

Psychological responses to blood donated by men who have sex with men

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Background - Restrictions previously limiting the ability of men who have sex with men to donate blood are being eased in a number of nations worldwide. In the context of these changes, it is important to determine public perceptions of receiving a transfusion of blood donated by men who have sex with men.

Materials and methods - In online surveys, 510 (Study 1) and 1,062 (Study 2) heterosexual participants reported attitudes, anxiety, disgust, and gratitude towards potentially receiving a transfusion of blood donated by a homosexual male donor and a heterosexual male donor. In Study 2, half of the participants were reminded of the safety testing carried out on donated blood samples. Negative attitudes, anxiety, disgust, and gratitude were compared between the two donors using *t*-tests and within-participants indirect effects analysis.

Results - Stronger negative attitudes, higher anxiety and disgust, and lower gratitude were reported in relation to a potential transfusion of blood donated by the homosexual male donor relative to the heterosexual male donor ($|d|=0.26-0.46$). This was the case even when participants were reminded of the safety testing completed on donated blood samples in Study 2. In both studies, the effect of donor sexual orientation on attitudes was explained via heightened anxiety and disgust and attenuated gratitude ($b=0.05-0.30$).

Discussion - Considering receiving a transfusion of blood donated by a homosexual male donor elicits more negative attitudes, anxiety and disgust, and less positive emotion, relative to blood donated by a heterosexual male donor. These attitudes and emotional reactions are not shifted by a reminder of the safety testing carried out on donated blood samples. In the context of changing restrictions on blood donation by men who have sex with men, these findings highlight a challenge to shift public perception to embrace this cohort of donors.

Keywords: *blood donation, attitudes, emotions, sexual and gender minorities.*

INTRODUCTION

Historically, men who have sex with men (MSM) were excluded from donating blood, due to transmission concerns surrounding human immunodeficiency virus (HIV)¹. However, improvements in HIV testing mean that the risk of contracting an infection through a blood transfusion is extremely low². As a result, policies categorically restricting blood donation

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by MSM are being eased and/or lifted in lieu of other measures. In Australia and the United States, for instance, time-based deferrals from most recent sexual encounter for MSM donors were reduced from 12 to 3 months in 2021³ and 2020⁴, respectively. The United Kingdom and Canada conduct individual risk assessments on all potential donors, which may result in time-based deferrals based on recent risky sexual behavior^{5,6}.

Easing restrictions on previously excluded populations provides a valuable opportunity to safely increase the blood supply. Estimates suggest that enabling MSM to donate could increase blood supplies in the United States by up to 4%⁷. Shortening time deferrals applied to MSM does not negatively impact actual safety of the blood supply; rates of donated blood samples found to be HIV positive have not changed from before to after the policy shift in the US¹. However, it is important to understand the general public's perception of and psychological reactions to the result of such changes in restrictions: namely, more blood donated by MSM in the blood supply. Prevalent sexual prejudice⁸ and lingering concerns regarding HIV transmission may detrimentally impact *perceived* safety of transfusion processes even if *actual* safety remains the same⁹⁻¹¹. Reduced perceived safety, in turn, may reduce the general population's willingness to donate blood^{12,13}, ultimately and concerningly reducing the blood supply.

One proximal way to assess distal effects of easing restrictions on safety perceptions is to examine attitudes towards receiving a transfusion of blood donated by a homosexual male relative to a heterosexual male. Attitudes are an expressed psychological tendency of favor or disfavor towards an attitude object (e.g., person, behavior, issue)¹⁴. Favored attitude objects are approached while disfavored objects are avoided^{15,16}.

Attitudes are formed based on thoughts about, past experience with, and emotions towards the attitude object¹⁷. Here, we examine which emotions underpin attitudes in the context of transfusions of blood donated by MSM. Three emotions are of specific interest in this context: anxiety, disgust, and gratitude.

Anxiety is an emotion characterized by experiences of worry, nervousness, and tension¹⁸, and is frequently experienced when an individual perceives a stimulus as potentially dangerous¹⁹. Despite safety improvements, receiving a blood transfusion is perceived as moderately

risky, largely driven by concerns around the transmission of HIV⁹⁻¹¹. Overinflated risk perceptions may drive anxiety in response to considering a transfusion of blood donated by MSM. Another source of anxiety in this context may be the intergroup context invoked by considering someone of another sexual orientation²⁰. Anxiety, in turn, might augment negative attitudes.

