

Situating commercialization of assisted reproduction in its socio-political context: a critical interpretive synthesis

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Submitted on May 08, 2022; resubmitted on November 15, 2022; editorial decision on November 18, 2022

BACKGROUND: In many countries, ART service provision is a commercial enterprise. This has benefits, for example, creating efficiencies and economies of scale, but there are also concerns that financial imperatives can negatively impact patient care. The commercialization of ART is often conceptualized as being driven solely by the financial interests of companies and clinicians, but there are in fact many complex and intersecting socio-political demands for ART that have led to, sustain and shape the industry.

OBJECTIVE AND RATIONALE: To use the academic and policy discourse on the commercialization of ART to build a theoretical model of factors that influence demand for ART services in high-income countries in order to inform potential policy responses.

SEARCH METHODS: We searched electronic databases for journal articles (including Web of Science, Scopus, PubMed) and websites for grey literature, carried out reference chaining and searched key journals (including *Human Reproduction*, *Fertility and Sterility*). The terms used to guide these searches were 'assisted reproductive technology' OR 'in vitro fertilization' AND 'commerce' OR 'commercialisation' OR 'industry' OR 'market'. The search was limited to the English language and included articles published between 2010 and 2020. We used an established method of critical interpretive synthesis (CIS) to build a theoretical model of factors that influence demand for ART services in high-income countries. We developed initial themes from a broad review of the literature followed by iterative theoretical sampling of academic and grey literatures to further refine these themes.

OUTCOMES: According to contemporary academic and broader socio-political discourse, the demand for ART has arisen, expanded and evolved in response to a number of intersecting forces. Economic imperatives to create sustainable national workforces, changing gender roles and concerns about the preservation of genetic, national/ethnic and role-related identities have all created demand for ART in both public and private sectors. The prominence given to reproductive autonomy and patient-centred care has created opportunities to (re)define what constitutes appropriate care and, therefore, what services should be offered. All of this is happening in the context of technological developments that provide an increasing range of reproductive choices and entrench the framing of infertility as a disease requiring medical intervention. These socio-political drivers of demand for ART can be broadly organized into four theoretical categories, namely security, identity, individualization and technocratization.

LIMITATIONS, REASONS FOR CAUTION: The primary limitation is that the interpretive process is ultimately subjective, and so alternative interpretations of the data are possible.

WIDER IMPLICATIONS: Development of policy related to commercial activity in ART needs to account for the broad range of factors influencing demand for ART, to which commercial ART clinics are responding and within which they are embedded.

STUDY FUNDING/COMPETING INTEREST(S): This work was supported by a National Health and Medical Research Council Ideas Grant (APPI181401). All authors declare that they have no conflict of interest in relation to this work.

Key words: assisted reproduction / commerce / business / IVF / infertility / health policy / demand / qualitative study / critical interpretive synthesis

WHAT DOES THIS MEAN FOR PATIENTS?

ART has allowed many people to have children who otherwise could not. ART is delivered largely in the private sector, and the global market for this technology and related services is now worth tens of billions of dollars. Critics have argued that commercialization has contributed to people with infertility being over-diagnosed, over-treated or being provided with suboptimal, non-evidence based and overly expensive treatments. The growth of the ART industry is often conceptualized as being driven solely by the financial interests of companies and clinicians. However, there are, in fact, many complex social forces that have led to, sustain and shape the industry. For many individuals, there is a strong desire to have biologically related children as a means of preserving and perpetuating their genetic, personal or cultural identities. For those unable to have children through sexual intercourse, or who wish to delay having children, ART provides choices for family planning that did not exist previously. For nation-states, preserving fertility is critical to ensuring that there are enough workers to keep the country productive and pay taxes. In this article, we explore academic and wider socio-political discussions of factors that create and sustain the demand for ART and critically interpret these to build a theoretical model of factors that influence demand for ART services in high-income countries in order to inform potential policy responses.

