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Published

2011

Journal Title

Transfusion

DOI

[10.1111/j.1537-2995.2010.02887.x](http://dx.doi.org/10.1111/j.1537-2995.2010.02887.x)

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An examination of the predictors of blood donors' intentions to donate during two  
phases of an avian influenza outbreak

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This research was supported by the Australian Red Cross Blood Services (Grant ref: A06-003) and was conducted in accordance with the National Health and Medical Research Council's *National Statement on Ethical Conduct in Human Research* as cleared by the ethics boards of the Australian Red Cross Blood Services and Queensland University of Technology.

All authors certify that they have no affiliation with or financial involvement in any organization or entity with a direct financial interest in the subject matter or materials discussed in this manuscript

Total page count: 28 (all inclusive)

## ABSTRACT

**BACKGROUND:** Data from prior health scares suggest that an avian influenza outbreak will impact on people's intention to donate blood; however research exploring this is scarce. Using an augmented theory of planned behavior (TPB), incorporating threat perceptions alongside the rational decision-making components of the TPB, the current study sought to identify predictors of blood donors' intentions to donate during two phases of an avian influenza outbreak.

**STUDY DESIGN AND METHODS:** Blood donors (N = 172) completed an on-line survey assessing the standard TPB predictors as well as measures of threat perceptions from the health belief model (HBM; i.e., perceived susceptibility and severity). Path analyses examined the utility of the augmented TPB to predict donors' intentions to donate during a low- and high-risk phase of an avian influenza outbreak.

**RESULTS:** In both phases, the model provided a good fit to the data explaining 69% (low risk) and 72% (high risk) of the variance in intentions. Attitude, subjective norm, and perceived susceptibility significantly predicted donor intentions in both phases. Within the low-risk phase, gender was an additional significant predictor of intention, while in the high-risk phase, perceived behavioral control was significantly related to intentions.

**CONCLUSION:** An augmented TPB model can be used to predict donors' intentions to donate blood in a low-risk and a high-risk phase of an outbreak of avian influenza. As such, the results provide important insights into donors' decision-making that can be used by blood agencies to maintain the blood supply in the context of an avian influenza outbreak.

**KEYWORDS:** theory of planned behavior, health belief model, intentions, blood donation, avian influenza.

**ABBREVIATIONS:** HBM = Health Belief Model; TPB = Theory of Planned Behavior;  
PBC = Perceived Behavioral Control; SARS = Severe Acute Respiratory Syndrome; WHO =  
World Health Organization

## INTRODUCTION

Since 2003 [1], warnings have circulated about the potential for a devastating influenza pandemic – first in the form of avian influenza (H5N1) and, more recently, in the form of swine influenza (H1N1). The emergence of H5N1, and the confirmed lethality of the virus to humans (killing around 59% of all those confirmed to be infected with the virus), led many countries, including Australia, to engage in extensive avian influenza pandemic planning. This response to the potential of an avian influenza outbreak was noted by the WHO [2] to have resulted in high levels of fear regarding an influenza pandemic.

Although the international blood community has now experienced firsthand the consequences of an H1N1 pandemic, the Australian evidence suggests that this had little impact on donors' behavior [3]. On the declaration of a H1N1 pandemic, donors would have considered their continued blood donation in the context of the low mortality rate from H1N1 (Leider et al. 2010) and the availability of a H1N1 vaccine. The context of an avian influenza pandemic may, however, be quite different [4]. Donors will consider their decision to donate blood in the context of the documented lethality of the H5N1 virus to humans and the possible absence of a widely available vaccine [c.f., 5]. At present, little is known of the effect that an avian influenza (H5N1) outbreak will have on people's intentions to donate blood. This understanding is critical given the continued threat of an escalation of avian influenza [6] and the international necessity of the provision of a safe, secure, and sufficient supply of blood and blood products [7].

### *Avian Influenza*

Avian influenza is a virus that causes disease in birds (and to a lesser extent pigs and other mammalian animals; [8,9]) and is transmissible from animal-to-animal in low and highly pathogenic forms. The latter form spreads rapidly through populations of poultry with mortality rates of up to 100%. Poultry can be infected with the less pathogenic form of the

virus by wild birds, with the virus mutating as a function of its prevalence. In large parts of the world, poultry live in close proximity to humans and this has resulted in human infection with H5N1. To date, 59% of humans infected with H5N1 have died, with some evidence of limited human-to-human transmission of the virus [8, 10-12]. Further, antiviral medications traditionally used to treat influenza (i.e., amantadine, oseltamivir, rimantadine) are resistant to the H5N1 strand [8,13]. Whilst the peak incidence of avian influenza appears to have passed, confirmed human cases of H5N1 currently remain in fifteen countries including China, Egypt, Indonesia, Thailand, Turkey and Vietnam [6]. As such, the potential for an avian influenza pandemic remains.

While H5N1 is of worldwide concern, avian influenza is of particular concern in Australia because of the geographical proximity of Australia to many of the sites of infected bird flocks and cases of human infection (e.g., Cambodia, Indonesia, Thailand, and Vietnam for cases of animal and human infection; China, Malaysia, Republic of Korea, Russia, Kazakhstan, Mongolia, Turkey, Romania, and Croatia as additional sites of animal infection). Australia is highly accessible by air and this accessibility, combined with symptom-free periods for those infected with H5N1, means that Australia may be seen as particularly susceptible to early involvement in the emergence of any H5N1 pandemic.