Disgust comprises the feeling of repulsion towards unpleasant stimuli which can include physical objects as well as people and moral concepts²¹. Disgust towards MSM is well-documented²²⁻²⁵. Moreover, blood transfusions may elicit concerns relating to pathogen-avoidance⁹ and moral-contamination²⁶⁻²⁸, both of which underpin disgust^{29,30}. Considering receiving a transfusion of blood donated by a homosexual male may thus compound disgust, and in turn underpin negative attitudes.

Gratitude is an emotion experienced when an individual recognizes the receipt of a costly and valued benefit given by someone else³¹. Gratitude is often felt in situations where people benefit from altruistic acts of others, such as blood transfusion recipients feeling grateful to blood donors³². It is unclear whether equivalent gratitude would be felt towards donors of different sexual orientations. Sexual orientation is one category along which ingroups and outgroups are defined^{8,33}, and lowered gratitude emerges as a form of intergroup bias³⁴. However, when prosocial actions occur in a life-saving scenario, gratitude is not moderated by the intergroup status of the helper³⁵. Thus, it remains to be established whether gratitude varies according to the sexual orientation of a donor and whether gratitude underpins attitudes in this context.

Previous research has examined attitudes towards receiving a blood transfusion from a member of a sexual minority group. Gobrial and Lui³⁶ documented substantively lower willingness to receive a transfusion of blood donated by a lesbian, gay, bisexual, transgender, or queer (LGBTQ) donor relative to a heterosexual donor, an effect that was particularly pronounced among heterosexual individuals. Meyer and colleagues²⁸ demonstrated more aversion to a blood transfusion or organ transplant from donors "different to self", which included someone of a different sexual orientation, relative to donors similar to self.

We report results of two studies designed to expand on this previous research, focusing specifically on attitudes

towards receiving a transfusion of blood donated by a homosexual male, relative to a heterosexual male. Focusing on homosexual male donors is warranted since deferral policies related to sexual activity by and large focus on men's sexual activity with other men, not between women nor between women and men. As such, broad attitudes that include several sexual and gender minorities (e.g., LGBTQ) may not best inform understanding of public perception of deferral policy changes. For parsimony, we opted to contrast a homosexual to a heterosexual male donor, but acknowledge that bisexual, transgender, and queer men may have sex with men. Broadly, we expected to document relatively more negative attitudes towards the notion of receiving a transfusion of blood donated by a homosexual male relative to a heterosexual male, an effect we refer to as the *donor sexual orientation effect*.

The studies also investigated the role of three contextually-relevant emotions: anxiety, disgust, and gratitude. Higher anxiety and disgust were expected in relation to receiving a transfusion of blood donated by a homosexual male compared to a heterosexual male. In light of contrasting findings relating to intergroup effects on gratitude, a directional hypothesis for this emotion was not set. Consistent with evidence that emotions reliably predict attitudes³⁷, anxiety and disgust were expected to mediate the relationship between blood donor sexual orientation and attitudes towards receiving a transfusion of blood donated by that individual.

Study 2 examined the impact of reminding participants of rigorous safety testing conducted on donated blood³⁸⁻⁴⁰. Being reminded of safety testing completed on donated blood was expected to attenuate the donor sexual orientation effect and associated emotion response patterns.

Hypotheses, methodologies, and data analysis plans for both studies were preregistered (Study 1 <https://osf.io/asz2f>; Study 2: <https://osf.io/c28a7>). Study materials, data, and analysis code are available on the Open Science Framework (<https://osf.io/mzn6e/>). Both studies were approved by the UNSW Human Research Ethics Advisory Panel (File 3480).

MATERIALS AND METHODS - STUDY 1

Study population and design

Study 1 utilized a within-participants design. A total

of 564 participants were recruited online via Prolific (Prolific Academic Ltd, London, UK). Participants who identified as heterosexual, and lived in the United States, United Kingdom, or Australia were eligible to take part. At the time of data collection, these countries had implemented changes to deferral policies for MSM. Applying pre-registered exclusion criteria to ensure data quality excluded data from 54 participants, leaving 510 for analyses.

The sample was 63.9% female, 35.9% male and 0.2% non-binary, with a mean age of 34.3 years (SD=12.1). A large majority of the sample resided in the UK (90%), with smaller portions of participants from the US (6%) and Australia (4%). In terms of ethnicity, 80% of the sample self-identified as White/Caucasian/European and 11% identified as Asian. The remaining 9% selected other ethnicities, multiple ethnicity groupings, or preferred not to respond.