Introduction

The global fertility industry is growing rapidly. It is predicted that, by 2026, the market will be worth \$41 billion, up from \$25 billion in 2019 (Waldby, 2019). In the USA, it has been estimated that the market will generate revenues of \$15.4 billion by 2023, more than double its value of \$7 billion in 2017 (Kowitt, 2020). In the UK, the fertility industry generated revenues of £320 million in 2018, and in Australia, the market generated sales of \$570 million in 2020 (Human Fertilisation & Embryology Authority, 2018; Richardson, 2020). In 2000, only one-quarter of the world's countries had IVF services, whereas by 2010 they were present in more than half of countries with an estimated 4500 IVF clinics globally (Inhorn and Patrizio, 2015).

The commercial opportunities associated with ART are immense, with private equity firms and public companies investing heavily in the fertility industry (Horwitz, 2005; Robbins, 2017). Some of the impacts of private investment are clearly positive, such as the potential to enhance efficiency and provide patients with access to treatments that the public sector is unwilling or unable to support. However, critics have argued that commercialization has contributed to people with infertility being over-diagnosed, over-treated or being provided with suboptimal, non-evidence based and overly expensive treatments for the sake of profit and shareholder value (Hodson and Bewley, 2019). In one study of the global industry, it was claimed that as the number of IVF treatments has increased, overall levels of success have diminished (Gleicher et al., 2019).

Given the potential harms associated with commercialization, it is important that commercial forces are critically examined. But any evaluation of commercial activities in the ART sector needs to account for the full range of factors that influence both supply and demand. While commercially driven industries can shape demand for ART services to some extent through advertising and sales tactics, there are also broad socio-political trends to which the ART industry is responding, and

which define the environment in which it operates. Without appreciating this broader 'demand' context, both critiques and defences of commercialization in the context of ART are likely to be over-simplified. To date, nobody has offered a systematic account of these socio-political factors that influence demand for ART services. We therefore conducted a critical interpretive synthesis of academic and socio-political discourses on ART in order to characterize the broad socio-political factors influencing demand for the commercialization of ART provision in high-income countries and inform potential policy responses.

Methods

A critical interpretive synthesis (CIS) of the literature was conducted. This method was developed by Dixon-Woods et al. (2006) to address weaknesses of protocol-based reviews (such as narrative reviews and systematic reviews) that aim to summarize, systematize and rationalize a particular body of knowledge and cannot be used to answer questions that are not well-specified in the literature, or when the theory behind the research question is not well developed, and therefore unsearchable (Dixon-Woods et al., 2006). The sampling technique of a CIS is purposive rather than protocol-based and can combine several strategies and sources of data, spanning quantitative, qualitative and theoretical work, as well as grey literature (e.g. policy documents, media articles and websites) (Dixon-Woods et al., 2006; Palinkas et al., 2015). A CIS also differs from traditional reviews in that its aim is to interpret a body of literature, not merely aggregate it. Its concern is the development of concepts and theories grounded in the body of literature reviewed.

In our implementation of the CIS, we first conducted a database search (Web of Science, Scopus and PubMed) using the search terms 'assisted reproductive technology' OR 'in vitro fertilization' AND

'commerce' OR 'commercialization' OR 'industry' OR 'market' (N.G. and M.W.). The search was limited to the English language and included articles published between 2010 and 2020. We identified over 1000 articles and scanned the abstracts to determine whether they could answer one of two questions:

- Does the article explicitly discuss the broad socio-political factors that influence demand for ART in high-income countries?
- Does the article discuss a topic or issue that could be interpreted as being a factor that influences demand for ART in high-income countries?

We excluded articles on how businesses may generate demand for their services (e.g. through advertising) because this has been discussed extensively in the literature and our aim was to understand the environment in which these businesses emerge, rather than how they function.

By 'factors influencing demand' and 'drivers of demand', we refer to any institutional, personal, social or political factors that create new opportunities for ART services, or that may increase uptake of, or support for, existing ART services.

