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**Causal explanations for lack of conception: Applying the Common Sense Model of
Illness Representation to the fertility context**

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27 **ABSTRACT**

28 **Objective**

29 The current study explored causal explanations for lack of conception and association with
30 help-seeking behaviour. Differences based on gender and country Human Development
31 Index (HDI) were examined.

32 **Design**

33 A mixed method design was used.

34 **Main Outcome Measures**

35 Data was drawn from the International Fertility Decision-Making Study (IFDMS), a cross-
36 sectional study of 10,045 individuals (1,690 men; 8,355 women) from 79 countries.

37 Respondents rated to what extent they believed their lack of conception was due to something
38 they or their partner had done/not done or other factors and described their reasons for
39 making this rating.

40 **Results**

41 Respondents were aged 18-50 (M=31.83) years, partnered and had been trying to conceive
42 for over six months (M=2.8 years). Men and women primarily believed their lack of
43 conception was due to medical problems or chance/bad luck. Thematic analysis of textual
44 responses from 29.7% of the sample found that respondents focused on their personal
45 experience or a salient life event when describing the cause of their lack of conception.

46 Women expressed more regret and helplessness about causes than men. Significant country
47 differences were observed.

48 **Conclusion**

49 Individuals may develop inaccurate causal explanations based on their personal experiences.
50 Access to accurate information is necessary to facilitate timely help-seeking.

51 **Key Words:** causal explanations, lack of conception, gender, country, Human Development
52 Index

INTRODUCTION

The Common Sense Model (CSM) of illness representation (Leventhal, Meyer, & Nerenz, 1980) is a framework for explaining how individuals understand and respond to health related challenges. According to the CSM, when faced with a health problem or threat, people seek information to label or define their experience and develop mental representations or lay theories of their health problem. Research using the CSM has established that the content of these illness representations can be organized into five themes or dimensions: identity, cause, timeline, consequences and cure or control (Leventhal, Leventhal, & Cameron, 2001). Identity refers to beliefs about the symptoms; timeline refers to beliefs about whether the illness is acute, chronic or cyclical; consequences are beliefs about short and long term outcomes of the illness and control or cure refers to beliefs about whether the illness is controllable and/or curable (Leventhal et al., 2001).

The focus of this study, the cause dimension, involves using what concrete and abstract information is available to develop a theory of the cause of the illness (Hagger & Orbell, 2003). In turn, how they understand the cause of their illness influences their help-seeking behaviours and outcomes (Bishop & Converse, 1986). Therefore, three predictions from the model are that people generate causes for their illness, that causes are shaped by socio-cultural factors and personal histories and that these causes are associated with help-seeking behaviour. These predictions were tested using a mixed-method study with an international sample of men and women who had been trying to conceive for at least six months. Understanding people's causal explanations can direct patient education, especially debunking myths about their health problem, which may impact people's help-seeking behaviour.

Causal Explanations

As many as 70-95% of people make causal explanations when presented with a health-related challenge (Grayson et al., 2014). Research on cancer, heart disease and diabetes have commonly found respondents to report biological (e.g., genetics), lifestyle (e.g., smoking) and psychological/emotional (e.g., stress) causes (Dumalaon-Canaria, Hutchinson, Prichard, & Wilson, 2014; French, Senior, Weinman, & Marteau, 2001; Searle, Norman, Thompson, & Vedhara, 2007). Some variations across illnesses have been identified. For example, a systematic review of breast cancer studies found family history to be the most frequently cited cause (Dumalaon-Caneria et al., 2014), whereas a systematic review on heart disease reported causes related to lifestyle and stress (French et al., 2001).

Within the fertility context, the available literature has examined the perceived risk factors or causes of infertility among individuals of reproductive age or individuals diagnosed with infertility and seeking treatment. People with fertility problems generally endorse medical reasons as causes whereas individuals of reproductive age (presumed fertile) report a wide range of factors. In a sample of American men and women experiencing fertility problems (80% of whom were in treatment) biological and medical causes were most often endorsed (Tennen, Affleck, & Mendola, 1991). In an interview study of (presumed fertile) Canadian men and women of reproductive age, the major causal themes were advanced maternal age, lifestyle factors (e.g., smoking, drinking) and genetics (Sabarre, Khan, & Whitten, 2013). Regardless of fertility level and treatment stage, cross-sectional research suggests that people often attribute fertility problems to inaccurate causes. For example, although there is no conclusive evidence that long-term oral contraceptive use deleteriously affects fertility (Mikkelsen et al., 2013), in a sample of women seeking treatment for infertility, 43% inaccurately believed that prolonged use of the contraceptive pill causes fertility problems (Swift & Liu, 2014). In a cross-sectional study of presumed fertile

Canadian women, 41% attributed the contraceptive pill to be a cause of infertility (Daniluk & Koert, 2015).

According to the CSM, causal explanations are formulated from general knowledge, cultural understandings of the illness and personal experience (e.g., symptomatic information; Leventhal et al., 1980; Leventhal, Nerenz, & Steele, 1984). Cross-cultural surveys on causal explanations for illness are limited, but those that exist suggest that socio-cultural factors may shape causal explanations. For example, within the fertility context, research in less developed countries has found that people attribute causes of fertility problems to gods or supernatural causes, often as punishment for wrong doings like promiscuity, improper sexual acts (e.g., masturbation) or abortion (Ali et al., 2011; Ola, Aladekomo, & Oludare, 2010). In contrast, in more developed countries, research with infertility patients shows fertility problems to be attributed to medical causes, chance, age and emotional problems (Swift & Liu, 2014; Tennen et al., 1991). Such differences in causal explanations could possibly be due to increased access to medical treatment in more developed countries, wherein a medical reason for lack of conception is often sought and provided (Hammarberg et al., 2017).

