

# Integrating self-determination theory and the theory of planned behaviour to predict intention to donate blood

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## SUMMARY

**Objectives:** The aim of this research was to test a model integrating self-determination theory (SDT) and the theory of planned behaviour (TPB) to predict intention to donate blood.

**Background:** Social science research suggests that motivational orientations outlined by SDT can be usefully integrated with constructs from the TPB to collectively predict intention and behaviour. Such analysis has not yet been undertaken in the context of blood donation.

**Methods:** A total of 458 currently eligible donors completed measures of blood donor motivations, attitudes, subjective norms, perceived behavioural control (PBC) and intention. Path analyses modelled the direct and indirect effects (via TPB constructs) of motivational orientations on intention.

**Results:** SDT motivational orientations explained an additional 14% of the variance in blood donation intention, compared to a TPB-only model. Amotivation had a negative direct effect on intention; external regulation had no overall effect on intention; introjected regulation had positive direct and indirect effects on intention; and autonomous motivation predicted intention both directly as well as via attitudes, subjective norms and PBC.

**Conclusion:** This research provides the first evidence that integrating SDT and the TPB is a useful approach in donor research, particularly for specifying plausible pathways through which motivational orientations impact intention to donate blood.

**Key words:** blood donation, donor intention, self-determination theory, theory of planned behaviour.

The theory of planned behaviour (TPB; Ajzen, 1991) is the dominant framework for modelling blood donation intentions and behaviour (France *et al.*, 2014b). In its most general form, the theory proposes that attitudes, subjective norms and

perceived behavioural control (PBC) positively influence intentions, which directly influence behaviour. *Attitudes* comprise evaluative judgements (cognitive attitudes) as well as emotional reactions (affective attitudes) to the behaviour, *subjective norms* involve perceptions of others' approval (injunctive norms) and the extent to which close others perform the behaviour (descriptive norms), and *PBC* comprises a person's perceived confidence in performing the behaviour (self-efficacy) and their perceptions of the extent to which the behaviour is under their control (controllability). A recent systematic review and meta-analysis concluded that TPB constructs explain a large proportion of the variance in the intention to donate blood (Bednall *et al.*, 2013).

Another theoretical framework that has been used extensively to explain behaviour in a wide number of domains is self-determination theory (SDT; Ryan & Deci, 2000). SDT highlights how different types of motivation regulate behaviour. According to this framework, motivations can either be non-existent (*amotivation*) or lie on a continuum from relatively external (*controlled*) to relatively internal (*autonomous*). People who are autonomously motivated feel that their actions represent their true selves and are freely chosen (Ryan & Deci, 2000). In contrast, those acting under more controlled forms of motivation may feel pressured or coerced, either by external rewards (*external regulation*) or by the desire to avoid guilt or enhance their ego (*introjected regulation*).

Recent meta-analyses of work that considers other health behaviours suggest that these motivational orientations can be usefully integrated with the TPB (Hagger & Chatzisarantis, 2009, 2015). Whereas the TPB is a social-cognitive model that offers a mechanistic explanation of intention (and ultimately, behaviour), SDT focuses on distal motivational orientations that may give rise to these social-cognitive beliefs (Deci & Ryan, 1985). SDT and the TPB therefore offer complementary explanations of intention and behaviour. This theoretical integration has received empirical support in models in which SDT constructs distally predict intention via attitudes, subjective norms and PBC (Hagger & Chatzisarantis, 2009, 2015).

The most consistent finding, as supported by meta-analytical reviews spanning a variety of health behaviours, is that autonomous motivation positively predicts behaviour via

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attitudes and PBC (Hagger & Chatzisarantis, 2009, 2015). In contrast, the indirect effect via subjective norms is either small (Hagger & Chatzisarantis, 2009) or unsupported (Hagger & Chatzisarantis, 2015). Fewer studies have examined the direct and indirect effects of amotivation, external regulation and introjected regulation on intention. However, as motivations move away from being autonomous on the self-determined spectrum, the effects on intention become weaker (e.g., for introjected regulation; Chatzisarantis *et al.*, 1997), null (e.g., for external regulation; Hagger & Armitage, 2004) or negative (e.g., for amotivation; Chatzisarantis *et al.*, 1997). Therefore, extant research suggests that autonomous motivation may be a critical source from which intention and behaviour stems.

