



Infertility, New Reproductive Technologies, and Women's Mental Health

8

Jane Fisher and Karin Hammarberg

Contents

Introduction	128
Global Patterns of Infertility	128
Psychological Causation of Infertility?	129
Etiology of Infertility	131
Psychological Consequences of Infertility	132
Assisted Reproduction	135
Psychosocial Aspects of Infertility Treatment	136
Deciding to Cease Treatment	138
Pregnancy, Birth, and Early Parenting After Assisted Conception	138
Fertility Preservation for Nonmedical Indications	140
Other Experiences of Reproductive Technologies	140
Implications for Healthcare	141
Conclusion	141
Cross-References	142
References	142

Abstract

Most women want to have children, but for some achieving a pregnancy when it is desired is either difficult and prolonged or impossible. Estimating the population prevalence of fertility difficulties or involuntary childlessness is hampered by varied definitions, but in all nations, a proportion of adults of reproductive age will experience infertility. It is a heterogeneous group of reproductive health problems usually defined as the failure to achieve a clinical pregnancy after at least a year of regular unprotected sexual intercourse. Some fertility difficulties are attributable to female, some to male, and some to shared causes, and some are regarded as idiopathic or unexplained. In high-income countries, it is estimated

J. Fisher (✉) · K. Hammarberg
Global and Women's Health Unit, School of Public Health and Preventive Medicine, Monash
University, Melbourne, VIC, Australia
e-mail: jane.fisher@monash.edu

that about 15% of people of reproductive age will seek medical assistance to conceive. Inability to conceive is highly emotionally distressing. The distress is variously conceptualized as an existential crisis, disenfranchised grief, or an adjustment reaction. The nature and intensity of emotional distress varies over the course of infertility treatment. At diagnosis, acute symptoms of distress may increase, but the initiation of treatment arouses optimism that the condition may be assisted or ultimately alleviated. Treatments with assisted reproductive technologies are physically demanding and can be experienced as invasive and accompanied by successive feelings of hope and despair, which are exacerbated when several treatment cycles are undertaken. Couples can experience isolation from the “fertile world” and experience envy when learning of other women’s pregnancies or celebrations of births. Among those who conceive, idealization of parenthood might prevent consideration of the inevitable losses associated with having a baby, and might limit support seeking. After treatment has ceased, those who have not conceived are less satisfied overall with their lives than those who had a baby.

Keywords

Infertility · Assisted reproduction · Psychosocial aspects of IVF treatment

Introduction

Most women want to have children (Boivin et al. 2007; Holton et al. 2011), but, for some, achieving a pregnancy when it is desired is either difficult and prolonged or impossible. Estimating the population prevalence of fertility difficulties, infertility, or involuntary childlessness is hampered by varied definitions and by selection of an appropriate comparison population, which have sometimes included people who have never tried to conceive, whose fertility is unknown. People with fertility difficulties are commonly classified either as individuals or couples who are unable to conceive after a specified period of regular unprotected sexual intercourse, or those seeking medical assistance in order to conceive. Primary infertility (the inability to conceive at all), secondary infertility (those who have at least one living child but are unable to conceive again), and subfecundity and the capacity to conceive but not to sustain a pregnancy to term are sometimes conflated but require separate consideration.

Global Patterns of Infertility

Infertility is experienced by people everywhere in the world (Inhorn and Patrizio 2015). Estimates are influenced by the availability of national population-level data, and the definitions and indicators of infertility (Fisher 2009). Boivin et al. (2007) aggregated the 25 available population surveys of people seeking medical assistance for infertility or of people diagnosed as infertile and estimated that 72 million women

were currently infertile and that on average globally 9% of couples will experience infertility. Five years later, Mascarenhas et al. (2012) pooled data from 277 demographic and reproductive health surveys that had collected data from women aged 20–44 years since 1990. The surveys were from all world regions and were included if data about women's age, current partnership status, current contraceptive use, date of first and most recent births, time since intimate partnership was first formed, and desire to have a child were available. Prevalence of infertility was calculated on the basis of the demographic indicator of proportion meeting criteria of desire and potential for pregnancy and actually having a live birth in a 5-year period. They found that worldwide, more than 48.5 million couples want to have a child but are unable to conceive, among them about 19 million are unable to have a first child, and about 29 million couples are unable to have a subsequent child. This divergence in estimates demonstrates how difficult it is to achieve precision. However, it can be concluded that in all countries, a proportion of adults of reproductive age will be experiencing or have experienced infertility. Prevalence varies between countries but is estimated to be highest in World Bank defined low- and lower-middle income countries, ranging up to 30% among men in Nigeria (Ombelet et al. 2008), predominantly attributable to infections of the genitourinary tract.

Psychological Causation of Infertility?

When the causes of infertility were less well understood, a high proportion of those classified as being of unknown etiology were presumed to be psychological in origin, a condition termed psychogenic or nonorganic infertility (Pantesco 1986). Bydlowski and Dayan-Lintzer (1988), for example, concluded on the basis of clinical observations that . . . *the desire for a child in a woman may correspond to the incestuous offspring she desired when she was a little girl . . . the Oedipus complex and the desire for parthenogenetic reproduction*. In studies which collected data from groups, the personality characteristics or psychiatric symptoms proposed as etiologically involved included uncertain gender identity, having an external locus of control, infertility as a defense against inner conflicts, ambivalence about having children, psychiatric symptoms, in particular, depression and anxiety, marital problems “masquerading as infertility” and sexual dysfunction (Callan and Hennessey 1988b; Möller and Fallström 1991; Greil 1997). Pantesco (1986) reviewed the then available literature in this field and argued that most of these conclusions were made on a scientifically unsound basis, including generalization from single case reports, very small samples influenced by high selection bias, and retrospective attribution of the observed differences between women who were presumed to be fertile and women seeking infertility treatment to preexisting psychological factors.

A diagnosis of psychogenic infertility was never applied to men, reflecting unquestioned stereotypes among researchers that it was only infertility among women that was believed to be psychologically caused and that it was related to their unconscious *psychological blockades* and intrinsic difficulties in being female (Pantesco 1986; Wischmann 2003). Kipper et al. (1977) concluded from comparisons of projective test

results contributed by a group of women who were diagnosed as psychogenically infertile, and a control group, that the latter had *covert attitudes* indicating they were *less accepting of their femininity*. Pantesco (1986) summarizes the investigations of causes of infertility among women until the mid-1970s as investigating constructs such as *masculine-aggressive personality, feminine immature personality, functional derangement, rejection (of pregnancy), frigidity, hostility, and anxiety about feminine role*. Pantesco (1986) and Wischmann (2003) consider that this approach to understanding infertility was a legacy of psychoanalytic theorists who assumed that women's psyches had causal links to their reproductive functions. Pantesco (1986) attributed this to a *lingering psychoanalytic emphasis . . . ignoring men's role in the infertility system of the couple in male-dominated, [but] women-centered research*.

