

# Attitudes about Infertility among Male and Female Saudi Medical Students

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Received: March 15, 2022 Accepted: March 20, 2023 Online Published: April 28, 2023

doi:10.5539/gjhs.v15n4p34

URL: <https://doi.org/10.5539/gjhs.v15n4p34>

## Abstract

Gender biases impact doctors' advising on infertility, thereby shaping treatment recommendations and patient health outcomes. This study explored the roles attributed to gender in the personal opinions of male and female medical residents in Saudi Arabia. This study used content and Appraisal analyses to explore attitudes realised by 85 female and 81 male Saudi medical interns about infertility. Content contained six themes, including infertility, psychology, children, marriage, divorce and religion. Both male and female participants understood women as the cause of and person responsible for dealing with infertility. Males focused on medical treatments, females on folk medicines. Female appraisals were mainly negative, male appraisals mainly positive. Strong co-frequencies were found for females between divorce and misery, and folk medicine and capacity, and for males between medical treatments and capacity, and children as emotionally fulfilling to women and normality. Both groups understood infertility primarily as a social and religious more than a medical issue. Gender biases, and contradictions in attributed gender roles were evident in how both groups discussed infertility. International institutions teaching healthcare communication must emphasise awareness of how gender stereotyping and cultural factors impact infertility advising and treatment.

**Keywords:** infertility, gender bias, subjective attitudes, content analysis, Appraisal analysis, Saudi Arabia

## 1. Introduction

Infertility is a significant problem in the Kingdom of Saudi Arabia (KSA), making gender awareness a relevant communication issue for patient-practitioner consultations about this medical condition. Wahhabi Islam retains gender roles and laws which treat men and women differently. This study explored the views of female and male Saudi medical students about infertility treatments, which elicited a complex web of social and religious themes, including women's and men's psychology, happy and unhappy marriages, divorce and religion.

Medical students bring their gender-stereotypical preconceptions to their communication with patients, impacting how they assess somatic and psychological elements of patient complaints, and recommend treatments. Gender awareness is an established part of healthcare communication courses, but gender bias can be "so normative as to be invisible" (Newman, Ng, Pacqué-Margolis, & Frymus, 2016). In many non-English-speaking countries, English-medium of instruction (EMI) medical education includes communication courses, but these focus on language competency (Chan, Purcell, & Power, 2016). This produces "graduates with narrow contextual understanding and insufficient knowledge, skills and competencies to understand social and other determinants of health and disease" (Frenk et al., 2010, p. 1923). Education in KSA is gender segregated, requiring religious instruction at all levels. There are "great defects in the curricula, particularly... toward anyone whose views are not in line with the Wahhabi religion" (Dankowitz, 2004, p. 1). The implementation of English-language education has not fostered independent thinking (Elyas & Picard, 2010). Female illiteracy rates remain about 20% (Hamdan, 2005). Only about 35% of Saudis attend university (Forstenlechner & Rutledge, 2011). University campuses architecturally segregate female and male students (Morin & Guelke, 2007). Thus, Saudi medical students remain conservatively religious.

The World Health Organisation (WHO) ranks KSA 26th in the world for its healthcare quality (WHO, 2010). Infrastructure, primary and preventative care, and public access are excellent, while costs remain low (Almalki,

FitzGerald & Clark, 2011). Yet the policy climate within which reproductive issues are handled is adverse: abortion is criminalised, contraception requires a medical prescription, and girls are not educated about family planning (Salam, 2013). The state controls the internet, limiting access to information about reproduction and contraceptives (Al-Jabre, 2013). Attitudes towards infertility reflect cultural practices and beliefs. Female genital mutilation is common, often causing infertility. Menstruation is ideologically marked; the law requires women to gain their male guardian's permission to access medical care, and polygamy is common, creating health problems for women (Mobaraki & Soderfeldt, 2010). Folk beliefs persist alongside scientific medicine, including widespread attribution of supernatural causes for infertility, the use of local healers (hakim, popular), and the practice of ruqyah (Ruqayyah), a blend of religious healing and exorcism believed to cure infertility. Many women use traditional herbal remedies for infertility, which act variously as diuretics, anticontractants, carminatives/laxatives, or stimulants (Abolfotouh, Alabdrabalnabi, Albacker, Al-Jughaiman & Hassan, 2013). Infertility rates are high. Female infertility rates are impacted by reproductive tract infections, STDs, sickle cell disease, auto-immune diseases, TB, ovarian cysts, fibroids and endometriosis. Primary and secondary infertility rates are high among males (Al-Turki, 2015). Most marriages are consanguinous, with spouses coming from the same tribe and location, increasing genetic disorders. About 1.5 of 27 million Saudis, or about 5.56% of the population, have blood diseases caused by the beta-thalassaemia trait (Al-Suliman, 2006). Over the past half-century, the fertility rate has decreased from 7.30 to 3.03. Premarital genetic screening, IVF, individualised genomic medicine and pharmaceuticals are available, and used by urbanised educated women. Overall, the burdens of infertility fall disproportionately on Saudi women (Abu-Elmagd et al., 2015).

This study use content and Appraisal analyses to explore the attitudes of male and female Saudi medical interns towards infertility. Despite the importance of gender awareness to infertility treatment, to date no study has explored Saudi medical students' attitudes in these areas. As the first study of this kind, text analytic methods were chosen, as they extract quantitative results from qualitative data. Research questions included: what content areas and what attitudes occur frequently when Saudi medical interns are asked about infertility treatments? What differences and similarities are found between female and male content and attitudes? What should we teach interns about effective and ethical infertility advising, in healthcare communication courses, in KSA and in international institutions?