Gender has been found to play a role in the formation of causal explanations with men more likely to attribute the causes of their illness to their behaviours and lifestyle (e.g., diet) and women to blame biological factors, stress or destiny (Dunkel, Kendel, Lehmkuhl, Hetzer, & Regitz-Zagrosek, 2011). Some inconsistencies have been found in the fertility context. Tennen and colleagues (1991) found female infertile patients to be more likely to believe their behaviour caused their infertility compared to males, a finding they suggest to be indicative of women taking more responsibility for fertility problems. That said, Dutch research found men to attribute the causes of fertility problems to their behaviour (van Balen, Trimpos-Kemper, & Verdurmen, 1996).

Taken together, these findings suggest that we must consider the influence of socio-cultural factors and personal experience (e.g., country of origin and gender) when examining the causal explanation process so that we can respond appropriately and effectively in education campaigns aimed at improving health knowledge and help-seeking. However, few studies comparing causal explanations between socio-cultural groups exist. Available research must be interpreted with caution given that studies tend to be conducted in individual countries using different samples of interest (e.g., couples, individual men and/or women) at various stages of reproduction (e.g., reproductive age, infertile), limiting our understanding of how socio-cultural factors shape causal explanations.

Help-Seeking Behaviour

The CSM posits that causal explanations are linked with the help-seeking behaviour individuals adopt to deal with their illness, which directly impacts health outcomes (Hagger & Orbell, 2003). For example, people who believe the causes to be unmodifiable (e.g., genetics) are less optimistic (Dumalaon-Canaria, Prichard, Hutchinson, & Wilson, 2016) and less likely to engage in help-seeking behaviour. The CSM suggests that the relationship between causal understandings and help-seeking is bi-directional with help-seeking (e.g., medical diagnosis and/or treatment) influencing people's understanding of the cause of their illness (Hammarberg et al., 2017; Leventhal et al., 1980). Socio-cultural factors and personal histories have also been suggested to shape the relationship between causal explanations and help-seeking (Thompson et al., 2016).

The link between causal explanations and help-seeking is particularly salient in the fertility context given that fertility problems can often be remedied with medical intervention. However, a large proportion of men and women delay or do not seek help. A review of 17 population studies across less and more developed countries revealed only a small proportion (22%) actually sought medical treatment for infertility (Boivin, Bunting, Collins, & Nygren,

2007). Research suggests a poor understanding of the causes of infertility may explain low rates of treatment uptake (Bunting & Boivin, 2007). If people misunderstand the cause of their lack of conception (e.g., contraceptive pill use; abortion), timely medical assistance may not be sought which could ultimately hinder their parenthood goals.

Other factors that may influence help-seeking in the fertility context are perceived (and actual) socio-cultural and personal barriers. For example, individuals in less developed countries may not have access to medical treatment. Areas with the highest levels of infertility often have the lowest number of fertility centers (e.g., Africa; Inhorn & Patrizio, 2015) and only the more affluent members of the population may have access to these clinics (Sundby, Mboge, & Sonko, 1998). Gender may also help explain help-seeking behaviour in the fertility context with women being more likely to seek help compared to men (Greil, Slauson-Blevins, & McQuillan, 2010), however its influence is difficult to ascertain because individuals often seek treatment as a couple and research commonly samples female patients.

OBJECTIVE

The purpose of the present study was to test the CSM predictions in the fertility context in an international sample of men and women trying to conceive. Research to date provides data on percentage of people that endorse broad causes (e.g., medical causes, emotional problems) on structured lists of reasons for fertility problems but not much detail about specific causes and the meaning respondents ascribed to these. The lack of specificity hinders the development of fertility educational material aimed at improving healthy fertility behaviour. We utilized a mixed-method design to generate a more detailed and nuanced understanding of the causal explanations and help-seeking process in the fertility context in countries with varying development status.

Participants were drawn from the International Fertility Decision-Making Study (IFDMS), which was a study about parenthood decision-making, sampling men and women

from 79 countries (sample size >100 in 18 countries) who had been trying to conceive for at least six months (Bunting, Tsibulsky, & Boivin, 2013). In this mixed-method study participants rated the extent to which they considered broad causes of fertility problems to apply to them, and textual replies about why they perceived these broad causes to apply to their lack of conception after 6 months of trying to conceive. The mixed-method design is a useful method to answer questions and build knowledge about complex phenomenon (Creswell, Klassen, Plano Clark, & Smith, 2011). In particular, online qualitative data collection methods offer an opportunity to collect rich, descriptive data in international samples that might otherwise not be accessible due to practical constraints (e.g., financial costs, language barriers, Mann & Stewart, 2000). Based on the literature reviewed, we hypothesized that: 1) people would generate causal explanations for their lack of conception, 2) causal explanations would vary according to socio-cultural factors and personal experience (measured by gender and country Human Development Index (HDI) and 3) causal explanations would be associated with help-seeking (i.e., engagement in treatment) and that this relationship would be moderated by gender and HDI.

DESIGN

The IFDMS methodology has been described in detail elsewhere (Bunting et al., 2013) and is briefly reviewed here. Only questions relevant to the current secondary analysis are described.