By the late 1980s, more detailed understanding of the biology of reproduction, including infertility, had grown and psychoanalytic explanations were generally rejected. However, clinician proponents of psychogenic infertility continued to publish theoretical papers based on their psychoanalyses of women who were experiencing infertility. George Christie (1994) concluded from *clinical material* generated in three vignettes of women experiencing infertility and being treated in analytic psychotherapy by him, that they all *had difficulties in achieving healthy separation from their mothers* towards whom they had *idealizing attitudes* which were a defense against *underlying hostility*. George Allison (1997) concluded on the basis of his psychoanalytic treatment of three "cases" that their fertility difficulties were related to their *unconscious guilt and hostility towards a defective or deceased male sibling*.

None of these influential investigators considered the psychological and social consequences of being infertile in their explanatory models or the circumstances in which it occurred. However, these conclusions led to misattribution of responsibility for the fertility difficulties to women and blaming of victims (Wischmann 2003).

Purposively designed and adequately powered studies using more appropriate sampling techniques, and replicable methods of data collection and analysis, reach quite different conclusions (Fisher 2009). Downey and McKinney (1992) administered a large battery of questionnaires including assessments of mood and psychiatric symptoms to 118 women seeking treatment for infertility and 83 women of the same age and demographic characteristics presenting for routine gynecological checks to the same clinician's offices in America. There were no differences in symptoms of mental health problems, self-esteem, or sexual functioning between the groups. At a similar time in England, Edelman et al. (1991) compared personality characteristics and symptoms of depression and anxiety being experienced by women and men seeking fertility treatment and demographically similar people seeking sterilization at the same clinics, having had children. They also made comparisons on the basis of cause of infertility within the treatment seeking group. No significant differences between infertile and fertile groups on any of the parameters were found. Two recent prospective studies assessed stress and anxiety levels among women who tried to conceive spontaneously and with assisted reproductive technology, and both concluded that there were no differences between those who did and those who did not achieve pregnancy (Lynch et al. 2012; Pasch et al. 2012).

Etiology of Infertility

Overall, infertility is regarded as a heterogeneous group of reproductive health problems, now most commonly defined as the failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse. Fertility is influenced by diverse risk factors. Some is attributable to female, some to male and some to shared causes, and some is regarded as idiopathic or of unexplained origin. In high-income countries, it is estimated that about 15% of people of reproductive age will seek medical assistance to conceive.

Male and female factors are each believed to account for about 40% of causes of infertility; the remaining 20% are either unexplained – so-called idiopathic infertility – or of shared etiology. In women, the most common causes of fertility difficulties are obstructed Fallopian tubes and ovulation dysfunction, while in men, low sperm viability and dysfunction of sperm motility are most common (Johnson and Everitt 2000, 2007). Age has a marked effect on fertility. There is a progressive decline in fertility after the age of 30 years, with a steeper decline after 35 years (Maheshwari et al. 2008) among women, attributed to declining numbers and quality of oocytes and the consequent increase in age-related infertility. In men, sperm quality decreases with age and rates of conception after the age of 45 is significantly lower than at younger ages (Hassan and Killick 2003). It has been suggested that 5% of infertility is caused by constitutional problems, including genetic conditions, anatomical defects, and endocrinological or immunological dysfunction (Kols and Nguyen 1997). The balance is attributed to infection (World Health Organization 1987), unhygienic health care practices, particularly in obstetrics, and exposure to environmental toxins. Inhorn and Patrizio (2015) in a comprehensive review of the demography of infertility drew particular attention to the burden of secondary infertility experienced by many women in low- and middle-income countries probably attributable to infections following unsafe abortion leading to tubal occlusion and inability to conceive a subsequent pregnancy (Fisher 2009).

In all the world's high-income countries, the average age at which women first give birth has increased in recent decades (Schmidt et al. 2011). The reasons for this are not fully understood, but it is thought to be a multifactorially determined social change. It is argued on one hand that better access to reliable contraception; increased participation by women in postsecondary education; the time required to qualify, secure employment and accrue financial resources; and inflexible, family-unfriendly employment conditions are influential in deterring women from conceiving (Mills et al. 2011).

On the other hand, it is a common public discourse that women can choose if or when to have a baby, and how many babies they wish to have, and therefore the popular assumption that women delay motherhood for “selfish” or “lifestyle” reasons to pursue goals like travel or perhaps professional ambition or home ownership (Mertes 2013, p. 142). Daly and Bewley (2013) argue that rather than positioning women who are employed as meeting their own basic needs, they are regarded as *seeking self-aggrandizement*. Holton et al. (2011) investigated childbearing expectations and outcomes among women aged 30–34 years in Victoria, Australia, the age

group of women with the highest fertility in this setting. In total, 569 Victorian (219, 38% childless) women in this age group were recruited from the Australian Electoral Roll and completed a postal questionnaire anonymously. Overall, 80% had fewer children than they wanted to have, but 54% thought they were unlikely to have any or more children. The reasons included lacking a secure job, financial obligations like considering it would be too difficult to pay a mortgage or rent while away from the workforce, having education debts or a health condition that required medication that might have teratogenic risks, or was potentially heritable. However, the predominant reason was not having a partner, or having a partner who did not want children or was unwilling to raise them. Schytt et al. (2014) had similar findings in a survey of 365 childless women and 356 childless men aged 28–40 years in Sweden. The predominant reason given by women for this situation was lack of a partner. Together, these data indicate that the popular discourse is a potentially inaccurate oversimplification, which blames women for a reproductive health outcome that is related to their circumstances, rather than to personal choices.

Some psychiatric illnesses and behaviors can nevertheless make individuals more vulnerable to infertility (Rosenthal and Goldfarb 1997; Deka and Sarma 2010). In particular, the severe weight loss associated with the eating disorder, anorexia nervosa, can lead to suppression of ovulation. Potentially modifiable factors, that might be influenced by mental health, including high body mass, tobacco, alcohol, and drug use, caffeine consumption, and micronutrient deficiencies can also lead to decreased fertility (Anderson et al. 2010). Sexual difficulties, especially erectile dysfunction and vaginismus, can impair completion of intercourse (Rosenthal and Goldfarb 1997). The links between behavioral factors and fertility pathology were examined in a substantial epidemiological comparison of 1750 women recruited from seven clinical services in North America who had been diagnosed as infertile and 1760 primiparous women who had given birth at the same services. It was found that, while there were few differences between fertile and infertile women, tubal obstruction was associated with a higher incidence of previous sexually transmitted disease. Women with this condition had a lower age of sexual debut and more sexual partners were more likely to have used an intrauterine contraceptive device, and were less likely to have used condoms than those with other fertility difficulties (Beral et al. 1994). Deka and Sarma (2010) postulate on the basis of clinical studies with small numbers of participants, that depression can affect libido, ovulation, self-care, and general health and might in turn increase reproductive difficulties, but acknowledge that the strength of this association is yet to be established.

