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TRANSITION TO PARENTHOOD AFTER FERTILITY TREATMENT WITH OOCYTE AND SPERM DONATION

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ACADEMIC DISSERTATION

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To Juho and Okko

ABSTRACT

The use of donated gametes has made parenthood possible for those women and men who are unable to conceive with their own. The number of treatments using donor gametes are constantly increasing worldwide. Although thousands of donor-conceived babies are born every year, parental psychological health has scarcely been addressed and most of the existing studies have concentrated on the parent-child relationship. One of the most important questions in gamete donation is whether the child should be informed about his/her genetic background.

The purpose of this study was to explore parental psychological well-being during pregnancy and early parenthood after successful oocyte donation (OD) treatment. Special interest was focused on OD mothers' fear of childbirth and delivery experience. Another aim was to examine attitudes and disclosure decisions of parents conceived with sperm or oocyte donation.

A prospective longitudinal questionnaire was employed to study maternal fear of childbirth, delivery experience, and OD mothers' and fathers' mental health during their transition to parenthood. The study group consisted of 26 OD women and their matched controls, 52 women who conceived with in vitro fertilisation/intra-cytoplasmic sperm injection (IVF/ICSI), and 52 spontaneously conceiving women (SC). Matching to find controls was made according to mothers' age, parity, plurality, and the number of returned questionnaires.

The couples answered questionnaires three times: at 2nd trimester; 8 weeks after the delivery; and when the child was one year of age. The questionnaires included questions about parents' background. Fear of Delivery Questionnaire (FDQ) and Pregnancy Anxiety Scale (PAS) were used to measure level of fear of childbirth at 2nd trimester and the Delivery Satisfaction Scale (DSS) to assess delivery experience 8 weeks after the delivery. Furthermore, General Health Questionnaire (GHQ-36) was to be answered at all three time points to assess mental health symptoms of mothers and fathers.

The level of fear of childbirth was lower among OD mothers than among IVF/ICSI mothers, but it did not differ significantly from SC mothers. Pregnancy-related anxiety was lower in OD mothers compared with both IVF/ICSI and SC mothers. Delivery experience was similar between the groups, but acute operative deliveries associated with dissatisfaction only in the OD mothers.

Regarding mental health symptoms of mothers at 2nd trimester, no differences were found between the groups, but they differed at 8 weeks postpartum and one year after the delivery. OD mothers showed less anxiety than SC mothers at 8 weeks postpartum and when the child was one year old. Furthermore, OD mothers had fewer sleeping difficulties and less social

dysfunction than IVF/ICSI mothers at 8 weeks postpartum and when the child was one year of age but when OD mothers were compared with SC mothers, differences were found only at 8 weeks postpartum. Mental health symptoms of OD fathers did not differ from IVF/ICSI and SC fathers at any time point.

Retrospective questionnaire studies provided information on parental disclosure intentions, experiences and attitudes after their OD treatment and insemination (DI) or IVF treatment with donated sperm (dIVF). Questionnaires were sent to mothers and fathers separately and included only heterosexual couples using donor sperm to the study. Parents were asked if they had already shared the information with the child about his/her genetic background and, if not, what were their intentions. Other questions were about the decision to use donated gametes, openness toward other people, concerns about the donor characteristics, experiences of counselling, and attitudes about Finland's new Fertility law. These parents received treatment before the Finnish open-identity ART law came in act in 2007, which means that the donor offspring can ask identifying information of the donor at the age of 18.

Answers were received from 68% (113/167) of OD mothers and 61% (100/163) of OD fathers, and 55% (139/252) of DI/dIVF mothers and 53% (127/239) of DI/dIVF fathers. Information was received from 164 OD children aged 1–14 years and 240 DI/dIVF children aged 1–22 years.

Of OD parents, 60% had already told or intended to tell the child and 26% (aged 3-14) of children had already received the information about the way of their conception. Parents with younger children were more willing to disclose compared with parents in the oldest age group and this difference was statistically significant.

Of DI/dIVF mothers, 41% and 36% of DI/dIVF fathers reported that they had either told or intended to tell the child about his/her donor conception. Of all children, 16% had received information and the majority of them had received it before and upon starting school. Again, parents with younger DI/dIVF children showed more openness toward the child compared with the parents with older children and the difference was statistically significant.

Psychological support had been insufficient for 24% of OD mothers and 11% of OD fathers, and less than half of DI/dIVF parents were satisfied with the psychological support they were offered. Of OD and DI/dIVF parents, 40% reported that the new Finnish open-identity ART law will probably not impact on the disclosure intentions of future donor offspring parents.

The results are encouraging. The psychological well-being of OD parents was good, and it creates therefore a strong basis for parenthood after all the challenges of becoming a mother and a father. Fears for the security of the long-wanted child did not overshadow OD mothers' pregnancy and delivery, which might have been a risk for the mother-child relationship. Although parents seem to cope well during pregnancy and early parenthood, it is

unclear, in light of these results, what effect a child-related or other stressor has on parental psychological well-being. Parents are screened for their mental health problems and marital relations before the treatment, which partly explains the findings. There are still couples who need additional psychological support during pregnancy and early parenthood, and they should be recognised.

One of the most important issues, and a potential stress factor for OD and DI/dIVF parents, is what to tell the child about his/her genetic background. General attitudes about donor treatments have changed over the years toward more acceptance and openness, and consequently, Finland among other countries enacted an open-identity law. This positive change in general attitudes has probably had an effect on the parents in this study because a tendency toward more openness was also found. Whether this tendency toward openness will continue under the new law remains to be seen.

Both OD parents and DI/dIVF parents had very few concerns about the donor and all thought that the child feels like their own. These reassuring results may hopefully help infertile couples who need donated gametes to proceed with gamete donation treatment, overcome their fears of the unknown, and parent their long-wanted child.

TIIVISTELMÄ

Luovutettujen sukusolujen käyttö lapsettomuushoidoissa on mahdollistanut raskauden ja lapsen vanhemmille, jotka eivät voisi saada lasta omilla sukusoluilla. Hoitomäärät lahjasukusoluilla kasvavat koko ajan maailmanlaajuisesta, ja joka vuosi tuhansia lapsia syntyy onnistuneen lahjasukusoluhoidon jälkeen. Tutkimuksia, joissa olisi tutkittu lahjasukusoluhoidolla raskaaksi tulleitten vanhempien mielenterveyttä raskauden aikana ja heti synnytyksen jälkeen, on hyvin vähän. Suurin osa tutkimuksista tähän asti on keskittynyt vanhemman ja lapsen välisiin suhteisiin. Keskeinen kysymys onnistuneen lahjasukusoluhoidon jälkeen on, mitä vanhemmat kertovat lapselle ja lähipiirille lapsen alkuperästä.

Tämän väitöstutkimuksen tavoite oli selvittää äitien kokemaa synnytyspelkoa ja synnytyskokemusta onnistuneen lahjamunasoluhoidon jälkeen. Lisäksi selvitimme lahjamunasoluhoidolla raskaaksi tulleiden äitien ja heidän puolisoittensa mielenterveyttä raskausaikana ja synnytyksen jälkeen. Toisena tavoitteena oli selvittää, ovatko vanhemmat kertoneet lapselle tai aikovatko kertoa lapselle lahjasukusoluhoidosta lahjoitetuilla munasoluilla tai lahjasiittiöillä. Lisäksi halusimme tietoa, mitä vanhemmat ajattelevat hoitopäätöksestä aikanaan, luovuttajasta, psykologisesta tuesta ja tulevasta uudesta hedelmöityshoitolaista.

Vanhempien mielenterveyttä ja äitien synnytyspelkoa ja -kokemusta tutkittiin kyselytutkimuksella. Tutkimusryhmä koostui 26 äidistä, jotka olivat tulleet raskaaksi lahjamunasoluilla. Heille haettiin kaltaistetut verrokit äideistä, jotka olivat tulleet raskaaksi omilla soluilla tehdyn koeputkihedelmöityshoidon (IVF/ICSI) jälkeen (n=52) ja äideistä, jotka olivat tulleet raskaaksi spontaanisti (n=52). Kaltaistus tehtiin äidin iän, pariteetin, sikiölukumäärän ja palautettujen kyselyitten suhteen.

Vanhemmat vastasivat kolmeen kyselyyn: keskiraskauden aikana, 8 viikkoa ja vuosi synnytyksen jälkeen. Synnytyspelkoa mitattiin raskausaikana Fear of Childbirth Questionnaire (FDQ) ja Pregnancy Anxiety Scale (PAS) avulla. Synnytyskokemuksen mittarina käytettiin Delivery Satisfaction Scale (DSS) kyselyä, joka tuli täytettäväksi 8 viikkoa synnytyksen jälkeen. Äitien ja isien mielenterveyttä tutkittiin General Health Questionnaire (GHQ-36) avulla kaikissa kolmessa kyselyssä.

Lahjamunasoluhoidolla raskaaksi tulleet äidit kokivat vähemmän synnytyspelkoa kuin IVF/ICSI äidit, mutta tilastollista eroa suhteessa spontaanisti raskaaksi tulleisiin äiteihin ei saatu. Lisäksi raskauteen liittyvää ahdistusta lahjamunasoluhoidolla raskaaksi tulleet äidit kokivat vähemmän kuin verrokit. Synnytyskokemus oli samanlainen kaikissa kolmessa ryhmässä. Akuutti operatiivinen synnytys liittyi huonompaan synnytyskokemukseen lahjamunasoluhoidolla raskaaksi tulleilla äideillä, mutta ei verrokeilla.

Lahjamunasoluhoidolla raskaaksi tulleitten äitien mielenterveys oli raskausaikana samanlainen kuin verrokkiäideillä. 8 viikkoa synnytyksen jälkeen lahjamunasoluhoidolla raskaaksi tulleet äidit kokivat vähemmän ahdistusoireita verrattuna spontaanisti raskaaksi tulleisiin äiteihin. Heillä oli lisäksi vähemmän univaikeuksia ja ongelmia sosiaalisissa suhteissa kuin IVF/ICSI ja spontaanisti raskaaksi tulleilla äideillä. Vuosi synnytyksen jälkeen lahjamunasoluhoidolla raskaaksi tulleilla äideillä oli vähemmän ahdistusoireita kuin spontaanisti raskaaksi tulleilla äideillä ja vähemmän univaikeuksia ja ongelmia sosiaalisissa suhteissa kuin IVF/ICSI äidiellä. Isien mielenterveys oli samanlainen kuin verrokeilla keskiraskaudesta alkaen aina siihen asti kun lapsi oli yksivuotias.

Vanhempien aikomuksia kertoa lapselleen lahjasukusoluhoidosta tutkittiin kyselytutkimuksella, joka lähetettiin niille äideille ja isille erikseen, joilla oli lapsi onnistuneen lahjasiittiöhoidon tai -munasoluhoidon jälkeen. Samalla kysyimme heidän kokemuksiaan hoitopäätöksestä aikanaan tarjotusta psykologisesta tuesta, huolista koskien luovuttajaa ja uudesta hedelmöityshoitolaista. Vanhemmat, jotka pyydettiin osallistumaan tutkimukseen, olivat saaneet hedelmöityshoitoa ennen uutta hedelmöityshoitolakia. Uuden lain mukaan kaikki luovuttajat rekisteröityvät eikä sukusolujen luovutus anonyyminä ole enää ollut mahdollista syyskuun 2007 jälkeen.

Lahjamunasoluilla lapsensa saaneista äideistä kyselyyn vastasi 68 % (113/167) ja isistä 61 % (100/163). Vastaavasti lahjasiittiöillä lapsensa saaneista äideistä vastasi 55 % (139/252) ja isistä 53 % (127/239). Saimme tietoa 164 lahjamunasolulla syntyneistä lapsista iältään 1-14 vuotta ja 240 lahjasiittiöllä syntyneistä 1-22 vuotiaista lapsista.

Noin 60% vanhemmista, joilla oli lapsi lahjamunasoluilla, oli kertonut tai aikoi kertoa lapselle hänen alkuperästään. Yli 3v ikäisistä lapsista 26% oli saanut jo tiedon. Ne vanhemmat, joilla oli nuorempia lapsia, olivat useammin avoimuuden kannalla kuin ne, joiden lapset olivat vanhempia tutkimushetkellä ja ero ryhmien välillä oli tilastollisesti merkitsevä.

Lahjasiittiöillä lapsensa saaneista äideistä 41 % ja isistä 36 %, oli kertonut tai aikoi kertoa lapselleen lahjasukusoluhoidosta. Lapsista 16 % oli jo tiedon saanut ja suurin osa heistä oli sen saanut ennen kouluikää. Lahjasiittiöhoidolla lapsensa saaneiden vanhempien avoimuus oli suurempaa mitä nuorempi heidän lapsensa oli tutkimushetkellä kuin niillä, joiden lapsi oli jo vanhempi. Ero oli tilastollisesti merkitsevä.

Lahjamunasoluhoidolla ja lahjasiittiöhoidolla lapsensa saaneilla vanhemmilla oli hyvin vähän huolta luovuttajan suhteen ja he kaikki raportoivat, että lapsi tuntuu omalta. Noin 24 % äideistä ja 11 % isistä lahjamunasoluhoidon jälkeen ja alle puolet vanhemmista lahjasiittiöhoidon jälkeen olivat tyytymättömiä tarjottuun psykologiseen tukeen hoitojen aikana. Noin 40 % kaikista vanhemmista vastasi, että uusi hedelmöityshoitolaki ei tulisi todennäköisesti muuttamaan vanhempien suunnitelmia kertoa lapselle lahjasukusoluhoidosta.

Tutkimuksesta saadut tulokset ovat rohkaisevia. Tuloksemme osoittivat, että lahjamunasoluhoidolla raskaaksi tulleiden äitien ja heidän puolisoidensa mielenterveys on hyvä raskausaikana ja pian synnytyksen jälkeen. Lisäksi äidit raportoivat vähemmän synnytyspelkoa ja olivat pääasiassa tyytyväisiä synnytykseensä. Löydökset antavat hyvän pohjan vanhemmuudelle varsinkin kun yo. tekijöitä voidaan pitää riskitekijöinä vanhemman ja lapsen väliselle suhteelle. Tämä on erityisen tärkeää, kun äidin ja lapsen välillä ei ole geneettistä yhteyttä. Ennen lahjasukusoluhoitoja vanhemmat käyvät keskustelemassa psykologin kanssa, ja mikäli mielenterveyden ongelmia tai parisuhdeongelmia esiintyy, hoitoa lykätään tai luovutaan hoidosta. Tämä selittänee osaltaan tutkimuslöydöksiä. Tutkimuksesta ei saatu tietoa, miten onnistuneen lahjamunasoluhoidon jälkeen äidit ja isät voisivat, mikäli heillä olisi lapseen liittyviä tai muita stressitekijöitä elämässä. Vaikka vanhempia on valmisteltu perusteellisesti lahjamunasoluhoitoon, niin silti on pareja, jotka tarvitsevat lisätukea vanhemmuuteen, ja heidät tulisi tunnistaa.