#### *Avian Influenza and Blood Donation*

With the exception of plasma that can be stored frozen up to 12 months, blood products cannot be stockpiled [14] and so health services are heavily dependent on a regular supply of blood from donors [7]. While the demand for blood or blood products may decrease during the high-risk phase of an avian influenza pandemic (i.e., when human-to-human transmission is sustained), a baseline demand for blood and blood products will remain. During the high-risk phases of an avian influenza pandemic, it is estimated that between 8-19% of blood donors may be infected [11] and, thus, excluded from donation on

that basis. As the current process of blood donation involves (at least minimal) human contact, it is likely that perceptions of threat stemming from fear of infection may inhibit non-infected individuals from donating blood during this phase of an avian influenza pandemic. Through the need to maintain a safe and secure blood supply, it is critical to understand how blood donors can be retained in such a situation [15]. Specifically, it is of critical importance to understand how the rational cognitive processes that typically underpin the decision to donate blood [16-20] may combine with likely feelings of threat to impact on individuals' decisions to donate blood in this context.

Previous research, which has considered the impact of a 'disaster' on blood donation intentions and behavior, has yielded contradictory findings. While the intention to donate blood is typically the result of a rational process [16-20] it appears that, in the event of a disaster, additional factors (such as the desire to help or conversely feelings of fear, threat, or risk) may impact on this process. For example, Hess and Thomas [21] report that following the September 11<sup>th</sup> 2001 attacks, there was a substantial surge in blood donation as the factors that normally influence the rational decision to donate blood were overwhelmed by reactions to the disaster and feelings for the victims of the disaster [see also 22-24]. Research focused on disasters more similar to an avian influenza pandemic, however, has reported the negative impact of other factors on individuals' willingness to donate blood. Specifically, Shan and Zhang [25] found that, during the Severe Acute Respiratory Syndrome (SARS) outbreak in Beijing in mid 2003, daily blood collections sometimes dropped below 10% of normal levels. This primarily occurred due to fear among potential blood donors about infection from other donors and incorrect beliefs concerning the consequences of blood donation. Similar fears and beliefs are likely to impact on blood donors during an outbreak of avian influenza. Thus, to fully understand the predictors of blood donors' intentions during an avian influenza

outbreak research needs to examine the rational processes as well as fear and perceptions of threat.

### *A Theoretical Framework for Understanding Avian Influenza and Blood Donation*

Within the context of blood donation, the theory of planned behavior (TPB; [26]) has been repeatedly used to successfully explain blood donation decision-making for both donors and non-donors [17-19]. The TPB is a rational decision-making model that specifies that behavior is most proximally determined by an individual's intention to engage in that behavior. Intentions are, in turn, predicted by attitudes (an overall positive or negative evaluation of performing the behavior), subjective norms (the individual's perception of whether people important to them would want them to perform the behavior), and perceived behavioral control (the extent to which an individual perceives the behavior to be under their volitional control; see Figure 1).

Studies using the TPB to predict blood donation intentions and behavior have found the TPB predictors to account for between 31-72% of the variance in blood donation intentions [17, 27-30]. Within these studies, attitudes and perceived behavioral control (or the related construct of self-efficacy) emerge as consistent predictors of intention [17,20]. However, the influence of subjective norm on intention has been found to be more variable [17,26]. Intention has repeatedly been found to be the most proximal determinant of behavior, accounting for between 54-56% of the variance in blood donation behavior [17,31,32].

Whilst the extant literature provides strong support for the utility of the TPB in predicting people's intentions to donate blood, it is a model of rational decision-making. As such, the TPB may be of less use in accounting for an individual's intentions and behavior when behavioral enactment engenders more non-rational feelings, such as threat or fear. One socio-cognitive based model that has incorporated the influence of threat perceptions on health behavior is the health belief model (HBM; [33,34]). In this model, individuals engage



in health-related behaviors depending on the evaluated threat of a health problem (which is based on their beliefs about the perceived susceptibility to health problems and the anticipated severity of the consequences of the health problems) and their evaluation of performing the preventative action. This behavioral evaluation reflects beliefs about the benefits of the health behavior and about barriers to performing the behavior and, therefore, may be seen as akin to the constructs of attitudes and perceived behavioral control within the TPB.

Research into the SARS outbreak [25] strongly suggests that perceptions of threat may play a key role in determining blood donors' intentions to donate during an avian influenza outbreak. As such, the inclusion of threat perceptions (i.e., perceived susceptibility of being infected with avian influenza as a result of donating blood and the severity of consequences if one was to become infected) within a TPB framework may provide a more accurate account of the key determinants of donors' intentions to donate blood during an avian influenza outbreak.

### *The Current Research*

Given the paucity of prospective research examining how blood donors would react to an avian influenza outbreak and pandemic, and the need to understand donors' motivations to remain donating in such situations, we employed a modified TPB framework to predict donors' intentions to donate blood. Although not a measure of behavior, intentions are a suitable proxy when actual behavior cannot be assessed [35,36]. The modified TPB framework assessed donors' blood donation intentions and the standard TPB predictors (attitude, subjective norm, and perceived behavioral control) as well as the HBM additions of threat perceptions (perceived susceptibility and severity of consequences). In a method similar to France et al., [35, see also 17-19], we used structural equation modeling to represent the relationships between the variables. Based on previous TPB (17, 26) and HBM

research [33,37], we hypothesized that all factors would be direct predictors of donors' intentions to remain donating during an avian influenza outbreak (see Figure 2).