If having a child is a highly desired life goal, the experience and diagnosis of infertility can have adverse psychological consequences.

Psychological Consequences of Infertility

Infertility is diagnosed when a couple has already sought to conceive for at least a year (Cousineau and Domar 2007; Lynch et al. 2012), and anyone who experiences this, and desires a child, experiences psychological consequences. For many

otherwise healthy people of reproductive age, this may be a first encounter with life events over which they have little agency. Usual responses to difficult events, including adopting healthy behaviors, finding salient information, or seeking additional support are less effective (Kols and Nguyen 1997) than they might be in other circumstances. The experience and ultimate diagnostic confirmation of infertility can have a marked psychological impact (Menning 1982; Fisher 2009; Schmidt 2009).

High rates of clinically significant symptoms of anxiety: 38% in a clinic in Sydney, Australia (Beaurepaire et al. 1994); 40.2% meeting diagnostic criteria for an anxiety or depressive disorder in a hospital in Taipei, Taiwan (Chen et al. 2004); and only 30% “non-cases” on a measure of anxiety symptoms in a hospital in Sousse, Tunisia (El Kissi et al. 2013) are reported in surveys of consecutive cohorts of women seeking fertility treatment. More than 20% of women attending an infertility support group reported that they had experienced episodic suicidal ideation (Kerr et al. 1999). However, labelling these symptoms as psychiatric illnesses has been criticized. First, because psychiatric symptom checklists include somatic symptoms (e.g., “Something is wrong with my body. . . .”) that are normal among those with infertility and can lead to overestimates of the clinical significance of symptoms. As psychological state is dynamic following diagnosis and during treatment for infertility, it has been argued that a psychiatric diagnostic approach to conceptualization is less accurate than considering a psychological profile along which individuals are distributed (Berg and Wilson 1990). Unlike other adverse life events, which may have a clear resolution, infertility is regarded as uniquely stressful because it can last for many years and for many will not be resolved through the birth of a child (Berg and Wilson 1990). Berg and Wilson (1990) argue that an infertility strain profile characterized by increased anxiety, irritability, profound sadness, self-blame, lowered energy levels, social isolation, and heightened interpersonal sensitivity is more germane. Almost all women presenting for treatment have been found to demonstrate some of these features (Berg and Wilson 1990).

Qualitative investigations of the experience of infertility have drawn on clinical experiences, in-depth interviews, focus group discussions, and thematic analyses of elaborated responses to open-ended survey questions (Greil et al. 2010). In an early report, Wallach and Mahlstedt (1985) described women experiencing a profound existential life crisis. Guilt was prominent, among women, including fears that earlier sexual experiences, the use of contraceptives, or delaying procreation while pursuing professional goals had compromised fertility. The frustration associated with being unable to control conception or their own physiological functioning can lead to anger and frustration directed towards the infertile partner, friends and associates who have been able to conceive easily, and people who offer unsolicited advice (Dancet et al. 2011; Greil et al. 2011).

Reaction to infertility is also conceptualized as grief, including for many intangible or disenfranchised losses (Menning 1982; Thorn 2009). The losses include: the experiences of pregnancy, childbirth, and breastfeeding; the unknown child or children and later grandchildren who will not exist; the loss of a generation and genetic continuity; the state of parenthood and the activities and relationships it entails; and an element of adult and gender identity which will never be realized and is substituted

with a flawed infertile identity (Menning 1982; Fisher 2009; Thorn 2009). In addition, anticipated losses of significant relationships, in particular with a partner who might wish to be freed to partner someone else in order to have a child, feared loss of physical attractiveness and intrusion into the sexual relationship (Wallach et al. 1985). Fertility difficulties appear to exert a pervasive negative effect on quality of life, with future planning and commitment to other life activities being compromised.

There is emerging evidence about the psychological impact of infertility on women in low- and middle-income countries, but disparities in the availability of local evidence remain (Inhorn and Buss 1994). Aghanwa et al. (1999) found that 29.7% of women being treated for infertility in Nigeria were depressed or had an anxiety disorder compared to 2.7% of fertile non-matched hospital staff controls. It is theorized that in highly pro-natalist societies where women may have few occupational choices and motherhood is the only identifier of adult status, infertility is highly stigmatizing (Inhorn 2003). Infertile women can have their gender identity questioned, experience social exclusion, be suspected of having evil potential and subject to harassment, especially from their in-law family (Rouchou 2013). In settings where women are subordinated, they can be blamed for infertility. Divorce may be required as a result of the failure to bear children, which itself is stigmatizing. Divorced and childless women are highly vulnerable when old, because adult children are the usual primary supporters of older people. Given the relatively limited access to assisted reproductive treatments in these settings, infertility has been described as leading to profound human suffering (Inhorn 2003; Rouchou 2013).

Individuals respond to disturbing life events in different ways. Women who are able to take an active part in seeking information and making decisions about treatment options have lower levels of depression and attract more social support than those who passively submit to medical recommendations (Himmel et al. 2005; Benyamini et al. 2008). Individuals with high self-esteem and dispositional optimism are better protected against severe depression (Litt et al. 1992). Denial and avoidance are elements of a normal response to adverse experiences including infertility (Menning 1982). Some individuals may appear to be unaffected emotionally by the diagnosis of infertility, but denial is not an effective defense against severe emotional distress. Individuals who use avoidant coping and deny the emotional impact of infertility may seek multiple medical opinions, in order to find an optimistic assessment. They are at higher risk of becoming depressed and may also be vulnerable to exploitation by extravagant claims for treatments, including those for which there is scant scientific evidence (Litt et al. 1992; Himmel et al. 2005).

Infertility can exert adverse effects on the emotional and sexual relationship between partners (Andrews et al. 1992; Eugster and Vingerhoets 1999; Hart 2002). Guilt and inexpressible blame can have insidious effects on intimacy. The infertile partner may fear rejection or may feel obliged to offer the other a divorce so that genetic parenthood can be achieved with another person (Hart 2002). The expression of anger and frustration about the predicament may be constrained in order to protect the infertile partner (Hart 2002). Sexual spontaneity can be impaired by the need for sexual intercourse to be carefully timed and by the clinical scrutiny to which the relationship is subjected. Both partners can experience emotional pain

seeing other couples with children (Hart 2002). However, systematic psychometric investigations reveal few differences between quality of marital relationship in fertile and comparison groups. Rather, they suggest that marital intimacy and cohesion can be strengthened and enhanced through confronting the experience of infertility together (Greil 1997; Schmidt et al. 2005).