Vanhemmat joutuvat ottamaan kantaa, mitä kertoa lapselle taustalla olevasta hedelmöityshoidosta. Yleinen mielipide lahjasukusoluhoitoja kohtaan on muuttunut vuosien varrella avoimemmaksi. Totesimme, että mitä nuorempi lapsi oli sitä avoimempia vanhemmat olivat lahjasukusoluhoidosta. Sitä, muuttaisiko uusi laki vanhempien ajatuksia kertomisesta vielä avoimempaan suuntaan, olisi syytä tutkia tulevaisuudessa uuden lain voimassa ollessa.

Ilahduttavaa oli todeta, että vanhemmilla oli hyvin vähän huolia luovuttajasta ja kaikki tunsivat, että lapsi on oma. Toivottavasti tutkimuksesta saadut tulokset auttavat hälventämään vanhempien huolia siitä, mitä lahjasukusoluhoito tuo tullessaan, ja he päättäisivät lähteä hoitoon ja saisivat kauan kaipaamansa lapsen.

CONTENTS

LIST OF ORIGINAL PUBLICATIONS

This thesis is based on the following publications:

I Sälevaara M, Punamäki RL, Poikkeus P, Flykt M, Tulppala M, Tiitinen A. Fear and experience of childbirth among women who conceived with donated oocytes: a prospective cohort study. Acta Obstet Gynecol Scand. 2016 Jul;95(7):755-62.

II Sälevaara M, Punamäki RL, Unkila-Kallio L, Vänskä M, Tulppala M, Tiitinen A. The mental health of mothers and fathers during pregnancy and early parenthood after successful oocyte donation treatment: A nested case-control study. Acta Obstet Gynecol Scand. 2018 Dec;97(12):1478-1485.

III Söderström-Anttila V, Sälevaara M, Suikkari AM. Increasing openness in oocyte donation families regarding disclosure over 15 years. Hum Reprod. 2010 Oct;25(10):2535-42.

IV Sälevaara M, Suikkari AM, Söderström-Anttila V. Attitudes and disclosure decisions of Finnish parents with children conceived using donor sperm. Hum Reprod. 2013 Oct;28(10):2746-54.

The publications are referred to in the text by their roman numerals. These original publications are published with the permission of their copyright holders.

ABBREVIATIONS

ART	Assisted reproductive technology
CS	Caesarean section
DI	Donor sperm insemination
dIVF	In vitro fertilisation with donor sperm
DSS	Delivery Satisfaction Scale
ET	Embryo transfer
EPDS	Edinburgh Postnatal Depression Scale
FET	Frozen embryo transfer
FDQ	Fear of Delivery Questionnaire
FSH	Follicle stimulating hormone
GHQ	General Health Questionnaire
GnRH	Gonadotrophin-releasing hormone
HCG	Human chorion gondatrotrophin
HELLP	Hemolysis- elevated liver enzymes – low platelet count syndrome
HIV	Human immunodeficiency virus
HTLV	Human T leucocyte virus
hMG	Human menopausal gonadotrophin
HPA-axis	Hypothalamus pituitary adrenal cortex- axis
HRT	Hormone replacement therapy
ICSI	Intracytoplasmic sperm injection
IVF	In vitro fertilisation
LBW	Low birth weight
LH	Luteinising hormone
NICU	Neonatal intensive care unit
OD	Oocyte donation
PAS	Pregnancy Related Anxiety Scale
POI	Premature ovarian insufficiency
PTB	Preterm birth
SC	Spontaneous conception
SES	Socioeconomic status
SET	Single embryo transfer
QOL	Quality of life

1. INTRODUCTION

Infertility affects approximately 3.5–16% couples of reproductive ages. It is defined as a failure to conceive over one year of unprotected timed intercourse (Boivin et al., 2007). In the youngest female age group (<25 years) incidence of infertility is 6% and in women aged 40–45 it is 40% (Baird et al., 2005; Rothman et al., 2013). Advanced male age also (>40 years) decreases ongoing pregnancy rates and increases risk for miscarriages (de la Rochebrochard et al., 2006).

Infertility is categorised as female-specific in 25–47% of cases, male specific in 16–26%, due to combined reasons in 18%, and due to unknown causes in 12–30% of cases (Evers 2002). The most common reasons for female infertility are ovulatory dysfunction (34%), tubal (24%), endometriosis (11%) and others such as, immunological problems, cancer chemotherapy, and genetic reasons (American Society for Reproductive Medicine (ASRM) Practice committee opinion, 2012; Lindsay and Vitrikas, 2015).

The causes of male factor infertility are unknown for almost half of the cases reported (Iammarrone et al., 2003). Sperm production may be impaired due to a number of reasons, including, hypogonadotrophic hypogonadism, chromosomal or other genetic disorders, failure of the testes to descend, cancer treatments, drugs, and environmental toxins (Skakkebaek et al., 1994; Nieschlag et al., 2010; Jungwirth et al., European Association of Urology Guidelines, 2015). In addition, testicular obstruction, retrograde ejaculation, and impotence are related to disturbed sperm transportation.

In developed countries, lifestyle factors such as female or male overweight, smoking, and anabolic steroid use negatively affect pregnancy results. The role of psychological stress as an etiological factor of infertility is controversial (Cesta et al., 2018), but it seems probable that stress can cause infertility problems by inhibiting the hypothalamus-pituitary-adrenal cortex axis (HPA axis), altering the concentration of fertility hormones, as well as cortisol, opioids, and melatonin. Stress also lowers testosterone levels with a secondary rise in LH and FSH, thus has an effect on sperm quality (Campagne, 2006; Bhongade et al, 2015).

Assisted reproductive technology (ART), including in vitro fertilisation (IVF), intracytoplasmic sperm injection (ICSI), and frozen embryo transfer (FET), is the most effective treatment for all types of infertility leading to the birth of millions of children worldwide. Multiple pregnancies with higher risk of prematurity and the associated morbidity of fetuses were a major obstacle in the early days of ART. An increasing use of single embryo transfer (SET) strategies to reduce multiple pregnancies increased the chances of additional FETs and this has increased the cumulative pregnancy rate per oocyte retrieval (McLernon et al., 2016).

Although ART is a clinically effective treatment for many forms of infertility, it is not always possible to conceive with own gametes. Donated gametes are used when own gametes are missing, the quality is bad and when a woman has no partner and donated sperm cells are needed. The phrase “third-party reproduction” refers to the use of gametes that have been donated by a third person (donor) to enable an infertile individual or a couple to become parents. Third-party reproduction can be socially, ethically, and legally complex. As donation treatments have become more common, it is necessary to consider the impact of this technology on parents, their children, and the gamete donors.

2. REVIEW OF THE LITERATURE

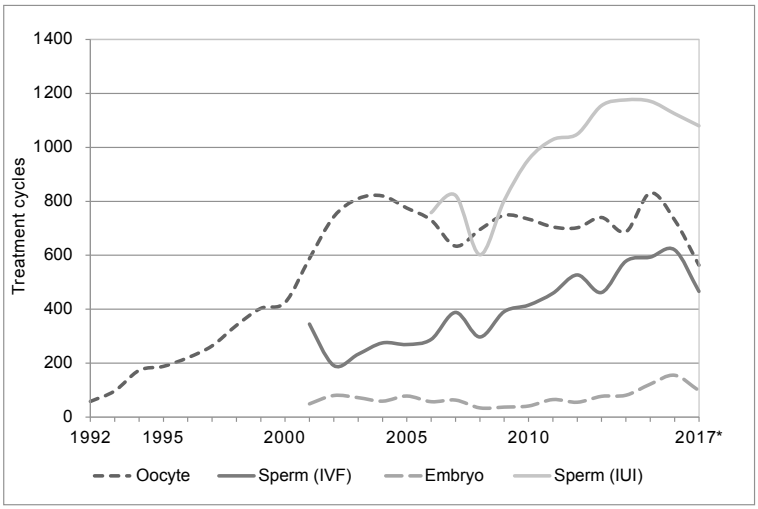
2.1. BACKGROUND AND USE OF DONATED GAMETES IN ART TREATMENT

The first successful oocyte donation (OD) treatment was performed in 1984 at Monash IVF Centre, Australia (Lutjen et al., 1984). Originally, it was developed to help women without ovarian function to conceive a child of their own. Very soon, the number of treatments started to grow and the indications for using donated oocytes expanded. Treatments now exceed 50 000 annually in Europe (de Geyter et al., 2018) and 20 000 in the USA (Society for Assisted Reproductive Technology National Summary Report, 2106). Over the three decades, OD has led to the birth of more than 200 000 children (Woodriff et al., 2014). Every year in Finland, 700–800 cycles (Figure 1.) are performed using donated oocytes, leading to live birth of 150–200 children (National Institute of Health and Welfare Statistics, 6/2018).

Donor sperm use was first documented in 1884 at the Jefferson Medical Centre, Philadelphia, USA (Brewayes et al., 1996). In 1953, the first reported infant was born after successful treatment with frozen donor sperm (Steinberger and Smith, 1973). Methods for use of fresh and frozen sperm were developed in the early 1950s (Gregoire and Mayer, 1965). In Finland, frozen donor sperm has been used in fertility treatments at least from the beginning of the 1980's. In the mid 1980's, it was estimated that 100–150 children were born every year with the use of frozen donated sperm cells (Iirola and Niemi, 1991).

Nowadays in Finland the annual number of donor inseminations (DI) exceeds 1000, leading to the birth of about 150 children (Figure 2.). In addition, about 150 children are born from IVF treatments with donor sperm (National Institute of Health and Welfare Statistics, 6/2018). No statistics are available on donor IVF treatments in Europe.

Assisted fertility treatments with donor gametes started in 1992–2017



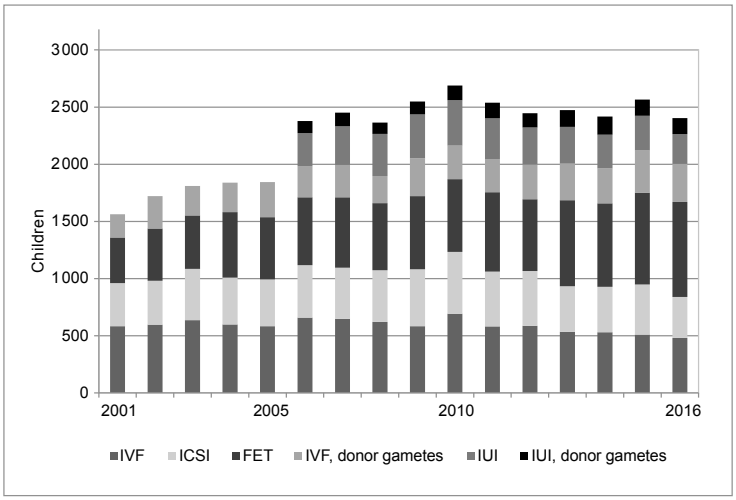
* Preliminary data

No data on donor sperm and donor embryos was collected before 2001
Data has been collected on inseminations since 2006

THL Source: THL, Assissted Fertility Treatments

Figure 1.

Children born from assisted fertility treatments in 2001–2016



THL Source: THL, Assissted Fertility Treatments

Figure 2.

2.2. LEGISLATION

Demands for donated cells are increasing as many couples are willing to choose gamete donation to overcome their infertility (Pennings, 2007). Fertility treatment with OD is allowed in most European countries, but legislation and clinical practices differ between the countries. In Germany and Norway, OD treatments are still prohibited by law. Gamete donation may be anonymous as is the case in France, Italy, Slovenia, and Spain or non-anonymous as in Finland, Sweden, and the UK. Non-anonymous donation means that donor identity is registered and can be released at a later time point to offspring.

Due to differences in legislation, lack of donors in a patient's home country, or searching for better quality care, people travel abroad to receive infertility treatments. It has been estimated that 11000–14000 patients in Europe travel outside their residence country each year to seek help for their infertility (Shenfield et al., 2010).

In September 2007, Finland enacted a law on assisted fertility treatments (1237/2006). The law states that gamete donors must register their identifying information in an official donor registry kept by the national Authority for Medico-legal Affairs in Finland (Valvira). This enables offspring born after treatment with donated gametes to obtain identifying information about the donor upon reaching the age of 18 years, but no other legal rights or obligations exist.

Donating gametes is a voluntary act and donors provide consent for the treatment which they can withdraw at any time. According to the 2007 ART law, the donor remains anonymous to the recipient couple and vice versa. Since fertility treatments with donor gametes started in Finland, it has also been possible for a recipient to choose a known person as a donor (a sister or a friend). Donors can also set limitations for the use of their gametes, for example with regard to female couples or single women. Gametes from one donor can be used as long as there are children born to no more than five families.

2.3. OOCYTE DONATION TREATMENT

Originally, oocyte donation treatment was used for patients with premature ovarian insufficiency (POI). The prevalence of POI is 0.3–1.0% in women of reproductive age and this risk increases with age. Etiological factors for POI are genetic, idiopathic, or acquired. The most common genetic causes of POI are Turner's syndrome, Fragile X premutations, and various genetic defects in steroidogenic enzymes or gonadotrophic receptors. Acquired causes can be of autoimmune origin like autoimmune polyglandular syndromes or concomitant autoimmune diseases of thyroid, pancreas, or adrenals. Enviromental causes like toxins or viruses can be potential reasons for POI,

as well as cancer treatments (cytotoxic agents, radiation, pelvic surgery), but the vast majority of POI remains idiopathic. Symptoms of POI vary according to causes from primary amenorrea and ovulation dysfunction to clear menopausal symptoms like hot flushes and secondary amenorrea (Chae-Kim and Gavrilova-Jordan, 2018). Nowadays, oocyte donation is mostly used in women with repeated IVF failure, due to poor ovarian response or suspicion of oocyte abnormality, or to overcome peri-or postmenopause.

2.3.1. MEDICAL TREATMENT

The oocyte donor undergoes ovarian stimulation with gonadotropins (FSH, hMG). Follicle growth is monitored with vaginal ultrasound and gonadotrophin-releasing agonists (GnRH agonist) or gonadotrophin-releasing antagonists (GnRH antagonist) are used to prevent premature ovulation. When the biggest follicles have reached a size of 17-20mm, the ovulation process is triggered with human chorion gonadotrophin (HCG) or GnRH agonist, to allow the oocytes to mature, and 36 hours later the oocytes are retrieved under ultrasound guidance and local anesthesia. The collected oocytes are fertilised with the sperm of the recipient's male partner, or with donated sperm, in the laboratory to produce embryos.

An embryo is replaced to the recipient's uterus either in a fresh or a frozen cycle. In a fresh cycle, the menstrual cycles of the donor and the recipient need to be synchronised. The recipient's endometrium is prepared for embryo transfer (ET) using either a GnRH analogue together with estradiol pills, patches or transcutaneous gel, or merely estradiol medication. Ultrasound scan is used to assess the thickness and configuration of the endometrium. Progesterone is usually started on the day of donor oocyte collection or 4–6 days before FET. If pregnancy is confirmed, hormonal replacement therapy (HRT) continues until 10-12 pregnancy weeks.

