

Motivators of and barriers to becoming a COVID-19 convalescent plasma donor: a survey study

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## ABSTRACT

**Objectives.** To determine the motivators and barriers to COVID-19 convalescent plasma donation by those in the UK who have been diagnosed with, or who have had symptoms of SARS-CoV-2 (COVID-19) but who have not donated.

**Background.** Convalescent plasma from people recovered from COVID-19 with sufficient antibody titres is a potential option for treatment and prevention of COVID-19. However, to date, recruiting and retaining COVID-19 convalescent plasma donors has been challenging. Understanding why those eligible to donate COVID-19 convalescent plasma have not donated is critical to developing recruitment campaigns.

**Methods/Materials.** Four hundred and nineteen UK residents who indicated they had been infected with COVID-19 and who lived within 50km of sites collecting COVID-19 convalescent plasma completed an online survey between June 25<sup>th</sup> and July 5<sup>th</sup> 2020.

Respondents completed items assessing their awareness of convalescent plasma, motivations and barriers to donation and intention to donate COVID-19 convalescent plasma.

**Results** Awareness of COVID-19 convalescent plasma was low. Exploratory factor analysis identified 6 motivations and 7 barriers to donating. A stronger sense of altruism through adversity and moral and civic duty were positively related to intention to donate, while generic donation fears was negatively related.

**Conclusions.** Once potential donors are aware of convalescent plasma, interventions should focus on the gratitude and reciprocity that those eligible to donate feel, along with a focus on (potentially) helping family and norms of what people ought to do. Fears associated with donation should not be neglected and strategies successfully deployed to recruit whole-blood donors adapted and deployed.

**Key words:** COVID-19 convalescent plasma, blood donors, pandemic, motivations, barriers

## INTRODUCTION

With currently limited treatment options for COVID-19, convalescent plasma from people recovered from COVID-19 with sufficient antibody titres is a potential option for treatment and prevention.<sup>1,2</sup> Convalescent plasma has previously been investigated as a treatment for many infectious diseases including those caused by other coronaviruses such as SARS-CoV and MERS-CoV, and early reports of its use in SARS-CoV-2 infection (COVID-19) showed some promise.<sup>1</sup> As a consequence, many trials of COVID-19 convalescent plasma are in progress, with 65 centres across 24 countries indicating that they were planning to collect and administer COVID-19 convalescent plasma to COVID-19 patients.<sup>3</sup> If these trials confirm efficacy of COVID-19 convalescent plasma, such as a mortality reduction, then demand for COVID-19 convalescent plasma will grow substantially.

While the focus of research has been on establishing the efficacy of COVID-19 convalescent plasma as a direct or manufactured treatment for COVID-19, little attention has been paid to the producers of COVID-19 convalescent plasma – the donors. Given the scale of the pandemic, Bloch and colleagues<sup>1</sup> noted that “finding donors is not anticipated to be a problem”. In reality the effective recruitment and retention of sufficient numbers of COVID-19 convalescent plasma donors who are eligible, have sufficient antibody titres, and are willing to donate has proved challenging with both the American Red Cross<sup>4</sup> and NHS Blood and Transplant<sup>5</sup> issuing urgent appeals for COVID-19 convalescent plasma donors in August 2020. Such a reticence in eligible convalescent plasma donors has been seen previously.<sup>6,7</sup> However, little is known about why this is and indeed nothing is known about what deters and motivates someone to become and remain a COVID-19 convalescent plasma donor.

Work on H1N1, the pandemic influenza strain that originated in 2009 and Ebola convalescent plasma donors suggested that fear about the process (e.g., fear of needles), the stigma of having been infected, and a sense that donating will impede recovery all deterred potential donors.<sup>6-8</sup> Further, trust in the institutions collecting convalescent plasma, solidarity with those currently infected, and belief in the efficacy of the treatment resulting from convalescent plasma enhanced willingness to be a convalescent plasma donor for Ebola.<sup>7</sup>

While these studies are informative, they are limited in being specific to H1N1 and Ebola. Early research on survivors of COVID-19 has identified similar themes in their illness narratives (e.g., guilt, fear, dichotomy of praise and stigma), however we do not yet know if previously identified barriers and motivators to convalescent plasma donation will generalize.<sup>9</sup> H1N1, Ebola, and COVID-19 are thought to differ substantially in mortality rates and this may influence how survivors feel about their illness, their survival and donating convalescent plasma<sup>10-12</sup>. Further, work on the preference/motivations for cooperative behaviour linked to tissue donation (blood, organs, gametes) has advanced greatly in recent years.<sup>13</sup> Thus, a comprehensive analysis of the motivation structure of convalescent plasma donors requires we move beyond what we know for convalescent plasma in Ebola and H1N1. For example, constructs like reluctant altruism – whereby people are motivated to help as the majority either cannot or will not – are very pertinent here, as those eligible to donate COVID-19 convalescent plasma are a minority.<sup>13-17</sup>