We combined content from articles that explicitly or implicitly discussed similar drivers of demand for ART under 'themes'. Themes were then organized into theoretical categories and further refined through the search of academic databases (Web of Science, Scopus and PubMed) and examination of websites (to identify relevant policy documents and news articles) until thematic saturation was reached, i.e. no further relevant themes were emerging (Saunders *et al.*, 2018).

In order to generate theoretical categories from themes, we drew upon Morse's account of the cognitive basis of qualitative research, which

specifies the cognitive movement of the researcher from comprehending, to synthesizing, theorizing, recontextualizing when engaging with an object of inquiry (Morse, 1994) and Charmaz's iterative and theory-building approach to data collection and analysis (Charmaz, 2006).

Each iteration of theory development was presented to all authors for feedback regarding coherence and completeness, and to guide further sampling. These authors include experts in reproductive health and medicine, and the ethics and sociology of reproduction. Early results were also presented to a wider team of national and international collaborators with expertise in various aspects of ART for feedback on the conceptualization presented.

Results

Table I outlines the themes and theoretical categories that we developed from the data as well as a short descriptor of how each influences demand for ART. Four theoretical categories (security, identity, individualization and technocratization) were derived from these themes. We elaborate on these theoretical categories and themes in the following sections, describing the literature from which they were derived.

Security

Economic security

We identified a number of articles and reports that note that declining fertility levels represents a significant economic threat to many high-income countries. A United Nations report, for example, notes that

Table I Socio-political factors that influence demand for ART services.

Theoretical category*	Theme	Effect
Security	Economic security (expanding and maintaining the workforce).	Creates a socio-political imperative for options to increase birth rates.
	Globalization (growth of cross-border medical practice)	Generates support for local ART providers to protect patients from the risks of cross-border reproductive care and to protect the country from economic losses.
Identity	Preserving genetic identity (preference for genetically related children)	Limits the desirability of alternatives to ART such as adoption.
	Cultural/national identity (desire to preserve national and cultural identity)	Reduces appeal of alternative means of population growth such as immigration.
	Pronatalism (pressure/desire to experience gestation, childbirth and parenting)	Limits the desirability of childlessness.
	Changing gender roles	Delays childbearing, reduces fertility and creates the need for greater assistance to achieve pregnancy.
Individualization	Reproductive autonomy (increased emphasis on individuals choosing how they reproduce)	Creates an incentive for society to provide individuals with as many reproductive options as possible.
	Patient-centred care (increased emphasis on patient preferences, values and experiences over more traditional measures such as effectiveness)	Diminishes gatekeeper function of physicians; potentially increases use of 'futile' or less effective interventions.
Technocratization	Commodification (turning bodies and reproductive process into marketable goods and services).	Transforms our conception of reproduction, parenthood, and creates new markets.
	Medicalization (framing of infertility as a disease)	Makes fertility an 'unmet need' subject to medical and technological intervention.

*Critical interpretive synthesis was used to build a theoretical model of factors that influence demand for ART services in high-income countries.

almost half of the world's population is reproducing below the replacement rate of 2.1 children per couple (United Nations, 2017) and other reports observe how levels of fertility across the globe have halved since the 1960s (The World Bank, 2020; Australian Bureau of Statistics, 2022). According to these reports and associated academic analyses, demographic projections indicate that coronavirus disease 2019 (COVID-19) will further depress the birth rate, at least in the medium term (Ullah et al., 2020). This is viewed as a problem because reduced fertility diminishes the working-age population and increases the size of the elderly population that may require support (the global population of people aged over 60 years is expected to double by 2050 (United Nations, 2017)). Fewer workers, taxpayers and consumers, combined with an increase in the number of people relying on pensions and public health systems, pose important challenges for nations.