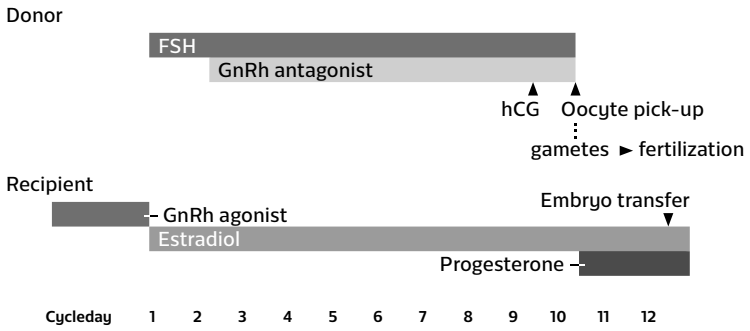


Figure 3 Synchronisation of donor and recipient cycles in oocyte donation treatment

2.3.1.1. Risks related to medical treatment

Donors are exposed to hormonal treatment and potential complications related to oocyte retrieval. In a recent Finnish study, the most common complication noted was hyperstimulation in 5% of the treatment cycles (Söderström-Anttila et al., 2016). Other complications (intra-abdominal bleeding, infection, allergic reaction, bladder injury, cysts) related to egg collection were rare (0.2-1.0%). About 16% of donors experienced physical side effects (pain, bloating, menstrual changes, nausea) and 2% psychological side effects (Söderström-Anttila et al., 2016). In two other studies the complication rate has been <1% (Bodri et al., 2008; Maxwell et al., 2008).

In a follow up study from the United States, 16 % of past donors reported long-term physical symptoms (infertility, cysts, fibroids, weight gain) and 20% some psychological consequences afterwards (Kenney and McGovan, 2010). In a Finnish study of 400 donors, over 90% experienced no harmful long-term general health effects. The treatment has not been found to have any negative effects on the donors' own fertility (Kramer et al., 2009; Stoop et., al 2012; Söderström-Anttila et al., 2016).

2.3.2. PREGNANCY OUTCOME

Treatment with donated oocytes has been associated with the highest pregnancy rates among all types of ART. According to the last statistics from Finland, pregnancy rate per embryo transfer (ET) was 48% and live birth rate 33% (National Institute of Health and Welfare Statistics, 6/2018). The pregnancy rate after fresh ET was 50% in Europe and 50% in the USA (Society for Assisted Reproductive Technology National Summary Report, 2107; de Geyter et al., 2018). After frozen embryo transfer (FET) the rate was 38% in Europe and 41% in the USA. In Finland, the great majority of OD embryo transfers are SETs. In Europe, every 4th pregnancy is a multiple pregnancy starting from ETs with two or three embryos (Society for Assisted Reproductive Technology National Summary Report, 2107; de Geyter et al., 2018).

The reason for the high success rate is the use of high-quality oocytes from younger women. A recipient woman's uterus can usually be prepared with hormones for embryo implantation, irrespective of the age of the recipient and therefore pregnancy results are similar in different age groups. Furthermore, the results are not dependent on the indication for treatment (Gupta et al., 2012). Factors that may decrease probabilities for pregnancy are a thin (< 5mm) endometrium (Arce et al., 2014), recipient's overweight (Bellver et al., 2013) and male partner's low sperm quality (Girsh et al., 2008).

2.3.3. OBSTETRIC AND PERINATAL OUTCOMES

Studies on obstetric outcomes have revealed an increase in incidence of pre-eclampsia and pregnancy induced hypertension (Serhal et al., 1989; Pados et al., 1994; Söderström-Anttila et al., 1998; Storgaard et al., 2016). Hypertensive disorders of pregnancy (pregnany induced hypertension, chronic hypertension, pre-eclampsia, and HELLP syndrome) is one of the major causes of maternal morbidity and mortality and may lead to stillbirth, preterm, or small-for-gestational-age babies (Sibai et al., 2005; Backes et al., 2011; Pennington et al., 2012). Furthermore, studies have revealed higher incidence of low birth weight (LBW), preterm birth (PTB), and caesarean section (CS) in OD pregnancies than autologous IVF pregnancies (Söderström-Anttila et al., 2001; Malchau et al., 2013; Nejdet et al., 2016). A recent systematic review and meta-analysis on obstetric and neonatal complications in OD pregnancies versus conventional IVF/ICSI found that the risk for pre-eclampsia was elevated both in singleton (AOR 2.1, CI 1.42–3.15) and in multiple pregnancies (AOR 3.31, CI 1.61–6.80). Furthermore, the risk for PTB and LBW was higher in singletons (AOR 1.75, CI 1.39–2.20) and multiple pregnancies (AOR 1.53, CI 1.16–2.01), respectively (Storgaard et al., 2016). Savasi et. al., (2016) reported similar results in their review article.

One explanation for the increased obstetric complications in OD pregnancies is immunological maladaptation, which in turn causes placenta disorders like villitis of unknown etiology (Styer et al., 2003), chronic deciduitis (Gundogan et al., 2010), chronic intervillositis (Boyd and Redline 2000), and maternal floor infarction (Katzman and Genest, 2002). In addition, in an animal work, hormonal preparation of endometrium may suppress trophoplastic remodeling of the uterine spiral arteries and have an impact on blood circulation (Aberdeen et al., 2012).

Most OD recipients are older than 40 years, and nulliparity and multiple pregnancies further increase pregnancy risks. In a recent French study, recipients older than 50 years did not differ in pregnancy complications from recipients aged 45–50 years although complication rates were high in both groups (Guesdon et al., 2017). Infertility and ovarian insufficiency have also been suggested to be explanatory factors for higher obstetric risks (Krieg et al., 2008).

The risk to give birth with CS is higher after OD treatment than after conventional IVF/ICSI (OR 2.20; CI 95% 1.85–2.60) or after a spontaneous pregnancy (OR 2.38; CI95% 2.01–2.81) (Storgaard et al., 2016). Indications for CS are seldom reported in the studies, but it might have to do with planned caesareans. Furthermore, the risk of having a postpartum hemorrhage in a singleton OD pregnancy is 4–17%, which is higher than in IVF/ICSI pregnancy with autologous oocytes (Storgaard et al., 2016).

Women should be screened carefully before treatment to avoid obstetrical complications and SET is recommended in OD programs (Clua et al., 2012; Savasi et al., 2016). There are only a few studies available on long-term

physical consequences later in life for a child or mother after an OD pregnancy. Williams et al. (2018) recently reported no overall risk of cancer in a cohort of 12 000 children born after donor ART.

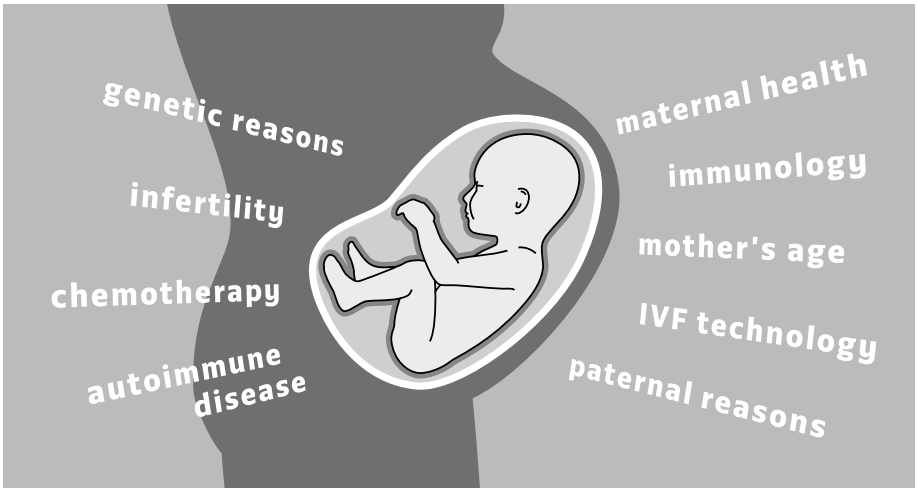


Figure 4. Factors affecting obstetric and perinatal outcome of oocyte donation pregnancies

2.3.4. OOCYTE BANK TREATMENT

Due to improvements in cryopreservation of oocytes (vitrification), human oocytes can be stored safely for infertility treatments. In 2014, the American Society for Reproductive Medicine (ASRM) stated that oocyte freezing is not to be regarded as an experimental method (ASRM Practice committee guideline, 2013) and nowadays OD treatments with vitrified oocytes are exceeding rapidly. The first experiences from a commercial donor egg bank was published by Akin et al in 2007. A recent retrospective study of 30 000 donor cycles found that fresh donor oocytes produced better live birth rates than frozen oocytes (51% vs. 40%) (Kushnir et al., 2018). Studies have shown no differences in birth weight and congenital malformations when pregnancies had started with fresh oocytes compared to conventional IVF/ICSI treatment and spontaneous conception (SC) (Chian et al., 2008; Noyes et al., 2009; Cobo et al., 2014). Seshadri et al. (2018) found no significant differences in obstetrical outcomes after using vitrified donor oocytes and fresh autologous oocytes. Studies on usage of vitrified donor oocytes and longterm consequences for the child are not yet available.

2.3.5. ASPECTS RELATED TO AN OOCYTE DONOR

2.3.5.1. Donor profile

World-wide there are different types of oocyte donors depending on the legislation in different countries. Non-patient donors can be voluntary, altruistic donors who donate without financial compensation, known donors (donating to a known recipient), or commercial donors receiving a monetary reward (Purewal and van den Akker, 2009). Commercial donors are common in the USA, but monetary compensation is prohibited in many European countries. Since 2007, Finnish oocyte donors are reimbursed for their expenses and inconvenience of the treatment with an extra payment of 250€. Patient donors are women undergoing their own IVF treatment (egg sharing), donating some of the collected oocytes to the OD program in order to subsidise their own treatment.

Socioeconomic and fertility-related characteristics of the oocyte donors vary across European countries. According to an epidemiological study from Europe, the mean age of the oocyte donors was 27 years, 49% were employed, 16% unemployed, and 15% were students (Pennings et al., 2014). Pennings et al. (2014) concluded: "The general oocyte donor profile was well-educated woman living with her partner and child/children". Typical characteristics for a Finnish oocyte donor are that she is highly educated, cohabiting or married, and motivated by pure altruism (Pennings et al., 2014). In a large cross-sectional study of all oocyte donors at the Väestöliitto's clinics during more than 20 years, the general profile and the mean age among donors before and after the 2007 ART act were similar. However, there was a tendency towards younger and more childless donors and more students and unemployed donors after 2007 (Söderström-Anttila et al., 2016).

2.3.5.2. Motivation to donate

Most oocyte donors have more than one motivation for donating their oocytes. Altruistic donors are purely motivated by their wish to help others (Söderström-Anttila, 1995; Purewal and van den Akker, 2009; Svanberg et al., 2012). Commercial donors are motivated by a wish to help but also by financial gain (Purewal and van den Akker, 2009). Other reasons for commercial donors have been a wish to get information about their own fertility (Jordan et al., 2004) and a wish to transmit their genes (Kalfoglou and Gittelsohn, 2000; Jadva et al., 2011). Known donors also donate to help their friend or a family member (Raoul Duval et al., 1992; Kalfoglou and Gittelsohn, 2000; Yee et al., 2007). Altruism and self-interest are motivations for patient donors, who believe it is a win-win situation for all parties (Ahuja et al., 1997; Blyth, 2004).

According to the before-mentioned study from 11 European countries, the motivations of the oocyte donors were pure altruism 48%, altruism and financial 34%, purely financial 11%, own treatment and altruism 6%, and own treatment 2% (Pennings et al., 2014). The highest level of altruism was found in France (100%), Finland (89%), and Belgium (86%).

2.3.5.3. Experience of donating oocytes

In general, oocyte donors' experiences are reported to be positive, medical procedures are well tolerated, and satisfaction after donation is excellent (Bracewell-Milnes et al., 2016). Although there are some differences between donor types, high levels of satisfaction among all donors have been reported in several studies (Söderström-Anttila, 1998; Jordan et al., 2004; Purewal and van den Akker, 2009; Kenney and McGowan, 2010; Skoog Svanberg et al., 2013). In Finland, 99% of past donors expressed high satisfaction with their decision to donate and 95% would recommend it to other women. Only 1% (4/428) of the donors had later regretted participation. Of the donors, 10% reported that they would have liked more support before and after the donation (Söderström-Anttila et al., 2016).

A systematic review of experiences of past oocyte donors has shown that the majority were interested in knowing the pregnancy outcome and even having contact with the offspring (Purewal and van den Akker, 2009). In a recently published Finnish study of oocyte donors reported that most voluntarily registered and open-identity donors welcomed or were neutral to potential contact with their donor offspring but were slightly more cautious towards contact between their own children and a donor-conceived child (Miettinen et al., 2019).

2.4. SPERM DONATION TREATMENT

Donor sperm has been used to overcome the challenges faced due to severe male factor infertility, and by female same-sex couples and single women. Azoospermia is defined as an absence of sperm cells in an ejaculate in at least two separate sperm analysis. Azoospermia is found in 1% of all men and 10–15% of infertile men. Endocrine causes for azoospermia/severe oligotsoospermia are hypogonadotrophic hypogonadism (Kallmann's sdr, pituitary trauma or tumour, use of anabolic steroids), hyperprolactinemia, and androgen resistance due to genetic reasons. Other causes for azoospermia/severe oligotsoospermia are testicular in origin, including varicocele, undescendended testicles, mumps orchitis, toxins and medications, and chromosomal disorders, most commonly Klinefelter

syndrome or y-chromosome microdeletions. Retrograde ejaculation and obstructive reasons like cystic fibrosis may also cause this problem (Coccuza et al., 2013).

A male donor gives sperm samples several times (10–12) to be stored frozen. On some occasions, fresh donations are made at the time of female recipient's ovulation or oocyte collection in connection with IVF. There are no medical risks for the sperm donor involved in the process.

There are three different types of sperm banks according to their operation subject, administrative structure, and budget source. Sperm banks may be mainly national like in the UK and France, mainly public like in Japan, and mainly commercial like in the USA and Denmark, or mixed like in Finland. Apart from providing donor sperm for fertility treatments, banks restore sperm for fertility preservation for cancer patients, as well as for high-risk professionals, transsexuals, and for men before vasectomy.

2.4.1. PREGNANCY OUTCOME

In Finland, the number of treatments using donor sperm has been increasing during the last decade. In 2006, 758 DI inseminations were carried out compared with 1080 treatments in 2017 (National Institute of Health and Welfare Statistics, 6/2018). The success rate of the treatment is dependent on the age of the recipient woman. Insemination resulted in pregnancy in 15–18% of treatments performed in women < 40 years of age compared with 5–12% in those over 40 years of age. Comparable results were reported in Europe where almost 50 000 AID cycles were done in 2014 and delivery rate per cycle was 12% (de Geyter et al., 2018).

In Finland in 2016, 620 IVF treatments with donor sperm were started, leading to a live birth rate of 23% (National Institute of Health and Welfare Statistics, 2017), and 1125 donor inseminations lead to a live birth rate of 12%.

