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SYMPOSIUM: REPRODUCTIVE TECHNOLOGIES AND THE CONCEPTUALISATION OF THE BIOLOGICAL CLOCK  
ORIGINAL ARTICLE

# Disrupting the biological clock: Fertility benefits, egg freezing and proactive fertility management

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**Abstract** In the last decade, the in-vitro fertilization (IVF) sector has witnessed a shift from so-called 'reactive IVF' to a new model of proactive fertility care. Whereas IVF was traditionally developed to treat people who found they were unable to conceive, the indication for IVF has broadened significantly to include a much wider group of potential patients through a new focus on proactive treatment of future (in)fertilities. This shift combines a number of new trends pertaining to preservation, prediction, private equity and platformization, all of which have gained influence in contemporary assisted reproduction. This article focuses on the emergence of company-sponsored fertility benefits, which combines each of these trends. Whereas fertility benefits – especially egg freezing insurance – have primarily been discussed in terms of women's empowerment or disenfranchisement, this article instead calls attention to the discursive, clinical and infrastructural shifts in contemporary assisted reproduction that have emerged with the rising popularity of these benefits. The analysis addresses these underdiscussed aspects of fertility benefits by focusing on the dynamics of demand; the shifts in the rationalization of intensified treatment pathways in the face of new reimbursement practices; and the online, platform-based infrastructures that are built to provide these treatments. In doing so, it analyses how this remaking of fertility towards an ethos of proactive fertility management reflects broader capitalist tailwinds.

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**KEYWORDS:** Fertility benefits, Egg freezing, IVF, Insurance, Fertility, Add-ons

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## Introduction

In the last decade, the in-vitro fertilization (IVF) sector has witnessed a shift from so-called 'reactive IVF' to a new model of proactive fertility care in assisted reproduction. Whereas IVF was traditionally developed to treat people who found they were unable to conceive, the indication for IVF has broadened significantly to include a much wider group of potential patients through a new focus on proactive treatment. This shift combines a number of new trends pertaining to preservation, prediction and private equity, all of which have gained increasing influence in contemporary assisted reproduction. The preservation of fertility with egg freezing has rapidly gained popularity in the last decade, after new vitrification technologies improved post-thaw survival rates of eggs and the American Society for Reproductive Medicine (ASRM) removed the experimental label in 2012. Rather than a reactive treatment for infertility, IVF became a means for proactively managing fertility by cryopreserving eggs (or sperm) for a future time of readiness. Likewise, the prediction of future fertility and viability has become a focus point of innovation, particularly as the popularity of egg cryopreservation has generated more interest in gauging future chances of reproduction, and as the rise of data technologies and artificial intelligence has introduced new approaches to prediction. Combined, these new preservation and prediction technologies enable the possibility of a more 'proactive' approach to using IVF to either extend fertility to later dates with preservation technologies, or shorten the time to pregnancy with the aid of predictive technologies.

Whereas preservation technologies allow a supposed 'stopping of the biological clock' by freezing cells, predictive technologies aid in the future-oriented reproductive decision-making that is required to navigate these new treatment choices. As new start-ups as well as market-leading pharmaceutical and biotechnology companies are investing in data-driven analytics for both clinical and organizational aspects of fertility care, new technologies for fertility prediction match an ethos of proactively managing future fertility. Egg freezing provides the technology for extending fertility to the time of readiness for a larger group of women, while data-driven technologies offer a means to inform 'fertility planning' decisions and promise to speed up the assisted reproductive process (e.g. by predicting which embryo will be most viable and should be implanted first). By expanding the time frame in the life course within which fertility treatment can be indicated, the target group of potential patients, the number of steps within an IVF cycle and the duration of paid engagement with the fertility clinic, the shift towards a proactive fertility management approach offers multiple axes for growth.

Reflecting a growing interest in the fertility sector by capital investors, the fertility sector has attracted an unprecedented amount of capital investment from private equity and, to a lesser degree, venture capital over the last decade. These investors buy all or part of a fertility company and seek to sell it at a profit several years down the line. As discussed elsewhere, these investments, and the concomitant financialization of fertility, have buoyed the creation of new fertility companies and this is changing

organizational structures and power relations in the IVF sector (Van de Wiel, 2020b).<sup>1</sup>

This paper focuses on the institutional landscape of the IVF sector in the USA, which is currently made up of independent clinics, (inter)national fertility groups and clinics in an academic setting. Private equity is driving a shift towards consolidation into larger fertility groups with the aim of increasing efficiencies of scale and creating return on investment. To independent practice owners, private equity may be attractive as a means of gaining resources, new technologies, centralized marketing, cost savings and an 'instant cash injection'. The latter is especially interesting to senior clinic owners, as the early generation of IVF clinic founders are reaching retirement age (Yanofsky and Hanselman, 2021). However, private equity can also create new pressures, conflicts of interest, dependencies towards investors and new discursive framings of fertility that align with a focus on achieving return on investment (Blakely et al., 2019). In the face of these developments, as fertility groups have grown both in size and geographic reach, the online platform has become a key instrument to coordinate the logistics, patient communication, marketing and finances of fertility treatment, thereby playing an increasingly central role in the organization of contemporary IVF.

The promise of growth associated with both the larger potential patient group for egg freezing and the extension of the IVF cycle with predictive technologies is at the heart of capital investments in the fertility sector – and the emergence of a new type of fertility company that focuses on proactive fertility management in particular. In the last decade, new start-ups have emerged in the US context that focus specifically on egg freezing (e.g. Extend Fertility, Prelude Fertility, Kindbody) or predictive reproductive technologies (e.g. Univfy, Future Fertility, Celmatix) with the aid of private equity and venture capital investments.<sup>2</sup> At the same time, equity investments have also focused on fertility clinics themselves, which have merged into, or have been acquired by, larger fertility groups in a trend of consol-

<sup>1</sup> Processes of financialization include the growing influence of financial products and capital markets in contemporary social life, and concomitant 'changes in management ideology that increasingly orient firms to financial markets (i.e. "shareholder value")' (Krippner et al., 2017). In the context of IVF, this process of financialization is primarily reflected in the growing interest of capital investors in fertility companies.