Several commentaries and news reports show that governments are alert to the threats posed by low birth rates. As far back as 2011, Taiwan acknowledged that its low birth rate is a national security threat that will cripple development (Basten and Verropoulou, 2015). When, in 2005, South Korea's fertility rate dropped to approximately half that required to replace the population, the government invested USD 100 billion in child-birth promotion strategies out of fear that the diminishing labour force and burden on the social security system would soon be unsustainable (Kim, 2019). In 2004, Australian couples were encouraged by the (then) Treasurer Peter Costello to have children to support the national economy (Farouque, 2004) and, in 2020, the current Australian Treasurer Josh Frydenberg again encouraged Australians to have more children to support the country during the economic crisis caused by COVID-19, warning that the country cannot rely on immigration to boost economic growth (Maley, 2020). An explicitly economic rationale also underpinned the coercive pronatalist policies of Ceausescu's Romania, which included incentives such as free healthcare for mothers with children, and penalties such as higher tax rates for unmarried and childless couples (Soare, 2013).

At a regional level, the President of the European Economic and Social Committee stated during the Committee's conference on demographic challenges that changing demographics 'will change the position of the EU in the global economic and geopolitical environment and affect its influence in the world', and that the 'EU needs to address this challenge if it wants to maintain its role as a global player in the future' (European Economic and Social Committee, 2019). These findings were echoed in the 2020 *European Commission Report on the Impact of Demographic Change*, which noted that solutions need to be found to 'ensure Europe stays competitive in the face of a shrinking working-age population' (European Commission, 2020). Although these media articles and reports do not make an explicit link between demographic challenges and growth in demand for ART, the issues they discuss (ageing populations, reduced workforces) can be interpreted as drivers of demand for reproductive medicine services.

More direct links between demographic challenges and demand for ART can be found in studies demonstrating that public subsidization of ART services represents sound fiscal policy. In the UK and the USA, economic modelling has shown that an IVF-conceived child will generate up to 8.5 times the procedure's cost in tax revenue (Connolly et al., 2008, 2009), while a Swedish study also demonstrated that IVF-conceived children provide positive net returns to their nations (Svensson et al., 2008). ART is therefore now seen in some

jurisdictions as a cost-effective national strategy for addressing economic challenges linked to demographic changes (Ziebe and Ziebe and Devroey, 2008; Connolly et al., 2010).

Our overall interpretation of this discourse is that the provision and public support of ART services is one strategy that nations might use to address their long-term economic goals and can help to explain demand for ART services.

Globalization

Both academic and grey literature on ART make frequent and explicit reference to the effects of globalization on patterns of ART provision. It is noted that ease of international travel and border crossing means that prospective parents can readily travel abroad for interventions that are not available or are difficult to access locally, that are ethically unacceptable or legally prevented locally, or that are unaffordable at local prices (Jackson et al., 2017). These individuals are sometimes framed in the literature as 'reproductive exiles' who are 'forced' to travel to access interventions denied them by their states—typically on cultural grounds (Inhorn and Patrizio, 2009; Zanini, 2011). Globalization, therefore, is often seen as playing a key role in reducing barriers to what can be bought and sold in a competitive fertility marketplace (Sarojini et al., 2011).

While the literature focuses primarily on how the globalization of fertility services and the availability of cross-border care encourages reproductive tourism and increases demand for ART on a global scale, it is also noted that fertility tourism can have economic disadvantages for an individual's home country. Studies have been conducted showing that the expense to home countries of managing complications that arise from cross-border reproductive care is significant (Hanefeld et al., 2014; Waller et al., 2017). For instance, in one Australian hospital, one-third of all multiple pregnancies conceived by ART were a result of ART procured abroad (Waller et al., 2017). Although these articles and reports do not make an explicit link between globalization and growth in demand for ART, the issues they discuss can be interpreted as drivers of demand for 'local' reproductive medicine services.