This sample size exceeded the preregistered minimum set in light of statistical power considerations (i.e., No.=500) for the planned analyses of indirect effects and moderation (see preregistration).

Procedure

After providing informed consent, participants were asked to imagine a situation in which they required a blood transfusion for medical reasons. The process of receiving a blood transfusion was explained, including the potential benefits and the role of blood donors. One at a time, participants were presented with four blood donors purportedly drawn from a database: a heterosexual male and a homosexual male both in their thirties, a heterosexual female in her twenties, and a heterosexual female in her sixties. The latter two donors were included to disguise the study's primary focus on male donors of differing sexual orientation. Data from the two female donors were explored in exploratory analyses, reported below. Information about each donor was presented in a table that included first name, age, gender, sexual orientation ("homosexual" or "heterosexual"), and hemoglobin level. Participants indicated overall attitudes and emotional reactions towards receiving a transfusion of blood donated by each donor one at a time. Participants then completed a range of individual difference questionnaires, provided demographic information, and were debriefed. Individual differences were assessed as moderators of the donor

sexual orientation effect in preregistered analyses. Due to space limitations, methodological details and results for these analyses are reported in a supplement available on the Open Science Framework (<https://osf.io/g5trc/>).

Measures

Negative attitudes

Negative attitudes were assessed using three items. Participants were asked to indicate how *willing*, *comfortable*, and *open* they felt towards receiving a transfusion of blood donated by each donor⁴¹⁻⁴³. Ratings were made on 7-point scales anchored by “Not at all” and “Completely”. A negative attitudes index was calculated for each donor by computing the mean of the three items ($\alpha_{MSM}=0.98$, $\alpha_{MSW}=0.95$) and reverse-scoring the value, such that higher scores represent more negative attitudes.

Emotion items

Anxiety, disgust, and gratitude were assessed using 12 items. In relation to each donor, participants indicated their emotional experience on 7-point scales anchored by “Not at all” and “Very much”. Anxiety was assessed using four items (i.e., “worried”, “dread”, “nervous”, and “anxious”) and disgust was assessed using five items (i.e., “grossed out”, “nauseous”, “disgusted”, “revulsion”, and “sickened”)⁴⁴. Gratitude was assessed using three items (i.e., “grateful”, “thankful”, and “appreciative”)⁴⁵. Four additional items (“curious”, “interested”, “content”, and “calm”) were included as filler items to balance the ratio of positively- and negatively-valenced emotion items and were not analyzed. For each donor, a mean emotion index was calculated separately for anxiety, disgust and gratitude ($\alpha_{MSM\ anxiety}=0.93$, $\alpha_{MSW\ anxiety}=0.92$, $\alpha_{MSM\ disgust}=0.94$, $\alpha_{MSW\ disgust}=0.92$, $\alpha_{MSM\ gratitude}=0.94$, $\alpha_{MSW\ gratitude}=0.82$).

Statistical analyses

Using R studio (v1.4.1717 [Posit, Boston, MA, USA]), a series of two-tailed paired *t*-tests ($\alpha=0.05$) examined the donor sexual orientation effect on negative attitudes, anxiety, disgust, and gratitude. The MEMORE macro for SPSS (v3.3 [IBM, Armonk, NY, USA])⁴⁶ was used to assess indirect effects of donor sexual orientation on negative attitudes via anxiety, disgust, and gratitude using a path-analytic framework suitable for within-participants designs. Indirect effects were estimated using bias-corrected bootstraps and assessed using 95% confidence intervals.

RESULTS - STUDY 1

Donor sexual orientation effect

Table I presents means, standard deviations, and *t*-test statistics for negative attitudes, anxiety, disgust, and gratitude reported in relation to the homosexual and heterosexual male donor. The hypothesized donor sexual orientation effect was observed for negative attitudes, anxiety, and disgust. Specifically, participants reported significantly more negative attitudes ($d=0.46$), higher anxiety ($d=0.37$), and more disgust ($d=0.27$) towards the notion of receiving a transfusion of blood donated by a homosexual male relative to a heterosexual male. The donor sexual orientation effect on gratitude was also significant ($d=-0.26$), with participants reporting significantly lower gratitude towards the homosexual male donor compared to the heterosexual male donor. Effect sizes were moderate.