<sup>2</sup> Extend Fertility is a fertility company that describes itself as 'founded on the premise that democratizing egg freezing could ultimately change the fertility industry and deliver better results' (Extend Fertility, 2019). Kindbody offers a broad suite of fertility treatments and particularly highlights fertility preservation in its marketing. Prelude Fertility's mission is to offer a 'modern approach to family' that allows people to 'be a mom or dad when they are ready' by using reproductive technologies and lists egg freezing as the first option for doing so (Prelude Fertility, 2021). Celmatix is a 'next-generation women's health company transforming fertility and reproductive health care through genomics and big data' (Celmatix, 2021). Univfy 'makes fertility costs and success more predictable for women and couples navigating their family-building options' (Univfy, 2021). Future Fertility has developed 'the first Artificial Intelligence image analysis tool to non-invasively evaluate oocytes (eggs)' to offer 'accurate prediction for egg quality and offer patient feedback in IVF cycles and social egg freezing' (Future Fertility, 2021).

indication in both US and global IVF (Alves, 2019; Van de Wiel, 2020b).

This article focuses on an important new fertility market that reflects emerging trends of preservation, prediction and private equity: company-sponsored fertility benefits. This study focuses on the USA, in which company-sponsored, or employer-sponsored, health insurance is widespread. In the USA, there is no broadly accessible national health insurance equivalent to the UK's National Health Service. As of 2017, 56% of the US population had company-sponsored health insurance, compared with 38% who were served by government insurance (Dolan, 2018). In this context, fertility insurance functions as another corporate health benefit that companies can offer their employees. Carrot Fertility, Win Fertility and Maven are all examples of start-ups in this new market; the case study in this analysis is US market leader Progyny, which currently offers fertility benefit coverage to over 2.7 million employees and floated on the NASDAQ stock market in 2019.<sup>3</sup>

With the advent of egg freezing, fertility treatments were reconceived as a relevant treatment option for a wider group of employees, rather than only a treatment for those who found themselves unable to conceive. However, beyond the highly-publicized offer of egg freezing itself, fertility insurers also played a key role in expanding the IVF cycle with additional predictive technologies. This paper discusses how fertility insurance 'disrupts' the biological clock by institutionalizing a broader shift from reactive to proactive IVF. What is at stake in this shift is a normalization, intensification and platformization of technologized reproduction for a larger, if stratified, group of people. Whereas fertility benefits, especially egg freezing insurance, have primarily been discussed in terms of women's empowerment or disenfranchisement, this analysis instead calls attention to the discursive and infrastructural shifts in contemporary assisted reproduction that have emerged with the rising popularity of these benefits.

In doing so, this article analyses the subtle shifts in the framing and technologized management of fertility as well as the less visible commercial and clinical infrastructures that are underlying the changes in the IVF sector through which fertility benefits emerged in the first place. It explores how these changes shift the indication, demand, intensity and discursive mediation of fertility treatment. At the same time, the fertility insurance start-ups take on a new role in the wider fertility sector, adopting not only the role of insurer, but also of auditor, patient communicator and marketer. The analysis addresses these underdiscussed aspects of fertility insurance by focusing on the dynamics of meeting and creating demand for fertility benefits; the shifts in the rationalization of treatment choices in the face of new reimbursement practices; and the online, platform-based infrastructures that are built to provide these treatments. In doing so, it analyses how this remaking of fertility towards an ethos of proactive fertility management reflects broader capitalist tailwinds.

## Fertility benefits and the contested demand for proactive fertility management

Trends in the increasing popularity of egg freezing, significant private equity investments, the turn to datafication in IVF and the move from a reactive model of IVF towards an ethos of proactive fertility management all meet in the emergence of employer-based fertility benefits. These fertility benefits, and particularly egg freezing coverage, caused a media hype in 2014, when Apple and Facebook first announced that they would pay \$20,000 for their employees' fertility preservation costs. Since then, a number of specialized fertility benefits companies have been founded and have grown rapidly to cover millions of people working for well-known US employers such as JP Morgan, Netflix, Microsoft, Google and Uber (Baldwin, 2019: 30). In order to explore what is at stake in fertility insurance, this section discusses the dynamics of demand that drive its emergence. As fertility benefit companies point to demographic factors, generational attitudes and employee requests as key factors driving demand, critics raise concerns about a top-down imposition of egg freezing coverage as itself an implicit demand to delay and deprioritize reproduction. This discussion will point to the underdiscussed infrastructural and discursive shifts in contemporary IVF that are being institutionalized through these new fertility benefits.

In the origin stories of the fertility benefit companies themselves, the demand for fertility insurance and the shift towards proactive fertility services is presented as the result of 'major cultural shifts and the evolving demographics of the workforce in the United States'. For example, when they entered the NASDAQ stock market, Progyny wrote in their initial public offering that their 'core market for fertility benefits management is substantial and growing rapidly with *strong tailwinds* from major societal and cultural shifts, such as people starting families later in life', lesbian, gay, bisexual, and transgender (LGBT) reproduction and single motherhood by choice (author's emphasis; Progyny, 2019: 93). These societal shifts provide the context within which a promise of future growth can be made to investors, given that the social challenges associated with fertility decline and later reproduction are widely anticipated not only to continue, but to intensify.

When egg freezing insurance was first introduced in 2014, academic and media commentators were concerned that companies could use egg freezing insurance to pressure women to avoid reproducing – and avoid associated maternity and parental costs – in favour of egg freezing. In contrast, fertility insurers have instead drawn attention to the self-directed nature of the employees' demand to access fertility services. For example, at a discussion event on the 'future of family benefits' hosted by the Conference Board's Annual Employee Health Care Conference, a major theme of discussion was the move from reactive to proactive fertility care, and the generational shift it reflects. In this discussion, Kindbody's Chief Executive Officer (CEO) and former CEO of Progyny Gina Bartasi noted that 'the millennial population [...] are being very proactive, whether that's egg freezing or embryo freezing. [...] I've seen over the last ten years how members think differently about being proactive about their reproductive health instead of

<sup>3</sup> Progyny is primarily focused on the USA, while companies such as Carrot Fertility focus on the global fertility insurance market.

