0.06$, * p . > 0.05, ** $p < 0.01$, *** $p < 0.001$.

With respect to kin- and need-altruism, the results in Table 4 show that kin-altruism does not vary across four lay groups (Black and White), however, the Black-Nigerian-Expert group report lower kin-altruism than the White-British-UK sample. Interestingly need-altruism is less likely to be endorsed by Black-British-UK residents compared to the White-British-UK residents. In terms of MOA, we observe that in comparison to the White-British-UK residents (i) the Black-Nigerian-Experts were more likely to endorse 'impure-altruism', and (ii) people from Black communities (except Black-Nigerian-Experts) are less likely to be motivated by 'reputation building' and 'reluctant altruism'.

For strategies to encourage donation (i) all Nigerian people (lay and expert) saw 'rewards, recognitions & benefits' as encouraging strategies, (ii) Black-British-UK and Black-Nigerian-World residents see 'incentives' as an encouraging strategy, while (iii) the 'Black-Nigerian-Experts' felt incentives were less encouraging.

Finally, in terms of barriers, compared to the White-British-UK people, (i) people from all Black communities were more likely to report a 'lack of trust in medical professionals and systems' as a barrier compared, and (ii) Black-UK-residents (Black-British-UK and Nigerian-Black-UK) reported greater 'fear of negative health effects'.

TABLE 4 Summary of SUR models for altruism, strategies and barriers as a function of agen gender, ethnicity, healthcare worker and donor status.

		General altruism kin vs. need		Mechanism of altruism for blood donation		
		Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
		Kin-based	Need-based	Impure altruism	Reputation building	Reluctant altruism
Ethnicity	Black-British-UK	0.0655	**−0.6038***	−0.7328	**−0.5487***	**−0.5412****
	Black-Nigerian-UK	−0.7723	0.5889	0.8454	**−1.3910*****	**−1.4033*****
	Black Nigerian-World	−0.6486	0.7259	0.2087	**−1.4620*****	**−1.3170*****
	Black-Nigerian-Expert	**−4.2853*****	**1.2341***	**3.7613****	−0.6364	−0.4438
Donor status	Lapsed donor	−0.1963	**0.7969****	**3.2714*****	**0.4884***	**0.8674*****
	Current donor	−0.4029	**1.3148*****	**4.5358*****	**1.2725*****	**1.0476*****
Age	Years	**−0.0293***	0.0180	0.0182	−0.0098	−0.0047
Gender	Female	**−0.9067*****	**1.7033*****	**2.7135*****	0.3122	0.1984
HealthCare worker	Yes	−0.2334	0.2654	**1.1705***	0.3389	0.0921
Constant		**17.2628*****	**12.8292**	**41.4967*****	**8.5324*****	**6.9648*****

		Strategies		Barriers to voluntary blood donation		
		Rewards, recognitions & benefits	Incentives	Fear of negative health effects	Fear of donation process	Lack of trust in medical professionals and systems
		Coeff.	Coeff.	Coeff.	Coeff.	Coeff.
Ethnicity	Black-British-UK	0.0431	**0.9224***	**0.8892****	−0.3074	**2.2459*****
	Black-Nigerian-UK	**2.1016*****	−0.3211	**1.1136***	−0.2832	**3.4584*****
	Black Nigerian-World	**2.2796*****	**1.9596*****	0.1772	−0.2236	**2.4390*****
	Black-Nigerian-Expert	**2.3976****	**−2.8434*****	−0.3047	−1.0206	**1.7999*****
Donor status	Lapsed donor	**1.0648***	−0.5107	**−2.5387*****	**−2.4014*****	**−1.2199*****
	Current donor	**3.0731*****	−0.3895	**−3.3485*****	**−2.9232*****	**−2.3128*****
Age	Years	−0.0091	**−0.1106*****	−0.0027	−0.0251	0.0099
Gender	Female	**1.0012***	**−0.8706*****	−0.4525	**0.5779***	**−0.4509***
HealthCare worker	Yes	0.6145	−0.0627	0.3341	−0.4538	−0.4007
Constant		**19.0175*****	**17.8159*****	**11.0094*****	**11.0511*****	**7.7989*****

Note: The comparison group for ethnicity is White-British-UK., for gender, it is male, for healthcare worker it is being a non-healthcare worker and for donor status it is being a non-donor. Coeficients are unstrandardised (in bold).
*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; ****$p < 0.0001$.