Furthermore, to explore how the relative impact of attitudes, subjective norm, perceived behavioral control, and threat perceptions would differ at different stages of an avian influenza outbreak, perceptions were assessed during a low- and a high-risk phase of a hypothetical avian influenza outbreak [38].

### **Preliminary Research**

In order to identify low-risk and high-risk avian influenza scenarios for inclusion in the main study, an initial sample of 20 participants were presented with the 16 sub-phases of an avian flu pandemic from the Australian Government's Department of Health and Ageing *Australian Health Management Plan for Pandemic Influenza* [38]. Participants were 13 male and 7 female residents of Queensland, Australia who ranged in age from 20-60 years, with a mean age of 33.60 years ( $SD = 13.80$ ). The order of presentation of the 16 phases was randomized for each participant. For each of the phases, participants were asked to respond to two questions: "To what extent would you feel that your health is at risk?" and "How likely is it that you would be infected by 'bird flu'?" using 7-point Likert scales (1 = *not at all*; 7 = *very much*). Based on the results of repeated-measures analysis of variance and follow-up paired-sample t-tests indicating significant differences between the two scenarios (at  $p < .05$ , one lower-risk scenario (i.e., evidence of avian influenza infection in animals in Australia;  $M_{\text{Health}} = 5.20$ ,  $SD = 1.32$ ,  $M_{\text{Infect}} = 3.00$ ,  $SD = 1.52$ ) and one higher-risk scenario (i.e., evidence of an avian influenza pandemic in Australia) were selected;  $M_{\text{Health}} = 5.90$ ,  $SD = 1.29$ ,  $M_{\text{Infect}} = 5.60$ ,  $SD = 1.64$ ).

The selected scenarios were then developed into two fictional newspaper articles, with each article detailing what would occur in Australia at each pandemic phase. Specifically, in the low-risk phase, participants read an article entitled: "Bird flu kills poultry in Queensland"

which specified that the Federal minister for Health and Ageing had stated: “There is animal infection by ‘bird flu’ in Australia which poses a substantial risk of human infection”. The article then indicated that the deaths of poultry on a property were due to the ‘bird flu’ infection, that the virus was contained to the poultry, that the owners of the property were tested and found not to be infected with the virus, and that all precautions were being implemented to reduce any further spread of the virus. In the high-risk pandemic phase, participants read an article entitled: “12 Dead, 30 infected. Health minister confirms ‘Bird flu’ pandemic in Queensland” which specified that the Federal minister for Health and Ageing had confirmed that the virus had mutated enabling spread from person-to-person, with 12 killed and 30 more people believed infected. The article then indicated that further spreading of the infection was likely and information was given on strategies to reduce the spread. These strategies included preventing access to and from the infected areas, closing of schools and public places, and urging people to remain in their homes. These newspaper articles were pre-tested with a further 36 participants for understanding and perceived risk. The results of the pre-testing indicated that the articles facilitated understanding of the scenarios and the level of risk (low and high, respectively) associated with each scenario.

## **MATERIALS AND METHODS**

### **Participants**

Participants were 172 (103 female, 69 male) residents of Australia who, consistent with donor eligibility requirements [14], ranged in age from 16-72 years with a mean age of 43.06 years ( $SD = 13.65$ ). Female respondents (comprising 60% of the sample) were over-represented in comparison to the percentage of Australian donors who are female (52%) [39]. Participants self-selected to take part in this study by responding to a request to complete an internet based survey on blood donation in Australia. To be eligible to complete the full survey, as reported below, participants were required to indicate on two ‘filter’ questions

(‘have you ever donated blood in Australia’ and ‘how long is it since you last gave blood in Australia’) that they had donated blood within the last 6-months. Eligible participants reported a mean time since last donation of 3.12 months ( $SD = 2.01$ ), and a range of 1-55 donations across their donor careers ( $M = 14.31$ ,  $SD = 14.43$ ). Given the low frequency of autologous donations within Australia (<5%) it is likely that the majority of these respondents were allogenic donors [40]. Survey responses were collected in February-March, 2009. Of the 172 eligible blood donors who responded, the majority were either married or in a common law relationship (65.7%), had either finished high school or attended college (59.9%), and were currently employed (56%).

### **Materials and Measures**

All participants were initially provided with a brief overview of avian influenza from the Australian Government’s 2006 Health Management Plan for Pandemic Influenza [38] before being presented with the fictional newspaper articles detailing the low-risk and high-risk outbreaks of avian influenza.

After reading each newspaper article, participants completed standard TPB (attitude, subjective norm, perceived behavioral control, intention) measures, which were developed, based on guidelines specified by Ajzen [26] and standard measures of perceived susceptibility to, and perceived severity of, avian influenza (derived from the HBM; [33]). The order of presentation of measures and scenarios was randomized for each participant. All measures had good internal reliability (all  $\alpha s > .81$ ) and composite scores were created so that higher scores equated to stronger levels of the construct. In addition to the measured constructs, participants also answered demographic questions focusing on age, gender, marital status, level of education, donor or non-donor status, number of months since their last blood donation, and total number of donations made in their donor career.

**Intention.** Intention to donate blood was assessed using two items: “I would intend to donate blood in this situation” and “I would plan to donate blood in this situation” scored 1 (*strongly disagree*) to 7 (*strongly agree*).