Participants

The inclusion criteria used in the IFDMS required participants to be between 18 and 50 years of age, currently married or living with their partner, currently trying to conceive for at least six months and not pregnant (see Bunting et al., 2013). The 6-month duration of trying criteria was used to recruit participants that could be feeling susceptible to fertility

problems and therefore considering causal explanations for their lack of fertility. The final sample comprised of 10,045 participants (8,355 women, 1,690 men).

Main Outcome Measures

Socio-demographic variables

Participants stated their country of residence, age and number of years they had been living with their partner. In order to make country comparisons, countries with over 100 respondents were grouped using the Human Development Index (HDI; United Nations Development Program (<http://hdr.undp.org/en/statistics/>)). The HDI ranks countries according to an index of life expectancy, educational attainment and income. Countries ranked as Very High HDI were grouped together (VHHDI) as were those that were not (Not Very High; NVHHDI).

Fertility status

Participants indicated duration of trying to conceive and whether they had ever given birth/fathered a child.

Causal explanations

Participants rated their agreement with the following causal statements using a five point response scale (1='strongly agree' to 5='strongly disagree'): 'I think I have not conceived because of a) something I have done (or not done) in the past; b) something my partner has done (or not done) in the past; c) my lifestyle; d) my partner's lifestyle; e) chance or bad luck; f) medical problems; g) emotional problems; h) God's will; i) my age; or d) my partner's age'. Those who indicated they 'strongly agree' or 'somewhat agree' were classified as having agreed. Two open-ended questions asked participants that agreed with statements a) or b) to describe those causes. Individuals who did not agree could also provide a textual response if they wished. Participants could describe additional causes in a third separate text box ('Other reasons, please describe'). No restrictions were placed on the length

of textual replies. A review of the literature and previous studies on causal explanations (e.g., Tennen et al., 1991) informed the selection of causal statements.

Help-seeking

Participants were asked to indicate all forms of medical help or treatment they had sought for their fertility. Medical help-seeking included undergoing fertility diagnostic testing, ovulation induction, insemination, surgery and/or treatment with assisted reproductive technologies (ART). Respondents were categorized as either help-seekers (engaged with treatment) or non-help-seeking (not engaged with treatment) and coded 1 or 0 respectively.

Procedure

The data collection period was from July 2009 to April 2010 using various methods (social research panel, fertility clinic or online). The survey was produced in English and then translated to 12 languages (see Bunting et al., 2013 for full procedural details). The University Ethics Committee approved the IFDMS study procedure and additional ethical approval was gained from each clinic as per country requirements.

Data Analysis

Descriptive statistics were used to determine the degree of endorsement for each quantitative causal explanation. A 2x2 multivariate analysis of variance (MANOVA) was used for comparisons between gender and Human Development Index (HDI) for ratings of causal explanations. Due to the large sample size, Rosenthal (r') was used to examine effect size ($r' = 0.10, 0.30, 0.50$; small, medium, large effect size, respectively).

A hierarchical logistic regression analysis was used to examine associations between quantitative causal explanations and help-seeking and moderation by gender and HDI. In the regression, the causal explanations were entered to examine whether they predicted help-seeking (model 1), followed by interactions to examine whether the association between

causes and help-seeking was moderated by gender (model 2) or HDI (model 3). Simple slope analysis was used to examine moderation effects. Only relationships that were significantly moderated by gender or HDI were reported.

The textual replies about causal explanations were analyzed using thematic analysis with inductive coding to identify patterns or themes that captured a salient aspect of the research question (Braun & Clarke, 2006). In the first step of the analysis, two independent researchers familiarized themselves with the data through reading the textual replies. Next they assigned each reply an initial code that reflected its content and meaning and facilitated an initial organization of data into groups. The researchers then grouped the codes into more abstract broad themes with a focus on identifying commonalities and differences within replies. The themes were assigned a descriptive title. Any inconsistencies between researchers were discussed until agreement was reached, and changes were made based on consensus. Next, two health psychologists with knowledge of infertility reviewed and refined the themes by reading the codes and textual replies for each theme and examining differences according to gender, HDI and help-seeking. The final step involved developing detailed and nuanced descriptions of the essence of each theme. This analysis was discussed over several time points to identify possible bias and to encourage researcher reflexivity (Braun & Clarke, 2006).

RESULTS

Socio-demographic and Fertility Characteristics

There were 18 countries with over 100 respondents. In total, six countries were categorized as NVHHDI (Brazil, China, India, Mexico, Russia, Turkey), and 12 as VHHDI (Australia, Canada, Denmark, France, Germany, Italy, Japan, New Zealand, Portugal, Spain, United Kingdom, United States; see Supplemental Table 1). Table 1 shows the socio-demographic profile of the total ($N=10,045$) and sub-sample ($n=2,988$) that provided textual replies (hereafter ‘textual sample’), according to gender and HDI. On average respondents

were in their early 30s, had been with their partner for six years. The majority of the sample were not yet parents, and had been trying to conceive for over 12 months (75.28%). The textual sample were significantly younger than those who did not leave a textual response ($t(10019)=2.65, p=.008$) and had been trying to conceive for longer ($t(998)=-3.83, p<.001$). There was no significant difference in the number of years together ($t(9990)=.29, p=.770$) and whether they had previously given birth/fathered a child ($\chi^2(1)=.97, p=.325$).