Likely also important in the decision to donate COVID-19 convalescent plasma are beliefs that result from the experience of COVID-19. Those eligible to donate COVID-19 convalescent plasma may experience gratitude at having survived a traumatic event, promoting a greater desire to help others: altruism borne from adversity.<sup>18,19</sup> Gratitude can

engender direct reciprocity (paying back a debt to the health services) or upstream (pay-it-forward) indirect reciprocity, where the COVID-19 convalescent plasma donor feels gratitude for having been helped and a want to help others.<sup>19</sup> Similarly, those who have survived COVID-19 may experience aspects of post-traumatic growth with perceptions of personal strength, and the finding of meaning in survival, potentially motivating donation.<sup>20</sup> These motivating factors may, however, be tempered by uncertainty about infectiousness, both in terms of potentially infecting others or becoming reinfected themselves.<sup>21</sup>

Aside from personal experience, context is also likely important. The media narrative of the COVID-19 pandemic has varied across countries, but in the UK has focused on the fight against an unseen enemy.<sup>22</sup> Consistent with appeals in times of crisis this has very much mirrored a wartime ‘call to arms’ to fight a national threat.<sup>23</sup> In the framing of COVID-19, notions of patriotism and the moral and civic duty of individuals have been common both in proclamations by governments and in the popular media.<sup>23-25</sup>

Accordingly, those members of the public with the (potential) ability to save others have been hailed ‘heroes’.<sup>23,26,27</sup> Civic duty motivates the donation of biological material (specifically, organs) and, given the contextual salience of the link between COVID-19 and moral/civic duty in the UK, may influence how those eligible think about donating COVID-19 convalescent plasma.<sup>28</sup>

An understanding of the impact of the framing of the pandemic on potential donors is important in developing strategies to ensure a future supply of COVID-19 convalescent plasma. The approach of identifying the motivators first then developing interventions to reflect these has proven to be successful in other area of health-based cooperation around

tissue donation. This is especially the case for whole blood and plasma donation.<sup>29,30</sup> The objective of this study is to do the same for COVID-19 convalescent plasma, with this the first study to report on the motivations and barriers of potential COVID-19 convalescent plasma donors. We also provide recommendations for how to most effectively recruit COVID-19 convalescent plasma donors based on the findings.

## MATERIALS AND METHODS

### Sampling procedure and sample size calculations

This study was approved by the University of Queensland Health and Behavioural Sciences, Low and Negligible Risk Ethics Sub-Committee (Ref: 2020001347), the Australian Red Cross Lifeblood Human Research Ethics Committee (Ref: 11062020) and the University of Nottingham Ethics Committee (Ref: F1257). Potentially eligible COVID-19 convalescent plasma donors were recruited via the online panel Prolific Academic between June 25<sup>th</sup> and July 5<sup>th</sup> 2020. At the time of data collection, confirmed cases of COVID-19 in the UK had fallen from their initial peak in early April of over 5,000 per day to less than 900<sup>31</sup>, and the widespread lockdown restrictions imposed during the early phases of COVID-19 were beginning to ease.<sup>32</sup> Reflecting the eligibility criteria to donate COVID-19 convalescent plasma in the UK, respondents were eligible to participate in this cross-sectional survey if they indicated that they had previously been infected with SARS-CoV-2, were fit and healthy, weighed between 50-158kg, were aged between 17-66 years (or 70+ if they had given a full blood donation in the last 2 years), and lived within 32 miles (50km) of one of the COVID-19 convalescent plasma collection sites in England, Scotland, Wales and Northern Ireland listed.

The main focus of the analyses was to explore the latent structure of the motivations and barriers of potentially eligible COVID-19 convalescent plasma donors. As such, we aimed to sample enough participants to ensure we could recover a stable factor structure. While many rules of thumb guide this decision<sup>33,34</sup>, a Monte-Carlo simulation showed that factor saturation (the average loading on a factor) and absolute sample size are the key determinants.<sup>35</sup> If saturation is high (0.6 or greater) then an absolute sample size of 150 is sufficient, if it is lower (0.4) then a minimum sample size of 300 is required. We assumed low saturation and sought a minimum sample of 300.

### **Materials and measures**

After reading information about the study and providing informed consent, participants were initially asked to indicate the month in which they tested positive or had symptoms of COVID-19, before being asked their current health using a single item adapted from the Short Form Health Survey<sup>36</sup> ('Right now, would you say your health is?' with response options of very good, good, fair, bad, very bad). Respondents were then asked to indicate whether they had heard of convalescent plasma (Yes, No). Those who answered 'yes' were asked to indicate how they knew about convalescent plasma and where they had obtained this information from.