## 2. Method

Qualitative data was collected, with text analytic methods used to generate quantitative measures. These methods are frequently used to analyse medical students' gender attitudes (Andersson, Salander & Hamberg, 2013; Osman et al., 2015; Vaismoradi, Turunen, & Bondas, 2013). Inter-coder and inter-rater reliability scores were obtained. Co-frequencies were determined. It should be noted that the use of the terms "male" and "female" in describing subcorpora reflect the segregation of medical students within the social and administrative milieu of the medical program, and their past socialisation. These terms should not be taken to reflect any assumptions about the potential range of gender identities either within the sample or the wider population.

### 2.1 Participants

Textual data was collected from 81 male and 85 female medical interns enrolled at the leading private EMI university in Riyadh. All were second- and third-year interns registered in a multi-section healthcare communication course. All had attained IELTS 5.0 or TOEFL 500/667 (35-45 iBT), giving them the English proficiency required within an EMI institution. Data from six Syrian students was removed from the dataset, prior to analysis.

### 2.2 Sample and Saturation

A sample of convenience was used. Student participants pose no intrinsic problem for validity, if inferences are constrained to relevant populations, as in this case (Hagaman & Wutich, 2017). This study used themes and attitudes realised by current medical students to infer those of the practitioners they will become in the coming decade, as they carry their cohort views into their work lives (Twenge, Campbell, Hoffman & Lance, 2010). In this case, they are a typical case or purposive sample (Zhi, 2014). Homogeneity was ensured by selecting for shared cohort traits including age, ethnicity, place of residence, educational background, nationality and culture (Meltzer, Naab, & Daschmann, 2012). Cohort members will tend to realise normative themes and attitudes (Fugard & Potts, 2015). Measures of confidence in qualitative data analysis (QDA) rely on saturation rather than sample (Thompson & Juan, 2006). Thematic salience refers to the frequency with which a specific theme is realised by any given participant (Guest, Bunce, & Johnson, 2006). As cohort members realise attitudes and themes which in their social milieu are normative, the minimum sample size for 95% thematic salience is 14 to 17 persons, with samples larger than 50 participants adding less than one new non-normative theme or attitude per participant (Tran, 2017).

2.3 Instrument

Data was collected from written personal opinions. Participation was optional and unassessed, to ensure realisation of authentic views. Participants wrote about 100 words on the topic, “What is your opinion about medical infertility treatments?” The prompt was grammatically simple allowing for ease of comprehension, and lexically simple to allow participants to define the topic (Hanson, Balmer, & Giardino, 2011). Personal opinions are a familiar writing task for second-language students, and produce more subjective content than academic genres such as essays (MacArthur, Graham, Fitzgerald, 2018). Data from non-Saudi nationals, including five Pakistanis, three Syrians and one Canadian, was excluded.

2.4 Content Analysis

Data was aggregated into two subcorpora, which were coded and converted to frequency scores. Content analysis reconfigures ideational content within a coding frame composed of major themes subdivided into multiple specific subthemes (Elo & Kyngäs, 2008). While the prompt elicited comment on infertility treatments, commentary included infertility impacts, religion, psychology, children and marriage. Thus, subcorpora analysis produced an emergent coding frame of six themes and thirty subthemes, as in Table 1.

Table 1. Coding frame themes and subunits

THEME	SUBTHEME	THEME	SUBTHEME
1. infertility impacts	as a female problem	4. infertility treatments	medical treatments
	as a male problem		adoption
	as a problem of both		surrogacy
	as a cause of male unhappiness		cost
	as a cause of female unhappiness		ethnomedicine
2. religion	specific doctrines	5. children	as emotionally fulfilling to men
	and men’s role and rights		as emotionally fulfilling to women
	and women’s role and rights		as a religious obligation
	religious obligation to have kids		as desired by extended family
	infertility as reason for divorce		quantity of children desired
3. psychology	of men	6. marriage	what men want in a marriage
	of women		what women want in a marriage
	of happy marriages		infertility and women’s beauty
	of unhappy marriages		impacted by family response
	of parent-child relationships		destroyed by infertility

The clause functioned as a bounded semantic unit of analysis (Krippendorff. & Bock, 2009). The coding frame was constrained, with extraneous content excluded. For example, “For the woman it is easier to have maids, to help with the children” contains no content connected to infertility, and was thus counted as a null clause. Constraining frequency scores to content having “a direct bearing on the question” generates lower, but more reliable frequency scores (Bazerman & Prior, 2004, p. 17). Similarly, n-gram dichotomous word-stem values were counted as a single subunit. Frequencies were tabulated at the level of the clause, with transitivity to distal clauses tallied independently (Neuendorf, 2016). In this example,

It is important to offer several (1) infertility treatments, including the (2) drug therapy, the (3) artificial vitro conception, and the (4) genetic treatment. (5) These are all possible now in the kingdom (6). It is not necessary to go abroad (∅).

the initial nominal group was counted, as well as six following instances of distal clauses including those using the referential pronoun “these”. However, the final sentence was not counted, as its ideational connection to infertility treatments is implicit rather than lexicogrammatical, with no nominal or pronomial token articulated.

2.5 Appraisal analysis

Derived from systemic functional linguistics, Appraisal is a semantically delicate form of sentiment analysis. When giving their personal opinions, people choose words from the range of options they know. These choices may be categorised within a hierarchical set of semantic categories and subcategories (Thompson, 2004), as in Figure 1.