Assisted Reproduction

Healthcare for infertility has advanced since the first children were born after IVF in the late 1970s. In the last 40 years, health technologies to treat both male and female infertility have developed rapidly. In high-income countries with well-developed infertility treatment services, it is estimated that up to 75% of couples with fertility difficulties will seek treatment (Boivin et al. 2007; Kirkman and Hammarberg 2014). In countries where ART attracts government and health insurance subsidies, up to 5% of births are a result of assisted conception. This proportion increases with greater subsidy and wider access to services. In resource-constrained settings, there are new initiatives to make low cost infertility services available, but in general, these are most accessible and available to people in higher socioeconomic positions (Kirkman and Hammarberg 2014).

For women, investigations of infertility can include blood tests at particular stages of the menstrual cycle to assess hormone levels, transvaginal ultrasound, hysterosalpingogram to assess patency of the Fallopian tubes and laparoscopy to assess reproductive organs, including for endometriosis. These are coupled with a detailed reproductive and sexual health history and self-monitoring of menstrual cycles. Lalos et al. (1985) assessed experiences of fertility investigations in a prospective interview-based study of women and men in Sweden. They found that for many, this step represented the end of their hopes and efforts to conceive spontaneously, and that the recounting of detailed aspects of their sexual relationship was discomfiting, but most said that they were prepared to tolerate these in service of the possibility of having a child.

Depending on the cause of infertility, treatment is individually tailored and can begin with ovulation induction or intrauterine insemination with either a partner's or a donor's sperm. Assisted reproductive technologies (ART) include all techniques to handle human gametes (oocytes and sperm) and or embryos in a laboratory outside the body, for the purpose of establishing a pregnancy. These include collection of oocytes and sperm, and formation of embryos, which can be used fresh or frozen (cryopreserved). The process of collecting oocytes requires a simulated cycle in which a woman has daily hormone injections for up to 12 days to stimulate her ovaries to form multiple mature follicles before undergoing surgical retrieval. Embryos are made in the laboratory and grown to a defined stage before being transferred to the uterus, following which, there is at least 2 weeks of waiting to learn whether pregnancy might have occurred or menstruation begins (Verhaak et al. 2006).

There are variations in pregnancy and cumulative live birth rates following assisted conception. These have been related to the level of experience of the treating

center, women's age and the number of embryos transferred (Garrido et al. 2011). Garrido et al. (2011) analyzed data from more than 11,000 women treated with ART and found that about 40% of embryo transfers led to a confirmed pregnancy, but 26% ended in miscarriage. A mean number of 8.2 transferred embryos were needed per newborn. Using life table calculations to review 4225 couples who had undergone 8207 cycles over 6 years, Kovacs et al. (2001) reported that half were pregnant within three cycles and two-thirds became pregnant over six. Women who are younger than 35 years have up to a one-in-three chance of conceiving per cycle, but this is halved for women aged 35–40 years and diminishes almost to zero over the age of 40 years (Kirkman and Hammarberg 2014).

Psychosocial Aspects of Infertility Treatment

The nature and intensity of emotional distress experienced by women varies over the course of infertility treatment. At diagnosis, acute symptoms of distress may increase, but there then appears to be a decrease in symptoms once active treatment is initiated. The initiation of treatment arouses optimism that the condition may be assisted or ultimately alleviated. However, women can hold unrealistically high expectations of the likely success of treatment at this stage (Beaurepaire et al. 1994; Hammarberg et al. 2001). Injections, scans, blood tests, and waiting to know whether eggs have fertilized are all regarded as more psychologically than physically demanding (Callan and Hennessey 1988a; Hammarberg et al. 2001). There is consistent evidence that the moment of embryo transfer arouses optimism, but that quite rapidly the interval between transfer, and pregnancy testing to confirm whether implantation and conception have occurred, is highly anxiety arousing (Callan and Hennessey 1988a; Franco et al. 2002). The onset of menstruation or negative pregnancy tests can arouse intense sadness, despair, and a sense of loss of agency (Franco et al. 2002; Litt et al. 1992). Dispositional optimism and active coping are protective against depression following implantation failure and women who use avoidant coping are more distressed (Litt et al. 1992).

Treatments with ART are physically demanding, in particular for women, and can be experienced as invasive, and accompanied by successive feelings of hope and despair, which is exacerbated when several treatment cycles are undertaken (Boivin et al. 2011). In a systematic review of 27 studies of emotional experiences during infertility treatment, Verhaak et al. (2007) found that experiences of low mood and anxiety (often at subclinical levels) increased after unsuccessful treatment and accrued and intensified over consecutive unsuccessful cycles. When IVF resulted in pregnancy, the negative emotions diminished, indicating that treatment-induced distress is related predominantly to the prospect of treatment failure.

In some settings, the costs of infertility treatment are subsidized either by private health insurance or the state, but in most places, some or all costs are carried by individuals. This can add substantially to the burden of emotional distress and have a marked effect on decision-making about how long to persist with treatment. Couples or individuals have to weigh the financial costs of diagnostic tests and treatment cycles

against their yearning for a child (Cousineau and Domar 2007). It has been asserted that couples cannot make a fully informed choice about participation in infertility treatment, because the risks of procedures (including ovarian hyperstimulation and multifetal gestation), the economic costs, the limited success rates, and the possible adverse health effects on women and their offspring can be understated by IVF services (Collins 1994). It is also possible that people experiencing infertility might be less open to hearing about risks. Some support for this view has been provided by evidence that, after prolonged infertility, multifetal pregnancy can be idealized and the associated hazards underestimated (Franco et al. 2002). Couples may seek a multiple birth intentionally, in order to create an instant family (Goldfarb et al. 1996). Although couples may have significant fears about fetal well-being and doubts about their own capacity to care for more than one infant, they can feel prohibited from expressing this ambivalence because they consented to the transfer of multiple embryos (Leiblum et al. 1990; Gleicher et al. 1995; Goldfarb et al. 1996). It is now recommended practice to transfer a single embryo which is associated with lower twinning rates, but similar live birth rates and (van Montfoort et al. 2005; Kirkman and Hammarberg 2014) therefore these outcomes are becoming less common.