Some articles make a more explicit link between these patterns of globalization and growth in demand for fertility services. For example, globalization is framed as a cause of 'fertility convergence' between countries as they become more closely connected politically, economically and socially and begin sharing the same ideals and lifestyles that impact negatively on fertility. This, in turn, foments the demand for ART in countries where it might once not have been needed (Hendi, 2017; Komura and Ogawa, 2019). Providing high-quality and subsidized ART services locally is also justified as a harm-minimization strategy that protects patients (Millbank, 2015), while also providing economic benefits to the home country.

This body of literature shows us both explicitly and implicitly how globalization can help to explain demand for, and support of, ART services within certain countries. Not providing these services locally may simply drive individuals seeking ART to access markets abroad, potentially exposing them to additional risks and, when things go wrong, exposing the local health system to additional costs. In addition, globalization can also help explain global demand for infertility treatment, insofar as modern western values and lifestyles may be related to low fertility, and their adoption by other countries negatively impacts fertility and so expands markets for ART.

Identity

Genetic kinship

Both theoretical and empirical discussions of ART make reference to the strong desire on the part of individuals to have genetically related offspring (Baldwin, 2012; Asplund, 2020). Empirical studies suggest that almost all infertile men and women prefer genetically related children (Hendriks *et al.*, 2017), although more recent studies have shown that many potential parents are willing to trade a genetic link for reducing risks of harms to the child or mother, or to increase pregnancy rates (Hendriks *et al.*, 2019). The perceived importance of a genetic link to offspring is also inferred by some scholars from the growing demand for oocyte preservation in the absence of medical indications (Kirkman-Brown and Martins, 2020), and from evidence that shows that genetic relatedness impacts future child–parent relationships (Isaksson *et al.*, 2019). It could be argued that infertility, combined with a desire for genetically related children, and anxiety around the prospect of not having children inevitably creates demand for the services that the ART industry provides.

Although this body of work does not make a direct link between the desire for genetically related offspring and demand for ART, our interpretation is that the desire for ‘genetic kinship’ constrains the acceptable means by which infertility can be resolved. It therefore creates demand for ART services insofar as it is the only means for people who cannot have children through sexual reproduction to have genetically related offspring.

Cultural/ethnic identity

According to some scholars, fertility-related advocacy is associated with the desire to preserve not only genetic identity, but also cultural and ethnic identity. From this perspective, reproduction not only helps to protect the nation by maintaining a robust labour force but also transmits national identity (Erel, 2018).

This attitude is also apparent in public discourse, for instance, in the Hungarian Prime Minister’s recent comments stating that ‘[if] we want Hungarian children instead of immigrants ... the only solution is to spend as much of the funds as possible on supporting families and raising children’ (BBC News, 2020), and also in recent debates around French IVF policy, which have been cast as fundamentally about ‘who is able to bear French children and therefore transmit the ineffable essence that is Frenchness’ (Donadio, 2019). An empirical study conducted in Israel has demonstrated a clear correlation between nationalistic sentiment and support for reproduction (Anson and Meir, 1996), and an analysis of Australian public discourses has identified the political utilization of the link between national identity and the fertility of the nation’s population (Cover, 2011).

Our interpretation of this body of literature is that ‘cultural and ethnic identity’ places constraints on the acceptable means of resolving demographic challenges by precluding, or at least making less palatable, options that challenge or undermine identity. ART services provide a solution to the demographic challenge that, unlike immigration, also preserves and perpetuates identity, and this might help to explain the demand for such services in some contexts.