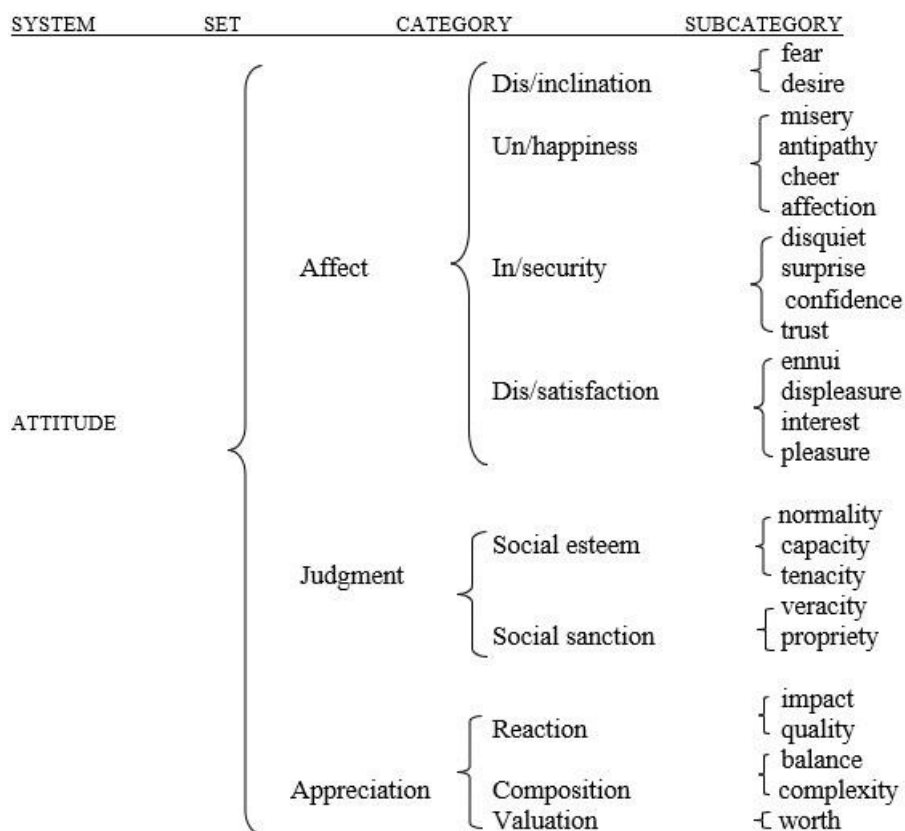


Figure 1. The Attitude System

The Attitude system is “not arbitrarily posited” (Bednarek, 2009). Choices made when realising subjective attitudes are based in emotions, which have a biophysical substrate shared across all cultures, and encoded in all languages. Polarity, the negative-positive dimension of emotion, is instantiated in all languages. For example, “Every couple loves to see their own babies” is positive, where “Infertility is a disaster for any woman” is negative. All languages offer resources for realising emotions directly or indirectly (Martin & White, 2005). For example, “Like any woman, I want to have children” is direct. Writers may also disperse their stance among several elements of a sentence: “Not being able to have children is the most terrible imagination in this world”. “Appraisal theories of emotion have gained widespread acceptance in the field of emotion research” (Kuppens, Van Mechelen, Smits, De Boeck, & Ceulemans, 2007). Automatic tagging of attitudinal lexis has been part of computational linguistics for decades, with emotional words the simplest lexis for NLP-based softwares to identify. The concordances used in analytic softwares are sophisticated through supervised classification tasks and statistical machine-learning methods (Polanyi & Zaenen, 2006). This study used the semi-automatic software CorpusTool (O’Donnell, 2008).

2.6 Co-Frequencies

Co-frequencies were measured as colligations of subtheme frequencies and attitudinal word classes (Baayen, 2008). Yule’s Y was used to measure co-frequency, within a values range of -1 to +1 (Gries, 2008).

2.7 Inter-Rater and Inter-Coder Reliability

The two subcorpora were independently coded and tagged by the researchers and a research assistant. Cohen’s κ free-margin (f-m) and percent-overall (p-o) values were used to determine reliability (Lombard, Snyder-Duch, &

Bracken, 2004).

### 3. Results

Male and female subcorpora features are described in Table 2.

Table 2. Female and male subcorpora description

SUBCORPUS	WORDS	SENTENCES		CLAUSES	
	N	N	N	CONTENT	NULL
Female	9312	503	893	831	62
Male	7555	421	904	688	216
	16867	924	1797	1519	278

Subcorpora were then analysed for content and attitude.

#### 3.1 Content Analysis

Thematic frequencies were determined for six themes and thirty subunits, as in Figure 2.