**Attitude.** Three 7-point semantic differential items were used to measure respondents’ attitude towards donating blood in the situation specified. These scales were: *unfavourable/favourable*, *bad/good* and *unpleasant/pleasant*.

**Subjective norm.** Subjective norm was measured using one item: “Most people who are important to me would approve of my donating blood in this situation” scored 1 (*strongly disagree*) to 7 (*strongly agree*).

**Perceived behavioral control.** Two items assessed perceived behavioral control: “I have complete control over whether I would be able to donate blood in this situation” and “It is mostly up to me whether or not I donate blood in this situation” scored 1 (*strongly disagree*) to 7 (*strongly agree*).

**Perceived susceptibility.** Two items were used to assess perceived susceptibility to avian influenza: “How susceptible do you think you are to being infected with ‘bird flu’ if you were to donate blood in this situation?” and “What do you think your chances of contracting ‘bird flu’ would be if you were to donate blood in this situation?” scored 1 (*extremely unsusceptible*) to 7 (*extremely susceptible*).

**Perceived severity of consequences.** Two items were used to assess perceived severity of consequences: “How severe do you think the consequences would be if you were to become infected with ‘bird flu’?” and “To what extent would being infected with ‘bird flu’ impact severely upon your life?” scored 1 (*not at all severe*) to 7 (*extremely severe*).

### **Statistical analysis**

Initial examination of the data involved an analysis of the correlational relationships between the measured variables and intentions to donate blood. Structural equation modelling

(SEM) analyses were then performed using AMOS 17.0 for the low-risk (animal transmission) phase of avian influenza and for the high-risk (sustained human-to-human transmission pandemic) phase of an avian influenza outbreak. Listwise deletion was used for missing data, resulting in a loss of 2 participants in the high-risk scenario. Maximum likelihood was used to estimate the parameters of the model [41]. The fit of the models were evaluated with chi-square test (non-significant), the comparative fit index ( $CFI > 0.95$ ), and the root mean square error of approximation ( $RMSEA < 0.06$ ) [42]. Path coefficients and  $R^2$  values were also inspected to evaluate the predictive power of the models. For the low-risk and high-risk phases, separate SEM analyses were used to test the hypothesized relationships between intention, the TPB variables (attitude, subjective norm, and perceived behavioral control), and the HBM constructs of perceived susceptibility and perceived severity. Furthermore, given the relationship of gender to intention to donate shown in some analyses [43], the relationship of donor gender to the measured constructs was explored also in these analyses. As in France et al [35; see also 18,19), predictors in the models were allowed to correlate freely.

## RESULTS

### Correlational Analyses

As shown in Table 1, correlational analyses revealed that all of the measures, except perceived severity, were significantly related to intentions to donate blood in both of the phases of an avian influenza outbreak (all  $ps < .01$ ). Attitude had the strongest positive association with intention in both the low-risk ( $r = .74, p < .001$ ) and high-risk phases ( $r = .75, p < .001$ ), followed by subjective norm, perceived susceptibility, perceived behavioral control, and gender. An examination of the collinearity statistics suggested that the attitude variable did not exceed parameters for inclusion as a predictor variable (tolerance  $> .59$ ). In addition,

a preliminary run of the analyses through regression did not indicate any problems due to singularity or other problems related to multicollinearity.

### **Tests of the Models**

For blood donation intentions during a low-risk avian influenza outbreak, the proposed model provided a good fit to the data,  $\chi^2(9) = 11.754$ ,  $p = 0.228$ , CFI = 0.992, RMSEA = 0.042, explaining 69% of the variance in intentions to donate blood. Donors' attitude, subjective norms, perceived susceptibility, and gender were revealed as significant direct predictors of intentions. Perceived behavioral control and perceived severity were non-significant direct predictors of intention. Attitude was the construct with the largest beta weight in the model ( $\beta = .51$ ,  $p < .001$ ), followed by subjective norm ( $\beta = .35$ ,  $p < .001$ ), perceived susceptibility ( $\beta = -.21$ ,  $p < .001$ ), and gender ( $\beta = -.09$ ,  $p < .05$ ). Male donors, donors with a positive attitude, donors who believed others would approve of them donating blood, and/or donors who perceived less susceptibility to avian influenza were more likely to intend to donate blood in an animal transmission phase of an avian influenza outbreak (see Figure 3).

In a high-risk pandemic phase of an avian influenza outbreak, the proposed model also provided a good fit to the data,  $\chi^2(9) = 14.264$ ,  $p = 0.113$ , CFI = 0.986, RMSEA = 0.059, explaining 72% of the variance in intentions to donate blood. Similar to the low-risk phase, donors' attitudes, subjective norms, and perceived susceptibility emerged as significant direct predictors of intention. In addition, however, in this phase perceived behavioral control also emerged as a significant direct predictor. Perceived severity and donor gender were non-significant predictors of intention in this phase. Attitude was the construct with the largest beta weight in the model ( $\beta = .44$ ,  $p < .001$ ), followed by subjective norm ( $\beta = .30$ ,  $p < .001$ ), perceived susceptibility ( $\beta = -.19$ ,  $p < .001$ ), and perceived behavioral control ( $\beta = .17$ ,  $p < .001$ ). Donors with a positive attitude, donors who believed others would approve of them

donating blood, donors who perceived less susceptibility to avian influenza, and/or donors who believed that they had control over donating in this situation were more likely to intend to donate blood in sustained human-to-human transmission pandemic phase of an avian influenza outbreak (see Figure 4).

