

Stimulating fertility awareness: the importance of getting the language right

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ABSTRACT

While education about fertility is not intrinsically controversial, finding the right language to communicate the topic can be challenging, as there are several risks of unintended negative effects such as dissonance, anxiety, culpability, and stigma due to social norming. In this article, we share some of our learnings from promoting fertility awareness in the hope that they will inspire further debate and research on this topic. Starting from the ethical principles of respect for reproductive autonomy, avoiding harm (in terms of stigma or anxiety) and inclusivity, we have formulated five recommendations: (i) frame fertility awareness messages with (reproductive) autonomy in mind and aim to be inclusive of those who do not represent the traditional nuclear family; (ii) be empathetic and steer clear of blame; (iii) avoid scaremongering and offer a positive angle; (iv) give due consideration to both women and men in fertility health messaging; and (v) tailor the messages to particular contexts and audiences and develop resources in close collaboration with the target groups.

Keywords: fertility education, fertility awareness, reproductive health, inclusion, health communication

Introduction

The International Reproductive Health Education Collaboration (IRHEC, originally known as the International Fertility Education Initiative) was established in 2021. Its mission is to improve fertility awareness through education (Harper *et al.*, 2021). In line with the ICMART glossary, we define fertility awareness as '[t]he understanding of reproduction, fecundity, fecundability and related individual risk factors (e.g. advanced age, sexual health factors such as sexually transmitted infections, and life style factors such as smoking, obesity) and non-individual risk factors (e.g. environmental and work place factors); including the awareness of societal and cultural factors affecting options to meet reproductive family planning, as well as family building needs' (Zegers-Hochschild *et al.*, 2017). While education about fertility is not intrinsically controversial, finding the right language to communicate the topic can be challenging (Bodin *et al.*, 2021). Of the 11 types of unintended effects of public health messaging in the typology developed by Cho and Salmon (2007), the ones we are particularly concerned with in this article are: (i) dissonance ('psychological discomfort and distress provoked by the incongruence between the recommended health states and the

audiences' actual states'), (ii) epidemic of apprehension ('unnecessarily high consciousness and concern over health produced by the pervasiveness of risk messages over the long term'), (iii) culpability ('the phenomenon of locating the causes of public health problems in the individual rather than in social conditions'), and (iv) social norming ('social cohesion and control and accompanying marginalization of unhealthy minorities brought about by campaigns'). In Lorenc and Oliver's conceptual framework for adverse effects of public health interventions, these would fall under 'equity harms' and 'group and social harms' (Lorenc and Oliver, 2014).

The danger of missing the mark in health promotion was unfortunately perfectly illustrated by a draft advice from the World Health Organization (WHO) in June 2021 to reduce the harmful use of alcohol. The advice was originally that '... attention should be given to [...] prevention of drinking among pregnant women and women of childbearing age' but this was swiftly amended after a public outcry and now only speaks about pregnant women (WHO, 2021). While it is legitimate to inform women and men that alcohol consumption can have a negative impact on fertility and reproductive outcomes, it is quite a leap to argue that all women, but not men, of childbearing age should avoid alcohol

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since the advice is: (i) not well targeted (as not all women of child-bearing age plan to 'bear children'), (ii) paternalistic (as it does not aim to enable better informed decision-making regarding alcohol intake, but to stop young women from consuming alcohol), (iii) overreaching (as complete prevention is not necessary to avoid negative impacts), and (iv) disproportionately focused on women (as preconception alcohol intake by men is also associated with worse perinatal outcomes, see, for example, [Terracina et al., 2022](#)). Unfortunate missteps like these contribute to a climate in which beneficial fertility health messages may also be rejected because they are perceived as offensive, discriminating or overly paternalistic. When developing fertility health messages or campaigns, it is therefore not only important to transmit information that is factually correct and that leads to improved awareness but also to do it in a way that does not generate a backlash due to the framing of the message. This article will focus specifically on the latter aspect, although we acknowledge that all these aspects are closely intertwined in practice. We take it as a given that resources are developed in accordance with health communication theory (see, for example, [Sharma, 2021](#)) and are evaluated to ensure their efficacy, comprehensibility, salience, and acceptability.