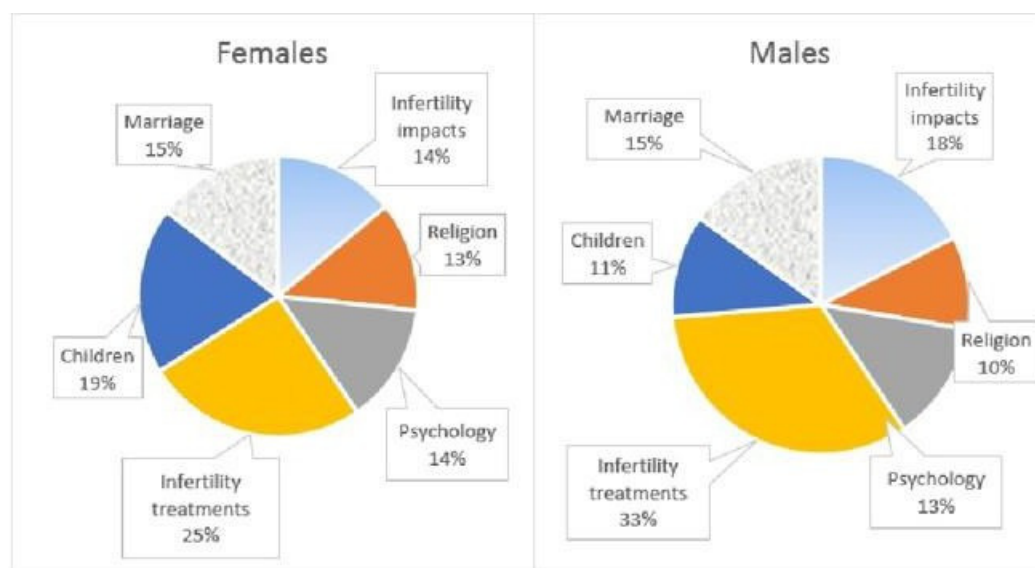


Figure 2. Distribution of female and male content within six themes

Male and female medical student participants realised two themes with different frequency, and four themes similarly.

#### 3.2 Two Themes Differently Realised by Male and Female Participants

Two differently-realised themes were: children and infertility treatments. Thematic content was nuanced through subunit frequencies. Fully 19% of female realisations discussed infertility treatments in conjunction with the emotional fulfilment from and religious obligation to have children:

Infertility treatments are a godsend to those who are incapable of conceiving naturally. Mothers often speak of the joys of parenthood and the pride that comes with caring for the life of another. Children are a blessing from Allah. Women should all be a parent.

Male realisations (11%) connected infertility treatments to women’s emotionally fulfilment: “Almost all women want to experience the gift of birth”.

Males realised medical infertility treatments about three times as frequently as females, especially IVF (“IVF treatment has an obvious advantage, which is the ability for couples to have a biological child of their own”). Females discussed herbal remedies extensively, where males did not discuss them at all. Herbs mentioned included those with chemical properties acting as diuretics, laxatives, anti-inflammatories, and abortifacients including

Santeen, Rahan, Ja'ar, Asaf and Tirgana ("I recommend Asaf because it is safe and has been in use for decades"). Both groups discussed adoption at about the same frequency, but males were negative where females were positive and referenced orthodox Islamic doctrine (kafala, nizam alkafalati) (Abu-Rabia, 2013). Males frequently realised a desire for their own genetic offspring:

- female Adopting a child is one of the most beautiful things in the world. It is part of our religion.
- male One of the important things about being a parent is that the children are their own children... So some men or women take that as a downside, because they would want to start a family so they'll divorce their spouse.

Both groups declared surrogacy adulterous.

- female From an Islamic view, the use of a third party in any respect is considered adultery. All forms of surrogacy are forbidden. A Muslim woman may not serve as a donor or surrogate, nor a man as sperm donor.
- male If a surrogate mother or a gamete donor is involved that is when a women should stop, as it is not ethically right in my opinion.

Females claimed women would choose this option to save themselves the difficulties of childbirth: "The treatment should be prohibited. Otherwise, women who don't have any problems, but they want a child without getting married and putting the effort." This "vanity" view of surrogacy is common throughout Muslim societies (Singerman, 2007; Rambo, Liu, & Nakata, 2009).

### 3.3 Themes Similarly Realised by Male and Female Participants

Four themes - marriage, infertility impacts, religion and psychology - were realised to a similar extent by males and females, with meanings nuanced by subunits. When connecting infertility impacts to marriage, female realisations focused on the loss of female beauty, the unhappiness of extended family members, and the potential for divorce:

Having a baby inevitably damages our beauty.

The presence of infertility is one of the leading causes of disagreements and arguments of the couple. In addition, in the normal arguments that a family may go through, the issue of infertility is highly likely to come up if a couple in that family does not have children. For a family to be happy, finding a way in which they can treat the infertility and hence have the chance to get a child is always a good idea.

Infertility is a major issue because it affects womens' marriage life and emotions. It can ruin her life and lead to a divorce at the end.

These comments reflect Saudi women's social and legal realities, which makes children the guarantors of their mothers' financial and legal security (Singerman, 2007). Most marriages are arranged. While pre/extramarital sex is illegal, men can travel freely and contract temporary marriages for sexual pleasure (misyar, almisyar nikah) where women until recently need the permission of a male guardian to travel, but would nonetheless suffer absolute loss of their social standing if they made such contracts. Childless women face physical and verbal abuse, disinheritance and divorce, where polygamy allows men to manage the social dishonour of infertility and divorce. Divorced women are frequently rejected by other women and family members. With 75% of Saudi women unemployed and needing the permission of a male guardian to work, most divorced women depend on welfare payments (Rambo, Liu, & Nakata, 2009). These realities are the context for male realisations connecting infertility to divorce, to what women want in a marriage, and to the impacts of child-bearing on women's physical beauty:

Many marriages were destroyed because of infertility. This leaves a women emotionally damaged as her marriage ended because a disease that is out of her control... Motherhood is central to womanhood, it is also very important to society because forming a family is crucial... Hope hangs on a string for infertile people and nothing is guaranteed.

Infertility is not a choice but it is a disease, a very heartbreaking disease. Almost all women want to experience the gift of birth.

Once she has the children, she will not be as beautiful. He may not want her.

Females mentioned divorce impacts nearly twelve times as frequently as males.