There are broader existential impacts. Infertility treatment can be preoccupying and supersede other aspects of life, influencing career considerations and decisions about expenditure on housing, or education (Cousineau and Domar 2007). It can be especially challenging to position infertility as an experience that is part of the life course rather than an end point. Couples can experience isolation from the "fertile world" and experience envy when learning of other women's pregnancies or celebrations of births. Cousineau and Domar (2007) found that women can feel inhibited expressing this to health professionals because of fears that it might influence decisions about further treatments. Redshaw et al. (2006) surveyed 18,503 women who had recently given birth in England and invited the 2.6% (460) who had given birth following infertility treatment to complete a postal survey about their experiences of the technical and psychosocial aspects of care. Responses to open-ended survey questions were analyzed thematically. Themes included that infertility was experienced as unjust and as incurring a burden of uncertainty, and unexpected hurdles, that fertile people were spared. In general, fertile people were found to lack understanding of or empathy about infertility. Treatment was "very physically hard," almost crippling financially, and required women to become expert in techniques and technologies that they had never imagined needing to know about. Some experienced the process as dehumanizing, in particular having unwelcome or disappointing news conveyed in very brief consultations before being shown out to make way for the next "paying patient." Nevertheless, many found that it was helpful to reframe the experience cognitively as an inconvenience rather than being identity-defining, and that it was helpful to be encouraged to concentrate on what the treatment was intended to do rather than what it involved (Redshaw et al. 2006). Cousineau and Domar (2007) found that many, including those who had not conceived, regarded themselves as lucky to have had access to care and treatment.

In addition to the questions raised about whether psychological state influences fertility, there have been questions about whether it influences likelihood of

successful assisted conception. Lintsen et al. (2009) investigated whether psychological state influences the likelihood of conception during treatment in a prospective investigation of 783 women receiving care at seven clinics in the Netherlands. Participants were assessed with standardized self-report measures of mood and anxiety prior to initiating treatment and one day before oocyte retrieval. They found that pregnancy was not associated with anxiety or depressive symptoms at either point (Lintsen et al. 2009).

Deciding to Cease Treatment

Infertility treatments do not lead to conception in all couples with fertility difficulties. Deciding when to stop treatment is especially challenging, in particular for women who have not conceived. It can represent a permanent loss of potential parenthood and therefore having to adjust to life without biological progeny. Long-term follow-up studies have examined women's views about and recollections of the experience of infertility treatment. Combining a survey with a medical record audit (Sundby et al. 1994) found that women had experienced discontinuity of treatment in the public sector with separate doctors for each consultation and one-third had left treatment without a formal termination being documented. Those who had a child were satisfied with treatment, but less than half who did not conceive were satisfied. Independent of whether a child had been born, 70% were dissatisfied with the emotional support that had been provided by professional staff (Sundby et al. 1994). A follow-up study 6 years after cessation of treatment found that it was recalled as a traumatic life event. Overall, long-term psychological functioning was in the average range, with higher well-being among those with a child compared to those without a child. Those with hostile marital relationships, preexisting psychiatric illnesses or lower levels of education were more psychologically vulnerable in the long term. Similarly, fewer than half the Finnish women studied by Malin et al. (2001) were satisfied with their infertility treatment. The dissatisfaction was higher among older women who had not conceived and the doctor's capacity for empathy and kindness were central to satisfaction. In an Australian study of 116 women 2–3 years after ceasing infertility treatment, Hammarberg et al. (2001) found that those who had not conceived were less satisfied with recalled treatment and clinical care and were less satisfied overall with their lives than those who had baby.

Pregnancy, Birth, and Early Parenting After Assisted Conception

Conceiving after assisted conception is stereotypically regarded as miraculous and exciting. Pregnancy after a prolonged wait, requiring intrusive procedures, and incurring disenfranchised grief, financial costs, and inconvenience is an event to be celebrated. It is also possible that it represents relief for family members and others, that the long period in which reassurance, comfort, and encouragement had to

be sustained is over. For clinicians, the technology has worked as predicted, a couple is grateful and appreciative and moves from infertility care to obstetric care, providing a sense of effectiveness and achievement.

However, there is evidence that the psychological aspects of pregnancy, birth, and early parenting after assisted conception might be more complex. Australia has unique residential early parenting services which provide brief admissions to structured psycho-education programs for women with mild to moderate depression and anxiety and infants who are dysregulated and unsettled. In 1993, Barnett et al. (1993) observed that high numbers of women admitted to one residential early parenting service had experienced infertility and assisted conception. In 1997, a similar observation was made in a survey of a consecutive cohort of women admitted to Masada Private Hospital Mother Baby Unit (MPHMBU): 6.5% had conceived with ART when the prevalence of assisted conception in the general population was 1.2% (Fisher et al. 2002). An item about whether conception had been assisted or spontaneous was added to the admission assessment protocol and, subsequently, the medical records of 745 women admitted consecutively to the MPHMBU were audited. Again, it was found that there was a higher proportion (6%) of women who had conceived with ART compared to the rate in the general community (1.52%). This represents a fourfold relative risk of admission following assisted conception. Subsequently, a cohort study of 239 women who had conceived with ART was initiated to identify risks for admission to REPS. They were assessed in the first and third trimesters of pregnancy and 3, 8, and 18 months postpartum. In total, 86% contributed complete data (Fisher et al. 2012). It was found that during pregnancy, participants were significantly more likely than pregnant women in the general community to experience their partners as highly supportive and empathic, and had significantly lower levels of symptoms of anxiety, depression, irritability, fatigue, and functional impairment. However, by 18 months postpartum, 17% compared to 5.5% of women in the general community (Fisher et al. 2011) had been admitted to a REPS. Within this group, risks of admission were primiparity, having received inadequate breastfeeding advice (Hammarberg et al. 2011), having low caregiving confidence when discharged from maternity hospital, and having an unsettled baby (Hammarberg et al. 2009).

Together these data were interpreted as indicating that the state of motherhood might be idealized following assisted conception, and that women can have a fantasy that the baby will bring complete joy. After repeated pregnancy losses, there can be an intense fear that the baby might not live and difficulty believing that breastfeeding will be established. Tolerance of infant crying can be low, with fears that there is something wrong with the baby. Ambivalence is normal after the birth of a baby, but it is possible that after assisted conception, there is difficulty in expressing this and a fear that it will not be received well within social networks. Taken together, caregiving confidence is undermined.

Hammarberg et al. (2008) reviewed 46 papers reporting 28 studies about the psychological and social aspects of pregnancy, childbirth, and early parenting after assisted conception. They found that while emotional well-being and self-esteem were

the same in groups of women who conceived with ART or spontaneously, anxiety about fetal viability, and parenting confidence in the first postpartum year, were lower among women who had conceived with ART. Idealization of parenthood might prevent consideration of the inevitable losses associated with having a baby and might limit support seeking.

Fertility Preservation for Nonmedical Indications

Assisted reproductive technologies (ART), including in vitro fertilization (IVF), are effective in treating many causes of infertility but have shown minimal success in overcoming age-related female infertility. Advances in preservation technologies have led to improvements in the successful freezing of eggs. Pregnancy rates using embryos formed with frozen eggs are now comparable to those from fresh oocytes (Cobo et al. 2013). Originally used predominantly to preserve fertility among women prior to treatment of cancers, egg freezing is now available to women seeking to avert the impact of age-related decline in oocyte quality (Hammarberg 2018).