2.4.2. OBSTETRIC AND PERINATAL OUTCOME

Information about obstetric and perinatal outcomes after the use of donor sperm in ART is limited. Some concerns have been raised when cryopreserved sperm have been used in DI and donor IVF treatments. Perinatal outcome might be adversely affected by mechanisms such as oxidative stress on sperm cells during cryopreservation, which increases the risk of DNA fragmentation (Ribas-Maynoy et al., 2014). Furthermore, use of donor sperm is an immunologic challenge for a woman and increases the risk for pre-eclampsia compared with using a partner's sperm (OR 1.63, 95% CI 1.36-1.95) (Gonzalez-Comadran et al., 2014). The underlying mechanism remains unclear.

A systematic review comparing donor sperm neonates and spontaneously conceived neonates found similar prevalence of LBW, PTB, and birth defects in both groups (Adams et al., 2017). The same researchers analysed almost 300 000 birth outcomes of children born after DI in 1996–2002 in Australia. Infants born after the use of donor sperm did not differ from their spontaneously conceived controls in mean birth weight, LBW, preterm delivery, or small or large for gestational age. They were, however, more likely to be born preterm with LBW, but these findings were partly attributable to multiplicity (Adams et al., 2017). A study from France reported no differences in birth defects and chromosomal abnormalities between donor sperm and SC children accordingly (Lansac and Royere, 2001). Recently Gerkowicz et al. (2018) published a study of perinatal outcome in donor IVF cycles compared with non-donor IVF cycles and found that outcomes were clinically similar, but LBW delivery was slightly lower in donor sperm cycles.

2.4.3. ASPECTS RELATED TO A SPERM DONOR

General opinions in Western societies towards sperm donation are positive and it regulates men's willingness of seeking to be a gamete donor. A study from Belgium asked a thousand male students about their attitudes towards sperm donation. Of respondents, 34% would consider donating sperm, 86% had positive attitudes, and 14% had neutral or negative attitudes (Provoost et al., 2018).

2.4.3.1. Demographics and motivation to donate

According to a systematic review, the demographic characteristics of sperm donors and persons considering donating sperm did not much differ from those who were against donating (Van den Broeck et al., 2013). Freeman et al. (2016) collected information on donors (n=383) who had registered online in a connection website for donors and recipients (Donor Sibling Registry). Of the donors, 80% were heterosexual, the mean age was 36 years, 59% had a university degree, 70% were employed full-time, and about 50% were single and childless. In another study gathering information of open-identity sperm donors from all fertility clinics in Sweden, the mean age was 34 years, 42% were married and 18% lived in a relationship, 68% had an university education, and 65% had biological children (Skoog Svanberg et al., 2013).

Contradictory results have been found concerning motivations to donate (Van den Broeck et al, 2013). Altruism, a pure wish to help others, was the most significant motive to take part. In addition, financial compensation, investigating their own fertility status, and appreciation of own genes served as motivating factors for actual donors (Daniels et al, 2005; Riggs and

Russel, 2010; Jadva et al, 2011). Studies have found that a minority of sperm donors would have wanted their partners to take part in the decision-making process to donate. Partner involvement was welcomed in general, but men thought that they did not need their partner to provide consent for sperm donation (Lalos et al., 2003; Thorn et al., 2008).

2.4.3.2. Experience of donating sperm cells

There is little information available on how sperm donors have experienced the process to be a gamete donor. Skoog Svanberg et al. (2013) reported that the overall experience of open-identity donors was positive. Those donors who were ambivalent about the donation were less satisfied. Very few knew the outcome of the donation. However, most donors were satisfied with the information received from the staff. The same researchers have reported earlier that of potential donors, 50% said they would want to know the outcome of the treatments (Svanberg et al., 2003).

2.5. PREGNANCY AS A PSYCHOLOGICAL PROCESS

For most mothers, pregnancy and giving birth to a child is a powerful emotional and physical experience. During pregnancy, parents prepare for parenthood and create a bond with the infant (Broden, 2006). Transition to motherhood has been found to start at a very early stage of pregnancy and to be completed months after the birth of the child (Darvill et al., 2010). The psychological process in the transition to motherhood has two themes: a pregnant woman reorganizes her self-identity to be a mother and develops a relationship with the fetus (Broden, 2006; Raphael-Leff, 2001). Becoming mother explores her experiences of motherhood, most importantly with her own mother. In addition, she explores expectations of surrounding society for the role of motherhood (Stern, 1995).

To be able to form a relationship with the fetus, a woman has to imagine an unborn infant as a separate individual from herself (Raphael-Leff, 2001). It is a continuum from the woman's attention on her own body and physical changes to the fetus and the real baby (Raphael-Leff, 2001). As soon as a pregnant woman starts to prioritize the baby's needs above her own, she also sees herself as a mother (Fonagy & Target, 1996).

For men the psychological process to fatherhood starts also during pregnancy but it is fundamentally different when fathers do not become pregnant. They feel emotional distance with the fetus but at the same time a desire to form an emotional bond with the infant (Genesoni and Tallandini, 2009). Father identity is based on their experiences and expectations of fathering from their surrounding environment. Furthermore, men have to redefine themselves with the relationship with their partner (Genesoni and Tallandini, 2009).

2.6. FEAR OF CHILDBIRTH AND PREGNANCY-RELATED ANXIETY

Mild to moderate fear-of-childbirth and pregnancy-related anxiety is common and can be considered as normal (Areskog et al., 1981; Melender 2002). For 6–14% of mothers, fear-of-childbirth becomes a problem and it appears to have increased in recent years (Areskog et al., 1981: Söderquist et al., 2004; Rouhe H et al., 2009; O'Connell et al., 2017). Moderate fear-of-childbirth and pregnancy-related anxiety are more common among primiparous than parous women (Areskog et al., 1982; Alehagen et al., 2001; Saisto et al., 2001; Johnson and Slade, 2002; Söderquist et al., 2004).

The background of fear of childbirth can be fear of pain, psychological (related to personality, previous traumatic events, or fear of future parenthood) or it can be due to lack of support or economic uncertainty or it can orginate from previous childbirth experiences.

Fear of giving birth to a child is a special form of anxiety and distress (Rouhe et al., 2009). Pregnancy-specific anxiety is concern about fetal normality and well-being, the potential for the childbirth to damage the infant, and being separated from the baby. General anxiety and depression were strongly associated with fear of childbirth in an unselected group of pregnant women (Saisto et al., 2001; Laursen et al., 2008; Rouhe et al., 2009; Storksen et al., 2012). Other predisposing factors for fear-of-childbirth are psychiatric disorders, negative life experiences, lack of social support, unemployment, and dissatisfaction with partnership (Areskog et al., 1982; Saisto et al., 2001; Söderquist et al., 2004; Rouhe et al., 2011; Dencker et al., 2018). A recently published review article of fear of childbirth concluded that primiparous and multiparous women have separate reasons for fear but similar levels of fear of childbirth (Dencker et al., 2018). The most common reasons for fear-of-childbirth in parous women are previous complicated or operative deliveries (Saisto et al., 1999; Storksen et al., 2013).

Previous infertility itself does not appear to increase fear-of-childbirth, but a long duration of infertility is a risk factor for severe fear (Saisto et al., 1999; Poikkeus et al., 2006). In some studies, women conceiving through ART have reported higher anxiety about the outcome of pregnancy compared with spontaneously conceiving women (McMahon et al., 1997; Hammarberg et al., 2008). However, a large Finnish cohort study found no differences in fear of childbirth in women conceiving after ART or spontaneously (Poikkeus et al., 2006).

Fear-of childbirth may complicate and prolong labour (Adams et al., 2012). It may also increase posttraumatic stress disorder (Söderquist et al., 2009) and risk of depression in the postpartum period (Räisänen et al., 2013). Furthermore, fear of childbirth may impair maternal attachment with the fetus during pregnancy (Lindroos et al., 2015).

Studies on fear-of-childbirth among women who have conceived with donated gametes have thus far been lacking.

2.7. CHILDBIRTH EXPERIENCE

Sense of security and control, experienced level of labour pain and analgesia, personal support, support from hospital personnel, information given, and participation in decision-making contribute to the childbirth (Green et al., 1990; Waldenström, 1996; Hodnett et al., 2002; Hodnett et al., 2007). Unplanned medical interventions during childbirth and operative delivery are strongly related to maternal dissatisfaction of delivery (Waldenström 1996; Ryding et al., 1997; Waldenström et al., 2004; Wiklund et al., 2008). Low educational level, poor social support, dissatisfaction with the partnership, fear-of childbirth, and most of all intolerable pain during the childbirth, increase the risk of dissatisfaction of childbirth (Saisto et al., 2001; Waldenström et al., 2004; Waldenström et al., 2006).

Very little is known about the childbirth experience of women conceiving with ART. These few studies suggest that the childbirth experience is as good as or more satisfactory among ART women that spontaneously conceiving women (van Balen et al., 1996; Poikkeus et al., 2014). This implies that a demanding infertility process may help mothers to deal with unexpected and complicated delivery outcomes (Repokari et al., 2006). Prenatal depression and fear of childbirth may increase the risk for mothers' dissatisfaction of childbirth. Among women conceiving with ART, these risks have been shown to be lower or similar to those experienced by spontaneously conceiving women (Klock and Greenfeld 2000; Repokari et al., 2005).

ART conceiving women are more vulnerable for the potential risks for their long-wanted child (Hjelmstedt et al., 2003). Furthermore, due to delivery complications ART women reported more negative experiences, such as feeling out of control, suffering from separation from the baby, and postoperative pain (Hammarberg et al., 2008). Dissatisfaction with delivery associates with difficulties feeding the infant and anxiety about infant care (Rowe-Murray et al., 2001; Waldenström et al., 2004; Fisher et al., 2012).

2.8. MENTAL HEALTH OF PARENTS AFTER ART

Parental psychological adjustment is associated with children's psychological development and is therefore an important aspect of family functioning (Blake et al., 2014). Prenatally depressed mothers can experience negativity towards the pregnancy and difficulties in developing fetal attachment (Seimyr et al., 2009). Depressive mothers behave less positively towards their newborn children than do women with no depression (Dix et al., 2014). Anxious mothers are found to behave less warmly, less positively and being more critical towards the child than non-anxious mothers (Whaley et al., 1999).

The influence of a father's psychological adjustment on family functioning and the child has not received the same attention as that of a mother's. A meta-analytic review concluded that psychological adjustment on a father's parenting has the same effect as that of a mother's (Wilson and Durbin, 2010).

Pregnancy after infertility brings great joy to the parents, but it may still be problematic. Infertility and ART treatments cause distress for many couples (van Balen et al., 1996; McMahon et al., 1997; Verhaak et al., 2005). Infertility is known to have a greater emotional impact on women than on their spouses (van Balen et al., 1996, Hjelmstedt et al., 1999). Negative feelings about infertility have been reported to persist even when they have become parents (Hjelmstedt et al., 2003; Verhaak et al., 2007).

ART women are at increased risk for anxiety, depression, and psychological distress during the pregnancy (van Balen et al., 1996; McMahon et al., 2013; Garcia-Blanco et al., 2018). However, there are reports of no difference in levels of depression and anxiety, or the levels have been lower, among ART women compared to spontaneously conceiving women (Klock and Greenfeld, 2000; Repokari et al., 2005; Punamäki et al., 2006; Hammarberg et al., 2008; Gourounti et al., 2016; Salih Joelsson et al., 2017). Infertile women may idealise the pregnancy (Hammarberg et al., 2008), but may also find their pregnancy more stressful for fear of pregnancy risks or losing the infant (Hjelmstedt et al., 2003). Despite pregnancy risks, women who conceived through ART perceived their pregnancies to be more rewarding and they had less worries about their body changes, child's gender, and loss of freedom in their lives than controls (Hjelmstedt et al., 2003; Klock and Greenfeld, 2000; Gourounti, 2016).

Women with earlier depression or distress have higher risks for postpartum depression. Some studies have found that women who had received infertility treatments were at greater risk for postpartum depression (McMahon et al., 1997; Monti et al., 2008), but other reports contradict this (Klock and Greenfeld, 2000; Lynch et al., 2014). One study of mother's adjustment to parenthood found significantly increased risk for parenting difficulties among women following ART (Fisher at al., 2012). Some have found instead no differences or fewer adjustment difficulties between ART and SC mothers (Repokari et al., 2006; Hammarberg et al., 2008; Jongbloed-Pereboom et al., 2012).

Knowledge of psychological well-being of fathers during pregnancy and thereafter is limited (Hammarberg et al., 2008). Van Balen et al., 1996 found that infertile fathers experience more joy about their wives' pregnancy than their fertile controls, but at the same time they considered the pregnancy experience to be stressful. Two studies have reported higher general anxiety antenatally among infertile men compared with fertile controls (Gibson et al., 2000; Glazebrook et al., 2001). Hjelmstedt et al. (2003), in turn, found lower levels of somatic anxiety and indirect aggression among infertile men than their fertile controls, but at the same time infertile men were more anxious

about the progress of their partner's pregnancy. Lower levels of antenatal depressive symptoms have been reported among infertile men compared with spontaneously conceiving controls (Glazebrook et al., 2001; Repokari et al., 2006) and these symptoms remained low also in the post-partum period. ART father's adjustment to parenthood was similar to fathers whose partners conceived spontaneously (Hammarberg et al., 2008).

2.9. MENTAL HEALTH OF COUPLES CONCEIVED WITH DONATED GAMETES

Parents who conceive with donated gametes have a different route to parenthood because they have experienced infertility and undergone infertility treatments, possibly for several years. They have gone through an intense deciding process to proceed to gamete donation. Furthermore, they may have feelings of grief and loss because the child is not their shared genetic offspring.

Women waiting for OD treatment experience emotional, sexual, and QOL impairments (Chen et al., 2004; Carter et al., 2011). Indekeu et al. (2012) compared male well-being and motives for parenthood among men starting treatment with insemination using their own sperm or donor sperm and they found that men in donor sperm treatment had higher expectations of parenthood, lower self-esteem, and more guilt.

General parenting stress level among donor conceiving parents has been reported to be in line with that of spontaneously conceived parents (Blake et al., 2014). Most psychological studies of gamete donation families have focused on the parent-child relationship or on children's psychological well-being from early childhood to adolescence (Golombok et al. 2011, Blake et al., 2014). Studies have shown that these children and parents are well-adjusted in all family types examined (sperm donation, OD, and surrogacy families). Absence of a genetic link between a parent and the child was not associated with negative relationship between a parent and a child (Golombok et al., 2017; Zadeh et al., 2018). A follow up study of over 10 years from UK showed that majority of donor conception parents' reported normal levels of depression, anxiety, and parenting stress (Blake et al., 2014).

Issues of disclosure with the donor conceived child and closest family members has an influence on parental psychological well-being. Several studies have reported no differences in parental psychological well-being between non-disclosing and disclosing families (Nachtigall et al., 1997; Golombok et al., 2002; Lycett et al., 2004). However, there are also other contrasting reports. In one British study, secrecy was associated with higher levels of psychological functioning for the fathers (Blake et al., 2014). Family secrets may cause higher levels of anxiety (Lane and Wegner, 1995) but on

the other hand disclosing the secret may be psychologically damaging (Caughlin et al., 2009). Parental disagreement over what to tell the child about the donor conception did not increase parental stress when the child was young, but it became relevant when the child grew older (Gebhardt et al., 2017). Couples conceiving with donated gametes have reported satisfaction with their relationship and it is considered as support system for parents (Blake et al., 2012; Sydsjö et al., 2014).