In sum, SDT motivational orientations have been usefully integrated with the TPB to predict intention in several behavioural domains. To date, however, such an integration has not been attempted in the context of blood donation. The current study aimed to address this gap and test the utility of integrating SDT motivations with well-established TPB predictors. Fulfilling such an aim would yield insight of both practical and theoretical import for donor research. We expected that our findings would largely align with past research that has integrated the models in other behavioural domains, as reviewed above.

## MATERIALS AND METHODS

### Participants

This study was approved by the Human Research Ethics Advisory Panel at the University of New South Wales (Approval #2114). Participants ( $N = 501$ ) recruited from Amazon.com's Mechanical Turk (MTurk; <https://www.mturk.com/>) completed the measures online in exchange for US\$1.20 after providing informed consent. MTurk is an online crowdsourcing platform that allows individuals to complete tasks in exchange for money. This platform is increasingly used by social scientists as a relatively diverse and plentiful source of research participants (Buhrmester *et al.*, 2011). We used a qualifying questionnaire to recruit prior donors. This questionnaire included questions on engagement in a wide variety of activities, including blood donation. After being asked to consider a successful blood donation to be a donation attempt that was fully completed, individuals who reported that they had successfully made one or more blood donations in the past were then given the opportunity to complete the study.

Given that the key dependent variable was intention to donate blood, in the main survey, we assessed the current eligibility to donate blood by asking participants to select one of three options: *I believe I am currently eligible to donate blood* ( $n = 422$ ), *I believe I am currently ineligible to donate blood* ( $n = 43$ ) or *I am unsure of my current eligibility to donate blood* ( $n = 36$ ). Data from the 43 participants who reported that they were currently ineligible to donate blood were excluded from all analyses. The final analysed sample ( $N = 458$ , which included those who were unsure of their eligibility) comprised 148 females and 310 males

aged 18–67 years ( $M_{\text{age}} = 31.02$ ,  $SD_{\text{age}} = 9.21$ ), 76% of whom identified as White/Caucasian. This sample size exceeded conventional recommendations for the minimum sample size of 200 for the structural equation model reported (i.e. a minimum of 10 participants per estimated parameter; Bentler & Chou, 1987).

To provide additional information on donor characteristics, participants responded to three questions. To assess perceived ability to donate, participants responded *yes* ( $n = 356$ , 77.7%) or *no* ( $n = 102$ , 22.3%) to the question 'If you wanted to donate blood tomorrow, do you believe you would be able to do so?' Next, participants responded *yes* ( $n = 315$ ; 68.8%) or *no* ( $n = 143$ ; 31.2%) to the question 'Do you consider yourself to be a person who donates blood?' Participants who responded *yes* to this question indicated the length of time since presenting at a blood collection agency with the intention of donating blood: *within the past month* ( $n = 29$ , 9.2%), *within the past 6 months* ( $n = 110$ , 35.0%), *within the past year* ( $n = 93$ , 29.6%) and *within the past 5 years* ( $n = 82$ , 17.9%) (one participant did not respond). Thus, although this question was only obtained for a portion of the sample, it is clear that the majority of respondents were relatively recent, active donors.

### Procedure and design

Participants completed measures of constructs from the TPB and SDT. After completing these measures and before being debriefed, participants indicated their age, ethnicity and gender and reported on items assessing eligibility and donor characteristics (described above). All participants engaged in a poster-viewing task prior to completing the measures for this study as well as other questionnaires assessing constructs not relevant to the research question investigated here (e.g., Big Five personality traits; see <https://osf.io/w2vj9> for full study materials). The content of the poster varied on a between-participants basis. We carried out a series of models that included poster condition as a predictor of the endogenous variables in the models reported below, which resulted in the same trimmed model specifications and nearly identical estimates. Full reporting of those models is given in Appendix S1, Supporting Information.

### Measures

**TPB constructs.** Participants completed France *et al.*'s (2014b) measures of blood donation attitudes (6 items,  $\omega = 0.79$ ), subjective norms (6 items,  $\omega = 0.91$ ), PBC (6 items,  $\omega = 0.81$ ) and intention (3 items,  $\omega = 0.97$ ). As per the design of the scale, all responses were made on 7-point scales (with various anchors), and higher scores reflect higher levels of that construct.