– historically it was very reactive. So it allows members to surface those needs and desires to HR [human resources] executives’ (Kindbody, 2020). In other words, she emphasizes that members of the ‘millennial population’ think differently about their reproductive health, and voice their desire to be proactive about fertility to HR executives. Bartasi emphasizes that fertility insurance is not a ‘top-down’ demand from employers or insurers, but that employees themselves are proactive about demanding proactive fertility care.

To an extent, such employee requests for fertility benefits are not surprising, given the US context of a largely privatized and corporatized health system, in which access to reproductive technologies is limited and unequal. The US fertility sector is characterized by notoriously high pricing, low regulation and low insurance coverage. A recent survey showed that almost all infertility physicians identified cost as the largest barrier to care and, unsurprisingly, this translated into a stratification of (assisted) reproduction across familiar lines of race- and class-based social hierarchies (McLaughlin et al., 2018). The average cost for a US IVF cycle is approximately four times the global average, and currently amounts to around \$23,474 (FertilityIQ, 2020b; Inhorn, 2020: 50). As of April 2021, only 19 of 51 states require some form of insurance coverage for infertility treatment, and only 11 states have laws for coverage of fertility preservation for medically induced infertility (Resolve, 2021). In contrast, European countries such as the UK and the Netherlands offer some national IVF coverage for people with diagnosed infertility, and egg freezing coverage for people undergoing fertility-compromising treatments (e.g. chemotherapy). In the USA, the vast majority of people undergoing IVF or egg freezing pay out of pocket (Inhorn, 2020: 50; Mohapatra, 2014: 384). However, even those women who do have health insurance find that they still have significant out-of-pocket expenses for egg freezing after a serious diagnosis. For example, Inhorn et al. (2018) showed that the average cost per egg freezing cycle was almost \$7000 (range \$1000–18,000) for US women with access to some level of fertility insurance.

As state provisions are limited, self-insured private employers provide an alternative source of fertility insurance coverage, and have the power to define inclusion criteria for treatment. In the last decade, employers have set precedents for providing treatments ‘without requiring an initial diagnosis of infertility’, which opened up access to single women and LGBTQ+ couples (Propes, 2020: 30). Beyond furthering inclusivity, this shift away from requiring an infertility diagnosis has also enabled a much larger group of people to become potential candidates for treatment. This is particularly relevant in the context of egg freezing – which is aimed at presumably fertile people – and predictive technologies for estimating future fertility. In this context, the offer of assisted reproduction to a more diverse group of people also becomes the basis for institutionalizing a wider indication for fertility treatment – and thereby addressing more people as potential candidates for IVF.

Along all these axes – patient numbers, treatment indications and expansion of treatment cycles – these shifts also represent a growth opportunity for both fertility insurers and fertility clinics. With the promise of future growth, fertility insurance – and egg freezing benefits in particular

– generated interest from capital investors, who have provided hundreds of millions of venture capital and private equity to new fertility benefits start-ups, including Progyny (founded in 2015), Carrot Fertility (2016), Stork Club (2017) and Kindbody (2018). As these new start-ups grew, the introduction of fertility benefits – and particularly egg freezing coverage – attracted ample media attention. Petropanagos et al. (2015) underscore that this media coverage tended to overemphasize the potential benefits and downplay the risks, while increasing pressures on young women to freeze their eggs. The media analysis by Campo-Engelstein et al. (2018: 186) found that the companies offering this benefit were typically presented as heroes for providing a ‘life-altering benefit’ that would offer a solution to the lack of state coverage.

In keeping with this, employers foreground women’s empowerment and employee demand as key motivations for offering fertility benefits. For example, Facebook’s Chief Operating Officer Sheryl Sandberg describes that they first started covering egg freezing after an employee requested it after a cancer diagnosis. She states that Facebook doesn’t ‘just try to follow the market, we try to follow our employees. So we offer four months of maternity and paternity leave. You can take it anytime in the first year. We give you cash when you have a baby, whether you adopt or give birth’ (Bloomberg, 2015; Davis, 2018: 383). Apple similarly highlights that it offers egg freezing benefits in its ‘new extended maternity leave policy’, which includes ‘extensive support for infertility treatments’ with the aim of ‘empower[ing] women at Apple to do the best work of their lives as they care for loved ones and raise their families’ (Tran, 2014). Progyny, in keeping with other new fertility start-ups, states its mission is ‘empowering more people to achieve their dreams of parenthood by bringing new life to fertility and family building benefits’ (Progyny, 2020a).

Critics have questioned this empowerment narrative and raised concerns about the companies’ other motives, including encouraging women to delay childbearing and offering the benefit as a distraction from more structural reforms (Davis, 2018: 384). Scholars have highlighted that egg freezing benefits could result in female workers feeling ‘subtle or significant pressure’ to do so ‘as a way to show their commitment to the company and their career’ (Zoll et al., 2015). Some have argued that these benefits ‘naturally plac[e] pressure on women to alter their bodies chemically and surgically in order to fit into the workplace ideal’, which harkens back to the ‘old-fashioned concept of man as breadwinner’ (McGinley, 2016: 363). Fertility benefits thus indicate a new, intensified involvement of the employer in women’s reproductive decision-making, which normalizes and institutionalizes the option of egg freezing through the employers’ coverage of the procedure (Van de Wiel, 2020a). A further concern is that women are not adequately informed about the medical risks and limited success rates of egg freezing. It may, then, not only result in reproductive delay, but also in future involuntary infertility (Zoll et al., 2015).

The overriding argument in social critiques of company-sponsored egg freezing is that it functions as an individualist techno-fix to problems that require structural reform. When fertility is understood as an individual problem, Cattapan et al. (2014, 239) argue, there is less perceived need and

support for structural changes, including ‘paid parental and sick leave, affordable child care, comprehensive health insurance, immigrant health care, and adequate wages’. Such structural changes are indeed absolutely crucial. However, it is also important to note that, within the context of these companies, egg freezing benefits are rarely offered on their own; they are typically part of a broader package of family- and fertility-related benefits – as the cases of Apple and Facebook mentioned above suggest. Likewise, fertility insurers such as Progyny and Carrot Fertility typically offer egg freezing benefits alongside coverage for other fertility treatments that are geared towards having children at present.