In this article, we share some of our learnings and reflections, without claiming to be exhaustive, on the challenges of promoting fertility awareness without offending and harming groups that are particularly vulnerable to the negative fallout of reproductive health communication, in the hope that they will inspire further debate and research on this topic.

Acknowledging reproductive autonomy

Although fertility awareness is intended to increase people's control over their fertility, some messages may create friction with firmly established principles such as reproductive liberty and personal autonomy. Fertility and reproductive decision-making are generally considered to be private matters in which outside interference is unwelcome. Thus, it is unsurprising that communication, however well intended, is ill-received when it is perceived as steering towards a reproductive decision that is not in line with one's personal preferences. For example, while information about an acceleration in female fertility decline in the mid-thirties may be factually accurate, complementary advice to reproduce at a young age or freeze egg cells 'before it is too late' can be perceived as too directive as it implies that having children is a goal to be pursued. Although this may be in line with the personal values of most people, for a significant minority it is not. For those who do not want to have children, fertility health messages may seem pronatalist and imply that they deviate from the norm ([Blackstone, 2019](#)). Also, they may interpret fertility health promoting messages as ignoring or challenging their choice to remain child-free ([Hintz and Brown, 2020](#)).

Similarly, people who do not fit neatly into heteronormative stereotypes, who do not identify with a binary gender role, or whose sex at birth does not match their gender identity, may take offence at how fertility health information is framed and communicated, as they do not see their personal situation reflected in the general communication. While it may not always be possible to phrase messages in such a way that everyone feels included, language inclusivity should at least be aimed for when it can be achieved without detracting from the message and without alienating groups of people (for resources on how to tackle this, see, for example, [Centers for Disease Control and Prevention, 2021](#); [Gribble et al., 2022](#)). For example, replacing 'you

and your husband' by 'you (and your partner)' does not complicate the message, yet immediately includes unmarried couples, same-sex couples and singles in the target audience.

Our first recommendation, therefore, is that fertility awareness messages need to be framed with (reproductive) autonomy in mind and aim to include those who do not represent the traditional nuclear family. Messages should demonstrate acceptance of the range of reproductive decisions people make, including to not have children. Inclusive framing will also prevent the hijacking of fertility awareness efforts for pronatalist, heteronormative, and/or anti-emancipatory agendas, aimed at reducing people (particularly women) to their reproductive roles and thus limiting their reproductive autonomy, which is the exact opposite of what the primary goal of fertility awareness ought to be. As an example, the message below acknowledges that it is up to each individual person to set their own reproductive goals and that there are factors beyond their personal control that influence their ability to have children.

Illustrative example 1

While some feel that biological parenthood is an important goal in life, others prefer other forms of parenthood (e.g., adoption, fostering), prefer to remain childfree, or are undecided. Also, not everyone who wants to have biological children has the same options. Factors such as age, weight or medical conditions can make it harder to establish or carry a pregnancy. Similarly, if you're part of the LGBTIQ+ communities, or you want to become a single parent, you may need to investigate reproductive options such as fertility preservation or donor eggs or sperm to have a child.

Avoiding stigma and blame

Communication about fertility can be perceived as stigmatizing by some people. Involuntarily childless people, for example, may perceive messages about the impact of exercise, nutrition, body weight, and lifestyle habits on fertility as blaming them for their own infertility, thus adding insult to injury. For others, such messages may be distressing and confronting because they put the spotlight on a personal characteristic or habit that they prefer not to focus on. As noted by [Cho and Salmon \(2007\)](#), campaigns that construct norms to reduce risk behaviour or promote health behaviour facilitate social cohesion amongst those who (can) comply with these norms, but social norming also renders those who do not comply vulnerable to shame and isolation. Many of the factors that affect fertility are already linked to stigma (e.g. obesity/anorexia, alcohol consumption and sexually transmitted infections) and taboos (e.g. older parenthood). Moreover, they are not easily modified and there is currently no evidence that awareness alone about these factors leads to a higher fecundity ([Boedt et al., 2021](#)). Poorly phrased fertility awareness messages may therefore reinforce stigmas and taboos without contributing significantly to more people achieving their reproductive goals.