Participants were then given standard information on COVID-19 convalescent plasma adapted from NHSBT websites<sup>37,38</sup> before being asked if they had attempted to donate convalescent plasma (yes, no). Those who indicated yes were asked if they had successfully donated convalescent plasma (yes, no) and whether they intended to continue donating convalescent plasma ('I intend to continue donating convalescent plasma', 1 *strongly disagree* – 7 *strongly agree*). Those who indicated that they had not attempted to donate



were asked to indicate their agreement with the statement ‘I intend to donate convalescent plasma’ on a 1 *strongly disagree* to 7 *strongly agree* scale.

Following this, participants were presented with 56 statements assessing (potential) motivators for/facilitators of donating COVID-19 convalescent plasma and deterrents and barriers to donating COVID-19 convalescent plasma (see Table 1). Barrier statements focused on participants’ self-perception that they were not yet well enough to donate<sup>7,40</sup>, concern about poor recovery following donation<sup>6,7</sup>, lack of familiarity with the plasmapheresis process<sup>6,7</sup>, general physical and logistical barriers to donating<sup>6,7</sup>, stigma associated with being identified as someone who had been infected with COVID-19<sup>7,9</sup>, (lack of) trust in medical personnel/institutions<sup>7</sup> and fear of infecting others/self. Motivating statements focused on solidarity with those currently experiencing COVID-19<sup>7</sup>, trust in the efficacy of the treatment<sup>7</sup>, moral and civic duty to donate<sup>23-25</sup>, altruism through adversity<sup>17,18</sup>, post-traumatic growth<sup>20,40</sup>, reluctant altruism<sup>13</sup> and patriotism and control<sup>25</sup>. All items were responded to on 1 (*strongly disagree*) to 7 (*strongly agree*) scales.

### **Statistical analyses**

Following initial examination of the data through descriptive statistics, we conducted exploratory factor analysis (EFA) using *MPlus* 8.1<sup>41</sup>. An exploratory, rather than a confirmatory analytic approach, was justified as (1) we had no formal model to represent the broad theoretical domains drawn on, and (2) these analyses focused on a novel domain with a mix of constructs that had not been examined together before. Therefore, an EFA approach was the most informative. However, the interpretation was informed by the conceptual domains examined.

The EFA analysis was estimated using a weighted least squares with mean and variance adjusted (WLSMV) estimator and GEOMIN oblique rotation. We used oblique rotation as within behavioural science research some degree of association is assumed and expected between factors, and oblique rotation allow for factors to have varying degrees of association including no association, while orthogonal rotation does not. A number of different factor models were compared with respect to the following goodness-of-fit indices: chi-square, a comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA). Within exploratory factor analysis the chi-square statistic should be non-significant, however as this statistic is sample size specific a non-significant chi-square is rarely achieved and its use is contentious.<sup>42</sup> As such, it is included for completeness only. The CFI and TLI should be 0.95 or greater and RMSEA below 0.08.<sup>43-45</sup> The chi-square difference test was used to compare across the different model solutions. If the chi-square difference is significant the model with the greater number of factors is selected. As an additional test of the adequacy of the solution, we calculated the factor stability coefficient (Y: the average distance between the sample and population loading) for each factor using the equation specified in Guadagnoli and Velicer<sup>35</sup> There is no calibration for this coefficient so the smaller the number the more stable the factor is.<sup>34</sup>

Following identification of the optimal factor solution, composite measures of each factor were created. Correlations between these measures, self-perceptions of eligibility to donate blood, and intention were examined, prior to multiple regression being undertaken to determine which barriers and motivators were significantly related to intention.

## **RESULTS**

### **Sample characteristics**

Participants were 432 (281 female, 150 male, 1 gender non-specified) UK residents aged 18 to 71 years ( $M=34.38$ ,  $SD=10.41$ ). Of these, 306 (70.8%) believed themselves currently eligible to donate blood, 85 (19.7%) were unsure, and 41 (9.5%) believed themselves currently ineligible to donate. In addition, 56 (13.0%) had donated blood in the last 12 months, while a further 37 (9.9%) had attempted to donate. Participants were asked to self-identify their ethnicity. We used the UK Office of National Statistics (ONS) system to categorize these self-identifications into 5 higher order codes. Of those who provided a self-identified ethnicity (some reported a religion or that they were British) 85.6% identified as White, 3% as Black/African/Caribbean/Black British, 4.2% as Asian/Asian British, 5.9% as Mixed/Multiple Ethnic Groups and 1% as other ethnic groups. These broadly correspond to the UK statistics on ethnic diversity of 87.2% White, 3% Black/African/Caribbean/Black British, 3.8% Asian/Asian British, 2% Mixed/Multiple Ethnic Groups and 7.2% other ethnic groups.<sup>46</sup>

Most participants (213; 49.8%) reported that they experienced COVID-19 in March 2020, and that their current health was 'very good' (25.5%) or 'good' (58.3%). Only 1.9% indicated that their current health was 'bad'.