While "male infertility is vastly under-appreciated and even under-reported in Middle-Eastern societies" (Abu-Rabia, 2013, p. 54), both genders realised infertility as a female problem:

- female Infertility treatments refer to different cure methods that can be administered in case a woman encounters problems with conception.
- male If a woman is infertile in any kind of way, she must seek infertility treatments no matter what. Although, not all treatments can cure all the infertility issues and problems in infertile ladies.

Allocating responsibility for infertility to women is common throughout Muslim countries. Both male and female Saudi medical interns rationalised their attribution of responsibility by reference to female bodies:

- Female Fertility treatments are always offered to women who have trouble getting pregnant. Many of the hormones secreted during menstruation can make the woman's system out of balance.  
They suffer from problems with ovulating, unexplained infertility, and blocked or damaged tubes.
- male The main reasons that cause people in my society to suffer from infertility issues is that most females suffer from some form of Hormone-imbalance or Uterine and Ovarian cysts and many of them are unaware of how serious these problem can develop to until they lead to different infertility issues.

Medicalising female responsibility reflects these participants' educated status. Their views differ from those of the KSA population, most of whom believe infertility is caused by magical forces or contraceptives (Abolfotouh, Alabdrabalnabi, Albacker, Al-Jughaiman, & Hassan, 2013).

Females realised infertility as a cause of female unhappiness, where males realised infertility as both a female and a male problem:

- female I believe that this is an immense solution to desperate women that have been through tragic experiences in result of unhealthy mitochondria.
- male If I have the same thing I will do the treatment immediately, because I want to see my children and know how mothers feel. Also I need the women feel this feeling...Their nightmare of not having a child may come to end by this treatment.

Both groups attributed unhappiness caused by infertility to women an order of magnitude more often than to men.

Both females and males connected infertility to religion through comments on women's roles, where males also connected them to religious doctrine:

- female In Islam women have the right to give birth to children, and being a mother is a main responsibility.
- male For Muslim men their religion requests them to have children. Islamic rules are simply manifested in marriage, in the children who parents have to guide.

This subcategory was distinguished from the similar subunit in the theme "children", by the fact of participants placing religion into the grammatical category of the subject, and infertility, the reflection's main theme, into the subordinate position of the rheme (Halliday & Matthiessen, 2004). This constructs infertility as a subcategory of religion. Sentence constructions in the other subunits treated religion as rheme, or as one of several topics arising when discussing children.

Finally, both groups focused on the psychology of women:

- female Infertility treatments have advantages for the recipients other than treating fertility. It reduces her psychological problems.
- female Many people can't wait to get married and have kids. Infertility is a major issue because it affects parents' marriage and life emotions. When they find out they can't, they might be forced to leave each other or live in regret.
- male Before these treatments were recognized so many ladies had to go through depression and anxiety disorders.
- male Treating infertility and having children makes people happy. Infertility treatments save a lot of marriages.

Females discussed the psychology of unhappy marriages, and males the psychology of happy marriages.

3.4 Content Subunits Frequently Realised by Male and Female Participants

Another way to see these attitudes is through the frequently-realised subunits. Ten of thirty subunits accounted for about 2/3 of all realisations, for both females (68.47) and males (68.32), as in Figure 3. The subunit data shows that, while both participant groups frequently realised infertility as a female problem, and frequently realised children as emotionally fulfilling to women, males discussed medical treatments where females discuss folk remedies.

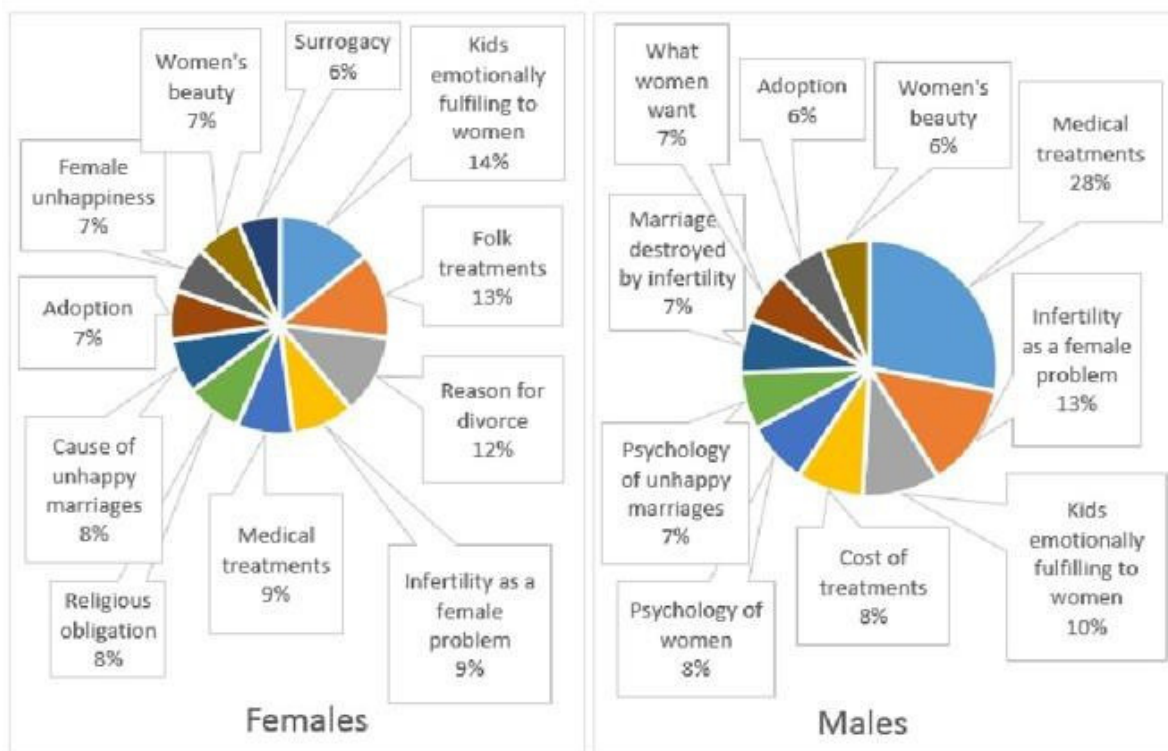


Figure 3. Frequently-realised female and male subunits

Females were also concerned with divorce and religious obligations, where males focused on costs and psychology.