Our second recommendation is that fertility awareness messaging needs to be empathetic and steer clear of blame. To avoid alienating people, careful crafting of messages about health behaviours is essential. This is particularly true for messages about the impact of obesity on fertility where evidence shows that programmes to address obesity that are largely based on education alone have not produced significant improvements in body weight ([Gill and Boylan, 2012](#)). Moreover, research in other settings has shown that a weight-normative approach is oftentimes linked to adverse health and well-being outcomes, partly due to stigma, whereas a

weight-inclusive approach improves physical, behavioural, and psychological indices, as well as the acceptability of public health messages (Tylka et al., 2014). For this reason, rather than focusing messages on weight, offering advice about healthy eating and regular exercise as ways to improve fertility might be less confronting and equally or more effective for people with obesity.

Illustrative example 2

Eating a healthy, balanced diet and exercising regularly are good ways to improve your overall health and fertility. This increases your chance of a pregnancy and healthy baby.

Messaging about the impact of age on fertility is particularly challenging. The message that trying for pregnancy at a younger age is more likely to be successful and less likely to lead to health problems in the offspring does not help the 38-year-old single woman or the 45-year-old single man. Quite the contrary, such messaging may be perceived as ignorant, negative and redundant, as it does not consider the personal roadblocks that stand between reproductive intentions and reality. Since age is not modifiable, messages about the impact of age on fertility need to be sensitive and acknowledge that circumstances can prevent people from having children during their most fertile years.

Illustrative example 3

The ideal time to have children from a biological perspective does not always overlap with the ideal time to have children from a personal perspective. For women, the easiest time to get pregnant is before the age of 35, and also men's ability to establish a pregnancy leading to a healthy child diminishes as they age. But for individuals and couples there can be many reasons why having children at a young age is not possible or desirable.

Not causing unnecessary anxiety

Communication about fertility is potentially anxiety-inducing (Maeda et al., 2016) especially in young adults (18–24 years, Boivin et al., 2018). Although messages need to address overly optimistic expectations of fertility and what is possible with fertility treatment, and although anxiety has been shown to have a motivating effect in health promotion (Millar and Millar, 1996), it is important that messages do not overstate the risks to fertility and do not cause unwarranted or exaggerated anxiety about reproductive options. While it may be tempting to emphasize the threats to fertility to achieve behaviour change, this approach is unlikely to (i) achieve its goal in most people or (ii) contribute to overall wellbeing. An intervention that increases threat perception only influences behaviour in combination with high self-efficacy, meaning that the recipient feels they can do something to overcome the threat (Peters et al., 2013). In their critical analysis of fear appeal theory, Peters et al. (2013) wrote that 'If an intervention developer is not very certain that either the population is high in response and self-efficacy, or that a given relevant intervention will manage to considerably increase response and self-efficacy, threatening communications should be avoided'. Messages about threats to fertility should therefore be accompanied by a positive angle and provide all the information about what can be done to counter these threats.

It is important to note, however, that behaviour change is not the only positive and intended outcome of increased fertility awareness. Cognitive changes leading to a more realistic view of someone's fertility are also meaningful and valuable, as they reduce mismatches between expectations and reality. On a related

note, mismatches between the expectations and realities of parenthood should also be countered by offering better information about the benefits of a childfree life and the psychological burdens of parenthood.