One hundred and forty-eight respondents (34.3%) indicated that they had heard of convalescent plasma, with a further 40 respondents (9.3%) unsure as to whether they had heard of convalescent plasma. Nine stated that they had attempted to donate COVID-19 convalescent plasma, 419 that they definitely had not and 4 were unsure. Among the 9 respondents (2.1%) who had attempted to donate, only one successfully donated. Of those who had attempted, 4 had enquired about donating but had not yet heard back, 2 had veins

that were not suitable for plasmapheresis, and 2 could not secure an appointment when they were able to donate.

### **Exploratory Factor Analysis**

The EFA was conducted on the data from those who had not yet attempted to donate convalescent plasma (n=419: there was no missing data). The chi-square difference test showed the 13-factor model was a significantly better fit to these data than a 12-factor model,  $\chi^2_{(\text{diff})} = 144.390 (40)$ ,  $p = .0000$ . This model showed an excellent fit to these data TLI = .954, CFI = .975, RMSEA = .044 (90% CI = .040, .047,  $p = .998$ ),  $\chi^2_{(40)} = 1307.624 (728)$ ,  $p = .0000$  and readily interpretable with respect to the initial constructs considered (see Table 1). We also examined the fit and interpretability of models with fewer potential factors (8-12). The RMSEA was significant for the 8- and 9-factor models and the TLI was below the .95 cut-off for the 8- to 11-factor models. While the fit was good for the 12-factor model (CFI = .971, TLI = .951, RMSEA = .045 (90% CI = .041, .049,  $p = .990$ )) the 13-factor model showed incremental fit in terms of the Chi-square difference test ( $\chi^2_{(\text{diff})} = 144.390 (40)$ ,  $p = .0000$ ). Thus, the 13-factor model was selected.

Ten of the factors showed good factor saturation (0.6 or greater) and 3 lower saturation (0.4 or great), which with an absolute sample size of 419 suggests that the solution is stable. Indeed, all the factors had small to negligible factor stability estimates indicating that the sample factor and loadings were close to the population values. Finally, all of the factors demonstrated good internal reliability. Therefore, the psychometric properties of these factors and this solution are excellent.

### **Factor descriptives**

An examination of mean scores on the composite measures showed that, on average, perceptions of barriers to donating COVID-19 convalescent plasma were low (and significantly below 4, the midpoint of the scale,  $t_s > -6.77$ ,  $p_s < 0.001$ ). Endorsement of the facilitators signalling reluctant altruism, altruism through adversity, and moral and civic duty were significantly above the scale midpoint ( $t_s > 6.15$ ,  $p_s < 0.001$ ), while endorsement of post-traumatic growth, and patriotism and control were significantly below the scale midpoint ( $t_s > -6.30$ ,  $p_s < 0.001$ ; Table 2). Participants' endorsement of reluctant altruism as a motive did not differ significantly from the scale midpoint. Further, participants' endorsement of all facilitators and barriers did not differ significantly by perceived eligibility to donate (see Table 2).

### **Predicting COVID-19 convalescent plasma behavioural intentions**

Variables with significant bivariate correlations with intention (see Supplementary File Table S1) were entered into a multivariable, hierarchical OLS regression model with perceived eligibility at step 1 and the motivations and barriers at step 2. At Step 1, perceived eligibility was a positive predictor with those who perceived themselves as eligible more likely to intend to donate COVID-19 convalescent plasma. Motivators and barriers accounted for an additional 32% of variance in intention to donate COVID-19 convalescent plasma, with altruism from adversity ( $\beta = .25$ , 95% CI [ 0.17, 0.46],  $p < .001$ ,  $sr^2 = 0.03$ ) and moral and civic duty ( $\beta = .13$ , 95% CI [ 0.01, 0.37],  $p = .042$ ,  $sr^2 = 0.01$ ) positively related to intention, while generic donation fears ( $\beta = -.16$ , 95% CI [-0.20, -.043],  $p = .003$ ,  $sr^2 = 0.01$ ) was negatively related (Table 3).