1. Causal Explanations for Lack of Conception

When asked the reason for their lack of conception, 24.26% ($n=2,427$) of the total sample ($N=10,045$) agreed that the cause was due to ‘something I have/have not done’, ‘something my partner has/has not done’ or both. A total of 72.43% ($n=7,276$) disagreed with these causes. For those who agreed, 56.71% ($n=1,382$) believed the cause was only due to ‘something I have/have not done’, 18.14% ($n=442$) believed it to be due to ‘something my partner has/has not done’, and 25.15% ($n=613$) believed it was due to a combination of self and partner. Of the individual causes, medical problems and chance or bad luck were ranked the highest (Table 2).

2. Causal Explanations for Lack of Conception and Socio-cultural and Personal Factors

Quantitative Response Scales

A 2 (Gender) x 2 (HDI) MANOVA on the quantitative causal explanations showed a significant main effect for gender ($F(10, 9155)=41.50, p<.001$) and HDI ($F(10, 9155)=85.87, p<.001$) and a significant gender by HDI interaction ($F(10, 9155)=5.89, p<.001$). Specifically, Table 2 shows men were more likely to endorse lack of conception to something their partner had or had not done, their partner’s age and their own lifestyle. Women were more likely to endorse lack of conception as being due to their age, chance or bad luck, medical problems, emotional problems and God’s will. The main effect of HDI

showed that those from NVHDI countries were more likely to endorse lack of conception to something their partner had or had not done, medical problems, emotional problems and God's will. Those from VHDI countries were more likely to endorse chance or bad luck, their age and partner's age.

Significant interactions between gender and HDI suggested that the gender difference in causal explanation differed according to HDI. Specifically, in comparison to women, men from VHDI countries reported their lack of conception was due to something they had or had not done ($p<.01$), their partner's lifestyle ($p<.05$) and emotional problems ($p<.001$) whereas in the NVHDI group the reverse was true with women more likely to endorse these causes than men. In comparison to men and women in VHDI countries, men and women from NVHDI countries endorsed God's will ($p<.001$) as the cause of their lack of conception, whereas those in the VHDI group endorsed chance or bad luck ($p<.001$).

Textual Replies

Of the 10,045 participants, 2,988 provided 3,900 textual replies for the three questions about causal explanations for lack of conception. The majority of textual replies were given in response to something the respondent had personally done or not done in the past ($n=1,589$, 40.7%) or were given as other reasons ($n=1,498$, 38.4%). Fewer possible causes were attributed to the respondents' partner's actions ($n=813$, 20.9%). The main themes within each question and the similarities and differences according to gender and HDI are presented next. Supplementary Tables 2 to 4 provide the complete list of themes, sub-themes and illustrative quotes for each of the questions.

Textual replies to the question: Because of something I have done (or not done)

Overall 20.7% ($n=2,058$) of the total sample ($N=10,045$) somewhat or strongly agreed that their lack of conception was due to something they had or had not done. Of these, 71.6% ($n=1474$, 146 men, 1328 women) provided an accompanying textual reply. An additional 115

respondents who disagreed or were uncertain also provided a textual reply. These replies were not strikingly different from those who agreed and were included in the analysis. Overall, almost half of the respondents' textual replies to this question highlighted particular reproductive choices (e.g., abortion). Other causes included medical or reproductive history, karma, motivation or ambivalence towards parenthood, and lifestyle practices, as described below (see Supplementary Table 2 for all causes).

Across all countries, women commonly stated that historical reproductive choices about abortion or birth control were the main causes of their lack of conception. Some believed these choices had impacted their fertility on a biological level: *'taking birth control from an early age has played with my hormones'*. Others believed this choice impacted them on a 'karmic' level: *'I am being punished for having an abortion ten years ago.'* Women expressed a sense of responsibility and self-blame for past reproductive choices and losses whereas men did not describe causes in this way. For example, women described having undergone abortions at *'too young'* an age, undergoing a *'voluntary'* abortion or taking birth control (usually the pill) for *'too long'*. Women from NVHHDI countries tended to cite infections (*'Perhaps [I] had an infection [in reproductive organs] I didn't know about.'*) while women in VHHDI countries commonly reported *'miscarriage'* (*'I had a miscarriage in the past when I was younger'*).

In addition, women from VHHDI countries described feelings of ambivalence, uncertainty or *'waiting too long'* to become a parent as a cause of their lack of conception. Delayed conception was coupled with regret: *'I think I should have tried to get pregnant sooner'* and *'I have many regrets about it'*. Respondents from Brazil and Turkey also provided similar causes but not participants in the other NVHHDI countries.

The causes related to 'karma' or punishment for past behaviours men and women provided included risky sexual practices (e.g., unprotected sex) and contracting sexually

transmitted infections (STIs). Men also listed ‘masturbation,’ as a cause whereas women did not. Lifestyle factors cited by both genders across HDI included weight, smoking, alcohol and drug use. Some described ambivalence to change their unhealthy states or behaviours as affecting their chances of conception: for example: *‘I am overweight and I haven’t bothered to lose it’*.

Textual replies to the question: Because of something my partner has done (or not done)

Within the total sample ($N=10045$), 10.6% ($n=1,062$) somewhat or strongly agreed their lack of conception was related to something their partner had or had not done. Of these, 68.4% ($n=726$, 109 men, 617 women) provided textual replies. The most commonly reported causes were their partner’s lifestyle practices, choices, motivation and ambivalence towards parenthood. Additionally, respondents cited their partner’s medical history and infertility diagnosis (see Supplementary Table 3 for all causes).