Exploratory analyses compared attitudes, anxiety, disgust, and gratitude in relation to the homosexual male donor relative to the two female donors. These

Table I - Means, standard deviations, and paired *t*-test results for the donor sexual orientation effect on negative attitudes, anxiety, disgust, and gratitude in Study 1

	Homosexual male donor M (SD)	Heterosexual male donor M (SD)	<i>t</i>	<i>p</i>	<i>d</i>	95% CI LL, UL
Negative attitudes	2.07 (1.60)	1.44 (0.82)	10.36	<0.001	0.46	0.37, 0.55
Anxiety	2.68 (1.71)	2.24 (1.43)	8.35	<0.001	0.37	0.28, 0.46
Disgust	1.72 (1.17)	1.48 (0.88)	6.14	<0.001	0.27	0.18, 0.36
Gratitude	6.32 (1.19)	6.56 (0.80)	-5.80	<0.001	-0.26	-0.34, -0.17

Note. For all measures possible range: 1-7. LL: lower limit of 95% confidence interval; UL: upper limit of 95% confidence interval.

comparisons mirrored those reported above comparing the homosexual male donor to the heterosexual male donor. Specifically, participants reported significantly more negative attitudes (WSM-20: $M=1.31$, $SD=0.67$, $t=11.72$, $d=0.52$ [0.43; 0.61]; WSM-60: $M=1.76$, $SD=1.14$, $t=5.09$, $d=0.23$ [0.14; 0.31]), higher anxiety (WSM-20: $M=2.15$, $SD=1.41$, $t=9.77$, $d=0.43$ [0.34; 0.52]; WSM-60: $M=2.43$, $SD=1.53$, $t=4.99$, $d=0.22$ [0.13; 0.31]), higher disgust (WSM-20: $M=1.43$, $SD=0.81$, $t=7.42$, $d=0.33$ [0.24; 0.42]; WSM-60: $M=1.54$, $SD=0.95$, $t=5.09$, $d=0.23$ [0.14; 0.31]), and lower gratitude (WSM-20: $M=6.66$, $SD=0.70$, $t=-7.71$, $d=-0.34$ [-0.43; -0.25]; WSM-60: $M=6.54$, $SD=0.83$, $t=-5.17$, $d=-0.23$ [-0.32; -0.14]; dfs for all tests=509) towards the notion of receiving a transfusion of blood donated by a homosexual male relative to either female. Effect sizes were moderate; all $ps < 0.001$.

Mediation

To assess indirect effects of donor sexual orientation on negative attitudes via emotions, a model was generated with donor sexual orientation (homosexual male donor vs heterosexual male donor) as the independent variable; anxiety, disgust, and gratitude as simultaneous mediators; and negative attitudes as the dependent variable. The inclusion of gratitude was a deviation from the pre-registered model based on the significant effect of donor sexual orientation on gratitude reported above. The model is depicted in **Figure 1**, including path estimates.

Table II presents estimates of the direct and indirect effects. All three indirect effects were nonzero. To the extent that the idea of receiving a transfusion of blood donated by a homosexual male, relative to a heterosexual male, elicited higher anxiety and disgust, and lower gratitude, stronger