Differences between participant groups' self-understanding, and attribution of gender identity to the other group, reveal areas of mismatch, the impacts of KSA law and religion, and gender biases, which will shape their advising of their future patients, as in Figure 4.



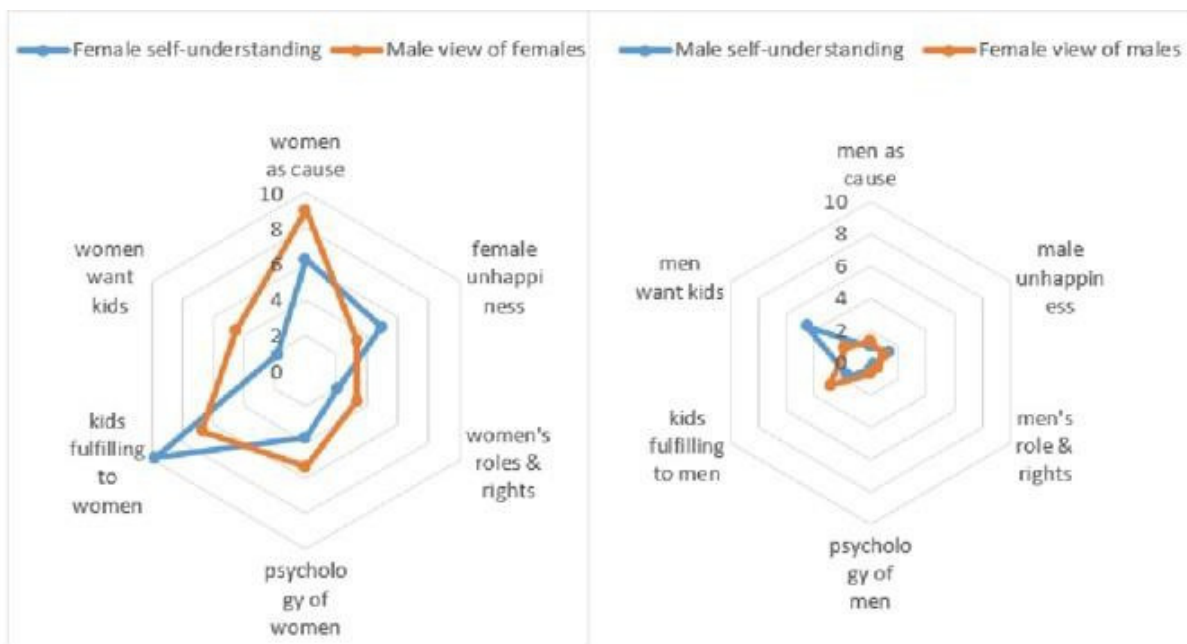


Figure 4. Gender constructions for own and attributed to other participant group

Both groups supposed that women were three to five times more often the cause of infertility than men, and men were not a significant cause of infertility, though this is medically inaccurate. Both viewed infertility as a cause of much greater female than male unhappiness. That female participants realised this more frequently than males may reflect the social and legal disabilities childless women face in KSA. This view is supported by low female realisation of desire for children, with male participants attributing twice that much desire to women. Male participants were also twice as concerned with children as an element of religious roles and rights than female participants were, where both were relatively unconcerned with children and men’s religious roles and rights. This may reflect the differential treatment of women and men within Wahhabi religion and KSA law. Male participants viewed infertility as connected with women’s psychology about half as much as did female participants, where both viewed the psychology of men regarding infertility as insignificant. Female participants supposed children were three times more fulfilling to women than to men, male participants supposed children were two times more fulfilling to women than to men, yet male participants supposed children were more fulfilling to them than their female counterparts supposed.

Overall, the dimension of female self-understanding and male understanding of females is more than twice as large as male self-understanding and female understanding of males, indicating that both participant groups shared a bias towards infertility as a female, not a male issue.

### 3.5 Appraisal Data

Subcorpora were then analysed for attitude. Within the Attitude system, the Affect set comprises lexis directly realising emotion. For example, “finding out that you are infertile can be extremely depressing” realises a feeling of Un/Happiness in the subcategory misery. The Judgment and Appreciation sets comprise lexis used for indirect realisations, but affect is understood to underlie both, which rework emotions as statements about persons, objects and events (Bednarek, 2009). Judgments rework emotions as statements about social norms and expectations. For example, in “People will always view a family as being incomplete if it has not been able to get a child”, “always...incomplete” restates a feeling of In/Security-disquiet as a quality of a family. Appreciations rework emotions as statements about the qualities or impacts of objects and events outside the self. For example, in “The discovery of infertility is quite painful”, a feeling of misery is reworked as an impact. While grammatically “painful” modifies “discovery”, clearly it reflects the feelings of the infertile person.