## **DISCUSSION**

The current study used a modified TPB model, incorporating threat perceptions from the HBM to explore the determinants of donors' intentions to donate blood during a low-risk and high-risk phase of an avian influenza outbreak. The results revealed that the proposed model incorporating perceived susceptibility and perceived severity from the HBM provided a good fit to the data in both a low- and a high-risk phase of an avian influenza outbreak, explaining 69% (low-risk) and 72% (high-risk) of the variance in intention to donate. Specifically, as predicted, attitudes, subjective norm, and perceived susceptibility had significant direct relationships with intention to donate in both phases. Furthermore, donor gender and perceived behavioral control were, respectively, significant direct predictors in the low-risk and high-risk phases. Contrary to predictions, perceived behavioral control in the low-risk phase and perceived severity (in either phase) were not significant direct predictors of intention.

### **Perceived Threat**

In attempting to account for the impact of fear or threat engendered by avian influenza [2] on blood donors' intentions to remain donating in the context of an avian influenza outbreak, the current study investigated the addition of perceived susceptibility and perceived severity from the HBM to the standard TPB model. In partial support of the hypothesis, perceptions of susceptibility, but not severity, played an important role in donors' intentions to remain donating in both a low- and high-risk phase of an avian influenza outbreak. Those who perceived that they had lower susceptibility to contracting avian



influenza were more likely to intend to donate blood. This finding is consistent with that observed by Shan and Zhang [25] in the context of SARS, who documented the relationship between perceived susceptibility and blood donation behavior. Contrary to predictions, however, the severity of avian influenza did not impact on donors' intentions in either a low- or high-risk phase. This lack of relationship may be a function of the extensive H5N1 pandemic planning that has taken place in many countries for the prevention of infection, including Australia [2] and the lack of first-hand experience in Australia with avian influenza infection. Uniformly the consequences of avian influenza infection have been portrayed as severe [e.g., 44]. As such, in considering whether to donate, Australian donors may be primed only to consider their susceptibility to the infection, rather than their (lack of) ability to recover from infection with H5N1.

### **Rational Decision-Making Processes**

Although an avian influenza outbreak may engender fear and threat, in the context of both a low- and high-risk outbreak of avian influenza, the intention of donors to continue donating was still, however, supplemented by elements of rational decision-making. Consistent with the utility of the TPB in explaining donors' intentions [17,18,36], attitudes and subjective norms emerged as consistent predictors of blood donors' intention to donate in both low- and high-risk phases. Previous TPB research has consistently found attitudes to predict donors' intentions [17,18,35]; however, the relationship of subjective norm to intention has been less consistent [17-19,35]. Under the unique circumstances that are present in an avian influenza outbreak, where blood donation may be seen to involve some risk to the donor, the approval of others for that behavior appears to play a key role in determining intention to donate. However, interestingly, perceived behavioral control was only significantly related to intention in the context of the high-risk pandemic phase. In an avian influenza pandemic situation, actual control over day-to-day behavior is likely to be

limited by restrictions on movement that may be put in place [38]. To the degree that donors perceive that donation remains a behavior that they have control over impacts significantly on the intentions those donors form to donate blood.

## **Implications**

As the risk of an avian influenza escalation remains [6], the results of the current study can provide some guidance as to how blood donation can be most effectively promoted under low-risk and high-risk phases of an outbreak of avian influenza. Although behavior was not assessed in the current study, intentions are a suitable proxy when behavior cannot be assessed [35,36]. Consistent with the previous research that has found men more willing to donate than women [43], the findings of the current study suggest that in a low-risk phase it may be advisable to target male donors for retention. In this phase, communications with donors should emphasise blood donation as a positive experience and the support of others for continued donation. Furthermore, attempts should be made to minimise the perceived susceptibility of donors to infection with avian influenza. This outcome may be achieved by information defining the population who is at risk or by personalizing the risk for individual donors [e.g., 45, 46]. Slater and Rouner [46] found statistical evidence to be particularly persuasive for recipients for whom the message was value-congruent. As such, communications emphasizing the statistical susceptibility risk of donors continuing to donate blood (in comparison to the susceptibility risk present in everyday life) may be particularly effective. The results of the current study suggest that a similar strategy, in terms of targeting attitudes, subjective norms, and perceived susceptibility, would be beneficial for all donors in the context of a pandemic phase of an avian flu outbreak. At this stage, it is critical to target perceived behavioral control. Given the likely restrictions on movement that would be in place in a pandemic phase, it appears critical for blood agencies to communicate to donors the revisions that would be made to standard operating procedures (i.e., the deployment of

mobile units to neighborhoods, the scheduling of appointments to minimize donor contact) to facilitate donation in such circumstances. These communications would emphasize to donors how, even in these adverse circumstances, the decision to donate remains under their volitional control.

## **Conclusions**

Overall, the current study extends previous blood donation research by examining donors' motivation to remain donating in the context of a low-risk and high-risk phase of an avian influenza pandemic. Using a scenario methodology [47,48], this is, to our knowledge, the first study that integrated the TPB and HBM to explore the role of rational processes and threat perceptions in the decision-making of donors in the context of an avian influenza outbreak. The results of this study contribute to improving our understanding of why people might be willing or not willing to donate during an influenza outbreak. These findings also provide some initial evidence of the beliefs of donors that should be targeted to retain donors to in the event of an avian influenza outbreak.