Nevertheless, comprehensive family and fertility benefits can exist alongside business cultures that may indeed pressure women to have children later and freeze their eggs instead. Fertility benefits may be presented as a counterweight to gender-based workplace inequities, and studies show that they are perceived as such by employees, but they also materialize precisely the inequities they seek to remedy. In a recent study of corporate-sponsored fertility insurance, sociologist Elissa Zeno found that women who are the (potential) recipients of these benefits feel that there is a significant career cost to becoming a mother. Women describe being embedded ‘in a professional landscape where persistent discriminatory attitudes and practices against mothers incentivize their delayed childbearing. Professional women feel it is necessary to convey their work commitment and establish career security before having children in order to avoid career penalties’ (Zeno, 2020: 3). Zeno’s study highlights that the women who receive the fertility benefits appreciate the coverage and understand it as a sign of their employer’s generosity. However, notwithstanding the availability of having ‘family-friendly’ insurance coverage, the demand for such benefits particularly emerges when they are embedded in a workplace culture that penalizes women for having children at ‘the wrong time’ (Zeno, 2020: 9, 15).

Returning to the companies’ disavowal of creating demand for fertility insurance, the demand for these benefits by employees may reflect these broader issues of lacking state coverage for fertility treatment; maternity discrimination; gender-inequitable workplace cultures; and broader housing, financial and labour-related socioprecarities that encourage later reproduction. At the same time, fertility benefits meet this demand not simply by covering treatment costs, but – as will become clear below – with an offer that institutionalizes new highly-technologized, proactive pathways to reproduction, normalizes the intensification of IVF and platformizes fertility care.

### Reproduction on investment: How assisted reproductive technology becomes a human resources technology

While critics raise antinatalist concerns and companies emphasize women’s empowerment and demands, it is important to highlight that the offer of fertility insurance reflects the fact that insurers pitch these benefits to employers primarily as a means of generating return on investment. Rather than a delay or avoidance of pregnancy

and its associated costs, this pitch focuses on human resource considerations of employee recruitment and retention, as well as the avoidance of costs associated with conventional ‘reactive’ fertility care – as opposed to the more proactive model of fertility management on offer in these insurance packages.

Reproductive technologies are presented as human resource technologies that allow companies to present themselves as ‘family-friendly’ and ‘female-friendly’ in order to attract and retain female employees – which is especially relevant in the male-dominated tech sectors that first adopted fertility benefits. As egg freezing and IVF have become technologies for preserving both fertility and personnel, they moreover hold the promise of organizing labour in more productive ways. Fertility benefits companies such as Progyny promote their assisted reproductive technology (ART) coverage as a means of reducing absenteeism and increasing productivity, as well as decreasing medical costs associated with prematurity and high-risk pregnancies. Beyond simply covering egg freezing or IVF, the fertility benefits programmes are sold as an investment in reducing neonatal intensive care unit (NICU)- and birth-related costs through highly-technologized treatment pathways. As discussed below, fertility benefits are therefore as much about preterm births and neonatal care as they are about egg freezing and IVF; it is the restructuring of fertility care in keeping with new reimbursement rationales that is changing contemporary ideas and practices of (assisted) fertility.

So, while the scholarly discussion about fertility insurance has thus far primarily focused on the potential delay and discouragement of reproduction, it is also important to call attention to the reconfiguration of the reproductive process in keeping with capital incentives for return on investment on the part of the employers, insurers and investors alike. The rest of this article explores how the rapidly growing availability of company-sponsored fertility benefits is not only linked to the potential pressure to postpone reproduction, but also more fundamentally reshapes the public, private and institutional negotiations of what constitutes fertility, how it can be managed, and who adopts an agentic role in reproductive decision-making. Beyond a financial reimbursement, this article highlights how fertility insurance ‘disrupts’ the biological clock through a more fundamental rearrangement of the organization and discursive framing of fertility care.

### Predicting fertility: The intensification of IVF

While the providers of fertility benefits motivate the offer in relation to employee demand and empowerment, the offer that meets this demand is not simply a reimbursement, but a reimagining of the assisted reproductive process in keeping with the new reimbursement rationales underlying these programmes. Rather than only covering egg freezing or IVF treatments, the fertility benefits institutionalize a model of proactive fertility management, which is characterized by long-term, highly-technologized, future-oriented treatment pathways that allow for both extending and shortening the time to reproduction with fertility technologies – including (cryo)preservation and prediction technologies. This section address which treatment pathways

are favoured and rationalized in keeping with the specific reimbursement logics introduced through these new benefit plans.

The pitch for fertility insurance compares a reactive model of IVF with a more proactive and intensive alternative. The latter, it suggests, will be beneficial for employers not because it discourages reproduction, but because it promises to decrease costs associated with reproductive complications and losses, such as miscarriages and preterm births. This becomes clear in an investor presentation by Progyny, in which they present the problems of a reactive approach to IVF through the case study of a fictional woman called Sarah. She 'has been trying to conceive' with a fertility benefit that limits her spending to \$20 K. As a result, Sarah makes treatment choices that appear to cut costs. She starts with intra-uterine inseminations (IUI), which are less costly than IVF, but nevertheless exhaust 'most of her benefit'. After failing three IUI cycles, she moves to IVF, which she finances with a loan. She 'skips genetic testing to save money', implants an untested embryo and subsequently gets pregnant but miscarries. Images accompanying these steps show women holding their heads with concern. For her second IVF cycle, Sarah 'insists that multiple embryos be transferred' and, consequently, she delivers twins at 36 weeks via caesarean section, thereby incurring costs for the caesarean section and NICU care. This conclusion is visualized with a picture of two newborns whose faces are hidden, but one of whom has a clearly visible nasal feeding tube, thereby demonstrating his/her need for medical care. Sarah also 'takes an unplanned 9-month leave', presumably because the twins and the surgery require unanticipated additional time off work (Progyny, 2020b: 8). The presentation subsequently proposes that this conventional, reactive approach to IVF yields suboptimal outcomes and 'costs employers billions' due to the costs of managing high-risk maternities, NICU and associated absenteeism, depression, stress and lower retention (Progyny, 2020b: 9). In other words, the status quo of reactive IVF is painful for the intended mother and costly for her employer.

