

# The Blood Donation Ambivalence Survey: measuring conflicting attitudes about giving blood

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## SUMMARY

**Objectives:** This study was designed to develop and conduct initial validation testing for a novel measure of ambivalence about donating blood.

**Background:** Previous studies of living organ, bone marrow and stem cell donors have identified donation-related ambivalence as a predictor of decisions about donation and post-donation outcomes. Ambivalence about blood donation has not received the same attention.

**Methods:** In Study 1, a sample of young adults ( $N = 396$ ) were administered test items of ambivalence, and exploratory (EFA) and confirmatory factor analyses (CFA) were performed to identify the Blood Donation Ambivalence Survey. In Study 2, a separate sample of young adults ( $N = 241$ ) completed the Blood Donation Ambivalence Survey in addition to questionnaires assessing known predictors of blood donation.

**Results:** Exploratory and confirmatory factor analyses indicated a two-factor structure reflecting commitment to donating blood and indecision about giving blood. The commitment subscale was positively related to known predictors of increased donation behaviour (e.g. donation intention, self-efficacy), whereas the indecision subscale was positively related to known predictors of decreased donation behaviour (e.g. donation anxiety, negative affect). Furthermore, a history of blood donation was associated with greater commitment and less indecision.

**Conclusions:** The present findings provide strong initial support for the reliability and validity of a novel measure of blood donor ambivalence.

**Key words:** ambivalence, blood donation, Theory of Planned Behavior.

Each year, volunteer blood donors enable life-saving treatments for millions of individuals affected by traumatic accidents and

chronic illnesses. Blood donors commonly endorse altruistic reasons for giving blood (Gillespie & Hillyer, 2002; Sojka & Sojka, 2008), report high satisfaction with having donated and express willingness to provide a repeat donation (Nguyen *et al.*, 2008). However, barriers to donation, such as fear of needles (Sojka & Sojka, 2008), inconvenience (Yuan *et al.*, 2011; Wevers *et al.*, 2014) and low awareness of donation opportunities, are also reported (Bednall & Bove, 2011). Thus, it is not uncommon to hear people express conflicting attitudes about giving blood (e.g. 'I want to help other people, but I'm afraid of needles'). Such ambivalence may be a significant impediment to the recruitment and retention of volunteer blood donors, but the true extent of the problem is unknown because there is no existing measure of blood donor ambivalence.

Relatedly, donation-related ambivalence has emerged as a consistent predictor of donation attrition and poorer post-donation outcomes among other groups of medical donors (i.e. living organ donors, stem cell donors, bone marrow donors). For example, although some degree of ambivalence is observed in up to nearly 75% of prospective living liver and kidney donors (Simmons *et al.*, 1977; Simpson *et al.*, 2011; DiMartini *et al.*, 2012; Dew *et al.*, 2013), extreme or acute ambivalence – while rare among those seriously considering donating an organ – is recognised as a contraindication to living donation. A total of 3% of prospective living kidney donors were excluded from donating because the donor was unsure about donating (Lapasias *et al.*, 2011), and 11% of prospective living liver donor exclusions have been attributed to ambivalence (Erim *et al.*, 2008). In addition, Switzer *et al.* (2013) found that ambivalence among prospective stem cell donors was the factor most strongly associated with donor registry attrition in the presence of a number of demographic and donation-related variables (e.g. donor self-identity, medical mistrust). Thus, the presence of pre-donation ambivalence reduces the likelihood that a prospective donor will eventually provide a donation to an individual in need. With respect to post-donation outcomes, pre-donation ambivalence has been associated with psychological and physical difficulties after bone marrow donation (Switzer *et al.*, 1996; Switzer *et al.*, 1997) as well as poorer mental health in living liver donors following donation (DuBay *et al.*, 2009).

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Despite the established impact of ambivalence on other forms of medical donation and the fact that blood donors share similar motivations as other forms of donors, ambivalence about donating blood has not received significant empirical attention. To address this gap in the literature, the goals of the present study were to develop a novel measure of ambivalence towards blood donation and to conduct initial validation testing. Specifically, the development and validation of the Blood Donation Ambivalence Survey proceeded in four phases, including (i) item construction, (ii) survey administration, (iii) exploratory and confirmatory factor analyses (EFA; CFA) and (iv) examination of construct validity.