Findings in the current study, however, should be interpreted in light of the study's limitations. Our sample comprised self-selected, experienced and, arguably, committed donors [49] who were asked to consider their behavior in the context of a low-risk and high-risk outbreak of avian influenza. To date, the current outbreak of avian influenza had not reached Australia and a pandemic phase has not been declared anywhere in the world [50]. As such, the scenarios presented to our sample of donors were hypothetical and donors could only consider their responses in abstract. Whilst the current study provides the first insight into the influences on donors' behavior in an avian influenza outbreak, it is unclear whether these perceptions of responses, reported by participants, would translate into actual responses in the event of an outbreak. To the degree that they do, however, it is of interest to note that even the behavior of these experienced donors would be impacted on by elements of both

rational decision-making processes and risk perceptions. Furthermore, it is also unclear the impact that the declaration of a swine flu pandemic by WHO in 2009 may have had on donors' responses to an avian influenza pandemic. Whilst swine and avian influenza are notably different – in terms of lethality to humans and the existence of a vaccine – the lack of impact on day-to-day life of the swine influenza pandemic declaration may have resulted in donors becoming less concerned about donating in an avian influenza outbreak, at least in the low-risk phases. To that end, the results of the current study may provide insight into a 'worst-case' scenario strategy in terms of the retention of committed blood donors in outbreaks of infectious diseases.

## **ACKNOWLEDGEMENTS**

We would like to acknowledge the Australian Red Cross Blood Service (the Blood Service) for funding this study, and Australian governments, that fully fund the Blood Service for the provision of blood products and services to the Australian community. We would also like to acknowledge the assistance of Professor Deborah Terry of the University of Queensland, Professor Jeni Warburton of LaTrobe University, Australia, Mr. Damon Cavalchini formally of the Australian Red Cross Blood Services and Dr. Ioni Lewis of Queensland University of Technology in conducting this research. The authors certify that they have no affiliation with or financial involvement in any organization or entity with a direct financial interest in the subject matter or materials discussed in this manuscript.

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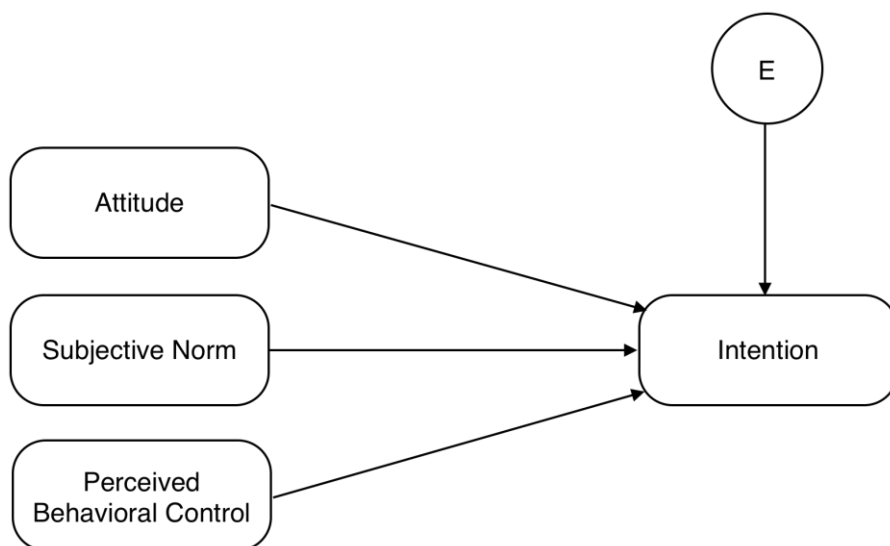
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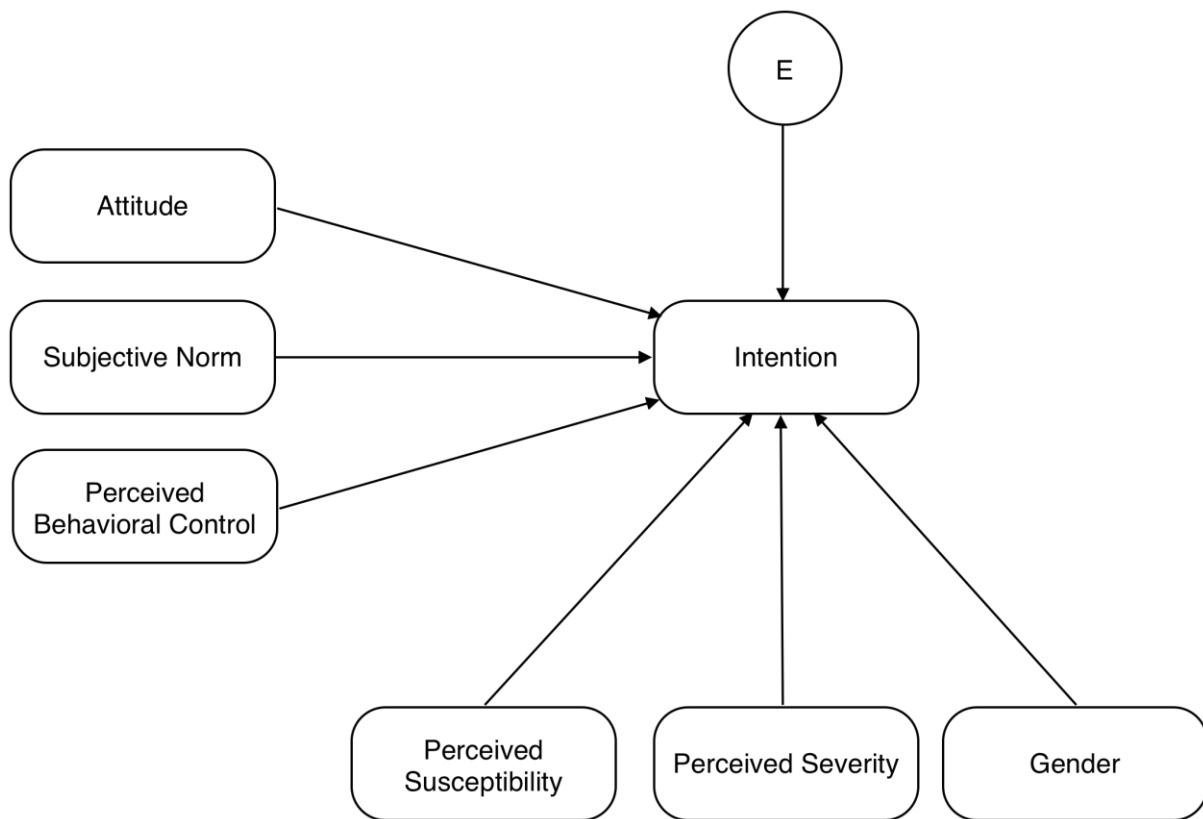