This is subsequently contrasted with Progyny's offer of a different 'patient experience', in which Sarah uses her 'smart cycle' benefits plan to skip the insemination attempts (IUI) and start with an IVF freeze-all cycle straight away. This treatment plan includes online support and pre-implantation genetic testing for aneuploidy (PGT-A). She then transfers a single screened embryo, delivers a healthy baby at full term, and takes 4 months of planned leave. These contrasting stories suggest that, when costs are not a constraint, a more intensive treatment pathway using more (expensive) technologies offers the best chance for a healthy singleton birth. In this presentation, short-term cost-saving decisions – using IUI instead of IVF, skipping genetic testing (PGT-A), and implanting multiple embryos to increase the chance of success per transfer – result in long-term negative consequences, such as higher overall treatment costs, miscarriages, caesarean section, prematurity, NICU costs and increased leave. The benefit on offer is instead organized by cycle, within which doctors and patients can choose a set of treatments, rather than by a specific cost limit to treatment.

Implicit in these narratives and reimbursement rationales is the suggestion that the use of more reproduc-

tive technologies – such as IVF rather than IUI or PGT-A inclusion – results in better outcomes, such as 'faster time to pregnancy, fewer miscarriages, healthier pregnancies, more live births and fewer twins and triplets' (Progyny, 2020b: 10). This approach to reimbursement thus frames an intensification of the treatment cycle as a means of getting better results. However, the question of whether IUI or IVF is a preferred primary treatment, for example, is widely debated. IVF, and specifically intracytoplasmic sperm injection (ICSI), may be a preferred option if there is low sperm count or motility, if there are problems with the fallopian tubes or if the woman is older (Moolenaar et al., 2015; Romundstad et al., 2015; Tsafirir et al., 2009).<sup>4</sup> However, in many other cases, IUI is a much less costly and invasive process, has fewer health risks for women, requires milder hormonal stimulation, and does not create supernumerary frozen embryos. In keeping with this, the 2020 ASRM guidelines note that IVF is 'substantially more invasive and more costly' than other treatments and state that 'current evidence does not support IVF as a first-line therapy for unexplained infertility'; usually 'the best initial therapy is a course (typically 3 or 4 cycles) of ovarian stimulation [...] and intrauterine insemination (OS-IUI)' (ASRM, 2020a).

However, concerns have been raised over potential conflicts of interest in favouring IVF over IUI precisely because it is more costly and can generate more revenue both through the procedure itself and through techniques that are 'additionally sold to patients with a view to improving their IVF outcomes, including the elective freezing of embryos' (Bahadur et al., 2016) – as is the case in Sarah's freeze-all cycle in the new proposed treatment plan. Although a personalized treatment plan offers flexibility to choose a more or less intensive trajectory, Sarah's story and the proposed solution to her predicament suggest that more technologized interventions yield better outcomes. Importantly, given that Sarah's case makes no mention of any specific infertility diagnoses, it presents these intensive reproductive treatments as resulting in the best outcome for women in general – rather than linking them as solutions to specific pathologies, a partner's reproductive health or other circumstances. In the case of IUI versus IVF, the former is less invasive, risky and costly as a first line of treatment, but would generate less revenue for the clinic and may take longer to achieve a pregnancy. Using shorter 'time to pregnancy' (Progyny, 2021: 9) and outcome per cycle as a metric for success can thus favour more intensive and expensive interventions at early treatment stages.<sup>5</sup>

<sup>4</sup> ICSI involves the injection of sperm into the egg, whereas conventional IVF enables fertilization by mixing the gametes in the petri dish.

<sup>5</sup> Likewise, concerns have been raised about the overuse of ICSI – rather than IVF – in cases of non-male factor infertility. There are important non-male factor indications for ICSI, including the use of frozen-thawed eggs, which require ICSI for fertilization to occur. However, the increasing use and wider indication for ICSI compared with IVF is controversial. In the USA, ICSI use for non-male infertility increased from 15.4% in 1996 to 66.9% in 2012, and data from the US Centers for Disease Control and Prevention records a range of 68–72% in 2016 (CDC, 2016a: 30). According to ASRM, this increase in ICSI for non-male factor cases likely did not improve livebirth rates, but does increase embryological labour and the financial burden on patients (ASRM, 2020b: 239).

Such considerations are also particularly pertinent for the question of PGT-A, which functions in the presentation as a technology that prevents miscarriage and enables single embryo transfer. PGT-A is a technique that requires the removal of one or more cells from the embryos in order to test whether they have the right number of chromosomes (i.e. are euploid), are likely to be viable and in which order they should be implanted. However, this technology is highly contentious because the evidence for its efficacy is limited while its costs are high (an additional \$3000–12,000 per cycle), and thereby present a significant means of increasing clinic revenue (Theobald et al., 2020; FertilityIQ, 2020a). In the UK, the fertility regulator [Human Fertilisation and Embryology Authority (HFEA)] gives the technology a red (negative) rating, stating ‘there is no evidence that this add-on is effective and safe’ and that there is a ‘risk of misdiagnosing a healthy embryo’ as abnormal. HFEA also claims that PGT-A ‘can sometimes cause damage to the embryo and prevent it from developing once it has been transferred into the womb’ (HFEA, 2018, 2020). ASRM likewise emphasizes that ‘there is insufficient evidence to recommend the routine use of blastocyst biopsy with aneuploidy testing in all infertile patients’ and states that ‘large, prospective, well-controlled studies are needed to determine not only the effectiveness, but also the safety and potential risks of these technologies’ (Penzias et al., 2018).