## STUDY 1

### Participants

Participants were recruited from an undergraduate research participation pool and invited to complete an anonymous online survey. Prior to completing the survey, participants viewed a brief description of the study online, which was identified as 'A Brief Survey to Assess Attitudes about Blood Donation' and provided informed consent by clicking a button. Participants received course credit for their participation. From an original group of 1163 students in the research participation pool (68.4% female, 84.6% Caucasian,  $M_{\text{age}} = 19.0$  years,  $SD = 1.2$ ), 1119 (96%) met eligibility criteria (i.e.  $\geq 18$  years old, spoke English as a native language), and a subsample of 500 (45% of those eligible) chose to enrol in Study 1. Of these 500 participants, 104 (21%) were excluded from the analyses for various reasons, including (i) failure to respond correctly to test items designed to detect inadequate attention to responses ('This is a test question. Please select response 2';  $n = 36$ ), (ii) perceived ineligibility to donate blood ( $n = 53$ ) or (iii) missing data on one or more ambivalence items ( $n = 15$ ). The final sample ( $N = 396$ ) included 37.4% who reported a history of blood donation, and the group as a whole averaged 1.1 prior donations ( $SD = 2.0$ , range: 0–12).

### Procedure

To begin, survey items were developed to reflect attitudes about giving blood regardless of prior donation history. Next, as shown in Table 1, 12 items reflecting face valid statements of ambivalence towards blood donation were either adapted from an existing measure of ambivalence about living organ donation (Simmons *et al.*, 1977) or developed by the authors. Healthy young adults were then asked to rate each item using a scale from 1 ('not at all true') to 7 ('very true'). The study design and procedures were pre-approved by the Ohio University Institutional Review Board.

### Statistical analysis

A randomly selected 50% of the sample ( $n = 198$ ) was included in an EFA, and the remaining half of the sample was included

in the subsequent CFA. For the EFA, the number of factors to be extracted was determined using the Velicer Minimum Average Partial (MAP) test and parallel analysis. The EFA was conducted with an oblique rotation using the principal components analysis method. Items were excluded from the scale if they loaded  $< 0.60$  or cross-loaded  $> 0.40$ . The subsequent CFA was conducted to examine goodness-of-fit indices for absolute fit (RMSEA; SRMR) and incremental fit (CFI).

## Results

*Exploratory factor analysis.* The results of the MAP test suggested extracting two or three factors, and the parallel analysis indicated extracting three factors. Based on these results, two-factor and three-factor EFAs were conducted and compared. Applying our selection criteria (i.e. at least three items per factor, loading  $> 0.60$  and cross-loading  $< 0.40$ ), the three-factor solution was eliminated because it returned factors with less than three items. As shown in Table 1, the two-factor solution included six items, with three items loading on the first factor (labelled 'commitment') and accounting for 45.4% of the variance and three items loading on the second factor (labelled 'indecision') and accounting for 12.6% of the variance.

*Confirmatory factor analysis.* Using the two-factor structure identified by the EFA, a subsequent CFA was performed to examine the goodness-of-fit of this model applied to the second half of the sample. Results of the CFA indicated that this two-factor model provided a good fit to the data (RMSEA = 0.07, CFI = 0.99, SRMR = 0.04) and good internal consistency reliability for each subscale (commitment  $\alpha = 0.85$ , indecision  $\alpha = 0.86$ ).

## STUDY 2

### Participants

The sample was drawn from 929 undergraduate students in a research participation pool (65.7% female, 85.5% Caucasian,  $M_{\text{age}} = 19.0$  years,  $SD = 1.1$ ) who were invited to complete an anonymous online survey using the same procedure described in Study 1. From this group, 895 (96%) met eligibility criteria, and 307 (34% of those eligible) enrolled in the study. A total of 66 (21%) participants were excluded from the analyses for various reasons, including (i) failure to correctly respond to the test items ( $n = 19$ ), (ii) perceived ineligibility to donate blood ( $n = 35$ ) or (iii) missing data on one or more ambivalence items ( $n = 12$ ). The remaining sample ( $N = 241$ ) included 50.6% who reported a history of blood donation, and the group as a whole reported an average of 1.4 prior donations ( $SD = 2.1$ ; range: 0–11).