## **DISCUSSION**

To increase the number of COVID-19 convalescent plasma donors, and progress trials and eventual large-scale deployment of COVID-19 convalescent plasma, we need to understand what motivates and deters donation. Creating awareness of convalescent plasma among potential donors is a necessary but not sufficient<sup>47</sup> first step, with understanding eligible donors' motivations and barriers also key. While all of our sample met basic eligibility criteria to donate COVID-19 convalescent plasma, surprisingly, 55% had not heard of convalescent plasma. Thus, at the time of data collection, awareness of convalescent plasma amongst those potentially eligible to donate in the UK was low. Attention or awareness is the first step for effective persuasion<sup>47</sup>, and recruitment efforts need to focus on disseminating information about the importance of COVID-19 convalescent plasma and eligibility criteria through the optimal channels to reach those recruiting agencies wish to donate. These may be donors with demographic characteristics that are typically associated with higher rates of retention (e.g., older individuals<sup>48</sup>) or, if demonstrated, donors with demographic or infection characteristics that make them more likely to have sufficient antibody titres.<sup>49</sup>

Critically, however, our data suggests that even when the barrier of awareness is addressed, broader beliefs about donating and COVID-19 impact intentions to donate COVID-19 convalescent plasma. The strongest motivator of intention was 'altruism from adversity' – beliefs centred around gratitude and reciprocity. The emergence of this as a main predictor is theoretically and practically of significance. Theoretically, it is consistent with approaches that highlight that adversity results in people aligning with wanting to help others.<sup>17,18</sup> This want is motivated by gratitude and debt that reflects both upstream and down-stream indirect reciprocity. In the context of COVID-19, gratitude focuses on having survived and is generalized (e.g., grateful for the beauty of the world<sup>19</sup>). This type of gratitude should link to upstream indirect (pay-it-forward) reciprocity motivating people to want to help those who

not been directly involved in helping the donor. For those without other ways to assist, then donating COVID-19 convalescent plasma may be a comparatively easy way to help. The desire to repay a debt to medical services is linked to down-stream (pay-it-back) reciprocity. While this can sometimes be a ‘dark-side’ of altruism associated with coercion<sup>50</sup>, the association of both gratitude and debt in the same factor with the general goal of helping others suggests that here debt has a positive sense of repayment.

Practically, this suggests that emphasising the gratitude felt at surviving COVID-19 and what that means for the person<sup>51-53</sup> may be useful to recruit and potentially retain COVID-19 convalescent plasma donors. Further, the principle of Voluntary Reciprocal Altruism (VRA) that has been effectively used in organ donation<sup>54,55</sup> could also be useful. A VRA intervention would ask people to consider if they would have a transfusion of COVID-19 convalescent plasma in the future if they needed it and if so would they consider donating COVID-19 convalescent plasma. This could be effectively applied in both recruiting new donors in a general advertisement and adapted slightly for those **those who have been treated with convalescent plasma and who are now eligible to donate** (e.g., “as someone who had convalescent plasma, and are now recovered, would you be willing to help others in a similar position”). This would also tap into the idea of advantageous inequality aversion that has been highlighted as a motivation for donating blood.<sup>56</sup>

Moral and civic duty was also a significant predictor of intention to donate COVID-19 convalescent plasma. In this, the focus was more on family and friends, rather than others in general, and links to mechanism of duty and injunctive norms (what people ought to do). There is growing evidence that norms can be used effectively to motivate cooperation and prosocial behaviour<sup>57</sup>. For example, “what do you personally think is the morally right thing

to do in this situation?” However, caution is needed here not to trigger guilt but activate prosocial emotions. One option is to actively encourage the potential donor to think of helping those close to them and rely on models of inclusive fitness and kin-selection which shows that people differentially help family over strangers<sup>58,59</sup>. Interventions here could ask people to consider donating to help a diversity of people from strangers through to family with this triggering kin-mechanisms.

Both of these approach motivations however were countered by general fears about donating and the donation process. It is not surprising that donation fears were negatively associated with intention to donate. Fears associated with donation, particularly of needles, are well known barriers to blood donation<sup>60</sup>, while concerns specific to the apheresis procedure, particularly the return of red cells, are known deterrents to donating plasma.<sup>61</sup> The cultural context must be taken into consideration in interpreting these findings, as UK residents have not previously been able to routinely donate plasma by apheresis, nor donate blood products if they have previously received a transfusion. Recruitment and retention materials could therefore pair VRA messaging with information designed to demystify the apheresis process through explaining what donors can expect when donating COVID-19 convalescent plasma and building self-efficacy to attempt donation.<sup>62</sup> This strategy may be particularly effective for those without prior donation experience who are contacted to donate only on the basis of their positive COVID-19 test result. A number of interventions have been developed and trialled to encourage those without experience of donation to attempt donation<sup>28,29</sup> and adaption of these materials may be useful in encouraging those eligible to donate COVID-19 convalescent plasma.



While this research drew on the interdisciplinary literature and represents the first attempt to identify beliefs critical to target to encourage non-donors to donate COVID-19 convalescent plasma, this contribution needs to be considered in light of the limitations of our approach.