Given that PGT-A only tests existing embryos, the cumulative live birth rate if they were all implanted could not be improved, but it could decrease miscarriages and reduce time to pregnancy by reducing the number of implantation cycles. This is what Sarah’s story suggests when she suffers a miscarriage without genetic screening and a full-term pregnancy after PGT-A. However, the effect on miscarriage rates is contentious; some recent studies, including multi-centre randomized controlled trials, show a reduced risk of miscarriage (Verpoest et al., 2018; Scriven, 2020), while others found that it did not affect miscarriage rates (Munné et al., 2019; Murphy et al., 2019; Sato et al., 2019), or that miscarriages were rare even following the implantation of embryos classified as ‘abnormal’ (Patrizio et al., 2019). The reduction of implantation cycles is likewise contested; a recent systematic review of 26 studies on PGT-A confirms that the add-on should, in theory, be able to enhance clinical outcomes on a per-transfer basis, but finds that the ‘current available literature is sparse or of insufficient quality’ and concludes that the routine use of PGT-A ‘with the aim of improving clinical outcomes is not supported by substantial evidence’ (Toft et al., 2020). ASRM notes that PGT-A may moreover decrease the birth rate per cycle as a result of the embryo’s culturing conditions and cell biopsy, which could adversely affect the embryo, or due to the risk of unnecessarily discarding embryos that are classified as ‘abnormal’ (Penzias et al., 2018). For example, Patrizio et al. (2019) found that the transfers of such ‘abnormal embryos’ nevertheless resulted in ‘robust pregnancy and live birth chances with low miscarriage rates’ and raised concerns about PGT-A leading to the disposal of ‘many normal embryos with excellent pregnancy potential’ (also see Mochizuki and Gleicher, 2020). Far from a straightforward improvement of the IVF cycle that enables single embryo transfer, PGT-A is thus a contested technology.

Although concerns have been raised about PGT-A, the practice is growing more popular in the USA. While the number of PGT-A procedures remained stable at <2% in the UK, this increased from 13% to 27% in the USA in 2014–2016 (Theobald et al., 2020). These national disparities in UK and US uptake of PGT-A suggest the influence of differing health systems and funding structures of IVF. While this technology was primarily used for women aged 40–42 years in the UK, in the USA, most women using PGT-A were aged <35 years, in spite of the finding by Murphy et al. (2019) of its lower efficacy in this group (also see Theobald et al., 2020). In a recent global study, 14% of clinics responded that they used PGT-A for all their cycles (Patrizio et al., 2019). Several authors have raised concerns about potential conflicts of interest that arise when PGT-A becomes an important source of revenue for clinics (Mochizuki and Gleicher, 2020; Theobald et al., 2020). Notwithstanding their efficacy, both the IVF-first approach and PGT-A included in the presentation share a controversial status, greater prevalence in private than in public health systems, and concerns about potential conflicts of interest. In the context of fertility insurance, their inclusion in the benefit thus paves the way for greater revenue per cycle for the treating clinics and a more technologically intensified cycle for the patient.

What is at stake here is thus not so much whether PGT-A is effective or efficient, but what the inclusion of this add-on technology signifies about the logic of fertility management that is institutionalized through new fertility benefit programmes. Indeed, the proposed benefit provides an alternative to a system in which cost and ‘dollar caps’ can perversely influence people’s choices not to choose optimum treatments. However, the counterpoint of a benefit that is denominated in ‘cycles of care’ rather than a fixed amount of money and is focused on reducing the time to pregnancy also has particular effects. As can be seen in Sarah’s story, this per-cycle approach favours an intensified and technologized treatment pathway, which comes with a risk of overtreatment and overmedicalizing reproduction. Rather than trying options that may have a lower per-cycle success rate but could present good cumulative chances and are less taxing on the body, the exemplary cycle includes IVF as a primary treatment and several add-on technologies, both of which could potentially pose additional risks according to ASRM. In this context, proactive fertility management means engaging with those technologies that are rationalized to achieve a live birth more quickly and align with the reimbursement logic of the insurance plan, which can lead to technologically intensified approaches to treating (in)fertility.

### Preterm births

Fertility benefits must also be considered in light of the politics of prematurity, especially because one of the main returns on investment presented to employers considering these benefits is reducing the costs of prematurity. In their appeal to companies, Progyny estimates that these amount to \$33.7 billion direct costs and \$5.7 billion indirect costs of lost productivity (Progyny, 2020b: 9). However, given that these figures reference nationwide trends, and given that

only approximately one-third of twins born were conceived using ART, thereby accounting for approximately 5–7% of all US preterm births (CDC, 2016b), the figures cited in the presentation are only in small part attributable to the reactive model of IVF.

As Davis (2019: 40–41) notes in her study of premature birth in the USA, the potential causes for prematurity include a continuum of medical and socio-economic reasons, including high blood pressure, substance use, late prenatal care, stress, cardiac disease, diabetes, teenage pregnancies, trauma, the mother's economic and nutritional status, and medical racism. Emphasizing the latter as key for understanding why Black women experience 50% more premature births than white women, Davis (2019: 113, 203–4) highlights the medical racism and 'diagnostic lapses' that have contributed to poor birth outcomes and mimic the 'historically constituted ways that the black and brown bodies of women have been treated, mistreated, or dismissed, because professionals modulate the alarm that a woman feels about her own health condition'. The above-quoted large costs of prematurity can thus not be counteracted simply by shifting to single embryo transfer, but point to a much larger set of social, economic and clinical variabilities.

Beyond these systematic causes of prematurity, in relation to IVF, an intensification of assisted reproduction does not necessarily present a techno-fix to prematurity. Indeed, a move from multiple to single embryo transfer will limit the number of multiple and preterm births. However, even among elective single embryo transfer (eSET) cycles, IVF pregnancies have a greater risk of preterm birth compared with matched singleton births conceived without reproductive technologies. A recent meta-analysis concludes that 'moving towards eSET as the primary transfer paradigm during IVF will likely not succeed in reducing the elevated risk of preterm delivery seen in IVF singletons' (Fechner et al., 2015; Goisis et al., 2019). While single – as opposed to multiple – embryo transfer does indeed reduce multiple pregnancies, these findings suggest that, in order to decrease preterm births, it is advisable to limit rather than broaden the indication for IVF, as the proactive fertility management model proposes.

The high cost of preterm births cited above is thus not reducible to the effect of a reactive model of IVF, and an intensification of assisted reproduction is not necessarily the most straightforward intervention to reduce prematurity. In the context of fertility insurance, only a specific set of solutions to premature births are presented as worth investing in for large employers. On the one hand, the intensified technologization of reproduction as a response to potential NICU and preterm costs reflects what may be called the 'capitalist tailwinds', which refer to the amplification of those policies and practices that favour the projected returns of capital investment.<sup>6</sup> On the other hand, this intensification of IVF reflects particular data practices on the part of the fertility benefit companies that become the basis for not only rationalizing a more intensified IVF cycle, but for more widespread reorganization of the fertility sector in keeping with its logic, as outlined below.