3.6 | Blood donation cooperative phenotype

Differentiating donors into current and lapsed donors (Table 4), we observed that, compared to non-donors, both are associated with increased need-altruism, impure-altruism, reputation building and reluctant-altruism and perceiving rewards, recognitions, & benefits' as an encouraging strategy. Additionally, both lapsed and current donors also are less likely, than non-donors, to endorse all barriers. The consistency of response pattern across donors (lapsed and current) versus non-donors, is indicative of unique pattern of heightened motivation (general and specific altruism and strategies) and reduced barriers for blood donation, suggesting a cooperative phenotype. Indeed, strong associations between motivation and barriers are observed in the whole sample (Panel A) and Black and White samples separately (Panel B) of Figure 1. To explore the cooperative phenotype further, we applied PAF analysis with varimax rotation to all the measures of motivations and barriers simultaneously (Table 2, Panel B). This resulted in a three-factor solution. The first factor represents a 'Blood-Donor Cooperative Phenotype' with impure-altruism, reputation building, need-altruism, and reluctant-altruism all positively loading and forming a distinct factor along with a preference for 'rewards and recognitions'. All the mechanisms on this factor support blood

donor behaviour. The second factor contains the barriers to donation and the third factor is a kin-altruism/incentives factor. Need-altruism also has an inhibitory role on the kin-altruism/incentives factor. The same pattern is observed for Black and White people separately, and for donors and non-donors separately (Figure 1 and Supplementary File S8, Supplementary Tables S16 and S17 and Supplementary Table S18 for additional SUR models).

4 | DISCUSSION

We tested three key hypotheses: (i) need-altruism is associated with blood donor behaviour, (ii) kin-altruism is higher in Black people, and (iii) a preference for kin-altruism predicts seeing incentives as a good recruitment strategy, whereas need-altruism is linked to seeing rewards and recognitions as an effective strategy. We also explored the nature of a blood-donor-cooperative-phenotype. Several clear findings emerge. First, there is clear support for the first hypothesis, need-altruism, not kin-altruism, is expressed more highly in those who have previously donated and predicts future willingness-to-donate for non-donors. Supporting this finding, we observe that need-altruism is strongly associated with other MOA known to predict donor behaviour (impure-altruism, reluctant-altruism, and reputation building) and rewards and recognition, forming a blood-donor-cooperative-phenotype. Second, no support for hypothesis two is observed as kin-altruism is equally expressed across all lay people. However, Black-British people express lower levels of need-altruism, compared to White people. There is clear support for hypothesis three, with a preference for kin-altruism predicting a preference to view incentives as a good recruitment strategy and a preference for need-altruism predicting seeing rewards and recognitions as a good recruitment strategy. Importantly preference for incentives predicted willingness-to-donate in non-donors.

4.1 | Theoretical implications

Need-Altruism and the Blood Donor Cooperative-Phenotype and Blood Donation as a 'Risk-Pooling' activity: Need-altruism predicts willingness-to-donate in non-donors, is highly endorsed by donors, and loads on a 'blood-donor-cooperative-phenotype' with MOA that support blood donation (impure-altruism, reputation building and reluctant-altruism[1–6]) and non-financial rewards and recognition that support altruism.[30] Work should now start to more formally assess the blood-donor-cooperative-phenotype, based on a mixture of psychometrics (e.g., warm-glow), and behavioural economic games.[26,40,45,46] Economic games allow for formal behavioural assessment of cooperative preferences, to avoid any social desirability effects.[2] Specifically, some domain general games have been shown to be linked to blood donation such as the dictator game as well as its warm-glow variant.[40] Thus, using multi-group factor analysis, it would be possible to explore if the same domain-general cooperative-phenotype differentiates between different types of charitable giving (e.g., time, money, bodily substances) or if there are domain-specific cooperative-phenotypes that can be cross-validated with a psychometric assessment of preferences. The work reported here suggests that this is a definite possibility.