### Procedure

Participants completed the same 12 Blood Donation Ambivalence Survey items to allow for a confirmation of the factor structure observed in Study 1 on an independent sample

**Table 1.** Standardised loadings observed for the exploratory factor analysis (EFA) and confirmatory factory analysis (CFA) conducted in Study 1 and Study 2

Item	EFA standardised loadings; Study 1 ( <i>n</i> = 198)		CFA standardised loadings; Study 1 ( <i>n</i> = 198)		CFA standardised loadings; Study 2 ( <i>n</i> = 241)	
	Commitment	Indecision	Commitment ( $\alpha = 0.85$ )	Indecision ( $\alpha = 0.86$ )	Commitment ( $\alpha = 0.84$ )	Indecision ( $\alpha = 0.85$ )
<b>I am sure that I will donate blood in the future.</b>	<b>0.88</b>	0.06	<b>0.89</b>		<b>0.88</b>	
<b>I really want to donate blood even though other people can do it.</b>	<b>0.77</b>	-0.08	<b>0.82</b>		<b>0.84</b>	
<b>My decision about donating blood reflects what is important to me.</b>	<b>0.79</b>	-0.13	<b>0.74</b>		<b>0.71</b>	
<b>I have a hard time deciding whether I will donate blood.</b>	-0.16	<b>0.81</b>		<b>0.85</b>		<b>0.85</b>
<b>I have mixed feelings about donating blood.</b>	-0.19	<b>0.80</b>		<b>0.84</b>		<b>0.83</b>
<b>I might change my mind about donating blood.</b>	-0.26	<b>0.66</b>		<b>0.76</b>		<b>0.74</b>
I would feel relieved if I found out I could not donate blood for some reason.	-0.52	0.12				
It is easy to decide whether I will give blood.	0.39	-0.58				
I am satisfied with my decision about donating blood.	0.59	-0.43				
I believe there are benefits and drawbacks to donating blood.	0.38	0.08				
My decision about blood donation is the best choice for me.	0.48	-0.40				
My decision about giving blood would be different if more people donated.	0.42	0.67				

Items in bold font were retained in the final scale.

of healthy young adults. In addition, participants completed a series of additional measures to allow for assessments of convergent and concurrent validity. Specifically, participants also completed: (i) an existing generic measure of ambivalence and (ii) a series of known predictors of blood donation behaviour (i.e. donation intention, attitudes, perceived behavioural control, anticipated regret, anxiety, positive and negative affect and identity).

**Griffin Index of Ambivalence.** To allow for an assessment of convergent validity of the Blood Donation Ambivalence Survey against an existing generic measure of ambivalence, positive and negative attitudes about blood donation were measured with two items: (i) 'Considering only the positive qualities of blood donation and ignoring its negative ones, evaluate how positive its positive qualities are' and (ii) 'Considering only the negative qualities of blood donation and ignoring its positive ones, evaluate how negative its negative qualities are'. Participants

responded to each question using a 1 (Not at all) to 4 (Extremely) scale (Thompson *et al.*, 1995). The Griffin Index (Thompson *et al.*, 1995) was then used to calculate a total ambivalence score that captured the relative intensity of the respondent's positive and negative evaluations and the level of similarity between the two evaluations. Thus, the highest levels of ambivalence are observed when both the positive and negative characteristics of an object are strongly endorsed. Scores for the Griffin Index range from -0.5 to 4.0, with higher scores reflecting greater ambivalence.

**Intention.** Intent to donate blood was measured with a three-item scale (France *et al.*, 2014a) that assessed the likelihood of the participant to donate blood within the next 8 weeks. Respondents rated each item (e.g. 'I plan to donate blood in the next 8 weeks') on a 1 (disagree) to 7 (agree) scale. Internal consistency reliability for the scale was excellent ( $\alpha = 0.98$ ).

*Attitudes.* The blood donation attitude scale (France *et al.*, 2014a) assessed both cognitive (e.g. 'For me, donating blood in the next 8 weeks would be useless/useful') and affective (e.g. 'For me, donating blood in the next 8 weeks would be unpleasant/pleasant') attitudes. Participants rated the three cognitive and three affective items on a 1–7 scale anchored by opposing adjectives (e.g. pointless, worthwhile). Good to excellent internal consistency reliability was observed for the subscale scores of cognitive attitude ( $\alpha = 0.89$ ) and affective attitude ( $\alpha = 0.92$ ).