2.10. INFORMING THE CHILD ABOUT THE WAY OF CONCEPTION

In the early days of donor gamete treatments, children conceived with donated gametes had generally not been told about the nature of the conception. The assumption was that they would not benefit from knowing of their genetic origin (Golombok et al., 1996; Brewayes et al., 1997). In the 1990's attitudes started to shift towards openness, which was partly based on experiences of both adult offspring and adoptive children (Turner and Coyle, 2000). Counselling practice moved slowly from secrecy to favouring openness (Daniels and Taylor 1993). In 2004, The Ethics Committee of the American Society for Reproductive Medicine (ASRM) noted that professional opinion has moved towards acceptance of identity disclosure to children and changed their recommendation from anonymous donation in 1993 to accepting non- anonymous donation. The Human Fertilisation and Embryology Authority (HFEA), expressed its opinion in favour of disclosure in 2008 (Crawshaw, 2008).

Finally, a trend towards open-identity gamete donation led several countries to introduce legislation allowing only identifiable donors (Frith and Blyth, 2007). Sweden was the first country to introduce open-identity legislation in 1985. Later, various systems of open-identity donation were carried out in the USA, Austria, Switzerland, Australia, The Netherlands, New Zealand, and the UK (Daniels et al., 1995; Scheib et al., 2003; Lycett et al., 2005; Janssens et al., 2006; Lalos et al., 2007). Finland enacted its ART law in September 2007. Fertility treatment using gametes from open-identity donors provides donor offspring the right to information about his/her genetic origin at the age of 18 years (1237/2006).

Studies have shown an increasing frequency of parents that have decided to share information about the donor treatment with their child (Gottlieb et al., 2000; van den Akker, 2006; Lalos et al., 2007; Isaksson et al., 2012; Applegarth et al., 2016; Tallandini et al., 2016). Parents, donors, and donor offspring may have different interests and opinions on disclosure issues.

2.10.1. FACTORS INFLUENCING DISCLOSURE OF DONOR CONCEPTION

To disclose the donor conception or not may be the most challenging question for the parents when considering treatment with donor gametes (Daniels et al., 2011). The disclosure decision is not an one-time act, but an ongoing process.

In a systematic review, Indekeu et al. (2013) reported several factors contributing to parental decision-making in disclosing donor conception, such as parents own beliefs and values, interpersonal factors (couple dynamics, grandparents' attitudes, family composition), an impact of health care staff and support groups, and sociocultural factors. However, the impact of legislation on disclosure is unclear. Younger parents' intention to disclose was higher than that of older ones after OD treatments (Baetens et al., 2000; Hahn and Craft-Rosenberg, 2002). The impact of social class and education level on the parents' decision to inform their child or not about the donor conception is inconclusive. According to some researchers, no association has been found (Nachtigall et al., 1997; Greenfeldt and Klock, 2004). Brewaeys et al. (1997) observed that higher education favours disclosure, but contradictory results have also been reported (Rosholm et al., 2010). In a lower socioeconomic context, nondisclosure is more common if male infertility is present (Brewaeys et al., 2005).

According to some studies, intention to tell the child about the use of donated sperm has not shown any gender differences between mothers and fathers (Brewayes et al., 1997; Nachtigall et al. 1997). However, others have observed that women tend to be more open than men with regard to disclosure both to the offspring and to other people (Daniels et al, 1995; Klock and Greenfeld, 2004; Mac Dougall et al., 2007; Shehab et al., 2008; Isaksson et al., 2011). Parents who are feeling uncomfortable with their decision to use donor gametes to resolve their infertility problem, are less likely to inform their child (Nachtigall et al 1997; Daniels and Thorn 2007; Laruelle et al., 2011).

In several studies, parental values and beliefs guide their decision to disclose or not (Brewaeys et al., 1997; Baetens et al., 2000; Hahn and Craft-Rosenberg, 2002; Murray and Golombok 2003; Golombok et al., 2004; Greenfeld and Klock, 2004; Lalos et al., 2007; Daniels and Thorn, 2007; Daniels et al., 2011; Isaksson et al., 2011; Yee et al., 2011). Those who intend to disclose or have done so already, reported that it is the child's right to know, they value the principle of honesty in building the parent-child relationship, they think that not knowing would be harmful for the child's self-esteem and create shame. Furthermore, they think it may be difficult to maintain secrecy and to avoid accidental disclosure. Non-disclosers want to protect the child from the risk that information might have a harmful effect on family functioning, or they do not see any benefit in telling, and want to maintain their right for privacy.

Disagreement of the disclosure issues within the couple can lead to conflict and delayed decision-making (Daniels et al., 1995; Shehab et al., 2008). The highest level of agreement was found among disclosing parents (Readings et al., 2011). A 14-year follow-up study showed that once the decision was made, it was maintained over the years (Daniels et al., 2009).

Research has revealed higher rates of disclosure to offspring among OD parents compared to those conceived using donor sperm (Klock and Greenfeld, 2004, Murray et al., 2006; van den Akker, 2006; van Berkel et al., 2007). The possible explanation for this is that after OD treatment, pregnancy and delivery compensate for the absence of a genetic link between mother and child (Greenfeld et al., 1998). Men are generally less likely to talk about their infertility and men who need donor sperm are more secretive and thus more often choose non-disclosure compared with OD recipients (Isaksson et al., 2011).

Recipient couples who have more information about the donor might more often share the information with offspring about his/her genetic origin (Cook et al., 1995). Parents may be worried that lack of information could be harmful for the development of the child (Cook et al., 1995; Brewaeys et al., 1997; Lycett et al., 2005). Some parents-to-be might not always wish to have information about the donor and therefore choose an anonymous donor (Golombok et al., 2004) and those who have already decided to disclose, are in favour of an open identity donor (Brewaeys et al., 1997, 2005).

One of the main concerns in the disclosure decision process has been at which age to share the information with the child. Parent's view on an appropriate age to disclose has been 7-11 years (Readings et al., 2011). There is an advantage in disclosing early because then they have "always known" and they respond neutrally and with curiosity (Scheib et al., 2005; Blake et al., 2010). Late disclosure during adolescence or adulthood might raise negative feelings, distrust, and anger among offspring (Daniels et al., 2005; Jadva et al., 2009).

Several studies have reported that parents have told at least one other person about the donor conception although they have decided not to tell the child (Baetens et al., 2000; Gottlieb et al., 2000; Murray and Golombok, 2003; Klock and Greenfeld, 2004; Lycett et al., 2005). Family support is regarded to be important and it is easier to inform the child when family members are informed about the way of conception (Shehab et al., 2008). However, other studies reported that parents were not influenced by their families (Hahn and Craft-Rosenberg, 2002). Reasons for not telling other people were to protect the offspring from being treated differently or need for privacy. Reasons for telling were wanting to be honest, to discuss psychological issues, and looking for support (Baetens et al., 2000; Blyth et al., 2010). Maternal family members were more likely to know about the donor treatment than paternal (MacCallum and Golombok, 2007).

2.10.2. PARENTAL DISCLOSURE INTENTIONS AND REALITY

Studies of parental decisions regarding information sharing with offspring have mainly been based on one time point. Follow up studies of parental decision-making are scarce. Studies from the 1990's showed that only 0–3% of parents who conceived with donor sperm, had told the child aged 5–6 years and 75% had decided not to tell (Golombok et al., 1996; Brewayes et al., 1997). Later, research showed that parents started to be more open, and 11–15% had told the child by the age of 15 (Gottlieb et al., 2000; Lycett et al., 2005; Isaksson et al, 2012). Reports from USA and New Zealand showed that 32–35% of parents of AID offspring had told their child (MacDougall et al., 2007; Daniels et al., 2009). In the follow-up study 14 years apart, where parents had decided to tell or not, none had changed their minds. In situations with disagreement between partners or uncertainness regarding what to do, the majority favoured not telling (Daniels et al., 2009).

According to a review article, oocyte recipient couples (26–70%) are more open about the donor conception than sperm recipient couples (10–35%) (van den Akker, 2006). In a Finnish study from 1998, 38% of OD parents intended to disclose the way of conception to their child (Söderström-Anttila et al., 1998). There are conflicting findings regarding disclosure when the donor has been known to the recipient couple. Some studies showed preference for disclosure (Baetens et al., 2000; Yee et al., 2007) while others reported opposite views (Klock and Greenfeld et al., 2004; Laruelle et al., 2011).

Table 1 *Studies examining parental disclosure decision after donor insemination (DI) and oocyte donation (OD)*

Reference	Sample	DI/ OD	Children's age	Told (%)	Plan to tell (%)	Uncertain (%)	Plan not to tell (%)
Golombok et al. (1996)	111 mothers	DI	4–8	0	12	13	75
Rumball and Adair (1999)	78 couples 23 mothers 2 fathers	DI	1–8	30	54	4	12
Gottlieb et al. (2000)	122 couples	DI	1–15	13	51	13	23
Golombok et al. (2002)	94 mothers	DI	11–12	8	10	12	70
Murray et Golombok (2003)	17 couples	OD	3–-8	0	29	24	47
Scheib et al. (2003)	45 couples	DI	12–17	93	4.5	2.5	0
Klock and Greenfeld (2004)	62 mothers 62 fathers	OD	0–8	11 8	48 45	7 6	34 41
Lycett et al. (2005)	46 couples	DI	4–8	13	26	17	44
Golombok et al. (2006)	41 mothers 41 mothers	DI OD	3	5 7	39 61	10 10	46 22
Lalos et al. (2007)	19 mothers 17 fathers	DI DI	1–15	58 64	26 18	0 0	16 18
MacDougall et al. (2007)	62 couples 79 couples	DI OD	1–19	32 23	45 58	6 9	16 10
Readings et al. (2011)	36 couples 32 couples	DI OD	7	28 41	19 31	14 12	39 16
Isaksson et al. (2012)	55 mothers 48 fathers 59 mothers 53 fathers	OD OD DI DI	1–4	18 13 17 17	75 77 80 79	5 8 0 2	2 2 3 2
Blyth et al. (2013)	94 couples	OD	1–15	51	42	4	3
Applegarth et al. (2016)	46 couples	OD	7–19	43	39	9	9

2.10.3. DONORS' PERSPECTIVE

Nowadays, when open-identity donation has been more common, donor's attitudes and interests in their donor offspring, have become an important issue. Donor legislation in many countries allows release of identifying information of the donor for the child at a certain age, but it does not guarantee that parents inform the child about his/her genetic origin. Among parents, future contact with the donor may be seen as a threat to the non-genetic parent (Isaksson et al., 2011).

There appears to be positive attitudes towards disclosure among oocyte donors that are reflected in their willingness to take part as identifiable donors (Purewal and van den Akker, 2009). A significant majority of volunteer oocyte donors would want the offspring to know how they were conceived (Söderström-Anttila, 1995; Jadva et al., 2011; Lampic et al., 2014). Mostly, no differences have been reported in donor opinions of disclosure if they donated to a known recipient or anonymously (Baetens et al., 2000). In one study of known oocyte donors, 69% wanted that the nature of conception should be told to the child (Yee et al., 2007). More information is needed on open-identity donors' attitudes towards disclosure and offspring. A Swedish study included 125 egg donors and 80 sperm donors under an open-identity system, and they found that 71–91% of all donors wanted that parents would tell the donor offspring about the way of conception and 80–87% had positive or neutral attitudes regarding contact with the child in the future (Lampic et al., 2014).

A systematic review of sperm donors' attitudes towards anonymity found conflicting results (van den Broeck et al., 2013). Only four out of 20 studies included in the meta-analyses asked the donors about the disclosure issue. These studies reported that 30–50% of sperm donors think that parents should tell the child of its conception (Daniels et al., 1996, 2005). Of anonymous sperm donors, 43% wished that offspring had been told and some donors would have been ready to be identifiable later (Daniels and Thorn, 2008). In the 1990's, the majority of donors favoured being anonymous, but attitudes have changed during the last decades (Daniels et al., 2005; Jadva et al., 2011).

2.10.4. CHILDREN'S WELL-BEING AND DISCLOSURE

Information on issues concerning children's well-being after donor treatment, is of utmost importance. Arguments in favour of disclosure are that not informing the child of his/her origins violates a child's autonomy (McGee et al., 2001) and human beings have interest in knowing their biological origins (Frith, 2001; Daniels, 1995; Hahn and Craft-Rosenberg, 2002). Research has shown that families who have disclosed indicates no

harm for the child and suggests a positive effect on parent-child relationship (Lycett et al., 2004; Scheib et al., 2005; Golombok et al., 2011). Other concerns relate to the timing of information sharing with the offspring. No research identifies a specific ideal age for telling the child, because no association between disclosure and family or offspring functioning has been demonstrated (Jadva et al., 2009; Mahlstedt et al., 2010). In contrast, some studies have found that early disclosure is associated with higher levels of psychological well-being among donor offspring (Jadva et al., 2009; Ilioi et al., 2016).

Those who argue against disclosure want to normalise their families, they want to be seen as real parents and minimise the donor's role. Children who have been told do well psychologically but, on the other hand, no harm has been reported by nondisclosure (Golombok et al., 2002; Readings et al., 2011; Pennings, 2017). Kovacs et al. (2015) and Ilioi et al. (2016) looked at family functioning, mother-child relationship, and adolescent psychological adjustment between non-disclosing, disclosing, and natural conception families and found no significant differences regarding child well-being.

Some studies have looked into the experiences of children who have found out that they were conceived with donor gametes. Youths (12-17 years) who were conceived with open-identity donor sperm, were asked how they felt about it. The majority of the respondents felt comfortable with their donor gamete origins and planned to obtain donor's identity when allowed. Most of them (76%) had always known (Scheib et al., 2005). Zadeh et al. (2018) reported similar results among sperm and OD offspring aged 14 years. Two internet-based studies found that offspring who were informed about their conception as adults felt mistrust, lack of genetic continuity, and frustration. Furthermore, they thought that an earlier disclosure would have been a more positive experience. One third wanted more than non-identifying information about the donor (Turner and Coyle, 2000). In an Australian study which examined the relationship of genes and the meaning of family, donor offspring felt that they have the right to learn about their donor origin. These persons thought that they themselves could consider becoming gamete donors if they had a possibility to develop a relationship with the offspring (Kirkman, 2003). Finally, adult AID offspring were asked about their opinions of donor treatments generally. They felt that there is no need for secrecy in donor conception and they would have wanted parents to use donors with identifying information (Mahlstedt et al., 2010). Beeson et al. (2011) found similar results as offspring had a wish for greater openness and contact with the donor.

2.11. COUNSELLING

One of the first reports about a role for mental health professionals in an infertility treatment program was published in 1984 (Greenfeld et al., 1984). Since then, the involvement of mental health professionals in counselling has grown because the number of unconventional ART treatments are increasing, and patients may benefit from psychological counselling (Practice committee of ASRM, Recommendations of gamete and embryo donation, 2013). Pretreatment counselling in connection to donor gamete treatments has become a central recommendation in guidelines in many countries. However, the practice varies, in some countries it is legislated and in some it is minimal (Blyth, 2012). In Finland, pretreatment counselling for gamete recipient couples became mandatory in 2007.