It is promoted as a technology to enable women to pursue career aspirations and financial goals and “delay motherhood.” Pritchard et al. surveyed 193 women who had stored eggs without a medical indication at an infertility service. They found that contrary (Pritchard et al. 2017) to presumptions that this was an active choice to delay motherhood, circumstance, in particular the difficulties experienced by well-educated, professional women in finding a partner willing to commit to parenthood, was the predominant reason to take this action. They also found that women may be acting on media reports or unproven tests of fertility in making these decisions which are very expensive and not as yet associated with assured outcomes in terms of live births.

Other Experiences of Reproductive Technologies

Kirkman and Hammarberg (2014) explain how access to ART is influenced not only by economic and geographic factors but also by social and cultural gatekeeping. Access can be limited to couples, heterosexual people, young people, and affluent people. This inequity of access is leading to a growth in cross-border reproductive care which is travel from one jurisdiction to another, including across state and national borders, to gain access to treatment techniques that are not otherwise available to them. This can include surrogacy services and purchase of gametes or embryos. Donor-assisted conception was once conducted with assurances of privacy and nondisclosure, but donor-conceived people have advocated for access to their biological heritage and, in some settings, been given access to identifying information about the donor. New technologies are emerging which lead to controversies regarding selection of embryos on the basis of sex or genetic carrier status. All are associated with complex ethical and legal debates about the rights of each party including the child.

Implications for Healthcare

Given the distress that can be experienced by people diagnosed with, and being treated for, infertility their clinicians need to be both medically and psychologically skilled. Mental health professionals providing care for people of reproductive age need to be well informed about fertility and infertility treatments. Cousineau and Domar (2007) argue that explicit consideration of the emotional consequences of infertility and its treatment are integral to high quality care.

Dispositional optimism and a sense of personal agency reduce psychological distress during treatment. As irritability, anxiety, and depressive symptomatology are most intense between embryo transfer and pregnancy testing, it is argued that supportive counselling should be targeted at this interval (Yong et al. 2000). These techniques have been shown to be helpful (Rowe et al. 2017):

- Open-ended questions (e.g., Please tell me about. . .?; How did you feel when. . .?).
- Explicit enquiry using the statement and question method (e.g., “I have met many men experiencing infertility, and they often feel sad, worried, embarrassed, lonely, etc.”; followed by the enquiry: “Have you had any feelings of this kind?” or “I would be interested to hear how you are feeling”).
- Asking each member of the couple “Who have you talked to about the fertility difficulties?” and “What do you imagine other people’s reactions to your situation might be?”
- After providing clinical information, e.g., about the infertility problem or a proposed treatment or the outcome of a cycle, check comprehension by asking the couple to summarize their understanding of what has just been discussed.
- Explaining technical terms in plain language and not assuming that more highly educated people already understand discipline-specific terminology.
- Using person-first language (e.g., the woman/man/person with . . . rather than the infertile woman/man/person).

It is helpful for clinicians to be aware of their personal stereotypes, including, for example, about emotional responses to the confirmation of pregnancy and “miracle babies” being easy to care for. Neutral responses convey permission to express diverse emotions. It is helpful to promote the normality of disenfranchised grief and ambivalence, and the right to complain about the realities of infant care. Statements like “. . .but you have a healthy baby,” prohibit the expression of uncertainty and help-seeking. Women who have conceived with ART need active assistance with breastfeeding and education about infant care and it is unhelpful to be told “. . . just trust your intuition.”

Conclusion

In conclusion, ART provides people with opportunities for family formation that they might not otherwise have had, but it is not psychologically benign and benefits from psychologically informed approaches to care, to research, and to service development.

Cross-References

► Culture and Women's Mental Health

References

- Aghanwa HS, Dare FO, Ogunniyi SO (1999) Sociodemographic factors in mental disorders associated with infertility in Nigeria. *J Psychosom Res* 46(2):117–123
- Allison GH (1997) Motherhood, motherliness, and psychogenic infertility. *Psychoanal Q* 66(1):1–17
- Anderson K, Nisenblat V, Norman R (2010) Lifestyle factors in people seeking infertility treatment – a review. *Aust N Z J Obstet Gynaecol* 50(1):8–20
- Andrews FM, Abbey A, Halman LJ (1992) Is fertility-problem stress different? The dynamics of stress in fertile and infertile couples. *Fertil Steril* 57(6):1247–1253
- Barnett B, Lockhart K, Bernard D, Manicavasagar V, Dudley M (1993) Mood disorders among mothers of infants admitted to a mothercraft hospital. *J Paediatr Child Health* 29(4):270–275
- Beaurepaire J, Jones M, Thiering P, Saunders D, Tennant C (1994) Psychosocial adjustment to infertility and its treatment: male and female responses at different stages of IVF/ET treatment. *J Psychosom Res* 38(3):229–240
- Benyamini Y, Gefen-Bardarian Y, Gozlan M, Tabiv G, Shiloh S, Kokia E (2008) Coping specificity: the case of women coping with infertility treatments. *Psychol Health* 23(2):221–241
- Beral V, Rolfs R, Joesoef MR, Aral S, Cramer DW (1994) Primary infertility: characteristics of women in North America according to pathological findings. *J Epidemiol Community Health* 48(6):576–579
- Berg BJ, Wilson JF (1990) Psychiatric morbidity in the infertile population: a reconceptualization. *Fertil Steril* 53(4):654–661
- Boivin J, Bunting L, Collins JA, Nygren KG (2007) International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. *Hum Reprod* 22(6):1506–1512
- Boivin J, Griffiths E, Venetis CA (2011) Emotional distress in infertile women and failure of assisted reproductive technologies: meta-analysis of prospective psychosocial studies. *BMJ* 342:d223
- Bydlowski M, Dayan-Lintzer M (1988) A psycho-medical approach to infertility: 'suffering from sterility'. *J Psychosom Obstet Gynecol* 9(2):139–151
- Callan VJ, Hennessey JF (1988a) Emotional aspects and support in in vitro fertilization and embryo transfer programs. *J In Vitro Fert Embryo Transf* 5(5):290–295
- Callan VJ, Hennessey JF (1988b) The psychological adjustment of women experiencing infertility. *Br J Med Psychol* 61(Pt 2):137–140
- Chen TH, Chang SP, Tsai CF, Juang KD (2004) Prevalence of depressive and anxiety disorders in an assisted reproductive technique clinic. *Hum Reprod* 19(10):2313–2318
- Christie GL (1994) The psychogenic factor in infertility. *Aust N Z J Psychiatry* 28(3):378–390
- Cobo A, Garcia-Velasco JA, Domingo J, Remohí J, Pellicer A (2013) Is vitrification of oocytes useful for fertility preservation for age-related fertility decline and in cancer patients? *Fertil Steril* 99(6):1485–1495
- Collins JA (1994) Reproductive technology – the price of progress. *N Engl J Med* 331(4):270–271
- Cousineau TM, Domar AD (2007) Psychological impact of infertility. *Best Pract Res Clin Obstet Gynaecol* 21(2):293–308
- Daly I, Bewley S (2013) Reproductive ageing and conflicting clocks: King Midas' touch. *Reprod Biomed Online* 27(6):722–732