Pronatalism

Scholars writing about ART note how, in many societies, childbearing and child-rearing roles associated with parenthood remain important components of what is perceived to be a ‘good life’ (Smeeton and Ward, 2017; Alamin *et al.*, 2020). In these societies, those who are

unable to bear or rear children might experience significant negative consequences, including personal distress, social stigma, and a sense of having their identity fundamentally damaged (Sperling, 2010; Bell, 2013; Hasanpoor-Azghdy *et al.*, 2014; Lakatos *et al.*, 2017; Dierickx *et al.*, 2018; Alamin *et al.*, 2020). Even in progressive countries, such as Denmark, high levels of ‘fertility stress’ impact a large minority of infertile people (Schmidt, 2006). The influence of pronatalist values is further evinced by growing demand for subsidized ART by individuals who are unable to have children even if they are potentially fertile (e.g. single women, the lesbian, gay, bisexual, transgender, intersex or questioning (LGBTIQ)+ community). Advocates for these groups have based these demands on the psychosocial consequences of not having children (Payne and Korolczuk, 2016). In short, in the face of social stigma and personal distress entangled with the ‘failure’ to assume child-rearing and child-bearing roles, ART is seen as a means of enabling the rehabilitation of one’s social identity, as well as a means of self-fulfilment (Strathern, 1990; Sperling, 2010).

This body of literature makes explicit the link between pronatalism and demand for ART services. Insofar as people are driven to be parents, and women wish to experience the intimacy of gestation and childbirth, ART provides the only viable solution to infertility.

Changing gender roles

The social scientific literature on ART includes numerous reflections and empirical studies on the ways in which the role of gender in society has changed over the course of the 20th century, particularly regarding the degree of control that women have over the timing and number of children that they have. It is observed that pregnancy and childbirth are now more likely to be initiated during women’s thirties, when the chances of success are lower than at younger ages (Mills *et al.*, 2011; Schmidt *et al.*, 2012; Petersen *et al.*, 2015; Adachi *et al.*, 2020). Additionally, the shift away from traditional gender roles towards more egalitarian values has an empirically demonstrated association with decreased fertility (and greater economic output) (Arpino *et al.*, 2015; Daniele and Geys, 2016). Changing gender roles are typically correlated with increased educational attainments and greater workforce participation by women, which has created new social roles that have come into tension with parenthood. Government and non-government organizations are also alert to changing gender roles—for example, according to the World Bank, low-income countries have a fertility rate three times higher than high-income countries, and research has directly attributed this lower economic output, at least in part, to ‘traditional’ family values and associated gender roles (The World Bank, 2020; Daniele and Geys, 2016).

This literature can be interpreted as implicit evidence that changing gender roles contribute to low fertility, which in turn expands the infertility market and thereby increases demand for ART services. Changing gender roles also precludes other solutions to infertility, as reversion to traditional gender roles would be widely seen as unacceptable, and thus encourages the uptake of other (technological) interventions.

Individualization

Reproductive autonomy

According to scholars writing in the academic literature, the freedom for women to make decisions about when, how, and if to have children without interference or coercion is considered essential for their

well-being (Purdy, 2006; Senderowicz and Higgins, 2020). Threats to reproductive autonomy can arise from inter-personal relationships, health systems and other social structures, racism and inequality (Senderowicz and Higgins, 2020). Support for reproductive autonomy is perceived by some commentators to be a social responsibility that is achieved, at least in part, by increasing choices available for overcoming infertility (Blyth and Farrand, 2005; Johnston et al., 2015). This includes the provision of affordable and safe ART services, which would minimize the pressure on people to pursue relatively risky procedures (Johnston et al., 2015; Insogna and Ginsburg, 2018), and reduce inequities (Johnston et al., 2015).

This body of literature thus both shows implicitly and states explicitly that autonomy can drive demand for ART. The increased emphasis on personal choice with regard to reproduction creates an incentive for society to provide as many reproductive options as possible. For instance, universal health coverage of proven and safe ART interventions is widely seen as essential for supporting reproductive autonomy, which in turn facilitates demand for the ART industry.