<sup>6</sup> This term is used as a variation on the aforementioned societal 'strong tailwinds' (Progyny, 2019: 98).

## Platform fertility

Since the birth of Louise Brown in 1978, IVF has evolved rapidly from a technique to circumvent infertility to what Franklin (2013: 1–2) calls 'a global technological platform, used for a wide variety of applications, from genetic diagnosis and livestock breeding to cloning and stem cell research'. In *Biological Relatives*, Franklin argues that IVF functions as a technological platform that has enabled not only the birth of so-called 'miracle babies', but also 'the creation of savior siblings, admixed human chimeras, and new cellular tools, such as induced pluripotent stem cells', thereby becoming 'the crucible for new means of reconstructing reproduction, manipulating development, and retooling embryology' (Franklin, 2013: 22, 36–37). Egg freezing functions as a further extension of this IVF platform within the fertility sector, enabling a broader indication and potential patient group for this technology. The expansion of IVF 'not only as a form of infertility treatment but as a technological platform' that functions as an 'increasingly complex tool kit for the control of mammalian reproduction' is also further extended when the IVF platform becomes integrated with the online platform (Franklin, 2013: 1–2, 22). Fertility benefits show what is at stake in this platformized encounter. More so than simply introducing reimbursement for treatment, the new fertility benefit companies are reconfiguring the US fertility sector and patient experience at large. What may be most disruptive about fertility insurance is not only the offer of egg freezing or IVF, but the introduction of a private platform that reorganizes the relation between patients, their employers and their clinic, while bringing together fertility accumulation, capital accumulation and data accumulation.

In the last decade, the online platform has emerged as a new business model that is capable of rearranging the power relations within a sector. As a company that was created from a merger between Auxogyn, a biotech start-up that produced predictive embryo selection technologies, and FertilityAuthority, an online fertility platform founded in 2009 that aimed to 'help women navigate the fertility industry', Progyny specifically presents itself as a digital health company that is organized around its fertility platform (Van de Wiel, 2019). When Progyny entered the NASDAQ stock market in 2019, their prospectus highlighted their 'purpose-built, data-driven and disruptive platform' as the key element of their business, which would allow them to take on a central role as an intermediary between patients, clinics and employers (Progyny, 2019: 1).

Whereas traditionally the IVF clinic is responsible for a large share of patient communication, in these arrangements, the fertility benefit company becomes the main point of communication through its online platform, 'comprehensive member portal' and personalized 'end-to-end concierge support', which includes 'logistical assistance (i.e. fertility specialist selection, appointment scheduling, treatment authorization and treatment payment), clinical guidance [...] and emotional support' delivered by 'patient care advocates' (PCAs) (Progyny, 2019: 95, 98). On the online platform, the 'member portal' presents fertility education and provides the means to exchange messages with the PCA, schedule treatments and organize fertility

finances. In this way, the fertility benefits company adopts a number of roles from the fertility clinic – pertaining to logistics, communication, education and finances – and centralizes them through their platform.

The platform also plays a key role in framing fertility and the need for treatment, thereby influencing who does and does not become a candidate for IVF. For example, Progyny's platform states that:

Women are born with all the eggs they will ever have, that number being approximately one to two million eggs at birth. [...] About 500 eggs will be ovulated during a woman's reproductive lifetime, and the remainder are programmed to no longer be viable by the time a woman enters her fourth decade. Thus, the biological clock presents a unique challenge: time.

You may think you want to have a baby, just not right now. [...] Your ultimate odds of a successful pregnancy are greater if you're younger when you freeze your eggs. (Progyny, n.d.).

This framing of fertility suggests that eggs are 'programmed to no longer be viable' in the fourth decade (30–39 years), and recommends younger egg freezing to meet the challenge of the 'biological clock' and have 'your ultimate odds' of a successful pregnancy. It does not mention the risks, contra-indications or success rates of egg freezing; rather, it positions women as potential patients for fertility preservation by virtue of their reproductive aging.

Likewise, the PCA, who is presented as an 'expert resource for discussing all things fertility' who will 'help you through every step of your fertility journey', also provides 'information related to treatment options and technologies that increase success and decrease risk of multiple births' (Progyny, n.d.). If this information aligns with the rationales presented in the investor presentation, the PCA can become a vehicle for advocating a more intensified, technologized treatment cycle. With an average of 15 online PCA interactions per 'member' (Progyny, 2019: 95), the fertility benefits company adopts a key role in patients' reproductive decision-making and can frame (specific) fertility treatments in keeping with its own vision and metrics for success. In doing so, and by offering 'education regarding what to expect at each of your doctor visits and procedures', the fertility insurer takes on the role of intermediary between patients and clinics.

The fertility benefits platform also adopts an organizing role in relation to the IVF clinics in Progyny's network, which comprises over 800 reproductive endocrinologists – over half in the USA – and 46 of the top 50 clinics by number of cycles. Members can only receive fertility benefits at selected clinics in the network, and clinics can only join if they meet 'rigorous credentialing standards and quality thresholds that [they] set for inclusion in our network' – which requires a high degree of data sharing with the fertility benefits company (Progyny, 2019: 95). Progyny collects data from clinics 'on adherence to treatment protocols and clinical outcomes [...]. [This] data is used to understand the utilization of our benefits, our provider clinics' adherence to best practices and the outcomes produced by each clinic and across our network' (Progyny, 2019: 95). The data are subsequently used to 'actively manage' the 'fertility

specialist network' with 'detailed quarterly reports' and 'ensure' that they are using what the insurer considers to be 'best practices' (Progyny, 2019: 96). These data, including the utilization of the benefit by employees and fertility outcomes, are also shared with the employers. Beyond a financial service, the fertility insurer thus takes on a governing role akin to a clinical auditor, while the data gathered become part of the sales pitch to (potential) clients.