Related to avoiding anxiety, disease mongering, i.e. 'the selling of sickness that widens the boundaries of illness and grows the markets for those who sell and deliver treatments' (Moynihan and Henry, 2006, p. 0425) is also to be avoided. Especially, but not exclusively, in the context of private initiatives offering fertility preservation options like egg freezing, there is a heightened concern for this phenomenon given the commercial interests involved. As a sidenote, in the context of egg freezing, it is not only important to prevent disease mongering but also to make sure that the alleged treatment is not pictured too optimistically. Advertising relating to egg freezing often promotes it as an insurance policy against age-related infertility without providing data about the likelihood of having a baby from frozen eggs (Gürtin and Tiemann, 2021). To make informed decisions, people need real-world data about what is possible with egg freezing (e.g. Mascarenhas et al., 2021). This also applies to other medical interventions for infertility and subfertility, as many people overestimate the ability of IVF to overcome infertility (Fauser et al., 2019) even when individualized prognostic information is provided (Devroe et al., 2022).

Our third recommendation is that fertility awareness messaging should avoid scaremongering and offer a positive angle. Messages about age, for example, could point out that although fertility declines significantly during a woman's thirties, about half of 40-year-old women are still able to become pregnant without medical assistance (Schwartz and Mayaux, 1982; Rothman et al., 2013; Steiner and Jukic, 2016; Wesselink et al., 2017). Also, positive images of fulfilling lives without children could be emphasized and normalized to counter more negative images of childlessness that may induce anxiety. Regarding awareness of the importance of positive health behaviours, messages may be more acceptable if they emphasize the benefits of adopting certain health advice. For example, messages about the adverse effect on fertility of cigarette smoking (Vanegas et al., 2017) can be followed by a positive statement.

Illustrative example 4

For men or women who smoke, quitting will increase the chance of pregnancy and having a healthy baby.

Being male inclusive

Research shows that both men and women see fertility as a woman's issue, and most fertility-related communications focus on women (Grace et al., 2019). This places undue responsibility for reproductive outcomes on women and contributes to men's lack of engagement in reproductive health and decision-making. This is despite evidence that some fertility problems are linked to the male partner, such as age-related increases in genetic mutations (Kong et al., 2012), a negative impact of obesity and alcohol intake on sperm quality and foetal development (Chambers and Anderson, 2015; Borges et al., 2018; Bedi et al., 2019; Pini et al., 2020), and adverse effects of poor diet and smoking on male fertility (Kovac et al., 2015; Nassan et al., 2018). Pearson et al. (2021) suggest that '[f]ertility-related health promotion initiatives and reproductive health information targeting men are needed to encourage men to be active participants in reproductive decision-making to optimize the chance of both women and men achieving their parenthood goals'.

Our fourth recommendation is to give due consideration to women and men in fertility health messaging. Male-focused messages about how men can contribute to the chance of pregnancy and the health of a future baby signal that reproductive outcomes depend on both sexes, and this approach should benefit women and men in their pursuit of parenthood.

Illustrative example 5

There is plenty of good information about how women can improve their chance of achieving pregnancy and having a healthy baby. But what about men? Well, research now shows that the man's age and his health can also affect the chance of having a healthy baby. Here is what men who want to have a (another) baby need to know.

Tailoring messages

Getting the message right also means that custom-made and personalized approaches are needed as people have different desires regarding family building which can change through the life course. Grace et al. (2022) recently drew up a typology to distinguish between different categories of people according to their reproductive intention, thus identifying what they labelled as Avoiders, Betweeners, Completers, Desirers, Expectants, and Flexers. People in these different categories have different reproductive health information needs. Whereas many Desirers will be actively seeking out fertility health information, Completers will not and, of particular relevance to this article, some, like the Avoiders (who may in time become Desirers) may be annoyed by information about fertility health when it is framed as general advice, rather than directed to those who want to have children. However, it is not always feasible nor desirable to target different messages to different groups because some people change categories during the life course and may risk missing crucial information if messaging is too targeted. What can be done, however, is to build in qualifiers in the message, for example 'Do you want to have children in the future? Then you might consider...' Information about reproductive options for LGBTIQ+ people who want children requires a similar approach to ensure they feel respected and included in fertility health discussions and it meets their specific needs.