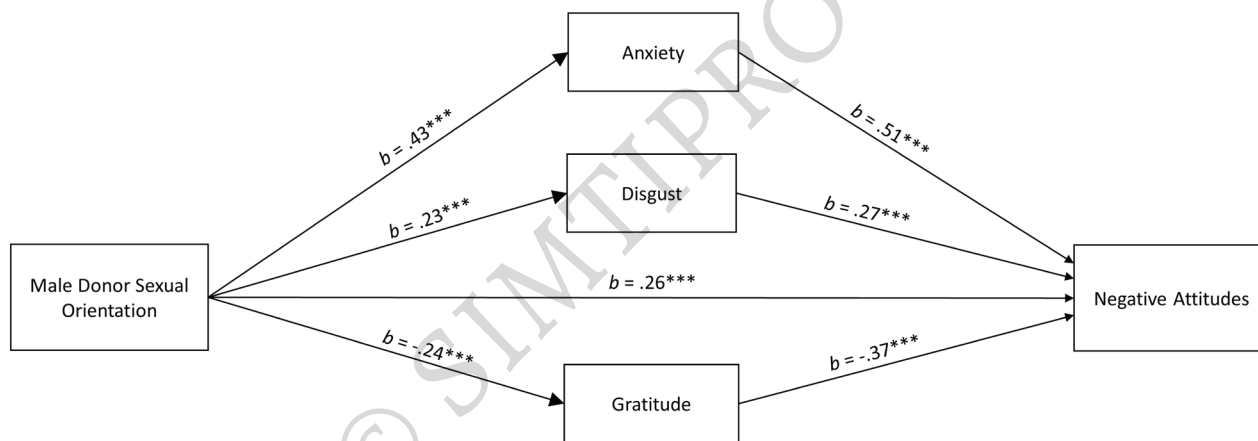


Figure 1 - Path estimates from the within-participants indirect effects analysis model of donor sexual orientation (homosexual vs heterosexual) on negative attitudes via anxiety, disgust, and gratitude from Study 1

Note. *b* represents unstandardized coefficients. *** denotes $p < 0.001$.

Table II - Direct and indirect effects of male donor sexual orientation on negative attitudes via anxiety, disgust and gratitude in studies 1 and 2

	Study 1		Study 2 Control condition		Study 2 Safety testing reminder condition	
	<i>b</i>	95% CI LL, UL	<i>b</i>	95% CI LL, UL	<i>b</i>	95% CI LL, UL
Total effect	0.63	0.51, 0.75	0.67	0.56, 0.79	0.60	0.48, 0.71
Direct effect	0.26	0.18, 0.34	0.30	0.22, 0.37	0.18	0.11, 0.26
Indirect effects						
Anxiety	0.22	0.15, 0.30	0.19	0.11, 0.28	0.30	0.21, 0.39
Disgust	0.06	0.02, 0.13	0.07	0.01, 0.14	0.05	0.0002, 0.12
Gratitude	0.09	0.04, 0.16	0.12	0.06, 0.20	0.07	0.03, 0.13

Note. *b* represents unstandardized coefficients. LL: lower limit of 95% confidence interval; UL: upper limit of 95% confidence interval.

negative attitudes were elicited. The indirect path via anxiety was stronger than via disgust (contrast estimate: 0.16, 95% CI [0.06, 0.25]) and gratitude (contrast estimate: 0.13, 95% CI [0.03, 0.23]). The magnitude of the indirect effects via disgust and gratitude were not significantly different from one another (contrast estimate: -0.03, 95% CI [-0.13, 0.06]).

MATERIALS AND METHODS - STUDY 2

Study 2 followed the same design and procedure as Study 1, with the addition of a between-participants manipulation. This manipulation assessed the impact of reminding participants that all donated blood samples undergo rigorous safety testing³⁸⁻⁴⁰. Participants were randomly allocated to either a control condition that replicated Study 1, or a safety testing reminder condition. After the process of blood donation was explained to all participants, those in the safety testing reminder condition were informed that all donated blood samples are tested for a variety of infectious diseases, including HIV, Hepatitis B and C, malaria, and syphilis. All participants then completed the donor task, as per Study 1. Individual difference measures were not included in Study 2.

A total of 1,102 participants were recruited via Prolific, using the same eligibility criteria as Study 1. Applying pre-registered exclusion criteria to ensure data quality resulted in exclusion of data from 37 participants, leaving 1065 for final analysis (control condition No.=531, safety testing reminder condition No.=534).

The sample was 50.3% female and 49.7% male, with a mean age of 41.9 years (SD=13.5). 96.2% of the sample resided in the UK, 1.0% in the US, and 2.8% in Australia. In terms of ethnicity, 86% self-identified as White/Caucasian/European, and 8% identified as Asian. The remaining 6% selected other ethnicities, multiple options, or opted not to answer.

This sample size exceeded the preregistered minimum set-in light of statistical power considerations (i.e., No.=1,000) for planned analyses of moderation of indirect effects (see preregistration).

Negative attitudes ($\alpha_{MSM}=0.99, \alpha_{MSW}=0.96$), anxiety ($\alpha_{MSM}=0.93, \alpha_{MSW}=0.92$), disgust ($\alpha_{MSM}=0.95, \alpha_{MSW}=0.92$), and gratitude ($\alpha_{MSM}=0.96, \alpha_{MSW}=0.89$) were measured.