In order to rapidly obtain data we employed a convenience sampling method recruiting from the four nations comprising the UK, and the disproportionate representation of women, the young, and those not targeted by recruiting agencies<sup>49</sup> (e.g., Asian, Asian/British) in our sample potentially limits the generalisability of our results. Further, as we were primarily concerned with the general motivational profile of potential donors, the variation in background information about donating COVID-19 convalescent plasma from the different recruitment strategies of the four nations comprising the UK was not detected in our data. However, it is notable that despite the different strategies of the four nations, general awareness of the need for convalescent plasma at this time was low.

In addition, given our focus on those who had not donated COVID-19 convalescent plasma and our measurement rather than intervention focus, we assessed only intention rather than behaviour. However, this was done knowing that behavioural intentions are strong predictors of actual behaviour.<sup>63</sup> Finally, our data are limited in only reflecting the motivations and barriers for those eligible to donate in the UK. Identifying how these motives and barriers are present and influence behaviour in other countries and contexts remains critical to ensure a sufficiency of CCP in the global fight against COVID-19.

The implications of these results for UK policymakers is clear. First awareness of the importance COVID-19 convalescent plasma as a potential treatment option for COVID-19 needs to be ensured using diverse channels to target (likely) optimal groups – either demographic groups with typically higher (blood donation) retention rates<sup>48</sup> or groups with a

statistically greater chance of having sufficient antibody titres.<sup>49</sup> Campaigns should target the motivating power of altruism from adversity, harnessing the gratitude and want to repay those eligible to donate COVID-19 convalescent plasma feel.<sup>51-53</sup> Interventions derived from Voluntary Reciprocal Altruism (VRA) may be useful.<sup>54,55</sup> Similarly, targeting perceptions of moral and civic duty through a focus on (potentially) helping family and injunctive norms or what people ought to do may be productive in interventions.<sup>57</sup> Fears associated with donation should be explicitly acknowledged and strategies that have previously been successfully deployed to recruit whole-blood donors could be adapted and deployed to recruit convalescent plasma donors.<sup>29,30</sup>

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BM conducted the research and BM and EF took primary responsibility for data analysis.

BM, EF, and RT drafted the manuscript and all authors contributed to revising the

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criteria and that no others meeting the criteria have been omitted.



Table 1. Motivation and barriers factors, internal reliability, factor stability coefficients, items and item factor loadings.

	Factor saturation	Y	Cronbach's alpha ( $\alpha$ ) or correlation ( $r$ ) for 2 item measures	Items	Factor loading
<i>Barriers</i>					
Worry that others will know of COVID-19 infection	0.838	0.014	.90	In general, I do not want people to know that I have had coronavirus	0.712
				If people found out that I have had coronavirus, I am worried how they would react to me	0.918
				I am concerned that some people may avoid me if they know I've had coronavirus	0.884
Infection and process risk to self and others	0.635	0.038	.83	I worry that I may inadvertently infect others with coronavirus through donating	0.598
				Donating convalescent plasma will set my recovery back	0.727
				I will become ill again if I donate convalescent plasma	0.834
				I would feel like a guinea pig if I donated convalescent plasma	0.348
				I am scared of what might be involved in donating convalescent plasma	0.502
I don't understand what donating convalescent plasma involves	0.802				

	Factor saturation	Y	Cronbach's alpha ( $\alpha$ ) or correlation ( $r$ ) for 2 item measures	Items	Factor loading
Logistics	0.724	0.028	.83	I do not want to travel to the donor centre to donate convalescent plasma	0.739
				It is just too inconvenient to donate	0.787
				Logistically, it is just too difficult for me to donate convalescent plasma (because of childcare/transport limitations etc.)	0.647
Not well enough	0.488	0.061	.82	I do not really feel well enough to donate convalescent plasma	0.511
				Others who are fitter than me can donate convalescent plasma	0.343
				I need more time to recover from coronavirus before I could donate	0.464
				I have spent too long in hospital settings recently	0.480
				I have been through enough recently	0.481
				I do not think I would physically be able to donate convalescent plasma	0.411
Generic donation fears	0.691	0.032	.79	I do not like needles	0.875
				I am frightened of blood	0.826
				I do not like the idea of donating convalescent plasma	0.372
				I do not trust the Blood Collection Agencies	0.804

	Factor saturation	Y	Cronbach's alpha ( $\alpha$ ) or correlation ( $r$ ) for 2 item measures	Items	Factor loading
Lack of trust in institutions	0.8045	0.018	$r=.75$	I do not trust doctors	0.805
Fear of re-infection	0.435	0.063	$r=.48$	I do not want to be around other people in the donor centre in order to donate convalescent plasma	0.549
				I am worried about getting re-infected if I donate convalescent plasma	0.321
<i>Facilitators</i>					
Signalling reluctant altruism	0.508	0.054	.82	Donating convalescent plasma will make others feel more positively about me	0.674
				If I donate convalescent plasma it will be a story I can tell others about	0.578
				Through donating convalescent plasma, I can be a hero and help others	0.645
				I am in a unique position to help by donating convalescent plasma where other people cannot	0.375
				There are very few people who can help through donating convalescent plasma	0.292
				Donating convalescent plasma would make me feel proud	0.486
	0.604	0.043	.78	I feel grateful that I survived coronavirus	0.731