*Perceived behavioural control.* The perceived behavioural control scale (France *et al.*, 2014a) included three items that asked participants to rate their donation-related self-efficacy (e.g. 'For me, donating blood in the next 8 weeks would be difficult/easy') and three items that addressed the extent to which participants believed donating was in their control (e.g. 'It is entirely up to me to donate blood in the next 8 weeks'). All items were rated on a seven-point scale. Excellent internal consistency reliability was observed for the self-efficacy ( $\alpha = 0.91$ ) and controllability ( $\alpha = 0.93$ ) subscales.

*Anticipated regret.* Negative feelings associated with failing to act in accordance with one's intent to donate were assessed with three items (e.g. 'If I do not donate blood within the next 8 weeks, I will regret it') rated on a scale of 1 (Very unlikely) to 7 (Very likely) (France *et al.*, 2016). The anticipated regret measure demonstrated excellent internal consistency reliability ( $\alpha = 0.96$ ).

*Anxiety.* Anxiety expected during the act of giving blood was measured with three items (e.g. 'If I donate blood, I will feel nervous'; France *et al.*, 2016). Respondents rated each item on a 1 (Not at all) to 7 (Very much) scale. Excellent internal consistency reliability was observed ( $\alpha = 0.99$ ).

*Identity.* The Blood Donor Identity Survey (France *et al.*, 2014b) was administered to measure autonomous motivation to donate blood. Participants rated 18 items (e.g. 'Donating blood is consistent with my life goals') on a 1 ('not at all true') to 7 ('very true') scale, and these responses were used to compute a relative autonomy index score (Grolnick & Ryan, 1987) reflecting overall level of internal motivation to give blood. This scale demonstrated good internal consistency ( $\alpha = 0.80$ ).

*Positive and negative affect.* A modified version of the Positive and Negative Affect Schedule (Watson *et al.*, 1988) was used to assess positive and negative feelings about blood donation. Five negative affect items (e.g. scared, distressed) and five positive affect items (e.g. enthusiastic, proud) were each rated on a five-point scale, ranging from 1 (very slightly or not at all) to 5 (extremely). Both the positive affect ( $\alpha = 0.92$ ) and negative affect ( $\alpha = 0.94$ ) subscales demonstrated excellent internal consistency reliability.

Finally, participants were asked to report the number of prior blood donations and perceived eligibility to donate blood (i.e. 'To the best of your knowledge, are you eligible to donate blood?'). The study design and procedures were pre-approved by the Ohio University Institutional Review Board.

### Statistical analysis

First, a CFA was conducted to determine if the factor structure of the Blood Donation Ambivalence Survey observed in Study 1 would replicate on an independent sample. Second, bivariate correlation analyses were conducted to examine convergent and concurrent validity between the Blood Donation Ambivalence Survey factors and a series of self-report measures. Third, *t*-tests were used to examine the relationship between donation history and responses on the Blood Donation Ambivalence Survey. Finally, *z* tests for correlated correlations (Meng *et al.*, 1992) were then conducted to compare the Blood Donation Ambivalence Survey against the Griffin Index of Ambivalence in terms of their relationship to other blood donor motivation variables (i.e. intention, self-efficacy, controllability, cognitive attitudes, affective attitudes).

### Results

*Confirmatory factor analysis.* Goodness-of-fit indices indicated that the two-factor model was a good fit for the data (RMSEA = 0.08, CFI = 0.98, SRMR = 0.05). As shown in Table 1, the six-item structure observed in Study 1 was replicated and demonstrated similarly strong internal consistency reliability for both commitment ( $\alpha = 0.84$ ) and indecision ( $\alpha = 0.85$ ).