**SDT constructs.** Participants completed a recently developed measure of self-determined motives designed for the blood donation context (France *et al.*, 2014a). With three items for each subscale, the measure assesses amotivation ( $\omega = 0.88$ ), external regulation ( $\omega = 0.82$ ), introjected regulation ( $\omega = 0.94$ ) and three forms of autonomous motivation: identified regulation,

**Table 1.** Descriptive statistics and intercorrelations among measured variables

	M	SD	1	2	3	4	5	6	7	8	9	10
1. Attitudes	5.33	1.00										
2. Norms	3.31	1.41	0.31									
3. PBC	5.69	1.11	0.40	0.27								
4. Amotivation	3.37	1.60	-0.40	-0.35	-0.31							
5. External	1.75	1.11	-0.13	0.07	-0.20	0.23						
6. Introjected	3.80	1.79	0.33	0.49	0.26	-0.44	0.07					
7. Autonomous	4.25	1.46	0.57	0.53	0.39	-0.65	0.03	0.63				
8. Intention	4.20	1.92	0.53	0.51	0.52	-0.54	0.02	0.55	0.71			
9. Age	31.02	9.21	0.11	0.04	0.03	0.01	-0.20	0.03	0.03	0.06		
10. Gender	0.32	–	0.05	0.00	-0.02	-0.08	-0.03	0.06	0.05	0.04	0.06	
11. Donor identity	0.69	–	0.41	0.24	0.28	-0.53	-0.05	0.32	0.55	0.51	0.01	0.02

SD, standard deviation; PBC, perceived behavioural control.

$N = 458$ . Correlation coefficients  $\geq |0.13|$  are significant at  $P < 0.01$ , and those  $\geq |0.20|$  are significant at  $P < 0.001$ . Gender was coded as 0 = Male, 1 = Female. Donor identity refers to responses to the question 'Do you consider yourself to be a person who donates blood?' (0 = No, 1 = Yes).

integrated regulation and intrinsic motivation. We conducted confirmatory factor analysis (CFA) on the autonomous motivation items and combined seven of the nine items to form a highly reliable measure of autonomous motivation ( $\omega = 0.92$ ; see Appendix S1 for CFA and prior empirical rationale). This latter scoring of the most autonomous forms of motivation mirrors that adopted by France *et al.* (2017). All responses were made on 7-point scales (1 = *not at all true*, 7 = *very true*), with higher scores reflecting higher levels of that motivational orientation.

### Statistical analyses

All analyses were conducted in R, and the analysis script and data required to reproduce these analyses are available at <https://osf.io/w2vj9>. Omega ( $\omega$ ) reliability coefficients, a preferred alternative to Cronbach's alpha (Dunn *et al.*, 2014), were computed using the MBESS package (<https://www3.nd.edu/~kkelley/site/MBESS.html>) (Kelley & Lai, 2012). CFA and path analyses were deployed using the lavaan package (<https://cran.r-project.org/web/packages/lavaan/citation.html>) (Rosseel, 2012). The significance of indirect effects was assessed using 95% bias-corrected confidence intervals (for the unstandardised estimates) that were estimated using 10 000 bootstrap samples. Standardised point estimates are reported for interpretability.

## RESULTS

### Descriptive statistics and correlational analyses

Means, standard deviations and intercorrelations between TPB and SDT constructs, as well as three demographic variables, are presented in Table 1. All of the hypothesised predictor variables, with the exception of external regulation, were significantly correlated with intention. Attitudes, norms, PBC, introjected regulation and autonomous motivation were positively correlated with intention, whereas amotivation was negatively correlated with intention. The relatively large magnitude of the observed

intercorrelations supports the utility of integrating these constructs in a single path model.