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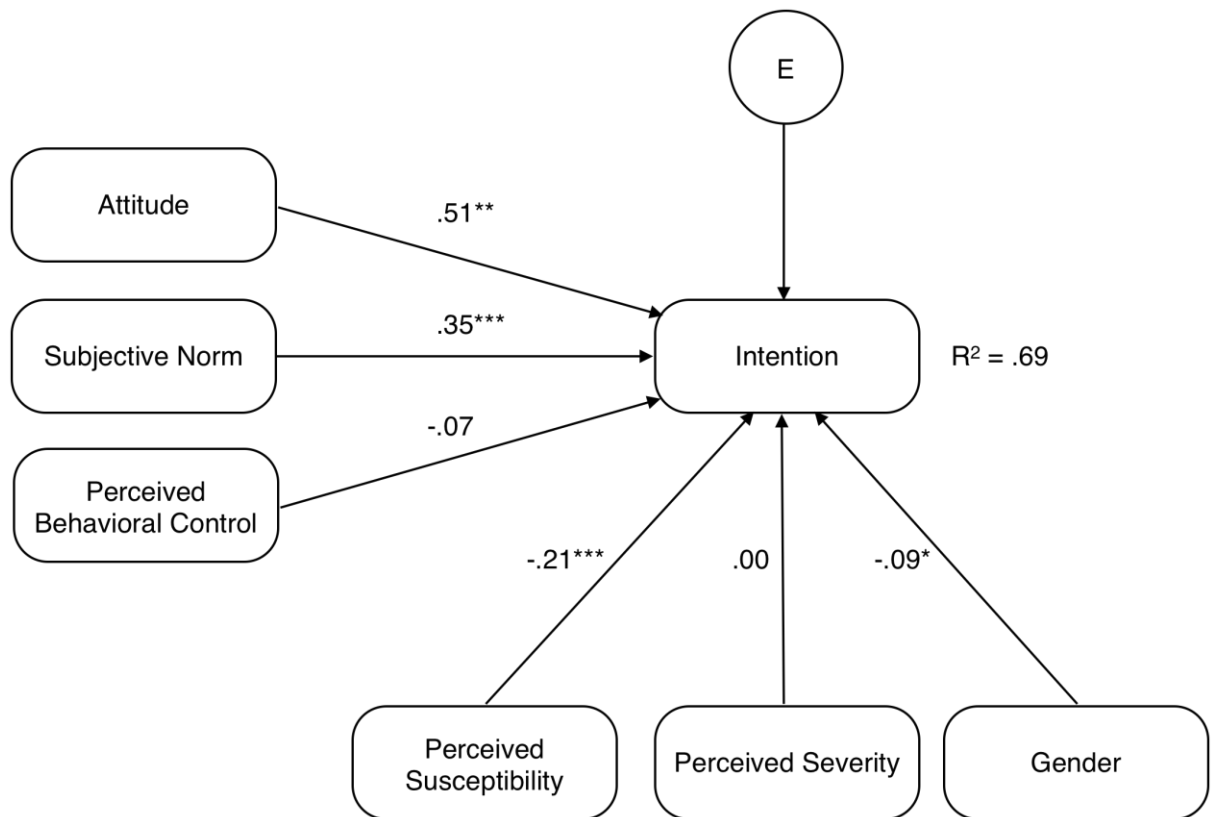
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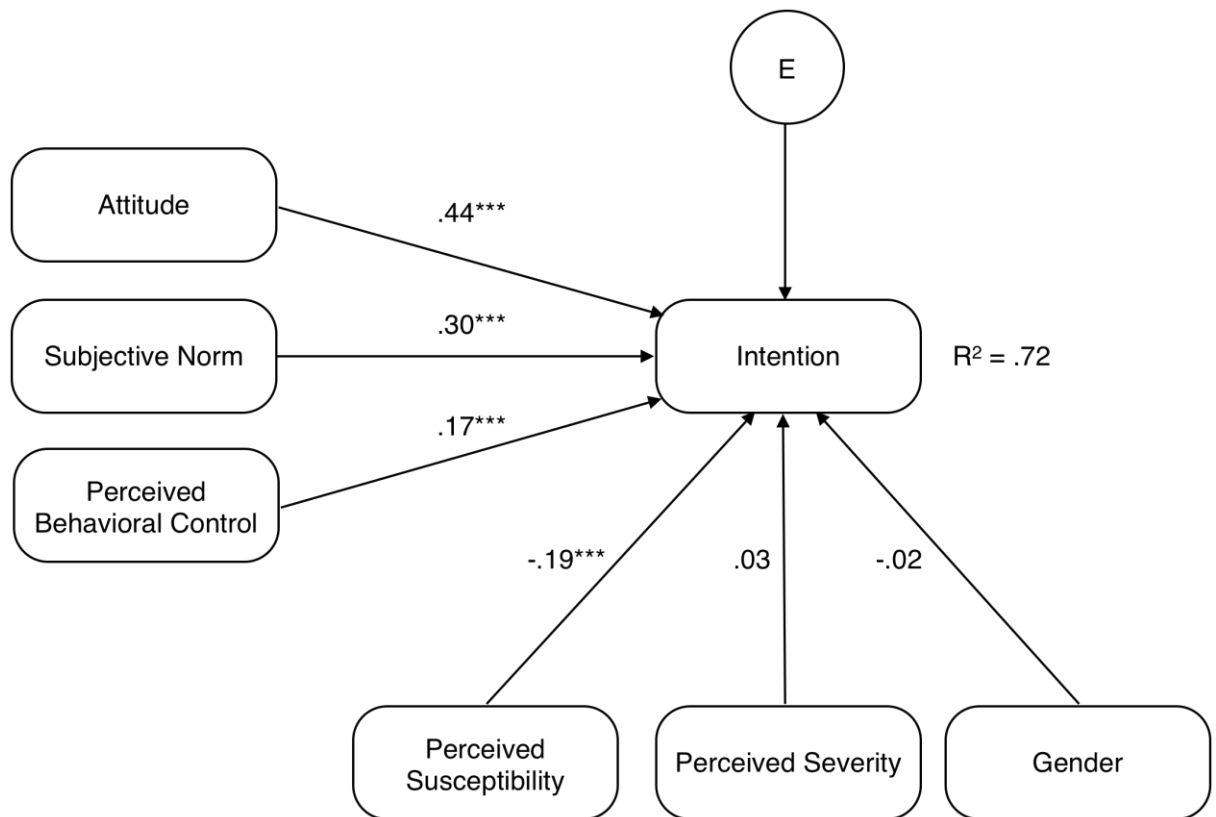
*Figure 1.* Standard theory of planned behavior model (Ajzen, 1991)