Our final recommendation is that messages should be tailored to particular contexts and audiences and developed in close collaboration with the target groups. This is needed as there is no 'one size fits all' (O' Cathain et al., 2019). The importance of involving the target groups and those with lived experiences when crafting fertility health messages can hardly be overstated. Ideally, the target groups are involved in at least four phases: (i) while deciding what the message should be about, (ii) while designing and producing an educational resource or message, (iii) while testing it, and (iv) while implementing it. First, having the target groups on board from the start will make sure that knowledge gaps are identified and that the messages that are considered most important are prioritized (see, for example, the James Lind Alliance Guidebook (2021) for guidance on priority setting partnerships and Duffy et al. (2020) for an example). Second, inclusive approaches through consulting, collaborating, co-designing, and co-producing messaging with the range of people who might benefit from receiving fertility health information, will help get fertility health messages right. The increased recognition of the importance of co-production has led to several guiding documents for co-production in research that can be used in the context of developing educational resources for fertility awareness

Table I. Summary box of recommendations for the use of language in fertility awareness efforts.

- Frame fertility awareness messages with (reproductive) autonomy in mind and aim to be inclusive of those who do not represent the traditional nuclear family.
- Be empathetic and steer clear of blame.
- Avoid scaremongering and offer a positive angle.
- Give due consideration to both women and men in fertility health messaging.
- Tailor the messages to particular contexts and audiences and develop resources in close collaboration with the target groups.

(such as Hickey et al., 2018; Tembo et al., 2021; Redman et al., 2021). Second, testing the developed resources in the target population is important to make sure that certain quality criteria are met (Sun et al., 2019). Third, including the voices of people with lived experiences by including representative testimonials that the target audience can identify with can make messages more relatable and impactful and counteract potential negative sentiments that recipients may feel when the message comes from 'outsiders' who do not understand their personal experiences. It is important that these testimonials are carefully chosen so that they are in line with empirical findings, rather than exceptional anecdotes, as narrative information is known to have the potential to eclipse statistical evidence (Winterbottom, 2008; Freling et al., 2020).

Conclusion

Wording messages about fertility in a way that people are willing to accept and, if possible and desirable, to act on, is a difficult balance. Starting from the ethical principles of respect for reproductive autonomy, avoiding harm (in terms of stigma or anxiety) and inclusivity, we have formulated five recommendations. Paternalistic or pronatalist rhetoric and scaremongering are to be avoided and inclusivity and acknowledgement of circumstances that are beyond personal control are key to avoid unintended effects such as dissonance, anxiety, culpability, and stigma due to social norming. While fertility health education resources exist and feature on the International Reproductive Health Education Collaboration (IRHEC) website (<https://www.eshre.eu/irhec>), the field of fertility health promotion is in its infancy and more work remains to be done. Fertility health communication is a challenging endeavour and involvement of different target groups is essential to get the messages right.

We summarize our recommendations in Table I.

Limitations

This article focuses on avoiding backlash against fertility health messages due to how they are worded.

We acknowledge that, in addition to paying attention to language, the development and evaluation of educational tools should focus simultaneously on their effectiveness and feasibility. Therefore, a balance may need to be sought on a case-by-case basis between some of the recommendations made here regarding acceptability and other quality criteria for health communication.

Data availability

No new data were generated or analysed in support of this research.

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Authors' roles

H.M., K.H., and J.H. contributed to conception and drafting of the article, revised it for important intellectual content, approved the final version, and agree to be accountable for all aspects of the work. J.B., M.E.R., B.G., M.M.-R., S.R.-H., and M.S. (in alphabetical order) equally contributed to the conception of the article, revised it for important intellectual content, approved the final version, and agree to be accountable for all aspects of the work.