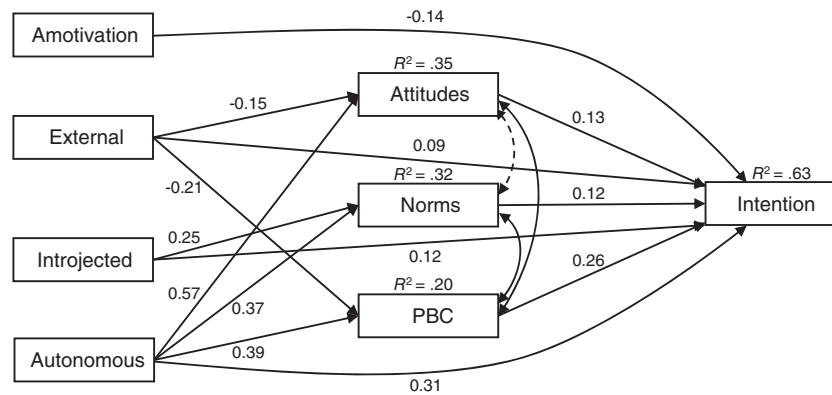
### Path analyses

Starting with a fully saturated initial model, we estimated all possible unidirectional paths from SDT constructs to TPB constructs and intention, all paths from TPB constructs to intention and residual covariances between TPB constructs. Exogenous SDT constructs were allowed to correlate. To obtain model fit statistics, we trimmed the six regression paths that were non-significant in this initial model (i.e.  $P > 0.05$ ). This resulted in a final model (Fig. 1) that achieved good fit on all indices as per Hu & Bentler's (1999) criteria:  $\chi^2(6) = 2.77$ , root mean square error of approximation  $< 0.001$ , 90% confidence interval (0.000, 0.035), comparative fit index  $> 0.99$ .

As shown in Table 2, amotivation had a significant negative direct effect on intention. Although there was a direct positive effect of external regulation on intention, this was counteracted by negative indirect effects via decreased attitudes and PBC. Because of these opposing direct and indirect effects, external regulation had no overall effect on intention. Introjected regulation had an overall positive effect on intention, with both a positive direct effect and a positive indirect effect via increased subjective norms. Finally, autonomous motivation had the largest total positive effect on intention, and this effect was more than three times the magnitude of the total effect of introjected regulation on intention. The effect of autonomous motivation on intention was mediated by all three proximal predictors over and above a substantial direct effect of autonomous motivation on intention.

### Additional variance explained by the integrated model

To establish the utility of adopting an integrated SDT and TPB model over a TPB-only approach, we compared the variance



**Fig. 1.** Final estimated path model. Estimates reflect standardised coefficients. Dashed lines denote non-significant paths; all other paths significant at  $P < 0.05$ .  $R^2$  reflects the total proportion of variance in that variable explained by variables that predict it. Correlations among exogenous variables and residual variances were estimated but are not depicted here (see Table 1 for values).

**Table 2.** Direct, indirect and total effects from self-determination theory constructs to intention

	Amotivation	External regulation	Introjected regulation	Autonomous motivation
Direct effect	-0.14 (-0.26, -0.07)	0.09 (0.05, 0.27)	0.12 (0.03, 0.23)	0.31 (0.26, 0.55)
Total indirect effect	-	-0.07 (-0.18, -0.08)	0.03 (0.01, 0.06)	0.22 (0.21, 0.38)
Indirect effect via ATT	-	-0.02 (-0.06, -0.01)	-	0.07 (0.04, 0.17)
Indirect effect via SN	-	-	0.03 (0.01, 0.06)	0.04 (0.02, 0.10)
Indirect effect via PBC	-	-0.06 (-0.14, -0.06)	-	0.10 (0.10, 0.18)
Total effect	-0.14 (-0.26, -0.07)	0.02 (-0.07, 0.14)	0.15 (0.06, 0.26)	0.53 (0.57, 0.82)

ATT, attitudes; PBC, perceived behavioural control; SN, subjective norms.

Point estimates reflect standardised coefficients; 95% confidence intervals (used for inference) reported in brackets reflect unstandardised coefficients; – denotes N/A due to trimmed paths.

in intention explained by the final model (63%) with that of a model with attitudes, subjective norms and PBC as predictors of intention (49%). The 14% increase in explained variance in intention to donate blood is on par with that seen in effective extensions to the TPB (Armitage & Conner, 2001) and provides support for adopting an integrated approach.

## DISCUSSION

This study provides the first evidence supporting the utility of integrating constructs from two theories – the TPB and SDT – to predict intention to donate blood. Although the TPB has been a dominant and useful framework for predicting blood donation intention and behaviour, research in other domains has pointed to the utility of integrating SDT motivational variables as distal predictors of intention via attitudes, norms and PBC (Hagger & Chatzisarantis, 2009, 2015). Our findings support this approach in the context of blood donation: inclusion of SDT motivational orientations increased the variance explained in donors' intention by 14%, relative to a TPB-only model.