Of 1,864 realisations of subjective attitude by female participants, those in eight subcategories comprised about ¾ (79.69%) of all attitudes, where 1,477 realisations in six subcategories comprised about the same proportion (77.39%) of male realisations. Females realised a greater range of attitudes than males. Of these, 602=40.54% of female attitudes were positive, and 883=59.46% negative. By contrast, of 1,477 appraisals realised by males,

942=82.41% were positive, and 201=17.56% negative, as in Table 3.

Table 3. Frequently-realised appraisals in the female and male subcorpora

R	ATTITUDE	+/-	N	%ATT
FEMALES				
1	AF:Dis/satisfaction-unhappiness	-	318	17.06
2	AF: Un/Happiness-misery	-	277	14.86
3	JU: Social esteem-capacity	+	245	13.14
4	AP: Reaction-impact	-	192	10.30
5	JU: Social sanction-propriety	+	169	9.07
6	AP: Valuation-worth	+	117	6.28
7	AF: In/security-disquiet	-	96	5.15
8	JU: Social esteem-normality	+	71	3.81
			1485	1864
MALES				
1	JU: Social esteem-capacity	+	317	21.46
2	JU: Social esteem-normality	+	268	18.14
3	AF: In/security-confidence	+	223	15.10
4	JU: Social sanction-propriety	+	134	9.07
5	AF: Dis/satisfaction-unhappiness	-	122	8.26
6	AP: Composition-complexity	-	79	5.35
			1143	1477

Most (485=80.56%) female participants' positive appraisals were realised as judgments, particularly capacity ("Tirgana is able to help her become pregnant"), propriety (it should be ethically acceptable"), and normality ("these traditional treatments are usually effective") Most (691=78.26%) female participants' negative appraisals were realised as emotions, particularly unhappiness ("an infertile woman will feel discouraged"), misery ("if she cannot get pregnant, she will suffer depression") and disquiet ("it will create anxiety in the relationship and the family"). Most (719=76.33%) male participants' positive appraisals were realised as judgments of capacity ("as the technologies and sciences developed we were able to find solutions"), normality ("The treatment will get marriages closer and make a women feel normal") and propriety ("having kids is a right every couple should own"), where the few negative appraisals were framed as emotion (unhappiness: "This leaves a women emotionally damaged as her marriage ended because a disease") and appreciation ("Some fertility problems are difficult to be treated").

### 3.6 Inter-Coder and Inter-Rater Reliability

Inter-coder reliability scores for content analysis and inter-rater scores for Appraisal data were determined using ReCal (Freelon, 2010), as in Table 4.

Table 4. Inter-coder and inter-rater reliability scores for female and male subcorpora

	P-O	F-M
<b>INTER-CODER</b>		
female	0.919	0.906
male	0.893	0.882
<b>INTER-RATER</b>		
female	0.895	0.878
male	0.886	0.874

### 3.7 Co-Frequencies

Strong co-frequencies between content and attitude were determined, using Yule's Y. Collocations were not used, as they can inadvertently measure idiomatic usage, for example "fertility" with "clinic" or with "drugs". Colligation of word classes with subthemes supports the correlation of content with attitude, within a participant group (Hunston, 2010). Values of  $\geq 0.50$  were used to identify robust co-frequencies (Chung & Lee, 2001). Three co-frequencies were identified for female and two for male participant groups, as in Table 5.

Table 5. Co-frequencies between content subunits and appraisals for male and female subcorpora.

R	THEME: SUBUNIT	ATTITUDE	Y
FEMALE			
1	religion: infertility as a reason for divorce	AF: Un/Happiness-misery	+0.66
2	religion: obligation to have kids	JU: Social sanction-propriety	+0.60
3	infertility treatments: folk treatments	JU: Social esteem-capacity	+0.53
MALE			
1	infertility treatments: medical treatments	JU: Social esteem-capacity	+0.62
2	children: emotionally fulfilling to women	JU: Social esteem-normality	+0.55

Strong co-frequencies were found in the female subcorpus between divorce and misery, between the religious obligation to have children and propriety, and between folk treatments and capacity. In the male subcorpus, they were found between medical treatments and capacity, and between children as emotionally fulfilling to women and normality.

## 4. Discussion

This study has produced four main results. First, infertility advising involves social and religious along with medical aspects. Second, female participants trusted in herbal but male participants in medical treatments, reflecting instrumental compared to idealistic forms of religiosity. Third, Saudi gender stereotypes contain areas of mutual contradiction and mis-attribution. Finally, both groups showed extensive gender stereotyping. These results are likely applicable beyond the KSA context, and underscore the cultural embeddedness and complexity of effective and ethical infertility advising. This study also has limitations. The number of participants is small, and there is a potential for self-censorship within this population. Gender stereotyping is socially embedded, and amplified in this medical issue. Both results and limitations point to the need for further research into how to advise practitioners about infertility advising.

### 4.1 Interns Construct Infertility More as a Social and Religious than Medical Condition

First, male and female Saudi interns construct infertility more as a social and religious than a medical issue. To some degree, this is realistic, given the importance of children to human society and couples. However, the prompt anticipated discussion of medical procedures and options, yet these comprised only 25-30% of content. Most content discussed social and religious issues, Saudi gender roles, and the material and emotional impacts of infertility. Females stressed the threat of divorce, males stressed female unhappiness. Frequent mentions of divorce and its impacts by females, and the negative polarity of their Appraisal data, as compared to low frequency and

positive polarity from males, indicates distinct gender perspectives, even for highly-educated medical interns. Female residents focused on the female psychology and happiness, males on the religious obligation to have children. These differences suggest Saudi infertility advising, and the treatments recommended, will vary by practitioner gender. In the Saudi context, female patients are seen by female doctors, male patients by male doctors, and couples most often by a male doctor. This seems likely to disadvantage female patients, as male practitioners may not perceive their needs and wants as they themselves do. Many Saudi medical graduates work abroad, where patients may consult doctors of either gender. International medical programs accepting Saudi students should include the impacts of gender perceptions on health outcomes, in their healthcare communication courses.