Donor gamete recipients have found counselling useful and they have positive attitudes about the experience (Hershberger et al., 2007; Hammarberg et al., 2008; Shehab et al., 2008). Counselling has often focused on the issues of how to inform the child about his/her genetic origin. From the patients' perspective, mental health professionals should be neutral in their beliefs and values when talking about disclosure issues (Hershberger et al., 2007; Shehab et al., 2008). There is no evidence that parents will follow mental health professionals' recommendations (Daniels et al., 2009). Other goals for counselling include: to provide realistic information about having a child after donor conception treatment; to explore possible fears; and to talk about the previous losses during the long infertility treatments and loss of genetic tie with the child. Regardless of disclosure, parents should leave a session with less fear of the unknown (Benward, 2015).

3. AIMS OF THE STUDY

The purpose of the study was to examine psychological issues relating to what parents face after successful fertility treatment with donated gametes. Specifically, the aims of this study are:

1. assess the level of fear of childbirth and pregnancy-related anxiety in oocyte recipients in comparison with women conceiving with conventional IVF or spontaneously.
2. examine whether the experience of childbirth differs between women conceiving with donor oocytes and those who are pregnant after IVF/ICSI or spontaneously.
3. clarify whether mental health of mothers and fathers after successful donated-oocyte treatment differs from that of mothers and fathers conceiving with IVF/ICSI as well as spontaneously.
4. collect information about parental disclosure intentions regarding informing their children about their way of conception after donor insemination, donor IVF, and donor-oocyte fertility treatment before the Finnish ART law enacted in 2007.
5. obtain information about parental attitudes and satisfaction regarding the treatment decision, counselling, and feelings towards the child.

4. SUBJECTS AND METHODS

At the time of the study, evaluation of the recipient couple was similar to that of couples undergoing conventional IVF treatment with autologous oocytes. High-risk recipients with medical conditions that may affect pregnancy or women of advanced age were referred to a pre-pregnancy health consultation. Counselling with a therapist or psychologist was highly recommended, but not mandatory before the ART law in 2007.

Oocyte and sperm donors were either anonymous or known (e.g. a sister or a friend) to the recipient couple. Evaluation of the donor candidates was done according to Väestöliitto fertility clinic`s practices.

4.1. STUDY DESIGN

***Table 2**. Study design according to the original publications*

Study	**I**	**II**	**III**	**IV**
Setting	Prospective, controlled	Prospective, controlled	Retrospective	Retrospective
Data source	Medical records, questionnaire	Medical records, questionnaire	Questionnaire	Questionnaire
Times of data collection	2nd trimester of pregnancy, 8 weeks after delivery	2nd trimester of pregnancy, 8 weeks and 1 year after the delivery	1–14 years after delivery	1–22 years after delivery
Main study questions	Compare levels of fear of childbirth, pregnancy-related anxiety and delivery experience among mothers after OD, IVF/ICSI and spontaneous conception	Compare mental health symptoms between mothers and fathers after OD, IVF/ICSI and spontaneous conception	Issues concerning parental disclosure of OD: intentions vs reality	Issues concerning parental disclosure of sperm donation: intentions vs reality

4.2. SUBJECTS

4.2.1. STUDIES I-II

The study group comprised 26 couples who conceived with donated oocytes and their matched controls: 52 women who conceived with IVF/ICSI with own gametes and 52 women who conceived spontaneously (SC). The OD study group represented 69% of all OD mothers who became pregnant in the recruiting clinics in 1999. These two studies are part of larger prospective, controlled, longitudinal follow-up study of focusing on psychological health of couples after successful IVF/ICSI treatment. The original IVF/ICSI group was comprised of 460 couples who were recruited from five fertility clinics in Finland (Väestöliitto Fertility clinics in Helsinki, Turku and Oulu, the Deaconess Institute of Helsinki and the University Hospital Helsinki) on a voluntary basis. Spontaneously conceiving controls (497 couples) were recruited when attending routine second-trimester ultrasounds in Helsinki University Hospital. They reported no history of infertility, they were Finnish speaking, over 25 years of age, and took part in of the study voluntarily.

The full response rate of OD mothers (T1-T3) was 76.9%. Among OD fathers, the response rate was 73.1%, among IVF/ICSI fathers it was 75.1% and 67.3% among SC fathers (ns). Matching was performed to find IVF/ICSI and SC controls according to mothers age (<34, 35-37, >38), parity (primipara or multipara), plurality (singleton or twin pregnancy), and number of returned questionnaires. Background information of the participants and their controls is presented in Table 3. Fertility history did not differ between OD and IVF/ICSI couples regarding duration of infertility: it was 5.9 years among OD couples and 5.1 years among IVF/ICSI couples ($F = 0.929$; $p = 0.339$). Number of fertility treatments received before successful pregnancy was similar between OD and IVF/ICSI couples (mean 3.1 vs 2.9; $F = 0.379$; $p = 0.540$). Only the reasons for infertility differed ($X2 = 17.51$; $p = 0.001$). For the OD couples the most common reason for treatment was premature ovarian insufficiency (15/26), whereas in the IVF/ICSI couples it was unexplained infertility.

Table 3 *Demographic characteristics of oocyte donation (OD), IVF/ICSI and spontaneously conceiving (SC) groups*

	OD, n = 26	**IVF/ICSI**, n = 52	**SC**, n = 52
Maternal age, mean (SD)	36.1(6.1)	35.2(4.5)	35.1(4.3)
Paternal age, mean (SD)	37.6(6.3)	35.6(4.7)	35.2(5.4)
Occupation, mothers, n (%)			
High professional	8(30.8)	18(35.3)	26(50.0)
Low professional	6(23.1)	19(37.3)	17(32.7)
Skilled worker	10(38.5)	9(17.6)	5(9.6)
Unskilled worker	2(7.7)	5(9.8)	4(7.7)
Occupation fathers, n (%)			
High professional	6(25.0)	18(40.0)	22(50)
Low professional	7(29.2)	14(31.1)	9(20.5)
Skilled worker	9(37.5)	10(22.2)	8(18.2)
Unskilled worker	2(8.3)	3(6.7)	5(11.4)
Marital status, n (%)			
Married	18(69.2)	36(76.6)	28(60.9)
Cohabiting	8(30.8)	11(23.4)	17(37.0)
Separated	0	0	1(2.2)
Duration of partnership, years mean	8.7(5.3)	9.3(4.9)	6.9(4.9)

4.2.2. STUDY III

During 1992-2006, altogether 175 couples had been treated with OD at Väestöliitto Fertility clinic in Helsinki. Information on the OD study group, reasons for exclusion and response rate is shown in Figure 5.

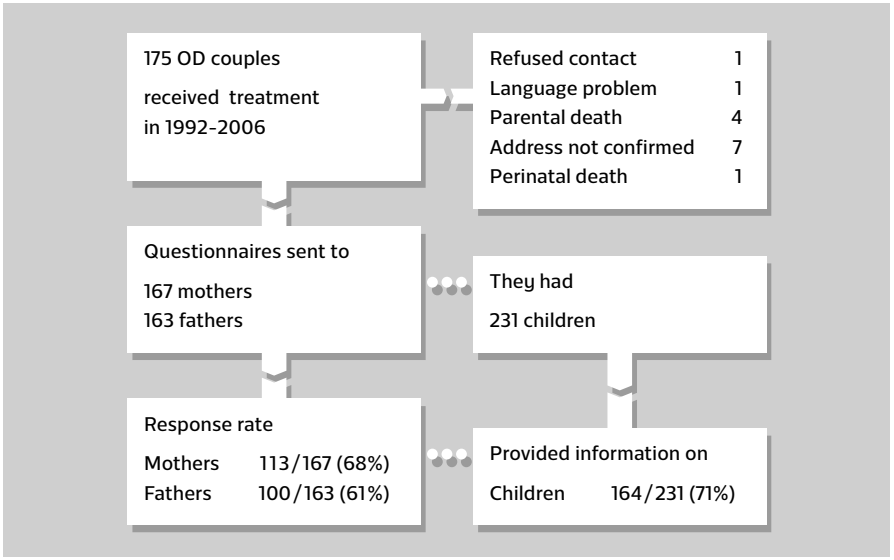


Figure 5. Formation of OD study group

The response rate did not differ among parents with different ages of children. A majority of the couples (85%) had received donated oocytes from an anonymous donor and 15% had a known donor (sister, niece, sister-in-law, cousin, friends, and donor through newspaper advertisement). The indication of OD treatment was POI in 45% of women. Of the responding couples, 55% had tried to conceive spontaneously or using ART with autologous oocytes for 1-20 years (mean 5.6 years).

Of all responding parents, 40/167 had two OD children, 13 had three OD children, and 13 had children born with own gametes in addition to OD offspring.

4.2.3. STUDY IV

During 15 years (from 1992 to 2007), 277 heterosexual couples had a child after successful treatment with donor insemination (DI) or donor IVF treatment (dIVF) at Väestöliitto Fertility clinic in Helsinki. A questionnaire was sent to 252 mothers and 239 fathers with donor-sperm offspring (Figure 6). Reasons for exclusion and the response rates are shown in Figure 6.

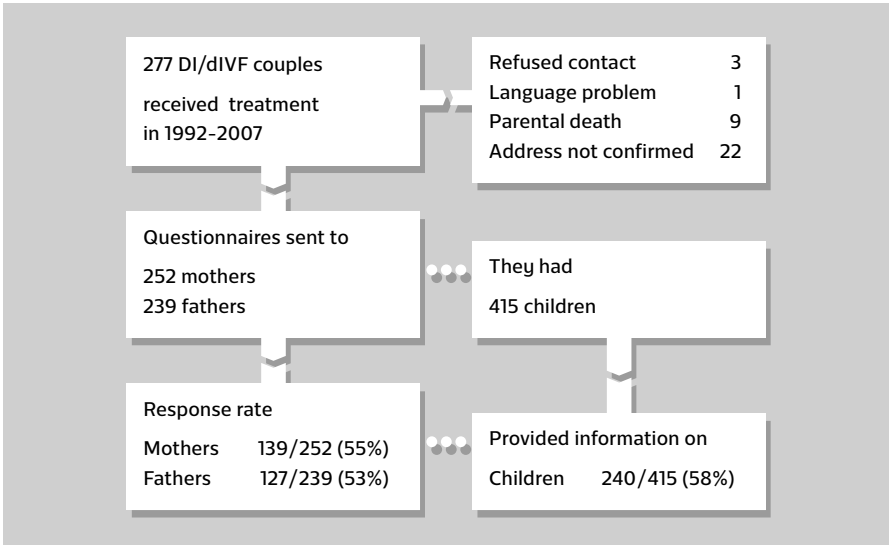


Figure 6. Formation of DI/dIVF study group

Answers provided information on 57.8% (240/415) of the children born. Siblings born before 1992, were also included in the study. The proportion of twin pregnancies was 9.6%.

Of the parents, 41 had two children born with DI or dIVF, 10 had three or more children, and 18 had children born with own gametes in addition to the donor offspring and one couple had one adopted child in addition to donor offspring. Only one couple had a known donor.

4.3. METHODS

4.3.1. STUDIES I-II

The participants completed the questionnaire during gestational weeks 18-20 (T1), 8 weeks after delivery (T2), and when the child was one year old (T3). Mothers and fathers were asked to fill in questionnaires separately. Background information about occupation, marital status, infertility history, and early pregnancy were collected from medical records by the person who recruited the couple to take part in the study at the time of ultrasound in early pregnancy or routine 2nd trimester ultrasound.

The first questionnaire was given when the couples were recruited for the study in 2nd trimester. Questions included information on social background, lifestyles, general health, and somatic problems in early pregnancy. The second questionnaire was sent to the couple after the delivery and after they

were first contacted by the research nurse. In the second questionnaire mothers were asked to report any pregnancy complications (pre-eclampsia, hypertension, vaginal bleeding, preterm contractions, and cholestasis in pregnancy) and related hospitalisation after 20 pregnancy weeks. Information on onset of labour and the type of delivery (vaginal, vacuum, Caesarean section) were collected with multiple-choice questions. The information about the health of newborns was gathered with questions concerning gestational age at birth, birth weight and height, general health, admission to neonatal intensive care unit (NICU) and length of stay there. To obtain information on maternal psychological and physical health after the delivery, hospitalisation time and reason was recorded. Structured questionnaires were used to assess the mental health of mothers and fathers (T1-T3), fear of childbirth and pregnancy-related anxiety (T1-T2), and experience of delivery (T2).

4.3.1.1. Fear of Delivery Questionnaire (FDQ)

The revised version by Saisto (Saisto et al., 2001) comprises 11 dichotomous questions of pain, losing control, isolation, and giving birth to an unhealthy child. The participants evaluated their feelings on a two-point scale (0= no; 1 = yes). A sum variable in which higher score indicates stronger fear, was constructed. The reliability was 0.68 (Cronbach α). Request of caesarean and higher score than 5 indicated severe fear. FDQ was to be filled in at T1. (Study I)

4.3.1.2. Pregnancy Anxiety Scale (PAS)

The revised scale by Levin (1991), consists of 10 questions about anxiety in pregnancy, childbirth, and hospitalisation. This is a five-point scale (1 = not at all, 5 = a lot) giving a possible range of sum score from 10 to 50. Higher sum scores indicated greater anxiety. The reliability was 0.82 (Cronbach α). Pregnancy-related anxiety was assessed with PAS at T1 and T2 to assess level of anxiety about future pregnancies. (Study I)

4.3.1.3. Delivery Satisfaction Scale (DSS)

DSS served to assess experience of childbirth at T2. It comprises eight questions, of them six focuses on delivery experience and two on labour pain. They answered on a 5-point scale (1 = not at all, 5 = very much). Sum score was constructed and a total score in or below the 10th percentile indicated dissatisfaction with the delivery. The reliability was 0.72 (Cronbach α) (Study I).

4.3.1.4. General Health Questionnaire 36 (GHQ-36)

Mental health problems were assessed using the General Health Questionnaire at T1, T2, and T3. Both parents answered separately. This is a self-report questionnaire designed to measure psychiatric disorders in the general population. It performs well as a screening instrument and has proven to function well in the population in Finland (Rantakallio, 1988; Holi et al., 2003). It consists of 36 items that measure depression (11 items), anxiety (11 items), social dysfunction (8 items) and sleeping difficulties (6 items). Depression involves feelings of hopelessness and suicidal thoughts, anxiety involves feeling of being under constant pressure and panicked, sleeping involves difficulties in falling asleep and waking up in the night and social dysfunction involves the inability to perform everyday tasks and participating in social activities. Respondents estimated how symptoms matched their current state from 1 (=not at all) to 4 (=much more) than usual. Sum scores were calculated for each symptom to make subscale scores comparable. Dichotomic variables of mental health clinical significance were (original values 1-2=0 and original values 3-4=1) created. Total score GHQ 36 cut-off point 9 and above was the criterion for clinical significance for mental health symptoms based on Finnish samples (Holi et al., 2003).