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J.H. is the author of *Your Fertile Years* and founder of Reproductive Health at Work. All other authors have no conflict of interest to declare.

References

- Bedi Y, Chang RC, Gibbs R, Clement TM, Golding MC. Alterations in sperm-inherited noncoding RNAs associate with late-term fetal growth restriction induced by preconception paternal alcohol use. *Reprod Toxicol* 2019;**87**:11–20.
- Blackstone A. *Childfree by Choice: The Movement Redefining Family and Creating a New Age of Independence*. New York, USA: Dutton. 2019.
- Bodin M, Plantin L, Schmidt L, Ziebe S, Elmerstig E. The pros and cons of fertility awareness and information: a generational, Swedish perspective. *Hum Fertil (Camb)* 2021;1–10. doi: 10.1080/14647273.2021.1968045.
- Boedt T, Vanhove AC, Vercoe MA, Matthys C, Dancet E, Fong SL; Cochrane Gynaecology and Fertility Group. Preconception lifestyle advice for people with infertility. *Cochrane Database Syst Rev* 2021;**2021**:CD008189.
- Boivin J, Koert E, Harris T, O'Shea L, Perryman A, Parker K, Harrison C. An experimental evaluation of the benefits and costs of providing fertility information to adolescents and emerging adults. *Hum Reprod* 2018;**33**:1247–1253.
- Borges E Jr, Braga D, Provenza RR, Figueira RDCS, Iaconelli Jr, A, Setti AS. Paternal lifestyle factors in relation to semen quality and in vitro reproductive outcomes. *Andrologia* 2018;**50**:e13090.
- Centers for Disease Control and Prevention. *Health Equity Guiding Principles for Inclusive Communication*. 2021. https://www.cdc.gov/healthcommunication/Health_Equity.html (5 January 2023, date last accessed).
- Chambers TJ, Anderson RA. The impact of obesity on male fertility. *Hormones* 2015;**14**:563–568.
- Cho H, Salmon CT. Unintended Effects of Health Communication Campaigns. *Journal of Communication* 2007;**57**:293–317.
- Devroe J, Peeraer K, D'Hooghe TM, Boivin J, Laenen A, Vriens J, Dancet EAF. Great expectations of IVF patients: the role of gender, dispositional optimism and shared IVF prognoses. *Hum Reprod* 2022;**37**:997–1006.
- Duffy JMN, Adamson GD, Benson E, Bhattacharya S, Bhattacharya S, Bofill M, Brian K, Collura B, Curtis C, Evers JLH et al.; Priority Setting Partnership for Infertility. Top 10 priorities for future infertility research: an international consensus development study. *Hum Reprod* 2020;**35**:2715–2724.
- Fausser BCJM, Boivin J, Barri PN, Tarlatzis BC, Schmidt L, Levy-Toledano R. Beliefs, attitudes and funding of assisted reproductive technology: public perception of over 6,000 respondents from 6 European countries. *PLoS One* 2019;**14**:e0211150.
- Freling TH, Yang Z, Saini R, Itani OS, Abualsamh RR. When poignant stories outweigh cold hard facts: a meta-analysis of the anecdotal bias. *Organ Behav Hum Decis Process* 2020;**160**:51–67.