- Dancet EA, Van Empel IW, Rober P, Nelen WL, Kremer JA, D'Hooghe TM (2011) Patient-centred infertility care: a qualitative study to listen to the patient's voice. *Hum Reprod* 26(4):827–833
- Deka PK, Sarma S (2010) Psychological aspects of infertility. *Br J Med Pract* 3(3):336
- Downey J, McKinney M (1992) The psychiatric status of women presenting for infertility evaluation. *Am J Orthopsychiatry* 62(2):196–205
- Edelmann R, Connolly K, Cooke I, Robson J (1991) Psychogenic infertility: some findings. *J Psychosom Obstet Gynecol* 12(2):163–168
- El Kissi Y, Romdhane AB, Hidar S, Bannour S, Ayoubi Idrissi K, Khairi H, Ben Hadj Ali B (2013) General psychopathology, anxiety, depression and self-esteem in couples undergoing infertility treatment: a comparative study between men and women. *Eur J Obstet Gynecol Reprod Biol* 167(2):185–189
- Eugster A, Vingerhoets AJ (1999) Psychological aspects of in vitro fertilization: a review. *Soc Sci Med* 48(5):575–589
- Fisher J (2009) Infertility and assisted reproduction. In: JRW F, Cabral de Mello M, Saxena S (eds) *Mental health aspects of women's reproductive health: a global review of the literature*. World Health Organization and United Nations Population Fund, Geneva, pp 128–146
- Fisher J, Feekery CJ, Amir LH, Sneddon M (2002) Health and social circumstances of women admitted to a private mother baby unit. A descriptive cohort study. *Aust Fam Physician* 31(10):966–970. 973
- Fisher J, Rowe H, Hammarberg K (2011) Admission of women, with their infants, for psychological and psychiatric causes in Victoria, Australia. *Aust N Z J Public Health* 35(2):146–150
- Fisher J, Rowe H, Hammarberg K (2012) Admissions for early parenting difficulties among women with infants conceived by assisted reproductive technologies: a prospective cohort study. *Fertil Steril* 97(6):1410–1416
- Franco JG, Baruffi RLR, Mauri AL, Petersen CG, Felipe V, Garbellini E (2002) Psychological evaluation test after the use of assisted reproduction techniques. *J Assist Reprod Genet* 19(6):274–278
- Garrido N, Bellver J, Remohi J, Simon C, Pellicer A (2011) Cumulative live-birth rates per total number of embryos needed to reach newborn in consecutive in vitro fertilization (IVF) cycles: a new approach to measuring the likelihood of IVF success. *Fertil Steril* 96(1):40–46
- Gleicher N, Campbell DP, Chan CL, Karande V, Rao R, Balin M, Pratt D (1995) Infertility: the desire for multiple births in couples with infertility problems contradicts present practice patterns. *Human Reproduction* 10(5):1079–1084
- Goldfarb J, Kinzer DJ, Boyle M, Kurit D (1996) Attitudes of in vitro fertilization and intrauterine insemination couples toward multiple gestation pregnancy and multifetal pregnancy reduction. *Fertil Steril* 65(4):815–820
- Greil AL (1997) Infertility and psychological distress: a critical review of the literature. *Soc Sci Med* 45(11):1679–1704
- Greil AL, Slauson-Blevins K, McQuillan J (2010) The experience of infertility: a review of recent literature. *Sociol Health Illn* 32(1):140–162
- Greil A, McQuillan J, Slauson-Blevins K (2011) The social construction of infertility. *Sociol Compass* 5(8):736–746
- Hammarberg K (2018) Fertility preservation in women for social reasons. In: *Encyclopedia of reproduction*, Elsevier Science Direct, pp 259–262
- Hammarberg K, Astbury J, Baker H (2001) Women's experience of IVF: a follow-up study. *Hum Reprod* 16(2):374–383
- Hammarberg K, Fisher J, Wynter K (2008) Psychological and social aspects of pregnancy, childbirth and the first postpartum year after ART: a systematic review. *Hum Reprod Update* 14:395–414
- Hammarberg K, Rowe H, Fisher J (2009) Early post-partum adjustment and admission to parenting services in Victoria, Australia after assisted conception. *Hum Reprod* 24(11):2801–2809
- Hammarberg K, Fisher JR, Wynter KH, Rowe HJ (2011) Breastfeeding after assisted conception: a prospective cohort study. *Acta Paediatr* 100(4):529–533
- Hart VA (2002) Infertility and the role of psychotherapy. *Issues Ment Health Nurs* 23(1):31–41