Table 4. *Methods used to collect data in studies I and II.*

	Study I	**Study II**
T1: 2nd trimester of pregnancy	SES. Family factors: age, number of children, duration of partnership, marital status. FDQ. PAS.	SES. Family factors: age, number of children, duration of partnership, marital status. GHQ 36 (mothers and fathers)
T2: 8 weeks postpartum	Pregnancy complications and related hospitalisation. Mode of the delivery. Gestational age. Health of the newborn. PAS. DSS.	Pregnancy and postpartum complications and hospitalisation. GHQ 36 (mothers and fathers)
T3: 1 year postpartum	-	GHQ 36 (mothers and fathers)

SES= Socioeconomic status; FDQ= Fear of Childbirth Questionnaire; PAS= Pregnancy Anxiety Scale; DSS= Delivery Satisfaction Scale; GHQ-36= General Health Questionnaire 36

4.3.2. STUDIES III-IV

Studies were carried out by means of questionnaires, which were sent to couples who were treated with OD or sperm donation at the Väestöliitto Fertility clinic in Helsinki between 1992–2006. Information on infertility factors and type of treatment were collected from the patient registries as well as data on early pregnancy and the result of pregnancy. Parental background information, such as age, marital status, education, and the indication for the treatment was collected in the first part of the questionnaire. The parents were asked in structured questions if they had told (1 = yes; 2 = no) or planned to tell (1 = not told yet but intend to tell; 2 = not told yet, don't intend to tell; 3 = don't know) their child about the way of conception and if they had told, at which age they had done so. There were multiple choice questions about the importance of information sharing with their child (it is natural to be open and honest, the child has right to know, to avoid accidental disclosure from others, another reason), and which reasons are not important (information is unnecessary, it could be harmful for the child, concern that the child would attach to the donor, another reason). Then there were questions about openness toward other people (1 = nobody; 2 = closest family members; 3 = closest friends; 4 = openly).

Parents were asked about the decision process to use donated gametes and if they felt that the child was their very own. Parents were asked to report their concerns about the donor characteristics, such as genetic and medical background, physical resemblance, personality, intelligence, and whether they had worries that their child would fall in love with his/her half sibling. There were questions about parents' satisfaction with the counselling they received before treatment, whether it was sufficient or not. In addition, open questions were included regarding wishes for a psychological support. Parents could express their opinions about the new fertility law in Finland and about patient support groups. Finally, they were asked to give any information about the child's health problems diagnosed.

5. STATISTICAL ANALYSIS

Statistical analyses were performed using SPSS-17-24 (IBM corp., Armonk, NY, USA). Categorical variables were analysed by means of X^2 tests and continuous variables by means of Student's t-tests in studies III and IV. P values less than 0.05 were considered significant.
Group differences of FDQ, PAS, and DSS were analysed by means of analysis of variance ANOVA with the post- hoc test and Tukey's correction were used to analyze differences between OD, IVF/ICSI and SC (study I). Spearman's correlation coefficients were used to analyze relations between fear of childbirth and pregnancy – related anxiety as well as satisfaction with the delivery (study I). A p value < 0.05 was considered significant.

In study I and II, chi-squared test was used to analyze group differences in the categorical data (demographic data, infertility and obstetric information) and analysis of variance with Bonferroni corrected post-hoc test in the continuous data (age, duration of partnership, days of hospitalisation). If the chi-squared test was positive, the specific within-group differences were calculated by adjusted residual values of each cell, using the criterion of > 2.00 of z-values ($p < 0.05$). Differences in parental mental health problems in OD, IVF/ICSI and spontaneous pregnancy groups were analysed by covariate analyses with univariate analyses with Bonferroni corrected post-hoc tests (study II). The covariates were the frequency of hospitalisation at second and third trimesters (0 = no, 1 = yes) and length of hospitalisation postpartum.

6. RESULTS

6.1. FEAR OF CHILDBIRTH AND DELIVERY EXPERIENCE (I)

The number of treatments performed before the pregnancy (OD 3.1 vs IVF/ICSI 2.9) did not differ between the OD and the IVF/ICSI groups. Among those women having undergone OD treatment, 65.3% became pregnant after one or two ETs with donated oocytes. Naturally, reasons for infertility treatments differed (χ^2 = 17.51; p = 0.001). In the OD group the most common indication treatment was POI, and in the IVF/ICSI group it was unexplained infertility.

The obstetric outcome is shown in Table 5. Length of gestation, preterm deliveries, birthweight, and separation at birth (NICU) did not differ between the groups.

Table 5. *Obstetric factors of oocyte donation (OD), IVF/ICSI, and spontaneously conceiving (SC) groups. Matched to parity and type of pregnancy.*

	OD, n=26 (%)	**IVF/ICSI**, n=52 (%)	**SC**, n=52 (%)
Parity			
Primipara	16(61.5)		
Multipara	10(38.5)		
Type of pregnancy			
Singleton	21(80.8)		
Twin	5(19.2)		
Hospitalisation in 1st trimester (%)	1(3.8)	2(4.5)	2(4.2)
Hospitalisation in 2nd and 3rd trimester (%) *	8(32)	13(26.5)	5(10.0)
Mode of the delivery (%)			
Vaginal, spontaneous	14(53.8)	26(51.0)	29(55.8)
Acute operative (vacuum, caesarean)	6(23.1)	15(29.4)	16(30.8)
Elective caesarean	6(23.1)	10(19.6)	7(13.5)

Pain relief			
None	3(12.5)	0(0)	3(6.3)
Epidural	14(58.3)	35(76.1)	37(77.1)
Other	7(29.2)	11(23.9)	8(16.7)
Premature delivery <37 weeks	5(19.2)	4(7.8)	9(17.3)
Separation at birth	12(50)	13(25)	17(32.7)
	mean (SD)	mean (SD)	mean (SD)
Birthweight, grams	3321(786)	3298 (699)	3368 (641)
Hospitalisation, postpartum, days, mean (SD) *	5.3(1.9)	4.2(2.1)	3.8(1.6)

*p < 0.05

6.1.1. GROUP DIFFERENCES IN FEAR OF CHILDBIRTH

The groups differed in their levels of fear of childbirth (ANOVA, F (2,114) = 3.692; p = 0.028). Mean total score Fear of Delivery Questionnaire (FDQ) was lower in OD group than in IVF/ICSI group (OD 1.5, IVF/ICSI 2.9, SC, 2.5; p = 0.021) but SC group did not differ significantly from either. For severe fear of childbirth (FDQ >5), there was no significant differences between the groups (OD 4.2%, IVF/ICSI 15.9%, SC 19.1%; X^2 = 2.903, p = 0.234). Fewer OD women (12%) asked for caesarean compared with the IVF/ICSI (15.9%) and SC (30%) women, but the difference was not statistically significant (X^2 = 4.348; p = 0.114).

6.1.2. GROUP DIFFERENCES IN PREGNANCY ANXIETY

The groups differed in severity of pregnancy-related anxiety (ANOVA, F(2, 116) = 5.25 ; p = 0.007). Post hoc analysis revealed that mean total score Pregnancy Anxiety Scale was lower in the OD group (17) than in the IVF/ICSI group (22.1, p = 0.006) and in the SC group (21.4, p = 0.019). OD women experienced lower levels of anxiety about all parameters but statistically significant differences were reached in lower concerns that the personnel might be unfriendly in the hospital (ANOVA, F(2, 121) = 4.17 ; p = 0.018), that their child may not be healthy (ANOVA, F(2, 120) = 4.36 ; p = 0.015) and about pain during childbirth (ANOVA, F(2, 120) = 3.29 ; p = 0.040).

Pregnancy Anxiety scale was to be answered again postpartum to measure thoughts concerning future pregnancies. It did not reveal any other differences between the groups but the OD women's need for analgesia in future deliveries was lower (ANOVA, F(2, 120) = 3.99 ; p = 0.021).

Correlation between FDQ and PAS in T1 was significant in OD (r = 0.689; p = 0.000), IVF/ICSI (r = 0.735 ; p = 0.000) and SC (r = 0.784 ; p = 0.000) groups.

Table 6. *Mean total scores of Fear of delivery questionnaire (FDQ) and Pregnancy-related Anxiety (PAS) among oocyte donation (OD), IVF/ICSI conceived, and spontaneously conceived (SC) mothers.*

	OD	**IVF/ICSI**	**SC**	**F-values**	**Sig.**	**Pairvise comparison**
Mean total score FDQ (SD)	1.5 (1.3)	2.9 (2.3)	2.5 (2.2)	3.692	0.028	OD<IVF/ICSI, p=0.021; OD<SC p=0.145
Mean total score of PAS (SD)	17.0(4.0)	22.1(7.0)	21.4(6.7)	5.257	0.007	OD<IVF/ICSI, p=0.006; OD<SC, p=0.019

6.1.3. GROUP DIFFERENCES IN EXPERIENCE OF CHILDBIRTH

Satisfaction with deliveries was similar in all three groups. Of OD women 8.7%, 4.9% of IVF/ICSI women, and 15.6% of SC women (X^2 = 14.929; p = 0.135) were dissatisfied with their delivery. Summed scores of Delivery Satisfaction Scale was 30 in OD and IVF/ICSI groups and 29 in SC group.
The mode of the delivery associated with satisfaction of delivery only in the OD group. Those mothers who delivered with acute caesarean or vacuum were more dissatisfied (ANOVA, F(2, 22) = 17.21 ; p = 0.000). In all three groups, there was a correlation between strong pain experienced during the delivery and dissatisfaction of delivery [OD (r = 0.735, p = 0.000); IVF/ICSI (r = 0.627, p = 0.000); SC (r = 0.618, p = 0.000)].

There was a statistically significant correlation between fear of delivery and satisfaction with delivery in OD and IVF/ICSI groups showing that women fearing delivery were less satisfied with the delivery (OD r = -0.548, p = 0.010; IVF/ICSI r = -0.404, p = 0.018). The incidence of fathers being present during delivery was 91% for OD, 93% for IVF/ICSI, and 93% for SC. The women in OD and IVF/ICSI groups were more satisfied with the support from their spouses than women in the SC group (ANOVA, F(2, 120) = 3.24 , p = 0.042).

6.2. MENTAL HEALTH OF MOTHERS AFTER OD (II)

6.2.1. MENTAL HEALTH OF MOTHERS

Multivariate covariate analysis results showed significant group differences at 8 weeks (T2; p = 0.019) and one year (T3; p = 0.027) after the delivery but not in the 2nd trimester of pregnancy.

At T2, OD women reported lower levels of anxiety symptoms (p = 0.01), sleeping difficulties (p = 0.04) and social dysfunction (p = 0.001) than spontaneously conceiving mothers and lower levels of sleeping difficulties (p = 0.02) and social dysfunction (p = 0.04) than IVF/ICSI women. At T3, OD women reported lower levels of anxiety than SC women (p = 0.02). Furthermore, at T3, OD women had lower levels of sleeping difficulties (p= 0.04) and social dysfunction (p= 0.03) compared to IVF/ICSI women.

The groups differed significantly in the frequency of hospitalisation in the 1st and 2nd trimesters and the length of postpartum hospitalisation. SC mothers experienced less hospitalisation due to pregnancy complications than OD and IVF/ICSI mothers. OD mothers were hospitalised for longer postpartum than SC mothers (5.3 days vs 3.8 days; p = 0.010) but the the postpartum stay in hospital was similar to that of IVF/ICSI mothers. The length of maternal postpartum hospitalisation as a covariate was significantly associated with maternal mental health problems at T2 (p = 0.034) and at T3 (p = 0.0001). Analysis of variance specified that the longer stay at the hospital was associated with higher levels of depressive symptoms at T2 (p = 0.004) and with all mental health symptoms in T3 (depressive symptoms, p = 0.0001; anxiety, p = 0.009; sleeping difficulties, p = 0.032; social dysfunction, p = 0.0001).

Group differences based on total scores of GHQ-36 showed no differences between the OD, IVF/ICSI, and SC mothers at T1 (2nd trimester). At T2, total scores were lower among OD mothers than those of IVF/ICSI (p = 0.003) and SC mothers (p = 0.03) and at T3, OD mother's scores were lower than those of SC mothers' (p=0.03). Clinically significant mental health problems were low at each time point among OD mothers (T1 = 7.3%; T2 = 5.7%; T3 = 5.1%) and it differed significantly only compared to SC mothers at T2 (p = 0.04).

Table 7. *Mental health symptoms measured with General Health Questionnaire 36 (GHQ-36) of oocyte donation (OD), IVF/ICSI and spontaneously conceiving (SC) mothers*

Mothers	**OD, n = 26**	**IVF/ICSI, n = 52**	**SC, n = 52**	**F-values[a]**	**Pairwise comparisons[b]**
	Mean (SD)	**Mean (SD)**	**Mean (SD)**		
T1					
Depression	1.12 (0.17)	1.15 (0.16)	1.19 (0.17)	1.63	
Anxiety	1.33 (0.32)	1.38 (0.34)	1.52 (0.41)	2.12	
Sleeping	1.74 (0.54)	2.07 (0.66)	2.08 (0.73)	2.50	
Social dysf.	1.97 (0.35)	2.09 (0.36)	2.08 (0.46)	0.84	
T2					
Depression	1.16 (0.13)	1.21 (0.32)	1.24 (0.19)	1.92	
Anxiety	1.28 (0.22)	1.50 (0.49)	1.63 (0.56)	4.73**	OD<SC*
Sleeping	1.56 (0.43)	1.94 (0.65)	1.98 (0.63)	6.19**	OD<IVF/ICSI, SC*
Social dysf.	1.86 (0.25)	2.11 (0.36)	2.19 (0.40)	7.94***	OD<IVF/ICSI*; OD<SC**
T3					
Depression	1.20 (0.11)	1.28 (0.43)	1.30 (0.26)	1.61	
Anxiety	1.24 (0.19)	1.44 (0.55)	1.56 (0.48)	4.32*	OD<SC*
Sleeping	1.45 (0.35)	1.84 (0.65)	1.84 (0.61)	5.37**	OD<IVF/ICSI*
Social dysf.	1.79 (0.13)	2.03 (0.41)	2.00 (0.36)	5.66**	OD<IVF/ICSI*

*p < 0.05, **p < 0.01, ***p < 0.001

[a] Covariated for hospitalisation in 2nd and 3rd trimester and days postpartum

[b] Post-hoc comparisons

6.2.1. MENTAL HEALTH OF FATHERS

Mental health problems among fathers with an OD child compared to those with a child after IVF/ICSI and SC did not differ significantly at any time point. The mean total score for GHQ-36 also showed similar levels. Only a few fathers with an OD child reported clinically significant mental health problems (T1 = 4.2%; T2 = 2.6%; T3 = 5.3%) and these did not differ from IVF/ICSI and spontaneously conceived fathers.