Statistical analysis

The MEMORE macro (v3.3) for SPSS⁴⁶ was used to estimate a model assessing whether the safety testing reminder moderated the donor sexual orientation effect. This model incorporated a between-participants moderator (i.e., safety testing reminder) of a within-participants effect (i.e., donor sexual orientation) on outcomes⁴⁷. Using the simple slopes method, donor sexual orientation effects on negative attitudes, anxiety, disgust, and gratitude were estimated separately for each condition, paralleling *t*-tests conducted in Study 1. Indirect effects were estimated using bias-corrected bootstraps and examined using 95% confidence intervals. Preregistered analyses included comparing the magnitude of indirect effects. However, pairwise comparisons between indirect effects in mixed-design moderated mediation models are not available in MEMORE v3.3; these comparisons were thus not computed.

RESULTS - STUDY 2

Table III presents descriptive statistics. In the control condition, the donor sexual orientation effects on attitudes and emotions were significant (see Table III and Figure 2), replicating Study 1. That is, participants reported more negative attitudes ($b=0.67$), anxiety ($b=0.46$), and disgust ($b=0.25$), and lower gratitude ($b=-0.24$), towards the idea of receiving a transfusion of blood donated by a homosexual male relative to a heterosexual male. Further,

Table III - Means and standard deviations for negative attitudes, anxiety, disgust, and gratitude in Study 2

	Control condition M (SD)		Safety testing reminder condition M (SD)	
	MSM	MSW	MSM	MSW
Negative attitudes	2.17 (1.68)	1.50 (0.96)	2.12 (1.62)	1.52 (0.92)
Anxiety	2.63 (1.63)	2.18 (1.40)	2.63 (1.63)	2.17 (1.35)
Disgust	1.63 (1.15)	1.39 (0.77)	1.66 (1.22)	1.45 (0.92)
Gratitude	6.26 (1.28)	6.50 (0.92)	6.25 (1.28)	6.47 (0.98)

Note. For all measures possible range: 1-7.

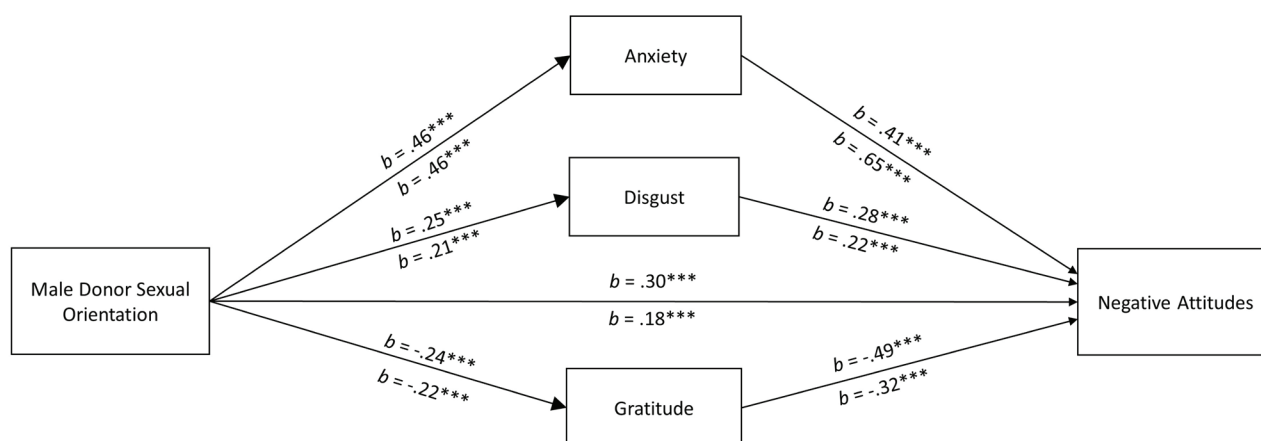


Figure 2 - Path estimates from the within-participants indirect effects analysis model of donor sexual orientation (homosexual vs heterosexual) on negative attitudes via anxiety, disgust, and gratitude from Study 2

Note. *b* represents unstandardized coefficients. Values above each path represent the control condition, values below each path represent the safety testing reminder condition. *** denotes $p < 0.001$.

indirect effects of donor sexual orientation on negative attitudes via anxiety, disgust, and gratitude were all nonzero, replicating Study 1 (see **Table II**).