Women from all countries expressed a sense of frustration, lack of control and helplessness over their partner’s lifestyle behaviour. They said, *‘He should stop smoking,’* or *‘[He] did not want to stop smoking and so his sperm are dim’*. In contrast, men tended to cite their partner’s past abortions, contraceptive use, and lifestyle behaviours with uncertainty rather than blame or helplessness. For example, *‘took pill too long possibly’*. Women also voiced frustration and helplessness with their partner’s lack of readiness for parenthood, which they believed led to delay and caused lack of conception: *‘Making us put off having children until now.’* Women from VHDI countries commonly provided reasons such as *‘waiting too long’* or their partner’s readiness as cause of their lack of conception whereas women from NVHDI countries did not and instead more likely provided reasons such as their partner’s lifestyle behaviours.

A further 87 respondents who disagreed or were unsure their fertility problems were due to something their partner had done provided a textual reply. Within the responses, some

375 respondents further indicated their partner's lack of responsibility: *'problem stems from me,*
 376 *my husband is very healthy.'*

377 ***Textual replies to the question: Other reasons***

378 In total, 14.9% ($n=1,498$, 173 men, 1325 women) of the total sample ($N=10,045$)
 379 provided an answer to the 'Other reasons' question. There was less variability in these replies
 380 with almost 40% referring to an infertility diagnosis as a cause of lack of conception. Other
 381 reasons included medical and reproductive history and emotional problems.

382 Respondents provided medical diagnoses of fertility problems such as polycystic
 383 ovary syndrome (PCOS), endometriosis and male factor infertility (sperm motility,
 384 morphology, and mobility) and medical issues known to cause fertility problems (e.g., cancer
 385 treatment, mumps). Others cited medical reasons not known or not conclusively known to
 386 cause fertility problems (e.g., allergies, anti-depressants, *'I had a ruptured appendectomy'* or
 387 *'a fever of 40 degrees'*). These responses did not differ based on gender or HDI. When
 388 referring to reproductive causes, women tended to refer to adverse reproductive events like
 389 ectopic pregnancies, miscarriages, and menstrual problems, whereas men tended to refer to
 390 their sexuality, for example, *'premature ejaculation'*, frequency of sexual intercourse or
 391 *'masturbation'*

392 Emotional problems were commonly provided in 'other causes' including general
 393 stress, work-related stress, and stress related to fertility problems and previous miscarriages:
 394 *'I think it is mainly due to stress'* or *'too much stress.'* There was a clear country trend with
 395 those from VHDI countries citing stress more than those from NVHDI countries. Across
 396 HDI, women described the psychological impact and anxieties related to trying to conceive as
 397 the cause of their lack of conception: *'I am anxious every month with the idea of being*
 398 *pregnant'* or *'because I am too obsessed'*. Men stated more generally, *'I think it is mainly due*
 399 *to stress'*.

3. Association between Causal Explanations and Help-Seeking Behaviour

Quantitative Results

In total, 62.1% of the sample reported that they had sought medical help for their lack of conception. Of those who sought help, the level of medical engagement was: 49.9% underwent diagnostic work-up or first line treatments (e.g., ovulation induction, insemination), 20.7% underwent fertility medical injections and 29.4% underwent more advanced treatment such as in vitro fertilization. Table 3 shows summary statistics for the logistic regression examining the relationship between causal explanations and help-seeking behaviour including gender and HDI moderation. Endorsing medical causes, own age, being a female and residing in a VHDI country were positively associated with help-seeking. In contrast, endorsing emotional problems, chance or bad luck, partner's age or lifestyle (self or partner) were found to be associated with a decrease in the odds of help-seeking.

Moderation analysis using regression showed the relationship between causal attributions and help-seeking was moderated by gender. Simple slope analysis showed that partner's age significantly hindered help-seeking for women (slope= -.13, $p<.001$) but was not significant for men (slope= .06, $p=.510$). Similarly, emotional causes in women hindered help-seeking (slope= -.09, $p<.01$) but was not significantly associated for men (slope= .08, $p=.232$). Endorsing chance or bad luck was found to significantly hinder help-seeking for men (slope= -.30, $p<.001$) and women (slope= -.09, $p<.01$) whereas endorsing God's will was found to facilitate help-seeking for men (slope= .20, $p<.01$), but not women (slope= .02, $p=.531$). Own age was found to facilitate help-seeking for women (slope= .18, $p<.001$) but not men (slope= -.14, $p=.213$).

Simple slope analysis also revealed the relationship between causal attributions and help-seeking was moderated by HDI. Perceiving God's will facilitated help-seeking in the VHDI group (slope= .22, $p<.001$) and the NVHDI group (slope= .35, $p<.001$). Perceiving

medical causes also facilitated help-seeking for both VHHDI (slope= .47, $p<.001$) and NVHHDI (slope= .56, $p<.001$) countries.

Textual Replies

Those in the help-seeking group commonly provided a specific infertility diagnosis as an explanation for lack of conception (e.g., endometriosis, PCOS). In this group, respondents believed that the stress associated with trying to conceive or undergoing treatment was also associated with lack of conception, with women more likely than men to provide this cause (e.g., *‘because I want it too bad and I am not relaxed’*). Respondents provided feelings of regret that they had not sought treatment earlier and attributed this delay to feelings of ambivalence, uncertainty, and fear of parenthood: *‘I should have paid attention sooner.’* Women expressed more regret than men. Respondents also believed their fear of discovering they were infertile delayed seeking help: *‘Not being proactive enough about my reproductive health because I was scared of the answer.’* Finally, women tended to provide reasons such as their/their partner’s lack of compliance and/or continuation with treatment as the cause of their fertility problems: *‘I did not complete the full course of treatment’* or *‘[my partner] did not take the medication’*.