	Factor saturation	Y	Cronbach's alpha ( $\alpha$ ) or correlation ( $r$ ) for 2 item measures	Items	Factor loading
Altruism from adversity				I want to feel part of the amazing effort to beat coronavirus	0.515
				I feel a debt to the medical staff and care workers who looked after me	0.597
				I like to help others, and donating convalescent plasma is just one way I can help	0.444
				I want to help others not get as ill as I was with coronavirus	0.732
Post traumatic growth	0.726	0.028	$r=.63$	I survived coronavirus, and feel that this must have been for a reason	0.693
				Surviving coronavirus makes you a strong person	0.759
Moral and civic duty to help research	0.449	0.061	.77	Donating convalescent plasma will help research into coronavirus treatments	0.498
				Donating convalescent plasma will potentially help my family and friends if they get ill	0.525
				I do not think that convalescent plasma will be an effective therapy for coronavirus ®	-0.483
				My friends and family would not want me to donate convalescent plasma ®	-0.322
				I would feel guilty if I did not donate convalescent plasma	0.328

	Factor saturation	Y	Cronbach's alpha ( $\alpha$ ) or correlation ( $r$ ) for 2 item measures	Items	Factor loading
				Donating convalescent plasma would be the morally right thing to do	0.609
				For me, donating convalescent plasma would be - The wrong thing to do: The right thing to do	0.376
Patriotism and control	0.683	0.033	.84	Donating convalescent plasma is a way to repay being saved	0.602
				Donating convalescent plasma would give me a sense of patriotic duty and national pride	0.726
				Donating convalescent plasma would help me get some sense of control back over my life	0.910
				I have felt a little 'down' since recovery and donating convalescent plasma is something I can do to pull myself back up	0.495
Reluctant altruism	0.831	0.015	r=.65	I do not trust that others in my position would be able to donate their plasma	0.928
				I do not trust that others in my position will want to donate their plasma	0.734

Note. Cronbach alphas/r calculated with whole sample. Y= factor stability estimate. All items responded to on 1-7 scales. Scale endpoints are strongly disagree to strongly agree. (R) indicates reversed item in composite scale.

Table 2. Means and standard deviations on continuous measures for whole sample and by perceived eligibility, significance of deviation from the midpoint of the scale (4) and significance of the difference in endorsement for those eligible and not eligible to donate (n=419)

Scale	Overall (n=419)	Significance of deviation from midpoint of the scale (4) <sup>†</sup>	Eligible (n=378)	Not eligible (n=41)	Significance of difference between those eligible and not eligible to donate <sup>†</sup>
<i>Barriers</i>					
Worry that others will know of COVID-19 infection	2.71 (1.61)	$t(418) = -16.36, p < 0.001$	2.73 (1.62)	2.60 (1.47)	$t(417) = -0.472, p = .637$
Infection and process risk to self and others	2.88 (1.26)	$t(418) = -18.23, p < .001$	2.89 (1.24)	2.83 (1.42)	$t(417) = -0.273, p = .785$
Logistics	3.45 (1.67)	$t(418) = -6.78, p < 0.001$	3.45 (1.67)	3.45 (1.72)	$t(417) = 0.003, p = .997$
Not well enough	2.78 (1.23)	$t(418) = -20.29, p < .001$	2.72 (1.22)	3.27 (1.31)	$t(417) = 2.704, p = .007$
Generic donation fears	3.18 (1.68)	$t(418) = -10.08, p < .001$	3.19 (1.68)	3.02 (1.62)	$t(417) = -0.638, p = .524$
Lack of trust in institutions	2.12 (1.36)	$t(505) = -28.26, p < .001$	2.11 (1.35)	2.18 (1.54)	$t(417) = 0.320, p = .749$
Fear of re-infection	3.15 (1.62)	$t(505) = -10.75, p < .001$	3.14 (1.60)	3.23 (1.82)	$t(417) = 0.348, p = .728$
<i>Facilitators</i>					
Signalling reluctant altruism	4.33 (1.09)	$t(418) = 6.16, p < 0.001$	4.31 (1.08)	4.48 (1.14)	$t(417) = 0.962, p = .336$
Altruism from adversity	4.90 (1.04)	$t(418) = 17.77, p < .001$	4.90 (1.04)	4.95 (1.07)	$t(417) = 0.280, p = .780$
Post traumatic growth	3.53 (1.52)	$t(418) = -6.31, p < .001$	3.52 (1.53)	3.65 (1.38)	$t(417) = 0.507, p = .613$
Moral and civic duty to help research	5.01 (0.96)	$t(418) = 21.52, p < 0.001$	5.01 (0.96)	5.01 (0.96)	$t(417) = 0.004, p = .997$
Patriotism and control	3.34 (1.39)	$t(418) = -9.68, p < 0.001$	3.32 (1.39)	3.60 (1.38)	$t(417) = 1.230, p = .219$
Reluctant altruism	3.90 (1.34)	$t(418) = -1.49, p = 0.136$	3.88 (1.35)	4.13 (1.26)	$t(417) = 1.165, p = .245$