The same pattern of results emerged in the safety testing reminder condition, with significant donor sexual orientation effects observed on negative attitudes ($b = 0.67$), anxiety ($b = 0.46$), disgust ($b = 0.21$), and gratitude ($b = -0.22$; see **Table III** and **Figure 2**), and nonzero indirect effects of donor sexual orientation on negative attitudes via anxiety, disgust, and gratitude (see **Table II**). Across both conditions, effect sizes were moderate.

Exploratory analyses compared attitudes, anxiety, disgust, and gratitude in relation to the homosexual male donor relative to the two female donors in both the control condition and the safety testing reminder condition. These comparisons mirrored those reported above comparing the homosexual male donor to the heterosexual male donor. Specifically, in the control condition, participants reported significantly more negative attitudes (WSM-20: $M = 1.35$, $SD = 0.73$, $t = 12.65$, $d = 0.55$ [0.46; 0.64]; WSM-60: $M = 1.69$, $SD = 1.13$, $t = 7.50$, $d = 0.33$ [0.24; 0.41]), higher anxiety (WSM-20: $M = 2.07$, $SD = 1.34$, $t = 10.85$, $d = 0.47$ [0.38; 0.56]; WSM-60: $M = 2.31$, $SD = 1.48$, $t = 6.20$, $d = 0.27$ [0.18; 0.36]), higher disgust (WSM-20: $M = 1.37$, $SD = 0.77$, $t = 6.88$, $d = 0.30$ [0.21; 0.39]; WSM-60: $M = 1.47$, $SD = 0.94$, $t = 4.48$, $d = 0.19$ [0.11; 0.28]), and lower gratitude (WSM-20: $M = 6.55$, $SD = 0.85$, $t = -6.90$, $d = -0.30$ [-0.39; -0.21]; WSM-60: $M = 6.48$, $SD = 0.89$, $t = -5.42$, $d = -0.24$ [-0.32; -0.15];

dfs for all tests=530) towards the notion of receiving a transfusion of blood donated by a homosexual male relative to either female. In the safety testing reminder condition, participants reported significantly more negative attitudes (WSM-20: $M = 1.44$, $SD = 0.84$, $t = 11.77$, $d = 0.51$ [0.42; 0.60]; WSM-60: $M = 1.72$, $SD = 1.09$, $t = 6.84$, $d = 0.30$ [0.21; 0.38]), higher anxiety (WSM-20: $M = 2.14$, $SD = 1.31$, $t = 9.48$, $d = 0.41$ [0.32; 0.50]; WSM-60: $M = 2.33$, $SD = 1.39$, $t = 5.79$, $d = 0.25$ [0.16; 0.34]), higher disgust (WSM-20: $M = 1.41$, $SD = 0.85$, $t = 6.91$, $d = 0.30$ [0.21; 0.39]; WSM-60: $M = 1.45$, $SD = 0.93$, $t = 5.41$, $d = 0.23$ [0.15; 0.32]), and lower gratitude (WSM-20: $M = 6.54$, $SD = 0.86$, $t = -6.86$, $d = -0.30$ [-0.38; -0.21]; WSM-60: $M = 6.46$, $SD = 0.98$, $t = -5.14$, $d = -0.22$ [-0.31; -0.14]; dfs for all tests=533) towards the notion of receiving a transfusion of blood donated by a homosexual male relative to either female. Effect sizes were moderate; all $ps < 0.001$.

The total effect of donor sexual orientation (homosexual male vs heterosexual male) on attitudes was not significantly moderated by condition ($\omega = -0.08$ [-0.24, 0.08], $p = 0.35$). The same was true for individual paths from donor sexual orientation to emotions ($\omega s < 0.08$, $ps > 0.35$) and for indirect effects via anxiety, disgust, and gratitude (indices of moderated mediation < 0.11). The direct effect of donor sexual orientation on negative attitudes (i.e., the effect not mediated by emotions) was significantly moderated by safety testing reminder condition ($\omega = -0.12$ [-0.22, -0.01], $p = 0.03$). The direct

effect was weaker in the safety testing reminder condition (0.18 [0.11, 0.26], $p < 0.001$) than the control condition (0.30 [0.22, 0.37], $p < 0.001$), suggesting that emotions may play a stronger role underpinning attitudes in the face of the safety testing reminder.

In summary, the safety testing reminder condition did not attenuate (or exacerbate) the effect of donor sexual orientation on attitudes or emotions. Participants robustly reported higher anxiety and disgust, and lower gratitude, towards the idea of receiving a transfusion of blood donated by a homosexual male relative to a heterosexual male, even when reminded of the safety testing procedures in place. These emotional responses in turn predicted negative attitudes.

DISCUSSION

This research provides insight into heterosexual participants' psychological response to considering receiving a transfusion of blood donated by a homosexual male and a heterosexual male. Two studies present novel additions to the literature, documenting patterns of attitudes and emotional responses (Studies 1 and 2) and the impact of a safety testing reminder (Study 2)³⁸⁻⁴⁰.

Corroborating prior research^{28,36}, participants were less willing, comfortable, and open to receiving a transfusion of blood donated by a homosexual male relative to a heterosexual male. Most blood transfusion recipients do not choose whether and from whom to receive a transfusion (e.g., in acute medical situations), so at face-value these findings may seem tangential to real-life situations. However, negative attitudes may serve as an indicator of lower perceived safety of transfusion processes, and carry downstream effects on the general population's willingness to donate blood^{12,13}.

These studies highlight the important role of emotions in this context. Focusing first on negative emotions, heightened anxiety and disgust were observed in response to a hypothetical transfusion of blood donated by a homosexual male relative to a heterosexual male. Anxiety and disgust, in part, accounted for the downstream effect of donor sexual orientation on negative attitudes. This pattern is consistent with HIV-transmission concerns via transfusion¹⁰, which are likely in relation to MSM donors due to higher perceived prevalence of sexually transmitted infections in this group⁸. In addition to

shared drivers (e.g., pathogen avoidance) across anxiety and disgust, unique mechanisms may be at play. Anxiety may stem from transfusion serving as a form of intergroup contact between heterosexual recipients and homosexual donors²⁰. Disgust may arise from concerns of moral contamination^{29,30}. Future research should seek to identify the shared and unique underlying drivers of anxiety and disgust in this context.

These studies also documented a novel finding of lower gratitude towards homosexual male donors relative to heterosexual male donors. This corroborates some past research³⁴, but counters other findings³⁵. Given replication across studies and robustness against an intervention, evidential weight tends to rest with gratitude being impacted by donor identity characteristics. Future research should explore whether this pattern expands to donors with other unshared characteristics (e.g., ethnic identity, age).

Study 2 demonstrated that reminding participants of the rigorous safety testing carried out on donated blood samples was insufficient to shift participants' attitudes or emotional reactions in this context. If anything, this reminder appears to have exacerbated the emotional mechanisms driving the effect of donor sexual orientation on attitudes, though the overall size of the effect was unchanged. The question of how to address, and ultimately reduce, these negative attitudes and emotional reactions remains a focus to be addressed in future research. Such work might target particular emotions. For instance, an educational campaign regarding HIV transfusion risk (e.g., adapted from readily available factsheets⁴⁸ and reports²) might be effective at shaping attitudes via reduced anxiety and disgust. Messaging seeking to establish a common ingroup^{49,50} among recipients and donors of different backgrounds might work via reducing anxiety and boosting gratitude.

Practically, these findings compel blood collection agencies to consider the potential that communications designed to recruit MSM to donate blood may proximally elicit negative attitudes and distally produce aversion to donation among heterosexual individuals. The suggested future research above might inform best practice for crafting such communications to yield positive outcomes.

CONCLUSIONS

The thought of receiving transfusion of blood donated by a homosexual male elicits a psychological response characterized by more negative attitudes, higher anxiety and disgust, and lower gratitude, relative to a heterosexual male. These effects remain even after a reminder of the rigorous safety testing carried out on donated blood samples. These findings are important to consider in the context of changing restrictions around blood donation by men who have sex with men and how those changes are communicated to the public.

ETHICAL CONSIDERATION

These studies were approved by the UNSW Human Research Ethics Advisory Panel (File 3480). The research was conducted ethically, with all study procedures performed in accordance with the requirements of the Australia National Health and Medical Research Council National Statement on Ethical Conduct in Human Research. Written informed consent was obtained from each participant for study participation and data publication.

AUTHORS' CONTRIBUTIONS

Per the CRediT taxonomy, LAW: conceptualization, methodology, investigation, formal analysis, writing-review and editing, supervision. KN: conceptualization, methodology, investigation, data curation, formal analysis, writing-original draft, writing-review and editing. JRWW: conceptualization, methodology, investigation, data curation, formal analysis, writing-original draft, writing-review and editing.

The Authors declare no conflicts of interest.

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