Those in the non-help-seeking group commonly described being unable to access the necessary treatment as an explanation for lack of conception (*‘I have not proposed it and do not have health care’* or *‘not having the proper orientation and means’*) with a small trend for higher frequency of responses among those from NVHHDI countries. Women in the non-help-seeking group commonly believed their lack of conception was due to their partner’s refusal to undergo fertility treatment (e.g., *‘no interest in treating infertility’*), or to lack of care for his general health (e.g., not being tested/treated for STIs).

DISCUSSION

Regardless of cause, fertility problems are often unexpected and accompanied by feelings of puzzlement, active denial and distress (Greil et al., 2010). These reactions have been shown to stimulate the search for causal explanations (Tennen et al., 1991). Our findings show support for the CSM model and its predictions in the fertility context.

First, men and women readily make causal explanations for their lack of conception. When making these causal explanations, they appear to be influenced by their culture, experiences and available information (Leventhal et al., 1980). Our results demonstrate that people make causal explanations for lack of conception similarly to how people respond to other health problems with medical causes endorsed most highly. However, the qualitative findings demonstrate that these medical causes may not all be legitimate causes, highlighting the need for patient education strategies to ensure people are making educated decisions about how to respond to their lack of conception (e.g., help-seeking).

Of the total sample, only 28% believed lack of conception was due to factors relating to themselves, their partner or the couple. The majority of the sample (72%) did not agree with this pattern of attribution. The qualitative results provide additional insight. The majority of textual replies referred to an infertility diagnosis, medical or reproductive history in line with the higher percentage of couples having sought medical help. However, fate, chance and God's will also figured prominently. It seems clear from this pattern of causal explaining that many individuals search for a reason beyond themselves or their partners to make sense of their lack of conception (Leventhal et al., 1980).

Second, consistent with the CSM (Leventhal et al., 1980), our study showed that causes are shaped by socio-cultural factors and personal histories. The results highlight how the majority of women use their personal history or a 'highly salient environmental event' (e.g., miscarriage) to understand the cause of their health problem (Leventhal et al, 1980). However, although personal experience is a readily available source of information, it may

not be accurate. In the current study, ‘abortion’ and ‘birth control use’ were some of the most frequently spontaneously reported causes for lack of conception, despite a lack of conclusive evidence that these procedures or methods deleteriously affect fertility (Mikkelsen et al., 2013).

Fertility education campaigns are needed to address misconceptions but also to tackle the emotional impact of causal processing. Some reported causes (e.g., abortion, extended pill use, ambivalence about parenthood) were coupled with feelings of self-blame and responsibility, in particular by women. Messages from the external social environment may also contribute to misconceptions and increase feelings of self-blame for lack of conception. For example, negative media representations of abortion as ‘risky’ are common (Purcell, Hilton, & McDavid, 2014) and may be highly influential (and accessible) sources of inaccurate information influencing the generation of causal explanations for lack of conception. These misconceptions come at a cost given that lack of conception may be due to other causes that could be remedied by medical help-seeking and/or behaviour modification (e.g., reducing smoking; Leventhal et al., 1980). These results suggest a need for provision of education about legitimate risks to conception alongside reproductive health services to women in particular (Bunting & Boivin, 2010; Fulford, Bunting, Tsibulsky, & Boivin, 2013).

Although our results identified significant differences in the ratings of causal explanations according to HDI, closer examination suggests important similarities. For example, although those from both HDI groups ranked medical problems as the most frequent cause of lack of conception, those from VHDI ranked ‘chance or bad luck’ and NVHDI ranked ‘God’s will’ as the second most frequent cause respectively. These results indicate that regardless of HDI levels, lack of conception is often believed to be due to uncontrollable, and arguably predetermined causes. As such, across countries, the causal explanation process may be motivated by a similar search for meaning (i.e., a cause beyond

themselves). These findings can inform the development of targeted educational strategies and patient support for lack of conception.

Our findings offer insight into the causal explanation process for men and women when a health problem or illness is experienced as a couple. For example, in both members of the dyad, quantitative findings showed that responsibility for lack of conception (i.e., the cause or source) was more commonly directed towards the female. Qualitative findings suggest that women experience more emotional costs in the causal explanation process. Women more commonly attached emotional significance to causes related to themselves, having more regret about their personal reproductive choices (e.g., previous abortion(s) and contraceptive use). When attributing the cause of lack of conception to their partner, women felt frustrated with decisional imbalances in their relationship, seemingly feeling helpless to change their partner's behaviour (e.g., smoking), to influence his readiness for parenthood, or to convince him to seek or comply with fertility treatment. In contrast, men did not express the same degree of helplessness when attributing their lack of conception to their partner. That said, given that only 28% of the sample attributed the cause of lack of conception to themselves, their partner or both, the finding needs to be interpreted with caution.

Finally, results also support the CSM in finding that causal explanations are associated with medical help-seeking. Overall medical problems were the most commonly rated causes which is consistent with the sample profile. As noted the majority of respondents in the sample (75%) had met the threshold for clinical definition of infertility, and the majority had engaged in medical help-seeking (62%). As expected, the results suggest that regardless of HDI those who had sought help were more likely to provide a medical reason for their fertility problems (i.e., infertility diagnosis) pointing to the bi-directional influence of authoritative others (e.g., doctors) on people's causal explanations (Hammarberg et al., 2017; Leventhal et al., 1980). The textual replies demonstrate that despite having sought help,

many respondents possessed misunderstandings about potential medical causes of lack of conception. There are different ways to interpret this finding. It may provide evidence for the robust and pervasive tendency for personal theories for their health problem to supercede what doctors tell them. Alternatively, it may point to a pervasive misperception about causes of lack of conception present in many countries (e.g., propagated through media, e.g., effect of abortion; Purcell et al., 2014). Whichever is the explanation there is a need for fertility education across the globe. More research is needed to understand trajectory of help-seeking and its effect on outcomes, and the role of causal understanding at different time points in this process.