*Construct validity.* Table 2 provides support for convergent validity between the Blood Donation Ambivalence Survey subscales and the Griffin Index. Specifically, a significant negative relationship was observed between the Griffin Index and commitment ( $r(238) = -0.43$ ,  $P < 0.01$ ), and a significant positive relationship was observed between the Griffin Index and indecision ( $r(238) = 0.32$ ,  $P < 0.01$ ). Table 2 also provides evidence of concurrent validity for the commitment and indecision subscales as indicated by significant correlations with existing constructs related to blood donation behaviour. Specifically, the commitment subscale evidenced positive correlations with constructs previously related to increased blood donor motivation (i.e. intent, cognitive and affective attitudes, self-efficacy, anticipated regret, positive affect and relative autonomy) and negative correlations with constructs associated with decreased motivation to donate (i.e. anxiety and negative affect). The only non-significant correlation was with controllability, which is a sub-component of perceived behavioural control. In contrast, the indecision subscale, which was significantly inversely correlated with the commitment subscale, evidenced negative correlations with constructs related to

**Table 2.** Correlations and descriptive statistics for all variables in Study 2

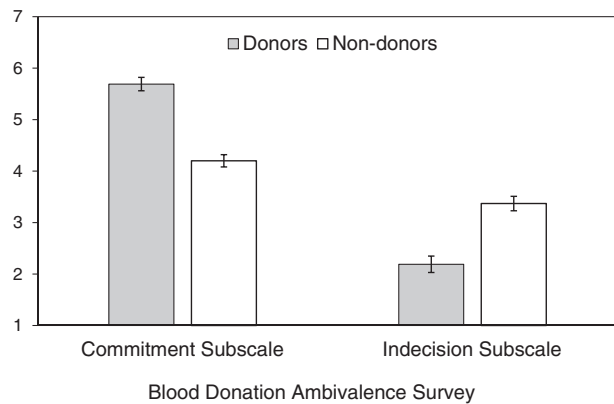
	1	2	3	4	5	6	7	8	9	10	11	12	M (SD)
Ambivalence													
1. Commitment	-												5.0 (1.7)
2. Indecision	-0.55**	-											2.8 (1.5)
3. Griffin Index	-0.43**	0.32**	-										1.1 (1.1)
Theory of Planned Behavior													
4. Intent	0.60**	-0.51**	-0.36**	-									2.7 (1.9)
5. Cognitive attitudes	0.55**	-0.26**	-0.37**	0.50**	-								5.3 (1.5)
6. Affective attitudes	0.74**	-0.64**	-0.47**	0.65**	0.59**	-							3.9 (1.9)
7. Self-efficacy	0.63**	-0.53**	-0.38**	0.68**	0.47**	0.69**	-						4.0 (2.0)
8. Controllability	-0.11	0.06	0.08	0.06	0.07	-0.14*	0.16*	-					5.3 (1.8)
Extended Theory of Planned Behavior													
9. Anticipated regret	0.44**	-0.29**	-0.21**	0.59**	0.36**	0.42**	0.41**	-0.05	-				2.4 (1.5)
10. Anxiety	-0.48**	0.66**	0.38**	-0.45**	-0.24**	-0.71**	-0.58**	0.15*	-0.23**	-			3.8 (2.3)
11. Positive affect	0.72**	-0.42**	-0.36**	0.58**	0.51**	0.64**	0.52**	-0.13*	0.54**	-0.38**	-		3.0 (1.1)
12. Negative affect	-0.45**	0.61**	0.40**	-0.43**	-0.28**	-0.68**	-0.57**	0.14*	-0.25**	0.87**	-0.31**	-	2.4 (1.3)
Blood donor identity													
13. Relative autonomy	0.73**	-0.47**	-0.44**	0.60**	0.56**	0.64**	0.52**	-0.03	0.57**	-0.39**	0.79**	-0.36**	7.4 (11.1)

\* $P \leq 0.05$ ; \*\* $P \leq 0.01$ .

blood donation motivation (i.e. intent, cognitive and affective attitudes, self-efficacy, anticipated regret, positive affect and relative autonomy) and positive correlations with constructs associated with decreased motivation to donate (i.e. anxiety and negative affect). The correlation with controllability was non-significant.

*Ambivalence as a function of donation experience.* To determine if ambivalence was related to prior donation behaviour, we examined responses on each of the ambivalence measures as a function of both donor status and number of prior donations. With respect to the Blood Donation Ambivalence Survey, Fig. 1 shows that prior blood donors reported greater commitment,  $t(239) = -7.31, P < 0.01$ , Cohen's  $d = 0.95$ , and less indecision,  $t(239) = 6.48, P < 0.01$ , Cohen's  $d = 0.84$ , about donating blood compared to non-donors. Furthermore, among those who had previously donated blood, the number of reported donations was positively related to commitment,  $r(120) = 0.36, P < 0.01$ , and negatively related to indecision,  $r(120) = -0.27, P < 0.01$ . Similarly, prior blood donors reported significantly less ambivalence, as measured by the Griffin Index, compared to non-donors,  $M_{\text{donors}} = 0.9, SD = 1.1$  and  $M_{\text{non-donors}} = 1.3, SD = 1.2, t(238) = 2.96, P < 0.01$ , Cohen's  $d = 0.38$ . The Griffin Index also demonstrated a significant inverse relationship with number of previous donations among prior donors,  $r(119) = -0.33, P < 0.01$ .