Patient-centred care

Commentators on the ART industry note how the ART industry and healthcare more broadly have shifted their focus from clinical outcomes important to healthcare providers towards a greater focus on outcomes that matter to individual patients such as physical and emotional burden, time, cost, potential risks and genetic parentage (Duthie et al., 2017). It is observed that patient-centred care is sufficiently important for many patients that they are willing to trade-off higher fertility success rates for a more patient-centred experience (Dancet et al., 2011; Gameiro et al., 2013). Relatedly, it is observed that because ART treatment has a relatively high failure rate, is distressing for many, and is associated with significant drop-out rates, a patient-centred approach is crucial (Dancet et al., 2011). Furthermore, it is noted that the ever-increasing array of treatment options and pressures upon couples makes the 'best' treatment in a specific situation difficult to ascertain (King, 2017). For this reason, shared decision-making is seen as critical for ensuring that context-specific decisions are respectful of couples' individual circumstances, which in turn leads to increased treatment variation (Ezugwu and der Burg, 2015; Brabers et al., 2016). While there is no doubt benefit in respecting patients' preferences, it has been noted that this shift towards a more collaborative and patient-driven model can also make it more difficult for all parties involved to ascertain the boundary between appropriate and inappropriate care and can potentially lead to a proliferation of commercialization and over-treatment (Edgar, 2013).

While there is no explicit link made in this body of literature between patient-centred care and demand for ART, the increased emphasis on patient preferences, values, and experiences over more traditional measures, such as effectiveness, can be linked to demands for ART services in the sense that it both diminishes the gatekeeper function of physicians and potentially increases use of 'futile' or less effective technological interventions in response to patient demand.

Technocratization

Commodification

Social science scholars have observed how the development of ART technology has made it possible to fragment reproduction into specific functions, bodily materials and related services that can be bought and

sold (Davis-Floyd, 1994; Cohen, 1999; Bennett, 2006). They note how all stages of human embryogenesis have become potential products, including eggs, sperm and embryos, and those technologies that facilitate their selection, formation, preservation and clinical use. This reproductive reductionism, it is argued, enables the formation of new markets for ART by creating and emphasizing choices to buy and sell products and services where once there were none (Cohen, 2015; Madeira, 2015; Albertini, 2017; Carroll and Krollokke, 2018). It is noted that these advancements have required a transformation and clarification of society's conceptualization of rights, responsibilities, and ownership with regard to the reproductive process and its products, and therefore what is legal to buy, sell and trade.

This literature highlights explicitly how 'commodification' of reproduction can be linked to growing demand for ART by turning bodies and the reproductive process into marketable goods and services which, in turn, transforms our conception of reproduction and parenthood, and creates new markets.

Medicalization

Social scientists have long been concerned with the ways in which ART has turned infertility into a medical condition to be viewed through a biomedical lens (Greil and McQuillan, 2010). This perspective is reinforced by the World Health Organization, which now defines infertility as a 'disease of the reproductive system' that affects approximately 186 million people globally (World Health Organization, 2020). Infertility is now an illness with billable codes that physicians can use when charging patients or their insurers (Insogna and Ginsburg, 2018). By transforming ART into an 'unmet need' subject to medical intervention, a higher demand for ART services is potentially created. Those aspects of infertility that are most easily medicalized become the most utilized, which according to some commentators has resulted in women bearing the brunt of the burden as their bodies become the loci of treatment (Greil and McQuillan, 2010). This is supported by the fact that almost all revenue generated by the Australian ART industry is from treating women even though the cause may be male infertility (Richardson, 2020). Furthermore, the popularity of IVF has been attributed in part to its readily 'protocolised' and scalable approach, making it more accessible and easier to commercialize as the focus shifts from clinical to laboratory expertise (Abbott, 2018).

This literature thus makes both implicit and explicit the links between framing infertility as a disease that is subject to medical and technological intervention and demand for ART.

Discussion

This analysis has generated a taxonomy of socio-political forces that help to explain the demand for the modern ART industry. The category that we labelled Technocratization describes the material means (or products) that make an ART industry possible and facilitate the demand by creating a disease that needs to be treated. The categories of Security and Identity describe the motivations that drive governments and individuals to support and seek out ART services. Individualization refers to the broad trend in healthcare that emphasizes patients as active participants in their own healthcare, disrupting the traditional balance of power in the patient-physician relationship, and enabling consumer-driven healthcare.