In line with the third hypothesis, results showed the relationship between causal explanations and help-seeking behaviour to be moderated by gender and HDI. Individuals from VHHDI countries were more likely to seek help than individuals in NVHHDI countries, a result that indirectly suggests access to care and economic status may have an impact on help-seeking behaviour. This suggestion was echoed by the qualitative findings that found individuals from NVHHDI countries who had not sought help for their lack of conception felt unable to do so. Beyond access to care, moderation effects suggested that help-seeking for women is hindered by more factors than seems to be the case for men. For example, attribution to emotional causes, partner's age, and chance or bad luck hindered help-seeking in women. The only factor that was found to significantly hinder help-seeking for men was chance or bad luck. Previous research consistently showed that women were more likely to seek help than men (Thompson et al., 2016; White & Witty, 2009). While this is reflected in the current study's findings, the moderation effects argue for a more complex causal frame for women given the multiplicity of determinants associated with their help-seeking behaviour.

Although moderator analysis showed differences in strength of association for medical causes between NVHHDI and VHHDI countries, the simple slopes were strong in both groups (slopes = .56, .47, respectively) and this cause was more strongly associated with help-seeking than any other moderator. Aside from medical causes, perceiving God's will had similar effects, with it being facilitative for both NVHHDI and VHHDI groups. Together, the results of the study suggest that future research into help-seeking needs to examine diversity of perceived causes and not just strength or type of cause. There is a need to increase access to fertility care where access for medical treatment is limited as well as the development of gender-specific strategies to promote help-seeking behaviour.

Limitations

The limitations for the overall IFDMS study have been reported elsewhere (Bunting et al., 2013) and are briefly reviewed here. In the current analysis, lack of conception (i.e., 'had not conceived') was used as a comparison to infertility and/or fertility problems. Given that 75% of the sample met the clinical definition for infertility, we believe this interpretation was warranted.

The cross-sectional nature of the IFDMS which means the direction of the relationship between causal explanations and help-seeking cannot be determined. The analysis of individual countries was limited because countries were grouped according to HDI. If we had compared across specific countries (e.g., Mexico versus Turkey) we may have found different results. Within country differences (e.g., different economic levels) may have also been missed as a result of country groupings. Caution must be made when interpreting the qualitative results as only 29% of the larger sample opted to answer one or more of the open-ended questions. However, the qualitative findings were based on 2,988 participants, and illuminate the subjective aspect of the explanation and help-seeking process that may have relevance for others, and point to future directions for research and practice. In

addition, within the group of help-seekers, there may be value in comparing fertility treatment outcomes (live birth versus no live birth) in relation to causal explanations to determine whether health outcome influences the causal attribution process.

CONCLUSION

People develop causal explanations for their health problem to try to restore the world as coherent, cohesive and predictable (Leventhal et al., 1980). They rely on available information to make sense of the cause and to inform their help-seeking behaviour. Our findings suggest that although those who seek help are more likely to believe that their lack of conception is due to medical reasons, individuals may develop inaccurate causal explanations based on their personal experiences. For women in particular, causal explanations are coupled with feelings of responsibility and self-blame. This is problematic given that causal explanations of illness have direct impact on help-seeking and subsequent outcomes. The current results point to the need to increase provision of information specific to common misconceptions about causes of lack of conception so that people are less likely to blame themselves and can seek timely and appropriate medical advice and treatment. Our findings also confirm the relevance of applying the CSM model in the infertility context and suggest that examining other components of the model in this setting could be of value. Other researchers have already begun to examine these areas including illness perceptions in particular (e.g., Benyamini, Gozlan, & Kokia, 2009).

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Table 1

Socio-demographic and Fertility Characteristics of the Total and Textual Sample According to Gender and Human Development Index*