*Comparison against Griffin Index.* As the Griffin Index has been shown to be related to Theory of Planned Behavior constructs (e.g. Armitage & Conner, 2000; Conner *et al.*, 2003), and significant relationships between the Griffin Index and Theory of Planned Behavior constructs were observed in the present study, we conducted z tests (Meng *et al.*, 1992) to compare the



**Fig. 1.** Observed scores on the commitment and indecision subscales as a function of self-reported blood donation history.

relative strength of the correlations observed between each of the ambivalence measures and Theory of Planned Behavior measures (i.e. donation intention, self-efficacy, controllability, cognitive attitude and affective attitude). Results of these analyses revealed that both the commitment and indecision subscales were more strongly related to intent, self-efficacy and affective attitudes as compared to the Griffin Index. Furthermore, the commitment subscale demonstrated a stronger relationship with cognitive attitudes than the Griffin Index (all  $P < 0.05$ ).

**DISCUSSION**

The results of the present study provide initial support for the reliability and validity of a novel measure of ambivalence about giving blood. First, EFAs and CFAs identified and confirmed a

two-factor structure of ambivalence reflecting personal commitment to blood donation and indecision about giving blood. Next, the construct validity of the Blood Donation Ambivalence Survey was examined, and the subscales demonstrated both convergent and concurrent validity. With respect to convergent validity, the commitment and indecision subscales were significantly related to a generic measure of ambivalence (i.e. the Griffin Index), suggesting that the Blood Donation Ambivalence Survey may provide a useful measure of ambivalence in the specific context of blood donation. With respect to concurrent validity, the commitment and indecision subscales evidenced significant correlations in the expected direction with variables known to be related to donor motivation. For example, commitment was positively related to donation-related self-efficacy and negatively correlated with donation anxiety, whereas indecision was positively related to negative affect regarding donation and inversely related to donation intention.

The Blood Donation Ambivalence Survey subscales also displayed the expected relationships with blood donation history (i.e. higher commitment and less indecision among donors versus non-donors), further supporting its validity and suggesting that the construct of blood donation ambivalence may be a useful addition to the donor motivation literature. For example, in line with research identifying ambivalence as a significant risk factor for stem cell donor registry attrition (Switzer *et al.*, 2013), potential blood donors who are ambivalent may be less likely to volunteer without additional encouragement. Alternatively, assuming that ambivalence is not necessarily prohibitive, a positive first donation experience may help to assuage mixed feelings and encourage additional donations. This possibility is contradicted, however, by existing evidence among gamete donors that pre-donation ambivalence is associated with decreased satisfaction with having donated (Klock *et al.*, 1998; Svanberg *et al.*, 2013). Hence, a blood donation experience may not be sufficient to resolve ambivalence, and specific interventions may be needed to target individual concerns that contribute to mixed feelings. Finally, the Blood Donation Ambivalence Survey evidenced stronger relationships with established predictors of blood donation behaviour (i.e. Theory of Planned Behavior constructs) than the Griffin Index. Thus, the Blood Donation Ambivalence Survey may enhance the understanding of blood donation antecedents and represent a target of intervention to encourage blood donation behaviour. For example, commitment demonstrated a strong positive relationship with both affective attitudes and intent, implying that efforts to strengthen commitment may be accompanied by increases in intent and positive attitudes about donating. In sum, the Blood Donation Ambivalence Survey may serve a useful function as both a research tool and as a practical screening measure for prospective blood donors. With respect to research, assessing ambivalence may refine our understanding of the antecedents of blood donation intention and behaviour. For instance, the commitment and indecision factors may capture a more nuanced motivational profile that is not explained