Another way of looking at the taxonomy we have provided is to view its elements as different, often implicit, accounts of the 'goods' that the ART industry serves. Viewing it this way is important because, as the late health economist Gavin Mooney argued, until we are clear about the 'goods' we are trying to achieve in healthcare, we cannot make a judgement about what is 'better' (Mooney, 2000). Therefore, if we wish to understand whether the ART industry (both in general and in its commercialized form) is serving the interests of society, we must evaluate this in reference to the different goods it serves.

In this regard, it is important to bear in mind that what counts as a 'good' can be contentious. For instance, medicalization of infertility may help to provide options where once there were none but can also put pressure on those who want to be parents to exhaust all opportunities available and continue with treatment that is unlikely to be successful (King *et al.*, 2017; Smeeton and Ward, 2017). The commitment to national identity may be perceived as patriotic, but at the extreme it may reflect and further reinforce discriminatory and racist values in the community (Erel, 2018; Donadio, 2019; BBC News, 2020); and while the desire to bear children may be innately valuable to many, societal pronatalism is also a cause of immense distress to many people, with social, psychological and emotional consequences (Schmidt, 2006; Sperling, 2010; Bell, 2013; Hasanpoor-Azghdy *et al.*, 2014; Lakatos *et al.*, 2017; Dierickx *et al.*, 2018; Alamin *et al.*, 2020).

While this analysis focuses on external socio-political forces that influence the provision of ART services, it is also important to realize that intrinsic commercial drivers may also inflate demand for ART and shape service provision. Organizational and payment structures, consumer debt facilities, shareholder obligations, intra- and extra-sectorial competition, market segmentation, and promotion and advertising practices can all shape both the healthcare landscape and consumer behaviour. An analysis along these lines is beyond the scope of this article, but the taxonomy presented here can be used as an analytical framework to help policy-makers, healthcare researchers and industry stakeholders understand the socio-political context within which these business drivers operate.

Strengths and limitations

The strengths of a CIS are that it allows one to pose questions of the literature that are not answerable via traditional protocol-based search methods (Dixon-Woods *et al.*, 2006). The output is defended on the grounds of its plausibility, its ability to provide valuable insights and its ability to generate questions and hypotheses for future research. One criticism of the methodology is that it is not reproducible and reflects the preconceptions of the person or group conducting the analysis. As Dixon-Woods and colleagues note:

'production of a synthesizing argument, as an interpretive process, produces one privileged reading of the evidence, and, as the product of an authorial voice, it cannot be defended as an inherently reproducible process or product'

The fact that the methodology is iterative, involving continuous refinement of the research question in response to emerging data also means transparency is difficult (Dixon-Woods *et al.*, 2006). However, it is important to note that, as with any qualitative analysis, full transparency is not possible because of the creative, interpretive processes involved. The potential prejudices this introduces were remedied in this study by the involvement of a large multidisciplinary team, and

continuous dialogue, which introduced checks and balances to guard against framing of the findings from a single perspective. Nevertheless, despite such mitigation strategies, the primary limitation of this study is that the interpretive process is ultimately subjective, and so alternative interpretations of the data are possible.

Conclusion

The ART industry serves a variety of economic, social, ideological and healthcare ends. We have identified 10 socio-political themes that help to explain the demand for the ART industry in modern society. Understanding these will assist with the development of sound policy around the provision and subsidization of ART.

Data availability

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

Authors' roles

N.G. led conceptualization, data collection and data analysis, and took the lead in writing the article. M.W. contributed to data acquisition and critical revision. A.J.N., C.W., R.J.N. and W.L. contributed to conceptualization and critical revision.

Funding

This work was supported by a National Health and Medical Research Council Ideas Grant (APPI181401).

Conflict of interest

All authors declare that they have no conflict of interest in relation to this work.

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