<sup>†</sup>Bonferroni correction ( $p \leq 0.003$ ) applied to alpha to protect against Type 1 errors.

Table 3. Hierarchical multiple regression of perceptions of eligibility, barriers and facilitators onto intention to donate convalescent plasma (n=418)

Step	Predictor	B	Std. Error	Beta	t	Significance	95% lower CI	95% higher CI
1								
	Constant	3.756	.208		18.040	.000	3.347	4.165
	Perceived eligibility to donate	.458	.219	.102	2.090	.037	.027	.889
2								
	Constant	1.611	.562		2.867	.004	.507	2.716
	Perceived eligibility to donate	.527	.188	.117	2.797	.005	.157	.898
	Worry that others will know of COVID-19 infection	-.011	.042	-.013	-0.251	.802	-.094	.072
	Infection and process risk to self and others	-.125	.072	-.117	-1.738	.083	-.266	.016
	Logistics	-.053	.043	-.066	-1.211	.227	-.138	.033
	Not well enough	-.028	.071	-.026	-0.394	.694	-.168	.112
	Generic donation fears	-.126	.042	-.158	-2.992	.003	-.209	-.043
	Lack of trust in institutions	.058	.052	.059	1.098	.273	-.045	.160
	Fear of re-infection	.006	.049	.007	0.122	.903	-.091	.103
	Signalling reluctant altruism	.045	.076	.036	0.588	.557	-.105	.194
	Altruism from adversity	.318	.073	.247	4.362	.000	.174	.461
	Moral and civic duty to help research	.187	.092	.134	2.043	.042	.007	.367
	Patriotism and control	.101	.055	.105	1.822	.069	-.008	.210
	Reluctant altruism	-.009	.043	-.009	-0.200	.841	-.094	.077

## **Supplementary Materials**

### **Simple associations of eligibility, barriers and facilitators with covid-19 convalescent plasma behavioural intentions**

Correlational analyses (Table S1) showed that all variables, with the exception of post traumatic growth were significantly related to intention to donate covid-19 convalescent plasma. Signalling reluctant altruism, altruism from adversity, moral/civic duty to donate and patriotism and control were significantly positively related to intention, while worry that others would know of covid-19 infection, infection/process risk, logistics, generic donor fears, not feeling well enough, lack of trust in the institutions, fear of reinfection and reluctant altruism were significantly negatively related to intention to donate. Perceived eligibility to donate blood was significantly positively related to intention.



Table S1. Summary of intercorrelations for scores on intention and each of the barrier and facilitator constructs.

Variable	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Intention
A Worry	1.00	.47***	.31***	.50***	.33***	.36***	.42***	.03	.05	.27***	-.31***	.27***	.20***	.02	-.13**
B Infection/process risk		1.00	.50***	.68***	.57***	.51***	.64***	-.10*	-.13*	.25***	-.55***	.07	.22***	.01	-.33***
C Logistics			1.00	.54***	.38***	.41***	.56***	-.18***	-.17**	.01	-.40***	-.09	.19***	.00	-.29***
D Not well enough				1.00	.52***	.52***	.58***	-.08	-.01	.25***	-.44***	.16**	.22***	-.13*	-.26***
E Generic donation fears					1.00	.45***	.40***	-.19*	-.20*	.07	-.48***	-.08	.16**	.03	-.36***
F Lack of trust						1.00	.44***	-.19***	-.22***	.09	-.53***	.01	.20***	-.02	-.25***
G Reinfection fear							1.00	-.05	-.01	.26***	-.45***	.15**	.22***	-.02	-.21***
H Signalling reluctant altruism								1.00	.61***	.29***	.51***	.60***	.08	-.05	.36***
I Altruism from adversity									1.00	.30***	.49***	.51***	-.07	-.01	.43***
J Post traumatic growth										1.00	-.07	.42***	.05	-.03	.05
K Moral/civic duty											1.00	.29***	-.16**	.00	.45***
L Patriotism/control												1.00	.01	-.06	.29***
M Reluctant altruism													1.00	-.06	-.11*
N Eligibility														1.00	.10*

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . n=419