Variable	Total Sample					Textual Sample				
	Total	Gender		Human Development Index		Total	Gender		Human Development Index	
		Men	Women	NVHHDI	VHHDI		Men	Women	NVHHDI	VHHDI
<i>N</i>	10,045	1,690	8,355	3793	6171	2,988	337	2,651	1,202	1,759
Age	31.83 (5.91)	33.15 (6.27)	31.56 (5.80)	31.38 (5.94)	32.11 (5.87)	31.59 (6.11)***	33.31 (6.75)	31.37 (5.99)	31.30 (6.12)	31.80 (6.10)
Years together Given birth/fathered a child (% , n)	5.90 (4.18)	5.91 (4.54)	5.90 (4.10)	5.57 (4.22)	6.10 (4.13)	5.88 (4.23)	6.19 (4.83)	5.84 (4.15)	5.77 (4.29)	5.96 (4.17)
Years trying to conceive	26.30 (2581)	27.10 (453)	26.10 (2128)	23.30 (861)	28.10 (1700)	27.00 (781)	30.00 (99)	26.60 (682)	27.10 (312)	26.70 (460)
Time trying (% , n)	2.77 (2.90)	2.87 (3.39)	2.76 (2.79)	3.03 (3.27)	2.62 (2.6)	2.95 (3.05)***	3.14 (3.48)	2.92 (2.99)	3.38 (3.50)	2.65 (2.63)
<12 months	24.30 (2421)	24.10 (404)	24.30 (2017)	24.20 (914)	24.20 (1484)	24.20 (719)	23.50 (78)	24.30 (641)	23.0 (276)	24.70 (430)
1-2 years	25.70 (2569)	28.70 (481)	25.10 (2088)	25.10 (947)	26.20 (1603)	23.10 (685)	24.70 (82)	22.90 (603)	21.10 (253)	24.40 (426)
2-3 years	16.10 (1606)	15.10 (252)	16.30 (1354)	15.00 (566)	16.80 (1029)	16.30 (483)	13.90 (46)	16.60 (437)	15.2 (182)	17.30 (301)
3+ years	33.90 (3387)	32.10 (537)	34.30 (2850)	35.80 (1353)	32.80 (2011)	36.4 (1081)	38.00 (126)	36.20 (955)	40.70 (487)	33.60 (586)
Help-seeking (% , n)	62.10 (6169)	51.50 (857)	64.20 (5312)	60.80 (2268)	63.10 (3865)	62.90 (1860)	57.30 (192)	63.70 (1668)	63.80 (757)	62.80 (1095)

Note. N=sample size, data are mean (standard deviation) unless otherwise specified. *Owing to missing data *n* varies per variable. *** $p < .001$ for MANOVA comparisons between those who did and did not leave qualitative data.

NVHHDI: Not Very High Human Development Index; VHHDI: Very High Human Development Index

Table 2

Mean (standard deviation) and effect size for Causal Explanations According to Total Sample (N=10045), Gender and Human Development Index

Index

I think I have not conceived because of:	Total	Gender		r^2	Human Development Index		r^2
		Men <i>n</i> =1,690	Women <i>n</i> =8,355		NVHHDI <i>n</i> =3,793	VHHDI <i>n</i> =6,171	
Medical problems	3.22 (1.46)	2.98 (1.37)	3.27 (1.47)***	0.07	3.27 (1.47)	3.19 (1.45)***	0.03
Chance or bad luck	3.16 (1.42)	2.94 (1.40)	3.20 (1.42)***	0.07	2.87 (1.49)	3.32 (1.35)***	0.15
God's will	2.77 (1.55)	2.68 (1.48)	2.78 (1.56)***	0.02	3.40 (1.51)	2.39 (1.45)***	0.32
Emotional problems	2.80 (1.41)	2.65 (1.30)	2.83 (1.42)***	0.05	2.91 (1.44)	2.74 (1.38)**	0.06
My Self	2.23 (1.36)	2.21 (1.21)	2.24 (1.38)	0.01	2.32 (1.42)	2.18 (1.32)	0.05
My age	2.37 (1.43)	2.05 (1.18)	2.43 (1.46)***	0.10	2.22 (1.39)	2.45 (1.44)***	0.08
My lifestyle	2.37 (1.33)	2.50 (1.29)	2.34 (1.34)***	0.04	2.41 (1.40)	2.34 (1.29)	0.03
My Partner	1.93 (1.18)	2.08 (1.14)	1.90 (1.19)***	0.06	2.00 (1.24)	1.88 (1.14)*	0.05
Partner's age	1.99 (1.23)	2.06 (1.22)	1.97 (1.23)**	0.03	1.90 (1.21)	2.04 (1.24)***	0.06
Partner's lifestyle	2.26 (1.30)	2.32 (1.23)	2.25 (1.31)	0.02	2.33 (1.37)	2.22 (1.25)	0.04

Note. * $p < .05$; ** $p < .01$; *** $p < .001$ for gender or HDI MANOVA comparisons.

NVHHDI: Not Very High Human Development Index; VHHDI: Very High Human Development Index

Table 3

Multiple Logistic Regression Summary Statistics for Help-Seeking as the Dependent Variable and Causal Explanations as the Predictors with Gender (Model 2) and HDI (Model 3) Interactions

Specific Casual Explanations	Model 1			Model 2			Model 3		
	<i>B</i>	<i>SE B</i>	<i>e^B</i>	<i>B</i>	<i>SE B</i>	<i>e^B</i>	<i>B</i>	<i>SE B</i>	<i>e^B</i>
Gender	.46***	.06	1.59						
Human development index	.15**	.05	1.16						
Medical problems	.58***	.02	1.79				.16**	.05	1.17
Emotional problems	-.07*	.03	.94	-.17*	.07	.85			
God's will	.04	.03	1.04	-.19**	.07	.83	-.32***	.05	.73
Chance or bad luck	-.13***	.03	.88	.21**	.07	1.23			
My lifestyle	-.25***	.03	.78						
Partners lifestyle	-.15***	.03	.86						
My age	.15***	.03	1.17	.32**	.12	1.37			
Partners age	-.11***	.03	.89	-.19*	.10	.82			
<i>R</i> ²		.15			.16			.17	
<i>X</i> ²		1093.50***			1129.98***			1190.01***	

Note. Coding was *help-seeking* = 1, *non-help-seeking* = 0. *Gender* female = 1, male = 0. *NVHHDI* = 0, *VHHDI* = 1 ****p* < .001, ***p* < .01, **p* < .05, *R*² = Nagelkerke R Square. *B* = standardized beta coefficient, *SE B* = standard error, *eB* = odds ratio. *HDI*: Human Development Index