Rather than simply arranging insurance coverage for certain treatments, fertility benefits companies are thus creating new online infrastructures that record and analyse data about the activities of its users. Of course, businesses have long collected and used data, but in the last two decades, as Srnicek notes, the technology for 'turning simple activities into data has become increasingly cheap; and the move to digital-based communications made recording exceedingly simple'. This has opened up 'new expanses of potential data' and new, platform-based business models have emerged that 'take full advantage of dwindling recording costs' (Srnicek, 2016: 40–42). Progyny's approach reflects a classic case of a platform that does not have to build a new marketplace, but rather disrupts the existing fertility sector by creating an online infrastructure that mediates between groups and adopts a business model for extracting and controlling data in the process (Srnicek, 2016: 48).

Therefore, a key issue in the debate around fertility insurance is not the employer paying for fertility treatments as such, but the creation of a new platform-based infrastructure that mediates – to name but a few – finances, communication, clinical guidance and performance metrics between employee-patients, clinics and employers. This infrastructural shift not only offers the fertility insurer significant discursive control over the understanding of fertility and its technologized management, but also affords it privileged access to financial and clinical data, which become a source of value in their own right. Progyny moreover recognizes the 'network effect' as its 'competitive advantage', following from the need for 'clients and patient volumes to attract the best doctors' and the need for 'the best doctors to attract clients and patient volume' (Progyny, 2020b: 18). This effect is amplified as the network expands: 'the more numerous the users who use a platform, the more valuable that platform becomes for everyone else', leading to a 'tendency towards monopolisation' (Srnicek, 2016: 45). Beyond the question of employers paying for egg freezing, the big shift that emerges with fertility benefits is thus the influence of a new type of company in the IVF sector that is beholden to its investors or shareholders, functions as a for-profit entity driven by financialized metrics of continuous growth, and propelled by an online platform that becomes a means for extracting data, shifting clinical practice, reframing fertility and changing power relations within a fertility sector in ways that require critical reflection.

## Conclusion

While fertility insurance has primarily been discussed in terms of its potential emancipatory or antinatalist effects, the introduction of new fertility benefits is also reconfiguring the demand, the treatment rationales and the organiza-

tion of assisted reproduction – for patients, their employers and clinics alike. The new fertility benefits companies offering these insurance plans have played a central role in the fertility field by introducing new norms in the understanding and management of fertility, and institutionalizing them through both employer and online platform-based infrastructures. In each of these ways, specific treatment pathways are introduced that draw on preservation and prediction technologies to normalize an ethos of fertility management that uses IVF to both speed up and slow down the time to reproduction.

The introduction of company-sponsored fertility benefits reveals how fertility is reconfigured through a dynamic of demand and disavowal. While critics raised concerns about large corporations encouraging employees to delay reproduction and freeze their eggs instead, fertility insurance representatives instead emphasized that their offer was a means of both empowering women and meeting their employees' demands for fertility treatments. What has remained relatively underdiscussed, however, is how these benefits are presented as HR and PR technologies to recruit and retain female employees and project a 'family-friendly' brand, while also aiming to generate return on investment by reducing maternal and neonatal medical costs. On the one hand, this results in a situation in which the widespread attention to, and promotion of, fertility benefits themselves plays a role in creating a demand for assisted reproduction among a wider group of employees who could now be addressed as potential candidates for treatment regardless of whether or not they have a diagnosis of infertility.

On the other hand, the reimbursement logic – developed with the aim of generating both return on investment for employers and high success rates that show the merit of the benefit – rationalizes treatment pathways that are more interventionist and intensive in nature. The current analysis focused on fertility benefits that are organized around treatment cycles, rather than a particular 'maximum dollar' amount. In this context, another biological clock – of 'time to pregnancy' – becomes an additional organizing principle for reproductive decision-making. When the outcome per cycle and 'time to pregnancy' become the measures of success, fertility benefits promote the intensification of the cycle (e.g. by favouring IVF over IUI as first-line treatment and including add-ons such as PGT-A). Although the major fertility societies do not recognize these technologies as recommended first-line treatments, the fertility insurance plans – and by extension, the employers – normalize and endorse such technologically intensified IVF cycles. While this intensification of treatment is presented as a means to limit multiple and premature births and associated costs for the employer, it may also result in unintended effects, including possible overtreatment, further reproductive stratifications and potential conflicts of interest, whilst not addressing the broader inequalities inherent in the politics of prematurity.

Far from offering a financial arrangement alone, fertility benefits companies are more broadly reconfiguring fertility care for both patients and clinics through their online platforms and data-driven analytics, thereby shifting power relations in the fertility sector at large. On the one hand, fertility insurers take on roles that were traditionally associ-

ated with the clinic; the platform becomes a key means of fertility education, and online concierge services coach patients through reproductive decision-making. By bringing education, marketing, patient communication, finances and treatment logistics into the online environment, the fertility platform creates new and ongoing forms of engagement with (potential) patients in ways that generate data each step of the way. On the other hand, fertility insurers take on the role of auditor and gatekeeper in the fertility sector, given that network inclusion is reliant on clinics' medical data and success rates. At the same time, fertility insurance, and its reliance on network formation, favours a form of monopolization because a larger network attracts more (potential) patients, while a larger (potential) patient group attracts more clinics. In these ways, fertility benefits companies function as influential intermediaries between patients, clinics and employers that extract data and exert influence throughout – and beyond – the treatment cycle.

In these ways, what is at stake in the growth of employer-based fertility insurance are not only questions of access and coercion, but also of the reconfiguration of both the demand for fertility treatment and the scope of reproductive risk. The 'disruptive' effect of fertility insurance is closely linked to the idea of disrupting the biological clock itself, as reproductive aging is reframed from an inevitable biological process to a phenomenon that may be proactively managed through ongoing communication and clinical intervention. These reconfigurations of fertility, these disruptions of the ways in which the biological clock may be 'managed', reflect a particular logic – a directionality – of financialized capitalism. Neither a benevolent empowerment drive nor a cynical antinatalist measure, these benefits reconfigure fertility experiences and treatment pathways in keeping with the capitalist tailwinds of projected revenue growth, reimbursement rationales and return on investment. The new fertility benefits thus propel a movement towards proactive fertility management, intensified IVF cycles and the platformization of fertility, all of which are institutionalized through the employer, through the new fertility benefits companies and the capital investments that are underlying them.

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