Need-altruism is central to need-based-transfer (NBT) systems supporting human altruism and cooperation to mitigate future risk.[47–50] In an NBT system, people enter into an agreement to help each other. When help is needed, the person (people) with sufficient resources, helps the person (people) who need help, without expectation of reciprocity, as long as this does not place the helper in need.[47–49] This unconditional help mitigates future risk by ensuring that everyone is helped and has access to resources if they are in need. This process of non-financial mutual risk management is termed 'risk-pooling'.[47] As need-based altruism is central to VNRBD, then it too may be characterised as a 'risk-pooling' system. That is, donors with sufficient resources (health), help recipients with fewer resources, with no expectation of reciprocity, but with the sense of future-proofing their own and their family's risk by ensuring that this is a sufficient supply of blood.[51,52] This risk-pooling social insurance policy is brokered by the blood services.

Acculturation and Barriers to Donation. It has been argued that through processes of acculturation, Black people are more willing to donate to a stranger, but the barrier is a belief that their blood will not be used.[53,54] Consistent with this, we observe that Black people endorse all barriers to donation, which include a lack of trust in healthcare professionals and the system, the idea that blood will be sold or a lack of certainty concerning what blood will be used for.

Lower Need-Altruism in Black People. We find no evidence that there is a greater preference for kin-altruism among lay people from Black communities compared to White communities. However, we do observe that need-altruism is lower in Black-British people in the UK. Lower levels of need-altruism have previously been reported in Black communities,[12] and thus, it may be that it is lower need-altruism acting as a barrier to donation in some Black communities rather than kin-altruism. Further work needs to identify what is driving the lower preference for need-altruism. However, it should be noted that while need-altruism is relatively lower it is still very high in absolute terms.

4.2 | Practical implications

Trust, health concerns and rewards: We replicate previous findings that impure-altruism and reluctant-altruism motivate donors.[5,6] We extend this by showing that reluctant-altruism is less motivating for Black people living in the UK. This adds to our growing understanding of the role of trust in motivating donations in Black people.[7] There is evidence that people from ethnic minority communities are more likely to consider donating blood if they trust others, indicating that what is important is that others also donate.[7] This is consistent with observed lower reluctant altruism, as reluctant altruism reflects a motivation to donate because others cannot be trusted to donate.[2,5] Thus, interventions that make the donation behaviour of others visible are likely to be effective.[7,55] We replicate findings that Black people have lower trust in healthcare.[7]

Consistent with other reports, people expressed concern that donating blood had negative health effects.[12,22,56] The negative effects of blood donation are starting to be recognised,[57] and as such, these concerns need to be addressed. We also show a clear difference in endorsement of strategies to encourage donation, with 'recognition' seen as important for Black-Nigerian people and 'incentives' as important for Black-British people, respectively.

Kin- and Need-altruism: The preference for kin-altruism did not differ across the lay communities we observed nor was it associated with blood donor behaviour. Need-altruism did predict blood donor behaviour, and was lower in Black-British people, therefore, an effective way to encourage blood donation would be to highlight the needs of the recipient.[58,59] This could be further strengthened by priming the concept of future cooperation and highlighting how friends and family would benefit from sufficient blood supply.[52]

4.3 | Limitations

While many of our reported findings replicate and extend previous findings, some, such as the positive association between kin-altruism and incentives, require replication in larger and more diverse samples to gauge the extent to which they can be generalised. This study has focused on Black communities, and while it has been noted that a preference for kin-altruism may be a potential barrier to blood donation in people from Asian communities,[16] our findings cannot be generalised to other ethnic minority communities.

AUTHOR CONTRIBUTIONS

Ferguson E, Dawe-Lane E, Ajayi 0, Osikomaiya B, Okubanjo A conceived and designed the study and contributed to the acquisition of these data. Ferguson E, Dawe-Lane E, Mills R analysed these data. Ferguson E, Dawe-Lane E, Ajayi 0, Osikomaiya B, Okubanjo A, Mills R contributed to the interpretation of these data. Ferguson E drafted the initial manuscript and all authors contributed to re-drafting and critically revising the manuscript for intellectual content. All authors provided final approval for the version to be published.

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CONFLICT OF INTEREST STATEMENT

The authors have no competing interests.

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Additional supporting information can be found online in the Supporting Information section at the end of this article.

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