by other established variables, such as intention and attitudes. In terms of practice, the Blood Donation Ambivalence Survey may be used as a brief screening tool to identify individuals most likely to benefit from intervention. This approach is consistent with existing research suggesting that ambivalent attitudes are more amenable to persuasive communication (e.g. Armitage & Conner, 2000) and with our recent findings that donors with higher levels of ambivalence report greater internal motivation to donate blood following a brief motivational interview compared to donors with lower levels of ambivalence (Fox *et al.*, 2017). In addition, it is possible that ambivalence may be related to poorer donation outcomes, such as decreased satisfaction with having donated and complaints of adverse physical reactions, as these relationships have been observed for other medical donors. Hence, a prior assessment of blood donor ambivalence may be useful in identifying individuals who could benefit the most from interventions focused on improving the donation experience.

As with any study, interpretation of the present findings must be made in the context of methodological limitations. First, because we purposefully conducted this scale development study among young adults with limited blood donation experience (because they are most likely to show ambivalence), further studies are needed to examine generalisability to more experienced blood donors. At the same time, it is important to note that the young age and limited donation experience of the current sample may also be viewed as a strength given the context of an ageing donor pool and continued difficulties with recruitment and retention of young donors. Second, although the observed cross-sectional relationships with important correlates of blood donation behaviour provide suggestive evidence that ambivalence may help to predict donation behaviour, longitudinal studies are required to confirm this hypothesis. Longitudinal data will also help to establish whether ambivalence is best viewed as an independent predictor of donor behaviour or perhaps as a moderator of existing key predictors such as intention. Finally, it must be acknowledged that donation history was assessed by self-report, and this limitation will also need to be addressed in future studies, ideally through independent corroboration from blood collection agency records. Recognising these limitations, we are currently conducting a longitudinal study in collaboration with a metropolitan blood centre so that we can address issues of prior donation history, generalisability to a larger and more diverse sample of blood donors and prediction of future donation behaviour.

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## CONFLICT OF INTEREST

The authors have no competing interests.