- Gill TP, Boylan S. Public health messages: why are they ineffective and what can be done? *Curr Obes Rep* 2012;**1**:50–58.
- Grace B, Shawe J, Johnson S, No U, Stephenson J. The ABC of reproductive intentions: a mixed-methods study exploring the spectrum of attitudes towards family building. *Hum Reprod* 2022;**37**:988–996.
- Grace B, Shawe J, Johnson S, Stephenson J. You did not turn up... I did not realise I was invited...: understanding male attitudes towards engagement in fertility and reproductive health discussions. *Hum Reprod Open* 2019;**2019**:hoz014.
- Gribble KD, Bewley S, Bartick MC, Mathisen R, Walker S, Gamble J, Bergman NJ, Gupta A, Hocking JJ, Dahlen HG. Effective communication about pregnancy, birth, lactation, breastfeeding and newborn care: the importance of sexed language. *Front Glob Womens Health* 2022;**3**:818856.
- Gürtin ZB, Tiemann E. The marketing of elective egg freezing: a content, cost and quality analysis of UK fertility clinic websites. *Reprod Biomed Soc Online* 2021;**12**:56–68.
- Harper JC, Hammarberg K, Simopoulou M, Koert E, Pedro J, Massin N, Fincham A, Balen A; International Fertility Education Initiative. The International Fertility Education Initiative: research and action to improve fertility awareness. *Hum Reprod Open* 2021;**2021**:hoab031.
- Hickey G, Brearley S, Coldham T, Denegri S, Green G, Staniszewska S, Tembo D, Torok K, Turner K. *Guidance on Co-Producing a Research Project*. Southampton: INVOLVE, 2018. <https://www.learningforinvolvement.org.uk/wp-content/uploads/2021/04/NIHR-Guidance-on-co-producing-a-research-project-April-2021.pdf> (4 March 2023, date last accessed).
- Hintz EA, Brown CL. Childfree and “bingoed”: a relational dialectics theory analysis of meaning creation in online narratives about voluntary childlessness. *Commun Monogr* 2020;**87**:244–266.
- James Lind Alliance. *The James Lind Alliance Guidebook*. 2021. <https://www.jla.nihr.ac.uk/jla-guidebook/downloads/JLA-Guidebook-Version-10-March-2021.pdf> (5 January 2023, date last accessed).
- Kong A, Frigge ML, Masson G, Besenbacher S, Sulem P, Magnusson G, Gudjonsson SA, Sigurdsson A, Jonasdottir A, Jonasdottir A et al. Rate of de novo mutations and the importance of father's age to disease risk. *Nature* 2012;**488**:471–475.
- Kovac JR, Khanna A, Lipshultz LI. The effects of cigarette smoking on male fertility. *Postgrad Med* 2015;**127**:338–341.
- Lorenc T, Oliver K. Adverse effects of public health interventions: a conceptual framework. *J Epidemiol Community Health* 2014;**68**:288–290.
- Maeda E, Nakamura F, Kobayashi Y, Boivin J, Sugimori H, Murata K, Saito H. Effects of fertility education on knowledge, desires and