- Hassan MA, Killick SR (2003) Effect of male age on fertility: evidence for the decline in male fertility with increasing age. *Fertil Steril* 79(Suppl 3):1520–1527
- Himmel W, Meyer J, Kochen MM, Michelmann HW (2005) Information needs and visitors' experience of an Internet expert forum on infertility. *J Med Internet Res* 7(2):e20
- Holton S, Fisher J, Rowe H (2011) To have or not to have? Australian women's childbearing desires, expectations and outcomes. *J Popul Res* 28(4):353
- Inhorn MC (2003) Global infertility and the globalization of new reproductive technologies: illustrations from Egypt. *Soc Sci Med* 56(9):1837–1851
- Inhorn MC, Buss KA (1994) Ethnography, epidemiology and infertility in Egypt. *Soc Sci Med* 39(5):671–686
- Inhorn MC, Patrizio P (2015) Infertility around the globe: new thinking on gender, reproductive technologies and global movements in the 21st century. *Hum Reprod Update* 21(4):411–426
- Johnson M, Everitt B (2000) *Adult ovarian function. Essential reproduction*. Blackwell Publishing, Oxford
- Johnson M, Everitt B (2007) *Testicular function in the adult. Essential reproduction*. Blackwell Publishing, Oxford, p 64
- Kerr J, Brown C, Balen AH (1999) The experiences of couples who have had infertility treatment in the United Kingdom: results of a survey performed in 1997. *Hum Reprod* 14(4):934–938
- Kipper DA, Zigler-Shani Z, Serr DM, Insler V (1977) Psychogenic infertility, neuroticism and the feminine role: a methodological inquiry. *J Psychosom Res* 21(5):353–358
- Kirkman, Hammarberg (2014) Assisted reproductive technology. In: *The Wiley Blackwell encyclopedia of health, illness, behavior, and society*, Wiley-Blackwell, Oxford, pp 97–102
- Kols A, Nguyen T (1997) Infertility in developing countries. *Reprod Health Outlook* 15(3):1–14
- Kovacs G, MacLachlan V, Brehny S (2001) What is the probability of conception for couples entering an IVF program? *Aust N Z J Obstet Gynaecol* 41(2):207–209
- Lalos A, Lalos O, Jacobsson L, von Schoultz B (1985) Psychological reactions to the medical investigation and surgical treatment of infertility. *Gynecol Obstet Investig* 20(4):209–217
- Leiblum SR, Kemmann E, Taska L (1990) Attitudes toward multiple births and pregnancy concerns in infertile and non-infertile women. *Journal of Psychosomatic Obstetrics & Gynecology* 11(3):197–210
- Lintsen AME, Verhaak CM, Eijkemans MJC, Smeenk MJJ, Braat DDM (2009) Anxiety and depression have no influence on the cancellation and pregnancy rates of a first IVF or ICSI treatment. *Hum Reprod* 24(5):1092–1098
- Litt MD, Tennen H, Affleck G, Klock S (1992) Coping and cognitive factors in adaptation to in vitro fertilization failure. *J Behav Med* 15(2):171–187
- Lynch CD, Sundaram R, Buck Louis GM, Lum KJ, Pyper C (2012) Are increased levels of self-reported psychosocial stress, anxiety, and depression associated with fecundity? *Fertil Steril* 98(2):453–458
- Maheshwari A, Hamilton M, Bhattacharya S (2008) Effect of female age on the diagnostic categories of infertility. *Hum Reprod* 23(3):538–542
- Malin M, Hemminki E, Räikkönen O, Sihvo S, Perälä M-L (2001) What do women want? Women's experiences of infertility treatment. *Soc Sci Med* 53(1):123–133
- Mascarenhas MN, Flaxman SR, Boerma T, Vanderpoel S, Stevens GA (2012) National, regional, and global trends in infertility prevalence since 1990: a systematic analysis of 277 health surveys. *PLoS Med* 9(12):e1001356
- Menning BE (1982) The psychosocial impact of infertility. *Nurs Clin North Am* 17(1):155–163
- Mertes H (2013) The portrayal of healthy women requesting oocyte cryopreservation. *Facts, views & vision in ObGyn*, 5(2):141
- Mills M, Rindfuss RR, McDonalds P, te Velde E (2011) Why do people postpone parenthood? Reasons and social policy incentives. *Hum Reprod Update* 17(6):848–860
- Möller A, Fallström K (1991) Psychological factors in the etiology of infertility: a longitudinal study. *J Psychosom Obstet Gynecol* 12(1):13–26

- Ombelet W, Devroey P, Gianaroli L, te Velde E (2008) Developing countries and infertility. *Human Reprod (Spec Issue)*:1–117
- Pantescio V (1986) Nonorganic infertility: some research and treatment problems. *Psychol Rep* 58(3):731–737
- Pasch LA, Gregorich SE, Katz PK, Millstein SG, Nachtigall RD, Bleil ME, Adler NE (2012) Psychological distress and in vitro fertilization outcome. *Fertil Steril* 98(2):459–464
- Pritchard N, Kirkman M, Hammarberg K, McBain J, Agresta F, Bayly C, Hickey M, Peate M, Fisher J (2017) Characteristics and circumstances of women in Australia who cryopreserved their oocytes for non-medical indications. *J Reprod Infant Psychol* 35(2):108–118
- Redshaw M, Hockley C, Davidson LL (2006) A qualitative study of the experience of treatment for infertility among women who successfully became pregnant. *Hum Reprod* 22(1):295–304
- Rosenthal MB, Goldfarb J (1997) Infertility and assisted reproductive technology: an update for mental health professionals. *Harv Rev Psychiatry* 5(3):169–172
- Rouchou B (2013) Consequences of infertility in developing countries. *Perspect Public Health* 133(3):174–179
- Rowe H, Fisher J, Hammarberg K (2017) A couple who considers artificial reproductive techniques: psychosocially informed care in reproductive medicine. In: *Bio-psycho-social obstetrics and gynecology*. Springer, Cham, pp 283–295
- Schmidt L (2009) Social and psychological consequences of infertility and assisted reproduction – what are the research priorities? *Hum Fertil (Camb)* 12(1):14–20
- Schmidt L, Holstein B, Christensen U, Boivin J (2005) Does infertility cause marital benefit? An epidemiological study of 2250 women and men in fertility treatment. *Patient Educ Couns* 59(3):244–251
- Schmidt L, Sobotka T, Bentzen JG, Nyboe Andersen A (2011) Demographic and medical consequences of the postponement of parenthood. *Hum Reprod Update* 18(1):29–43
- Schytt E, Nilsen A, Bernhardt E (2014) Still childless at the age of 28 to 40 years: a cross-sectional study of Swedish women's and men's reproductive intentions. *Sex Reprod Healthc* 5(1):23–29
- Sundby J, Olsen A, Schei B (1994) Quality of care for infertility patients. An evaluation of a plan for a hospital investigation. *Scand J Soc Med* 22(2):139–144
- Thorn P (2009) Understanding infertility: psychological and social considerations from a counseling perspective. *Int J Fertil Steril* 3(2):48
- van Montfoort AP, Dumoulin JC, Land JA, Coonen E, Derhaag JG, Evers JL (2005) Elective single embryo transfer (eSET) policy in the first three IVF/ICSI treatment cycles. *Hum Reprod* 20(2):433–436
- Verhaak CM, Smeenk J, Evers A, Kremer JA, Kraaijmaat F, Braat D (2006) Women's emotional adjustment to IVF: a systematic review of 25 years of research. *Hum Reprod Update* 13(1):27–36
- Verhaak CM, Smeenk JM, Evers AW, Kremer JA, Kraaijmaat FW, Braat DD (2007) Women's emotional adjustment to IVF: a systematic review of 25 years of research. *Hum Reprod Update* 13(1):27–36
- Wallach EE, Mahlstedt P (1985) The psychological component of infertility. *Fertil Steril* 43(3):335–346
- Wischmann TH (2003) Psychogenic infertility – myths and facts. *J Assist Reprod Genet* 20(12):485–494
- World Health Organization (1987) Infections, pregnancies, and infertility: perspectives on prevention. *Fertil Steril* 47(6):964–968
- Yong P, Martin C, Thong J (2000) A comparison of psychological functioning in women at different stages of in vitro fertilization treatment using the mean affect adjective check list. *J Assist Reprod Genet* 17(10):553–556