## REFERENCES

- Armitage, C.J. & Conner, M. (2000) Attitudinal ambivalence: a test of three key hypotheses. *Personality and Social Psychology Bulletin*, **26**, 1421–1432.
- Bednall, T.C. & Bove, L.L. (2011) Donating blood: a meta-analytic review of self-reported motivators and deterrents. *Transfusion Medicine Reviews*, **25**, 317–334.
- Conner, M., Povey, R., Sparks, P., James, R. & Shepherd, R. (2003) Moderating role of attitudinal ambivalence within the theory of planned behaviour. *British Journal of Social Psychology*, **42**, 75–94.
- Dew, M.A., DiMartini, A.F., DeVito Dabbs, A.J. *et al.* (2013) Preventive intervention for living donor psychosocial outcomes: feasibility and efficacy in a randomized controlled trial. *American Journal of Transplantation*, **13**, 2672–2684.
- DiMartini, A., Cruz, R.J. Jr., Dew, M.A., Fitzgerald, M.G., Chiappetta, L., Myaskovsky, L. & DeVera, M.E. (2012) Motives and decision making of potential living liver donors: comparisons between gender, relationships and ambivalence. *American Journal of Transplantation*, **12**, 136–151.
- DuBay, D.A., Holtzman, S., Adcock, L. *et al.* (2009) Adult right-lobe living liver donors: quality of life, attitudes and predictors of donor outcomes. *American Journal of Transplantation*, **9**, 1169–1178.
- Erim, Y., Beckmann, M., Valentin-Gamazo, C. *et al.* (2008) Selection of donors for adult living-donor liver donation: results of the assessment of the first 205 donor candidates. *Psychosomatics*, **49**, 143–151.
- Fox, K.R., France, C.R., France, J.L. *et al.* (2017, March) Ambivalence moderates the effect of Motivational Interviewing on the promotion of internal motivation to donate blood. Poster presented at the 38<sup>th</sup> annual meeting of the Society of Behavioral Medicine, San Diego, CA.
- France, J.L., Kowalsky, J.M., France, C.R., McGlone, S.T., Himawan, L.K., Kessler, D.A. & Shaz, B.H. (2014a) Development of common metrics for donation attitude, subjective norm, perceived behavioral control, and intention for the blood donation context. *Transfusion*, **54**(3 Pt 2), 839–847.
- France, C.R., Kowalsky, J.M., France, J.L., Himawan, L.K., Kessler, D.A. & Shaz, B.H. (2014b) The blood donor identity survey: a multidimensional measure of blood donor motivations. *Transfusion*, **54**, 2098–2105.
- France, C.R., France, J.L., Carlson, B.W. *et al.* (2016) A brief motivational interview with action and coping planning components enhances motivational autonomy among volunteer blood donors. *Transfusion*, **56**(6 Pt 2), 1636–1644.
- Gillespie, T.W. & Hillyer, C.D. (2002) Blood donors and factors impacting the blood donation decision. *Transfusion Medicine Reviews*, **16**, 115–130.
- Grolnick, W.S. & Ryan, R.M. (1987) Autonomy in children's learning: an experimental and individual difference investigation. *Journal of Personality and Social Psychology*, **52**, 890.
- Klock, S.C., Braverman, A.M. & Rausch, D.T. (1998) Predicting anonymous egg donor satisfaction: a preliminary study. *Journal of Women's Health*, **7**, 229–237.
- Lapasias, J.B., Kong, S.Y., Busque, S., Scandling, J.D., Chertow, G.M. & Tan, J.C. (2011) Living donor evaluation and exclusion: the Stanford experience. *Clinical Transplantation*, **25**, 697–704.
- Meng, X.L., Rosenthal, R. & Rubin, D.B. (1992) Comparing correlated correlation coefficients. *Psychological Bulletin*, **111**, 172–175.
- Nguyen, D.D., DeVita, D.A., Hirschler, N.V. & Murphy, E.L. (2008) Blood donor satisfaction and intention of future donation. *Transfusion*, **48**, 742–748.
- Simmons, R.G., Klein, S.D. & Simmons, R.L. (1977) *Gift of Life: The Social and Psychological Impact of Organ Transplantation*. John Wiley, New York.
- Simpson, M.A., Kendrick, J., Verbese, J.E., Morin, D.S., Dew, M.A., Trabucco, A., Pomposell, J. & Pomfret, E.A. (2011) Ambivalence in living liver donors. *Liver Transplantation*, **17**, 1226–1233.
- Sojka, B.N. & Sojka, P. (2008) The blood donation experience: self-reported motives and obstacles for donating blood. *Vox Sanguinis*, **94**, 56–63.
- Svanberg, A.S., Lampic, C., Gejerwall, A.L., Gudmundsson, J., Karlström, P.O., Solensten, N.G. & Sydsjö, G. (2013) Gamete donors' satisfaction; gender differences and similarities among oocyte and sperm donors in a national sample. *Acta Obstetrica et Gynecologica Scandinavica*, **92**, 1049–1056.
- Switzer, G.E., Simmons, R.G. & Dew, M.A. (1996) Helping unrelated strangers: physical and psychological reactions to the bone marrow donation process among anonymous donors. *Journal of Applied Social Psychology*, **26**, 469–490.
- Switzer, G.E., Dew, M.A. & Simmons, R.G. (1997) Donor ambivalence and postdonation outcomes: implications for living donation. *Transplantation Proceedings*, **29**, 1476.
- Switzer, G.E., Bruce, J.G., Myaskovsky, L. *et al.* (2013) Race and ethnicity in decisions about unrelated hematopoietic stem cell donation. *Blood*, **121**, 1469–1476.
- Thompson, M.M., Zanna, M.P. & Griffin, D.W. (1995) Let's not be indifferent about (attitudinal) ambivalence. In: *Attitude Strength: Antecedents and Consequences* (eds Petty, R.E. & Krosnick, J.A.), **14**, 361–386. Lawrence Erlbaum, Hillsdale, New Jersey.
- Watson, D., Clark, L.A. & Tellegen, A. (1988) Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, **54**, 1063–1070.
- Wevers, A., Wigboldus, D.H.J., de Kort, W.L.A.M., van Baaren, R. & Veldhuizen, I.J.T. (2014) Characteristics of donors who do or do not return to give blood and barriers to their return. *Blood Transfusion*, **12** (Suppl 1), s37–s43.
- Yuan, S., Hoffman, M., Lu, Q., Goldfinger, D. & Ziman, A. (2011) Motivating factors and deterrents for blood donation among donors at a university campus-based collection center. *Transfusion*, **51**, 2438–2444.

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