Consistent with the results of integrated models in other domains, our results suggest that motivational orientations may exert effects on intention, both directly as well as through social-cognitive constructs from the TPB. For example, in line

Chan *et al.*'s (2014) study of myopia prevention, we found that amotivation had non-significant effects on attitudes, subjective norms and PBC. Furthermore, in line with Chatzisarantis *et al.*'s (1997) findings in the domain of exercise, we observed a negative direct effect of amotivation on intention. External regulation had mixed effects on intention, with a positive direct effect that was undermined by two negative indirect effects via decreased attitudes and PBC. The positive direct effect mirrors findings establishing a positive link between controlled regulation (of which external regulation is a part) and intention (Hagger *et al.*, 2014), and the observed negative effects of external regulation on attitudes and PBC are consistent with previous studies on physical activity (Hagger & Armitage, 2004). In line with previous research (Chatzisarantis *et al.*, 1997), introjected regulation had a positive direct effect on intention. In addition, we found that introjected regulation also had a positive indirect effect via increased subjective norms. Given the focus on avoiding guilt and/or desire to enhance ego that is present in introjected regulation, this may suggest that recruitment materials that focus on donating blood as a way of avoiding anticipatory guilt may be particularly effective (Renner *et al.*, 2013).

Above all, and consistent with two meta-analyses of effects in the domain of physical activity (Hagger & Chatzisarantis, 2009, 2015), autonomous motivation had the largest overall positive effect on intention, with a significant direct effect, as



well as three significant indirect effects via attitudes, subjective norms and PBC. This finding points to the importance of providing autonomy-supportive contexts for blood donation and the benefits in terms of donor retention that may accrue to collection agencies if donors come to see their donation behaviours as internally motivated. Indeed, initial forays into such efforts are promising. Several studies support the efficacy of autonomy-promoting post-donation motivational interviews in boosting intention to return (Livitz *et al.*, 2017) and actual return (Sinclair *et al.*, 2010), at least among donors who are autonomously motivated to begin with (France *et al.*, 2016, 2017). Although it may not be feasible for collection agencies to interview each donor after their donation, empirical work (e.g., Sinclair *et al.*, 2010; France *et al.*, 2016, 2017; Livitz *et al.*, 2017) suggests that messaging designed to recognise and enhance an individual's autonomy in making the decision to donate again may be a more effective retention strategy than simply encouraging donors to return (France *et al.*, 2016).

A key limitation of this study is that we did not measure blood donation behaviour. Although assessing behaviour would have been optimal, our aim with this initial study was to determine whether SDT constructs could usefully be integrated with those from the TPB to explain intention in the blood donation context. The results clearly show that the integration of SDT with the TPB provides a more complete picture of the determinants of blood donors' intention. As prior work in other health domains has successfully used an integrated SDT and TPB model to predict behaviour (via intentions; Hagger & Chatzisarantis, 2009,

2015), we would anticipate that observed indirect effects would hold in predicting actual behaviour. However, such patterns need to be assessed by future research. Such research should not only replicate the findings we have obtained but also measure behaviour and seek to assess potential variance across donor career stages (Veldhuizen *et al.*, 2011) and donation types (Veldhuizen & Van Dongen, 2013; Bagot *et al.*, 2016). In addition, recognising the limitations of statistical mediation (e.g., Bullock *et al.*, 2010), we cannot draw causal conclusions from these cross-sectional data.

In conclusion, the results demonstrate the utility of integrating SDT motivational variables with constructs from the TPB in providing a fuller account of blood donors' intentions to donate. By highlighting specific pathways through which motivational orientations have effects on intention, this research informs approaches to donor management that promote autonomy and deter amotivation.

## ACKNOWLEDGMENTS

All authors (L. W., J. S., B. M.) contributed to the design of the study. L. W. and J. S. conducted data collection. J. S. analysed the data. All authors wrote the paper. J. S.'s current affiliation is the University of California, Davis, California, USA.

## CONFLICT OF INTEREST

The authors have no competing interests.

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## Supporting Information

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

**Appendix S1.** Full reporting of confirmatory factor analysis of the SDT constructs and path analyses incorporating poster condition.