*Figure 2.* Proposed theoretical model for understanding current blood donors blood donation decision-making during an avian influenza outbreak



*Figure 3.* Theoretical model for understanding blood donation decision-making during an animal transmission stage of an avian influenza outbreak ( $N = 172$ ),  $\chi^2(9) = 11.754$ ,  $p = 0.228$ , CFI = 0.992, RMSEA = 0.042. \* $p < 0.05$ , \*\*\* $p < 0.001$ .



*Figure 4.* Theoretical model for understanding blood donation decision-making during a pandemic stage of an avian influenza outbreak ( $N = 170$ ),  $\chi^2(9) = 14.264$ ,  $p = 0.113$ , CFI = 0.986, RMSEA = 0.059. \*\*\* $p < 0.001$ .

Table 1.

*Summary of Intercorrelations, Means, and Standard Deviations for Scores on Intention, Attitude, Subjective Norm, Perceived Behavioral Control, Perceived Susceptibility, Perceived Severity, and Gender as a Function of Stage of Avian Influenza Outbreak*

Variable	1.	2.	3.	4.	5.	6.	7.	<i>M</i>	<i>SD</i>
1. Intention	-	0.74***	0.65***	0.33***	-0.50***	0.05	-0.22**	5.64	1.33
2. Attitude	0.75***	-	0.51***	0.37***	-0.37***	0.04	-0.15	5.30	1.33
3. Subjective norm	0.69***	0.57***	-	0.48***	-0.35***	0.09	-0.17*	5.59	1.33
4. Perceived behavioral control	0.45***	0.28***	0.36***	-	-0.22***	0.06	-0.10	5.90	1.31
5. Perceived susceptibility	-0.60***	-0.52***	-0.44***	-0.29***	-	-0.06	0.02	2.76	1.66
6. Perceived severity	0.05	0.01	0.05	0.07	0.04	-	0.12	5.65	1.33
7. Gender	-0.21**	-0.19*	-0.20*	-0.12	0.18*	0.12	-	-	-
<i>M</i>	5.45	4.80	5.22	5.61	3.03	5.86	-		
<i>SD</i>	1.44	1.50	1.63	1.58	1.71	1.24	-		

*Note.* Intercorrelations for the low-risk animal transmission stage ( $n = 172$ ) are presented above the diagonal, and intercorrelations for the high-risk pandemic stage ( $n = 170$ ) are presented below the diagonal. Means and standard deviations for the animal transmission are presented in the vertical columns, and means and standard deviations for the pandemic stage are presented in the horizontal rows. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .