

# Protestant Christian attitudes to ART

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**STUDY QUESTION:** How do Christian religious beliefs affect attitudes to ART?

**SUMMARY ANSWER:** Attitudes to ART depend on the religiosity of the respondent, and although the majority of those that had successfully used ART were positive or moderately positive in their views, the acceptability of procedures fell when damage to the marriage relationship or the embryo was a potential outcome.

**WHAT IS KNOWN ALREADY:** Religion can impact views on ART. Sanctity of marriage and sanctity of the embryo are major concerns for some Christians, but details are unclear.

**METHODS:** A cross-sectional online survey was used to collect data from 1587 participants over a 3-month period in 2013, of which 1334 were of the Christian faith and included in this study. Descriptive statistics were reported for individual ARTs, and a general score of all ART approval was calculated. A multivariable linear and logistic regression was conducted on general approval for ART to identify predictors of ART approval.

**MAIN RESULTS AND THE ROLE OF CHANCE:** Indicators of religiosity (religious meeting attendance and Bible reading frequency) showed that this was a highly religious sample. We found that in this cohort of English-speaking, well-educated, practising and mainly Protestant Christians 164 (12.3%) of those had personal experience of ART. Most participants that had successfully used ART were positive or moderately positive in their views. Throughout the cohort, procedures were less acceptable if there was a perception that the marriage relationship or the life of the embryo was threatened: including donated gametes (28.7–29.1% approval), surrogacy (22.7–33.1% approval), and PGD (1.0–23.8% approval). A multivariable analysis of the ART approval score found that it was higher among those with Protestant compared with Catholic/Orthodox faith ( $P < 0.001$ ; mean score difference, 5.06; 95% CI 4.36–5.81) and those who believe life begins after fertilisation ( $P < 0.001$ ; mean score difference, 4.86; 95% CI 4.14–5.57). Approval was also higher, but to a lesser extent, in women than men ( $P = 0.008$ ; mean score difference, 0.73; 95% CI 0.18–1.28), and those with lower religiosity ( $P < 0.001$ ). The area raising most indecision for this cohort was disposal of excess embryos.

**LIMITATIONS, REASONS FOR CAUTION:** This sample includes an uneven geographical spread of respondents and restriction to English-speaking participants. Different views may be expressed by a different religious cohort. Use of an online survey platform means that a bias towards those with computers (consistent with education levels of this cohort) could exist. Use of this platform also makes it impossible to know the response rate, and the veracity of responses cannot be verified. However, despite these limitations we believe this survey gives us insight into the reservations held among a certain population of Christians regarding the use of reproductive technology.

**WIDER IMPLICATIONS OF THE FINDINGS:** Our findings highlight the need for ART clinicians to consider the influence of patient spiritual beliefs on therapeutic options and provide detailed information that will allow them to be accommodated. Practices such as widening the options for collecting semen and limiting the number of embryos created through IVF so as to reduce or eliminate excess embryos may be helpful for these patients.

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## WHAT DOES THIS MEAN FOR PATIENTS?

This international study surveyed online >1300 participants, mostly Protestants, about their views on different aspects of ART. The results showed that, in this population, there were objections to many aspects, but not all aspects, of ART where they challenged ethical beliefs. This study helps clinicians to understand that some people have ethical objections of aspects of ART and would appreciate clinics adjusting treatment (such as widening the options for collecting semen and limiting the number of embryos created through IVF so as to reduce or eliminate excess embryos), so they can have ART without going against their conscience.

## Introduction

Religion is known to be a determinant for attitudes towards the ethics of ART for both healthcare providers (Fonnest *et al.*, 2000) and patients (Power *et al.*, 1990; Genius, 1993; Schenker, 2005; Dutney, 2007; Shreffler *et al.*, 2010; Collins and Chan, 2017); however, little research has explored the nature of and reasons for such views, especially in the Christian faith (Schenker, 2005). Family formation is central to the concerns of the church (Dutney, 2007); therefore, infertility has considerable impact on many Christians. With the increasing availability of ART, more providers are making an effort to accommodate the specific religious and cultural requirements of their patients. In this context, it is helpful to know exactly where ethical attitudes of religious patients differ from those of the general public and the reasons underlying such ethical beliefs.

In view of the increased range of ART processes that have become available since this topic was initially explored, and religious patterns are known to change over time (Schenker, 2005), we conducted an online international survey targeting Christian communities in order to understand the attitudes of Christians towards various aspects of ART.

## Materials and Methods

### Population

This survey was advertised online to the general public in two English-speaking countries (Australia and USA) by posting the web address for the survey on a Christian University website in each country during 2013. It was subsequently circulated by individuals who increased the cohort by snowballing. Respondents were eligible if they were 18 years of age or older. Apart from age, no exclusion criteria were applied.

### Methods

This is a cross-sectional study. A 25-item anonymous survey exploring public attitudes to ART was developed after a literature search and consultation with an expert panel (comprising experts in ART and medical ethics) and entered into an online survey platform (SurveyMonkey). Six hypothetical scenarios were presented (Supplementary Table S1), and participants were asked to respond according to a 3-point Likert scale indicating their approval/unsure/disapproval of the procedures described. Participants were also asked about their experience of ART (using a 4-point Likert scale), when they thought human life began, and their demographic details. These included religious affiliation and frequency of church attendance and bible reading, as surrogates for degree of religiosity. Skip logic was employed to maintain relevance of questions, with 25 being the maximum number of questions asked. Opportunities were given for participants to expand their responses

using free text. Respondents were encouraged to complete the survey independently, rather than as couples. The survey was closed after 3 months of data collection.

### Statistical analyses

Demographic details were tabulated, and summary statistics used to describe results (see Results section).

Approval scores were calculated based on the responses to 10 questions, involving the topics of IVF, embryo and gamete donation, ICSI, surrogacy, and PGD (Supplementary Table S1). For each question, a score of 0 was awarded for disapproval, a score of 1 for being undecided, and a score of 2 for approval of the procedure, resulting in a score ranging from 0 (disapproval for all procedures) to 20 (approval for all procedures). Approval score was then compared across the independent variables in a multiple linear regression model. As approval score was truncated at 0 and 20, the linear regression error at these boundaries was not normally distributed and showed some heteroscedasticity—two assumptions of a linear regression. Although these assumption violations were not extreme, to test the robustness of the model to identify predictors of approval score a logistic regression based on approval above and below a value of 10 (63% of responders had scores below 10) was carried out with similar results. This logistic regression does not have the same assumption requirements of normality and homoscedasticity as the linear regression. The results of the multiple linear regression are reported in the manuscript text. Statistical analysis was carried out in R version (R Core Team, 2017) with functions 'l.m.' for the multiple linear regression and 'g.l.m.' for the logistic regression.

Respondents were given the opportunity to respond in free text through the survey. These responses were analysed with thematic analysis. Qualitative analysis will be reported separately.

### Ethical approval

Ethics approval was given by the Research Ethics committees at Moore Theological College, Sydney, Australia, and Trinity International University, Deerfield, USA.

## Results

There were 1598 responders to the invitation to participate in the survey. As the number of people notified about the survey link is unknown, the response rate cannot be calculated. Of 1598 initial responses, 11 people exited the online survey after reading the participant information sheet and 253 people were excluded as they were not Christian. A total of 1334 completed responses were analysed. While there was some missing data, the majority of responders completed most questions.

**Table 1** Demographic characteristics of sample in a study of Christian attitudes to ART.

Characteristic	Number (%)*
<b>Sex</b>	
Male	501 (37.6)
Female	833 (62.4)
<b>Age (years)</b>	
18–20	26 (2)
21–29	229 (17.2)
30–39	310 (23.3)
40–49	290 (21.8)
50–59	260 (19.5)
60 or older	218 (16.4)
<b>Marital status**</b>	
Single (including widowed, divorced, separated)	265 (20)
Cohabiting not married	12 (0.9)
Married	1047 (79.1)
<b>Region of usual address**</b>	
Asia	14 (1.1)
Australia/New Zealand	410 (31.2)
Central/South America	3 (0.2)
Europe/UK	52 (4)
Middle East	1 (0.1)
North America	830 (63.1)
Sub-Saharan Africa	5 (0.4)
<b>Highest level of education achieved**</b>	
Postgraduate	604 (45.5)
College/undergraduate	625 (47.1)
Secondary education or less	99 (7.5)
<b>Number of children</b>	
None	375 (28.1)
One	156 (11.7)
Two	330 (24.7)
Three	255 (19.1)
More than three	217 (16.3)
<b>Personal contact with ART</b>	
Used ART successfully	114 (11.9)
Used ART unsuccessfully	50 (4.1)
Investigated but not used ART	40 (3.3)
Know someone else who has used ART	666 (54.9)
No personal contact	444 (36.6)
Conceived through ART	13 (1.1)
<b>Denomination</b>	
Protestant Christian	1079 (80.9)
Catholic/Orthodox	255 (19.1)
<b>Attendance religious meetings**</b>	
<b>Denomination</b>	
Protestant Christian	1079 (80.9)
Catholic/Orthodox	255 (19.1)

Continued

**Table 1** Continued

Characteristic	Number (%)*
<b>Attendance religious meetings**</b>	
Once a month or less	99 (7.5)
More than once a month	1226 (92.5)
<b>How often reads Bible**</b>	
Never	33 (2.5)
Once a week or less	276 (20.8)
More than once a week	1016 (76.7)

\*Not all questions were available to all respondents because of skip logic (to maintain relevance), and \*\*some questions had missing data.

Approximately two-thirds of the sample were female, with an even distribution across age groups ranging from 18 years upwards (Table 1). Although the sample was international, approximately one-third came from Australasia and approximately two-thirds from North America. The majority of the sample were married, highly educated, and affiliated with Protestant denominations. Indicators of religiosity (religious meeting attendance and Bible reading frequency) indicated that this was a highly religious sample.

Experience of ART differed widely. Over two-thirds (71.9%) of the sample had had children, and of those only 11.9% had successfully used ART to conceive. Of those who had not conceived through ART, 4.1% had used ART with no success, 3.3% had considered ART but decided against it, 54.9% knew someone personally who had used ART, 1.1% had conceived through ART, and one-third (36.6%) of the sample had had no personal contact with someone who had used ART. Demographic details can be found in Table 1.

### Experience of ART

Those who had personal experience of ART were asked about their overall experience. Of the 164 (12.3%) responders, 80% were positive or moderately positive, and of this subgroup 81.7% would choose ART again or were undecided. The reasons for deciding against choosing ART again included emotional cost and the ethical problem of destroying embryos (both 34.6%), a preference for adoption of a child (33.3%), financial cost (30.8%), and relationship stress (12.8%).

### Gamete collection

When asked to respond to scenarios involving a husband collecting sperm through masturbation, without his wife present, less than half the sample (46.5%) approved with the remainder disapproving or undecided, but if the husband collected the sperm at home with his wife, 73.8% approved. See Table IV.

### Attitudes to IVF and ART in general

With regard to embryo creation for the purpose of reproduction through IVF, 70.4% of the sample approved, with the remainder disapproving or undecided. To gauge general approval of ART a score ranging from 0 (no approval) to 20 (complete approval of all ART questions) was calculated (see methods above). A multivariable analysis on this approval score found that it was higher among those with

**Table II** Factors associated with ART approval scores.

Question	Category	95% CI			P-value
		Estimate	Lower	Upper	
When does life begin?	After fertilisation	Ref.			<0.0001*
	At fertilisation	-4.86	-5.57	-4.15	
Age (yrs)		0.02	0.00	0.05	0.02
Gender	Female	Ref.			0.008*
	Male	-0.73	-1.28	-0.18	
Education		-0.08	-0.31	0.15	0.50
Religiosity		-1.58	-1.87	-1.28	<0.0001*
Parental status	Not a parent	Ref.			0.02
	Is a parent	1.01	0.18	1.84	
ART experience	None	Ref.			0.17
	Has experience	0.39	-0.17	0.94	
Marital status	Divorced	Ref.			0.05
	Married	2.13	0.59	3.68	
	Never married, currently cohabiting	3.95	0.72	7.19	
	Never married, never cohabited	1.42	-0.34	3.17	
	Never married, previously cohabited	1.71	-1.38	4.80	
	Separated	4.36	0.10	8.62	
Religion	Widowed	1.90	-1.16	4.95	<0.0001*
	Catholic/Orthodox	Ref.			
	Protestant	5.09	4.36	5.81	

\*P-values that remain below 0.01 when analysing with a logistic regression on scores less than or equal to 10 (out of 20)

Protestant faith compared with Catholic/Orthodox faith ( $P < 0.001$ ; mean score difference, 5.06; 95% CI 4.36–5.81) and those who believe life begins after fertilisation ( $P < 0.001$ ; mean score difference, 4.86; 95% CI 4.14–5.57). Approval was also higher, but to a lesser extent, in women than men ( $P = 0.008$ ; mean score difference, 0.73; 95% CI 0.18–1.28), and those with lower religiosity ( $P < 0.001$ ).

There was only weak evidence for an increase in approval with increasing age and being a parent, and no evidence for differences with those who had experience with ART, had different marital status or different education levels (Table II).

When asked about the use of ICSI, 63.7% of the sample approved with 14.6% undecided.

## Donor gametes and surrogacy

Respondents were asked to comment on whether they approved, disapproved or were undecided about two scenarios involving donor gametes. 'A married couple use sperm donated by another man to fertilise the wife's egg' was deemed ethically wrong by 57.6% of the sample, with 13.3% undecided. Similarly, 'A married couple use sperm from the husband to fertilise an egg donated by another woman' was deemed wrong by 57.3% of the sample with 13.9% undecided.

Approval of surrogacy was low, with 22.7% of the sample approving of the use of a surrogate mother unknown to the intended parents, and 18.7% undecided. This rose to 33.1% approval when the surrogate mother was related to the intended social parents, with 17.6% undecided. However, surrogacy, regardless of whether the surrogate

was unknown or related, was not acceptable to over half of the cohort.

## PGD

PGD was not acceptable to the majority of this sample. Disapproval varied depending on what conditions were being screened for. Screening for serious, untreatable disease had 66.5% disapproval, screening for serious but treatable disease had 69.4% disapproval, 75.3% disapproved of screening for adult-onset disease, and 95.1% for sex selection. HLA-matching (for a 'saviour sibling') was disapproved by 80.8% of the sample, and 97.2% would disapprove of using PGD to select for preferred characteristics of the child such as intelligence, physical appearance, and athletic ability.

## Fate of excess frozen embryos

Respondents were asked what should be done with excess frozen embryos. Four options were offered, with responses required for each alternative: 'let the embryos perish undisturbed' (19.2% approved, 17.6% undecided), 'donate embryos for research' (12.0% approved, 10.2% undecided), 'donate embryos to other infertile couples' (55.3% approved with 14.6% undecided), and 'couples should use all their own embryos' (54.3% approved with 23.1% undecided).

## When does life begin?

Participants were asked when life begins, and forced choice answers were at fertilisation, at implantation, gradually over time, at birth, and

**Table III** Life begins at fertilization.

	Percentage of responders that believe life begins at fertilisation (sample size)
<b>Age group (years)</b>	
18-20	100 (25)
21-29	77.3 (225)
30-39	79.6 (309)
40-49	80.6 (288)
50-59	85.7 (258)
59 or older	81 (216)
P-value continuous	0.04
<b>Sex</b>	
Female	81.7 (826)
Male	80.4 (496)
P-value	0.62
<b>Education</b>	
< 10 school years	100 (3)
12 school years	89.6 (96)
Certificate	81.1 (37)
Diploma	82.9 (82)
Bachelor	82.5 (502)
Postgraduate	78.6 (602)
P-value continuous	0.008
<b>Bible reading</b>	
Never	45.5 (33)
< monthly	60.2 (83)
Once month	70 (40)
Once week	73 (152)
> weekly	85.8 (1014)
P-value continuous	< 0.001
<b>Children</b>	
0	83.1 (964)
> 0	76.3 (358)
P-value	0.006
<b>ART experience</b>	
No experience	83.9 (465)
Has experience	81.7 (742)
P-value	0.37
<b>Marital status</b>	
Divorced	72.5 (40)
Married	82.3 (1040)
Cohabiting	72.7 (11)
Never cohabited	79.2 (192)
Previously cohabited	54.5 (11)
Separated	85.7 (7)
Widowed	90.9 (11)
P-value	0.13

Continued

**Table III** Continued

	Percentage of responders that believe life begins at fertilisation (sample size)
<b>Religion</b>	
Catholic/Orthodox	88.4 (255)
Protestant Christian	79.6 (1079)
P-value	0.002

Data were analysed by linear and logistic regression.

not sure. A significant proportion of the sample (81.2%) reported the belief that human life begins at fertilisation. There was an association between those that believed that life begins at fertilisation and being of Catholic/Orthodox faith, lower education levels, having no children, and/or with high religiosity scores (all  $P < 0.01$ ). There was no association with sex, marital status, or experience with ART, and only weak evidence for an association with age (Table III).

## Discussion

This cohort of primarily Protestant, highly religious participants, was asked to report on views regarding various aspects of ART. We found that there were several topics where acceptance diverged between those of high and low religiosity. The reasons for divergence of opinions were different according to topics.

Dutney (2007) has suggested that the main pre-occupations of religious concern regarding ART are sanctity of the marriage relationship and sanctity of the embryo. Regarding the former, we found that acceptability of ART procedures was impacted by the way the process involved might influence the marriage relationship. For example, acceptability of sperm collection increased when the wife assisted her husband in the process (compared to masturbation alone in the clinic), and donated oocytes made ART less acceptable (perhaps due to a weakening of the marriage bond). Other investigators have found similar results (Shreffler *et al.*, 2010). Emotional cost and relationship stress were listed as reasons for deciding against ART use, and over half the sample disapproved of the use of donor gametes. Nonreligious populations have also expressed less approval of using donor gametes, disapproval increasing with increased distance between the donor and the recipient (Genius, 1993). Surrogacy was unacceptable to over half of the current sample. These results suggest that potential weakening of the marriage relationship, whether due to masturbation (possibly with pornography) or making the biological bond to offspring uneven, was seen to make ART procedures less acceptable to this cohort.

In exploring beliefs about the moral status of the embryo, participants were asked when they thought human life begins. In our sample, 81.2% believed that human life begins at fertilisation. In support of Dutney's (2007) claim that sanctity of the embryo is a major pre-occupation for religious cohorts, we found that the potential for embryo destruction was a leading reason for deciding against ART, and belief that life begins at fertilisation was significantly associated with not approving of IVF. Over half the sample preferred that excess frozen embryos be used either by the couple responsible or another



**Table IV Attitudes to Individual ART.**

Technology	Approve (no./%)*	Disapprove (no./%)	Undecided (no./%)
IVF	939/70.4**	293/22	100/7.5
Single embryo cryopreservation	671/51.3	486/37.2	150/11.5
Multiple embryo cryopreservation	491/37.6	616/47.1	200/15.3
Donated sperm	365/29.1	722/57.6	167/13.3
Husband collects sperm alone	583/46.5	474/37.8	197/15.7
Husband collects sperm with wife	926/73.8	227/18.1	167/8.2
Donated oocyte	360/28.7	719/57.3	174/13.9
ICSI	799/63.7	272/21.7	174/14.6
Unknown surrogate	282/22.7	727/58.6	232/18.7
Related surrogate	411/33.1	612/49.3	218/17.6
PGD for serious untreatable disease	292/23.8	816/66.5	119/9.7
PGD for serious treatable disease	281/22.9	852/69.4	95/7.7
PGD for adult-onset disease	183/14.9	924/75.3	120/9.8
PGD for sex selection	26/2.1	1167/95.1	34/2.8
PGD for saviour sibling	97/7.9	991/80.8	139/11.3
PGD for designer child	12/1	1193/97.2	22/1.8
Excess embryo left to perish	246/19.2	810/63.2	226/17.6
Excess embryos donated for research	154/12	997/77.8	131/10.2
Excess embryos donated to other couples	517/55.3	281/30.1	136/14.6
Couple should use all embryos	696/54.3	290/22.6	296/23.1

\*Denominator varies between questions. \*\*Includes 'if couple is in a long-term relationship/if couple is married'.

couple, rather than allowing the embryos to succumb or be destroyed in research. While the specific question was not asked, it is possible that objection to embryo destruction also contributed to low approval of PGD, as noted by other authors (Ford, 2002).

Within the ART clinic, healthcare providers are familiar with the need to consider the nonmedical concerns of patients, and the religious concerns of patients are an important area of consideration. Patients are known to desire their physician to respect and accommodate their spiritual views, despite therapeutic challenges (Pathy et al., 2011; Padela et al., 2012). Greater awareness of the nature of religious objections to ART will assist the clinic in devising solutions for their patients which do not violate their spiritual values, such as widening the options for collecting semen and limiting the number of embryos created through IVF so as to reduce or eliminate excess embryos. This is particularly important in view of the importance of personal spirituality in coping with illness (Hassed, 2008).

Limitations of this sample include an uneven geographical spread of respondents and restriction to English-speaking participants. Different views may be expressed by a different religious cohort, and the absence of a control group makes it impossible to compare our results to those of the general population. Use of an online survey platform means that a bias towards those with computers (consistent with education levels of this cohort) could exist. Use of this platform also makes it impossible to know the response rate, and the veracity of responses cannot be verified. This sample was largely constituted of participants who had not experienced ART personally, which is known to influence views (Purewal and van den Akker, 2009). However, despite these limitations we believe this survey gives us insight into the reservations held among

a certain population of Christians regarding the use of reproductive technology.

## Conclusion

This cohort of religious, predominantly Christian, participants expressed concerns with aspects of ART that could potentially damage the marriage relationship and/or threaten the life of the human embryo. Familiarity with, and acceptance of, these concerns will facilitate the ability of ART providers to offer modified procedures that accommodate Christian beliefs.

## Supplementary data

Supplementary data are available at *Human Reproduction Open* online.

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## Authors' roles

MB, EH and MS conceived and designed the study, and contributed to data collection; MB and TS analysed and interpreted the data; MB drafted the article and all authors revised the paper critically for important intellectual content and approved the final version to be published.

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## Conflict of interest

The authors have no conflicts of interest to declare.

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