#### *4.2 Response Showed Gendered Differences that May Impact Medical Advising*

Second, content analysis showed that, where male interns relied on medical treatments, females were more traditional than males in their endorsement of folk remedies, and their focus on children as a religious obligation for women. However, female endorsements for folk remedies often attributed a scientific warrant to traditional herbal medicines:

Women can usually achieve a better outcome with a remedy like Tirgana, which the doctors know.

We know that scientific research supports the fact that Rahan can cure infertility, and it is more healthy living than hormone treatment.

Female use of religious concepts such as the obligation to have children may reflect viable rhetorical approaches in the Saudi context, grounded in a pragmatic desire to avoid divorce as a consequence of infertility: "All women should have children, according to Allah's intention. Society must pay these costs to make it possible for women who are infertile." By contrast, male participants made fewer religious comments, but conventionally privileged religious over scientific authority:

Embryo testing...is, in my opinion, is a barbaric act. Who are we to manipulate such powers only God, Himself can exercise? By attesting such a procedure we indoctrinate ourselves to a certain level of beauty, perfection and the like. But, no! Each and every one of us are perfectly imperfect and that's what makes us beautiful.

I believe that it is unacceptable as we are all products of God's Magnificent creation. And it is He who fashioned us in the most perfect way and whatever deficiency we are born with only serves to test our patience and teach us about the imperfect temporariness of life.

In my opinion the genes of the baby should stay untouched as God has created them without any adjustment or fixing.

Females were more concerned with beauty, and with managing the extended family's happiness, elements which may be in tension with each other. This study cannot establish participants' motivations and epistemologies, or chart their conceptual complexities. But the instrumentality of females' realisation of religious concepts should be noticed, as it would likely shape how Saudi female patients communicate with practitioners in international contexts, and how Saudi female practitioners communicate with patients in both Saudi and international contexts. This result indicates the importance of the intercultural components of international institutions' healthcare communication courses.

#### *4.3 Responses Contained Gender Stereotypes Which May Impact Advising*

Third, this study has detailed areas of contradiction within Saudi gender stereotypes. This result would likely occur among interns in any nation, but these results are markedly so. Male participants attributed twice as much desire for children as females attributed to themselves. This suggests the need for research into cultural contexts of infertility advising which may not facilitate discussing whether the woman wants children. Males were twice as concerned with children as a religious obligation than females, and females supposed children were three times

more fulfilling to women than to men, but less fulfilling to men than males' self-understanding suggested, raising questions about decision-making by couples in various cultural contexts. Males were positive about medical infertility treatments, females negative. But females were more positive about adoption than males. These results further highlight the ethical complexities and pitfalls of infertility advising. Appraisal analysis showed that both groups realised infertility through ideas of ability and normality, but for females herbal remedies were powerful and normal, where for males medical treatments were powerful, and rendered infertile women normal. Overall, these results show the continuing need for healthcare communication courses to spell out how gender stereotypes impact the equality and dignity of patients as persons.

#### 4.4 Own gender identity and attributed gender identity were incommensurate in ways which may impact advising

Finally, the disparity between each group's self-understanding and their attributed character underlines the prevalence of gender stereotyping among Saudi interns. This could undermine infertility advising, and cause some patients distress, as in this example, written by a male:

Infertility can cause a women to feel upset and angry. People do not realise the effect of this disease, it can cause psychological and social damage. Many marriages were destroyed because of infertility. This leaves a women emotionally damaged as her marriage ended because a disease that is out of her control. It can also cause depression and anxiety. Infertility treatment can take months or years, but it is worth it. The treatment will get marriages closer and make a women feel normal. Nothing can replace the feeling of having a child of your own, not even adoption. Therefore it is very important to get cured if possible. Many women think that infertility treatment makes the child "less of your own" so they reject the treatment. However, getting the treatment does not change anything, it only gives a person a chance of creating a family. Motherhood is central to womanhood, it is also very important to society because forming a family is crucial.

Here, infertility is seen as a woman's problem, with no role articulated for the male. Infertile women are understood as "damaged" and not "normal", the potential for divorce is acknowledged but the uniquely negative consequences for the woman are not, women's individuality is subordinate to the needs of the marriage and society, and women are defined by their maternal role. The implicit perspective is male.

It may also be observed that Saudi gender stereotypes include no place for non-binary identities. For example, "Having a family is one of life's greatest blessing. A family contains a mother, a father, and children. No one can have a family without having all of these members" is not meant to deny the legitimacy of gay, bisexual or other identities, but to assert the religious mandate for couples to have children. Clearly, the impacts of gender biases on effective advising and treatment must retain an important place in healthcare communication courses.

Overall, this study has shown the many ways in which effective infertility advising requires practitioners to navigate complex social and religious commitments, acquire a high degree of sensitivity and self-awareness. It has detailed how gender stereotypes may impact advising, treatment recommendations and patient outcomes. These indicate that gender beliefs remain a salient element of a medical education, and along with cultural, religious and social content and awareness, should remain a focus of international institutions' healthcare communication courses.

#### Acknowledgements

The authors thank Associate Professor Volodymyr Dvornyk for his assistance with data collection.

#### Competing Interests Statement

The authors declare that there are no competing or potential conflicts of interest.

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