- anxiety among the reproductive-aged population: findings from a randomized controlled trial. *Hum Reprod* 2016;**31**:2051–2060.
- Mascarenhas M, Mehlawat H, Kirubakaran R, Bhandari H, Choudhary M. Live birth and perinatal outcomes using cryopreserved oocytes: an analysis of the Human Fertilisation and Embryology Authority database from 2000 to 2016 using three clinical models. *Hum Reprod* 2021;**36**:1416–1426.
- Millar MG, Millar KU. Effects of message anxiety on disease detection and health promotion behaviors. *Basic Appl Soc Psychol* 1996;**18**: 61–74.
- Moynihan R, Henry D. The fight against disease mongering: generating knowledge for action. *PLoS Med* 2006;**3**:e191.
- Nassan FL, Chavarro JE, Tannik C. Diet and men's fertility: does diet affect sperm quality? *Fertil Steril* 2018;**110**:570–577.
- O'Cathain A, Croot L, Sworn K, Duncan E, Rousseau N, Turner K, Yardley L, Hoddinott P. Taxonomy of approaches to developing interventions to improve health: a systematic methods overview. *Pilot Feasibility Stud* 2019;**5**:1–27.
- Pearson L, Holton S, McLachlan R, Hammarberg K. Australian men's fertility information seeking attitudes and behaviour: a qualitative investigation. *Sex Reprod Healthc* 2021;**29**:100621.
- Peters Y, Ruiter RAC, Kok G. Threatening communication: a critical re-analysis and a revised meta-analytic test of fear appeal theory. *Health Psychol Rev* 2013;**7**:S8–S31.
- Pini T, Parks J, Russ J, Dzieciatkowska M, Hansen KC, Schoolcraft WB, Katz-Jaffe M. Obesity significantly alters the human sperm proteome, with potential implications for fertility. *J Assist Reprod Genet* 2020;**37**:777–787.
- Redman S, Greenhalgh T, Adedokun L, Staniszewska S, Denegri S; Co-production of Knowledge Collection Steering Committee. Co-production of knowledge: the future. *BMJ* 2021;**372**:n434.
- Rothman KJ, Wise LA, Sorensen HT, Riis AH, Mikkelsen EM, Hatch EE. Volitional determinants and age-related decline in fecundability: a general population prospective cohort study in Denmark. *Fertil Steril* 2013;**99**:1958–1964.
- Schwartz D, Mayaux MJ. Female fecundity as a function of age: results of artificial insemination in 2193 nulliparous women with azoospermic husbands. *N Engl J Med* 1982;**306**:404–406.
- Sharma M. *Theoretical Foundations of Health Education and Health Promotion*. Burlington, MA, USA: Jones & Bartlett Learning, 2021.
- Steiner AZ, Jukic AMZ. Impact of female age and nulligravidity on fecundity in an older reproductive age cohort. *Fertil Steril* 2016;**105**: 1584–1588.e1.
- Sun Y, Zhang Y, Gwizdka J, Trace CB. Consumer evaluation of the quality of online health information: systematic literature review of relevant criteria and indicators. *J Med Internet Res* 2019;**21**: e12522.
- Tembo D, Hickey G, Montenegro C, Chandler D, Nelson E, Porter K, Dikomitis L, Chambers M, Chimbari M, Mumba N et al. Effective engagement and involvement with community stakeholders in the co-production of global health research. *BMJ* 2021;**372**:n178.
- Terracina S, Ferraguti G, Tarani L, Messina MP, Lucarelli M, Vitali M, De Persis S, Greco A, Minni A, Polimeni A et al. Transgenerational abnormalities induced by paternal preconceptual alcohol drinking: findings from humans and animal models. *Curr Neuropharmacol* 2022;**20**:1158–1173.
- Tylka TL, Annunziato RA, Burgard D, Daniélsdóttir S, Shuman E, Davis C, Calogero RM. The Weight-Inclusive versus Weight-Normative Approach to Health: Evaluating the Evidence for Prioritizing Well-Being over Weight Loss. *Journal of Obesity* 2014; **2014**:1–18.
- Vanegas JC, Chavarro JE, Williams PL, Ford JB, Toth TL, Hauser R, Gaskins AJ. Discrete survival model analysis of a couple's smoking pattern and outcomes of assisted reproduction. *Fertil Res Pract* 2017;**3**:5.
- Wesselink AK, Rothman KJ, Hatch EE, Mikkelsen EM, Sørensen HT, Wise LA. Age and fecundability in a North American preconception cohort study. *Am J Obstet Gynecol* 2017;**217**:667.e1–667.e8.
- WHO. *Global Alcohol Action Plan 2022-2030 to Strengthen Implementation of the Global Strategy to Reduce the Harmful Use of Alcohol*. First draft, 2021. https://cdn.who.int/media/docs/default-source/alcohol/action-plan-on-alcohol-first-draft-final_formatted.pdf?sfvrsn=b690edb0_1&download=true (13 June 2022, date last accessed).
- Winterbottom A, Bekker HL, Conner M, Mooney A. Does narrative information bias individual's decision making? A systematic review. *Soc Sci Med* 2008;**67**:2079–2088.
- Zegers-Hochschild F, Adamson GD, Dyer S, Racowsky C, de Mouzon J, Sokol R, Rienzi L, Sunde A, Schmidt L, Cooke ID et al. The international glossary on infertility and fertility care, 2017. *Hum Reprod* 2017;**32**:1786–1801.