Table 8. *Mental health symptoms measured with General Health Questionnaire 36 (GHQ-36) of oocyte donation (OD), IVF/ICSI and spontaneously conceiving (SC) fathers*

Fathers	**OD, n = 26**	**IVF/ICSI, n = 52**	**SC, n = 52**	**F-values**
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	
T1				
Depression	1.26 (0.44)	1.24 (0.31)	1.22 (0.19)	0.33
Anxiety	1.40 (0.41)	1.44 (0.42)	1.37 (0.39)	0.43
Sleeping	1.65 (0.48)	1.64 (0.57)	1.56 (0.47)	0.75
Social dysf.	1.85 (0.32)	1.09 (0.38)	1.89 (0.27)	0.04
T2				
Depression	1.34 (0.44)	1.19 (0.17)	1.23 (0.20)	2.66
Anxiety	1.43 (0.47)	1.34 (0.33)	1.34 (0.33)	0.96
Sleeping	1.86 (0.47)	1.59 (0.46)	1.68 (0.53)	2.40
Social dysf.	1.99 (0.40)	1.91 (0.29)	1.89 (0.30)	0.76
T3				
Depression	1.41 (0.50)	1.26 (0.17)	1.28 (0.28)	1.50
Anxiety	1.48 (0.62)	1.33 (0.33)	1.31 (0.36)	1.15
Sleeping	1.60 (0.48)	1.57 (0.46)	1.64 (0.50)	0.89
Social dysf.	1.98 (0.46)	1.92 (0.23)	1.95 (0.31)	0.29

6.3. PARENTAL OPENNESS AFTER OD (III)

6.3.1. DISCLOSURE TO THE CHILD

Of the mothers, 61% and 60% of fathers reported that they had told their child about the way of conception or were planning to do so. There were no differences among mothers (60% vs 65%) and among fathers (61% vs 56 %) regarding openness if the donor had been anonymous or known, respectively. Parent's education, marital status, indication for treatment, and number of genetically own children had no effect on parental openness towards the child. Parental disclosure intentions were different in different age groups of the children when 88% in younger age group intended to tell versus 44% in the oldest age group ($p = 0.011$).
Of children aged 3–14, 26% had already received information on their donor conception.

6.3.2. DISCLOSURE TO OTHER PEOPLE

The majority of mothers (82%) and fathers (71%) had told the medical team working in prenatal and postnatal care clinics about the donation treatment. Mothers had been more open to other people (closest family members, friends) and to medical team compared to fathers (87% vs 71%, $p < 0.005$). A strong correlation was found between the intention to tell the child and informing other people ($p < 0.005$).

Table 9. Parents' reasons to tell or not to tell the child about his/her conception

	OD mothers	**OD fathers**	**DI/dIVF mothers**	**DI/dIVF fathers**
Reasons to tell (answers by those who intend to be open or unsure)	(n = 97)	(n = 82)	(n = 53)	(n = 46)
Natural to be open and honest (%)	66 (68.4)	67 (81.7)	30 (56.6)	27 (58.7)
Child's right to know (%)	77 (79.4)	50 (61.0)	30 (56.5)	15 (32.6)
Risk to avoid accidental disclosure (%)	54 (55.7)	36 (43.9)	29 (54.7)	30 (65.2)
Other (%)	7 (7.2)		3 (5.7)	

	OD mothers	OD fathers	DI/dIVF mothers	DI/dIVF fathers
Reasons not to tell (answers by those who are inclined to secrecy or are unsure)	(n = 39)	(n = 30)	(n = 82)	(n = 81)
Information is unnecessary (%)	16 (41.0)	16 (53.3)	27 (32.9)	32 (39.5)
Information is harmful for the child (%)	18 (46.2)	15 (50.0)	25 (30.5)	32 (39.5)
Concern that the child will attach to the donor (%)	4 (10.3)	0	0	0
Other (%)	10 (25.6)	5 (16.7)	13 (15.9)	10 (12.3)

Other reasons to tell include: secrecy creates tension within the family, to prevent possible family conflicts when the child is a teenager, medical reasons, to promote identity development

Other reasons not to tell include: my partner does not want to, will inform if forced to because of medical reasons, wish of the known donor, unnecessary to tell because the donor was anonymous, risk of inequality between the partners, risk that the child would abandon his/her father, desire to keep equality between biological children and donor conceived child, grandparents would not understand, fear of confusing the child, no clear reason, issue is not important for the parents.

6.3.3. ATTITUDES REGARDING TREATMENT

Of the mothers, 89% and 81% of fathers reported that the decision to use donated oocyte was easy. After the child was born, 100% of mothers and 97% of fathers thought it was a right decision to proceed and choose OD. Altogether 39% of the mothers and 32% of the fathers had some worries about the genetic or medical background of the anonymous donor. Parents reported that 13% of OD children had some health problem. The majority of the parents had very few or no concerns regarding the donor's physical resemblance, personality, intelligence, or the risk that the child would fall in love with his/her half-sibling. None of the 17 mothers with a known donor reported any kind of problems in their relationship with the donor.

Altogether 59% of the fathers and 54% of the mothers were satisfied with the psychological support they were offered during their donor treatment. However, 24% of mothers compared with 11% of fathers thought that they received insufficient psychological support ($p < 0.05$). The Finnish ART law came into force in 2007 and requires open-identity donation. A total of 31% of the mothers and 25% of the fathers thought that the mandatory registration of gamete donors was a good decision. Forty percent of the parents reported that the law is not going to impact future parents' disclosure intentions.

6.4. PARENTAL OPENNESS AFTER SPERM DONATION (IV)

6.4.1. DISCLOSURE TO THE CHILD

Of all parents with a child after sperm donation treatment, 41% of mothers and 36% of fathers had either told or intended to tell their child. Altogether 17% of the parents had already told, and 64% of these children were told before they started school, at a mean age of 6.8 years. Parents with younger children planned more often to inform the child than parents with older children ($p < 0.005$). Parents' intentions to tell were not dependent on education, marital status, or number of children in the family. Of the parents, 19% had different opinions related to disclosure and in the majority of cases (22/27) fathers were more in favour of secrecy. The main reasons to inform/not inform the child are presented in Table 9.

6.4.2. DISCLOSURE TO OTHER PEOPLE

Only 5–6 % of the parents had been open to everyone about their child's donor conception background and 38% of mothers and 50% of fathers had not told anyone. Parents who had already been or who had decided to be open towards the child, were also more inclined to be open towards other people ($p < 0.005$). Mothers had more often than fathers (51% vs 33%; $p < 0.05$) informed medical personnel about the nature of conception in prenatal and postnatal care clinics. Some mothers (12%) and fathers (5%) regretted that they had told other people. They thought afterwards that the child should be the first one to know, and they were afraid of accidental disclosure from relatives. Furthermore, some parents reported that reactions of relatives towards both the child and the father had changed after they were told about the donor conception.

6.4.3. ATTITUDES REGARDING TREATMENT

Similar proportion of mothers (79%) and fathers (70%) thought that the decision to use donor sperm in the fertility treatment was easy. Almost all mothers (99%) and all fathers (100%) reported that it had been a right decision. Of the parents, 92–96 % had very few concerns regarding the background (medical or genetic, personality, physical resemblance, intelligence) of their anonymous donor. Parents reported that 22% of children had some health problem. Of mothers 22% and of fathers 8% worried about the risk that the child would fall in love with his/her half-sibling.

During the total study period, 39% of mothers and 45% of fathers were satisfied with the pretreatment psychological support they were offered ($p < 0.05$). However, satisfaction with psychological support and counselling increased among parents (38% vs 53%) comparing time periods before and after the year 2000. Furthermore, a higher proportion of parents were unsure of the usefulness of psychological support before 2000 (33% vs 23%; $p < 0.05$). One out of six parents expressed that they would have wanted support during the pregnancy and after the child was born, but such help was not easily available.

Only 24% of mothers and 17% of fathers thought that the removal of anonymity in Finland was a good decision. Parents in favour of disclosing (29%) thought that the use of open-identity donors is a good practice but only 19% of those in favour of non-disclosing thought so (ns). Altogether 46% of the mothers and 41% of the fathers reported that the new ART law probably will not impact on disclosure intentions of donor offspring parents in the future.

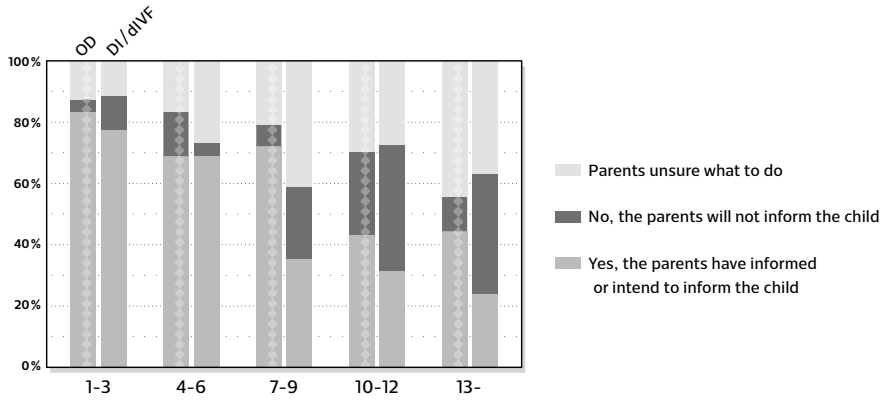


Figure 7. Parental disclosure intentions after oocyte donation (OD) and donor insemination/ donor IVF (DI/dIVF) treatments in different age group of donor conceived children.

7. DISCUSSION

Sperm donation has been used for over a century, but since IVF technology was discovered over 30 years ago, OD treatment has been possible. During the last decades, the number of gamete donation treatments has been rising worldwide to help couples who could not acheive pregnancy with their own oocytes or sperm. Treatments with donated gametes have a high success rate, even higher than with autologous gametes, which gives hope and brings great joy to the future parents.

When the use of donated gametes is the only option to overcome the infertility, couples face feelings of uncertainty for the future. Questions will arise, like "Am I ever going to get pregnant?", "Is my body able to carry a child?", "Am I able to love my child and does the child feel like own?", "How am I able to tell the child about his/her conception?", "What will the closest relatives and friends think?", "What if my child wants to contact the donor?".

Apart from uncertainty, the parents are also involved with emotional loss related to genetic connection with the child. Parental psychological well-being is associated with the child's psychological development. The more is known about parental well-being and psychological adjustment during the course of donation treatment, the better the parents and donor-conceived children can be supported. One of the main issues that parents have to face after the successful treatment is the question of secrecy about the donor conception.

The data used in studies I and II was collected with longitudinal prospective self-reported questionnaires. Three assessment points (2nd trimester, 2 months, and 1 year postpartum) were chosen because these points represent different phases of family life such as pregnancy, parent-infant relationship, and child development. IVF/ICSI and spontaneously conceiving controls were chosen from a larger cohort. Matching to find controls was made according to mother's age, parity, plurality, and number of returned questionnaires to find controls. Instead of using the whole cohort, the above criteria were chosen to match the controls, because they are all known factors affecting the mental health of parents and maternal fear of childbirth, thus eliminating confounding factors in the analyses.

Background characteristics were similar across the groups. Controls were recruited in Helsinki where the education level of mothers is higher compared with other parts of Finland where some of the IVF/ICSI controls and OD mothers were recruited. However, it was not statistically significant between the groups. Previous studies have shown that fear of delivery and mental functioning are unaffected by the education level of mothers in the Finnish population (Saisto et al., 2001; Poikkeus et al., 2006; Martikainen et al., 1999).

Unexpectedly, obstetric outcome was similar across the groups. Pregnancy complications causes higher levels of pregnancy-related anxiety. Acute operative deliveries and pain experienced during labour are associated with delivery dissatisfaction. Furthermore, poor child health and worry about the infant associates with anxiety and depression among mothers. Therefore, a similar obstetric background between the OD group and IVF/ICSI and SC groups made the results more reliable.

Data for studies III and IV was collected by questionnaire in a retrospective manner. Questionnaires were sent separately for both partners involved. In previous studies, questionnaires and interviews have mostly been directed only to mothers. The majority of the questions were multiple choice, but there were also open-ended questions which better facilitates the collection of detailed information on personal feelings and experiences which could have been missed with structured answers.

There are several strengths of the studies. High reponse rate and fathers' participation are worth mentioning as most of this type of studies are directed only to mothers (studies I and II). The fact that mothers and fathers gave their answers separately could not be controlled, however. Of all OD couples who were offered to participate in the study, 69% of the mothers took part and 77% of all participants completed all three questionnaires until the child was one year old. The response rate of the OD fathers was 75%.

A noteworthy strength of studies III and IV was that the whole cohort of mothers and fathers who had a child after gamete treatment after treatment in 1991-2007 were asked to participate. In study III, the response rate among mothers (68%) and fathers (61%) was high and similar for parents with different ages of children. The data provided information on 164 OD children which is one of the largest known follow-up studies on these children. In previous studies, the participation rate has been low or parents have actively been willing to be contacted for research purposes (Klock and Greenfeld, 2004; Shehab et al., 2008; Applegarth et al., 2016).

For study IV, the questionnaire was sent to 252 heterosexual couples, separately to mothers and fathers, who had become parents with donor insemination or donor IVF treatment. Information was received on 58% (240/415) of children born to these couples. In previous studies, disclosure intentions have been examined among heterogenous groups of parents, except for heterosexual couples, also single mothers and lesbian couples. Absence of a father in the family requires an explanation to the child and thus disclosure rates are expected to be higher (Scheib et al., 2003). In addition, most of previous studies have examined parental disclosure intentions after DI treatment but not separately after donor IVF treatment where not only male factor infertility exists but a female factor as well.

One limitation of the studies I and II are the low number of patients Matching was considered to be successful. Because of lack of controls at similar age we had to allow four controls from a lower age group of mothers. However, the mean age of mothers was statistically similar between the groups (Studies I–II).

Unfortunately, no information is available for patients who declined participation in the studies (I–IV). Parents declining to answer questions in studies III and IV are most likely in favour of secrecy (Nachtigall et al., 1997; Gottlieb et al., 2000; Klock and Greenfield, 2004).

Generally, questionnaire studies have some limitations that warrant mention. Self-reported data is suitable to assess subjective well-being but reporting somatic symptoms during pregnancy may differ from medical records. This apply to questions about children's health which were answered by parents and not confirmed from medical records. A child's health problem may have an impact on parents' willingness to inform the child about the way of the conception.

Mental health problems, fear of childbirth, and pregnancy-related anxiety were instead reported with validated questionnaire tools such as GHQ-36, FDQ, and PAS. Self-reported mental health symptoms are potentially vulnerable to social desirability among couples undergoing OD and IVF/ICSI (Holter et al., 2006).

7.1. FEAR OF CHILDBIRTH AND DELIVERY EXPERIENCE OF OD MOTHERS

Women pregnant after successful OD were hypothesised to be more likely to suffer from fear of childbirth and pregnancy-related anxiety due to their demanding background and process achieving pregnancy.

Instead, this study showed that women pregnant with donated oocytes experienced less fear of childbirth and pregnancy related anxiety than IVF/ICSI and SC controls. The majority of OD women in this study had POI for which OD is the only available treatment option and they became pregnant on average after two ET cycles. Except for the reasons of infertility, background measures for infertility such as duration of infertility/wish for pregnancy and number of previous failed treatments were similar in OD and IVF/ICSI groups and thus do not explain the lower level of fear of childbirth.

One reason for mother's fear of childbirth is often the fear of unknown, especially for primiparas. Couples have faced the feeling of unknown when they accepted an anonymous donor chosen for them and accepted the fact that the child is not genetically their own. For young women with POI, the

possibility to deliver by using donated oocytes might be seen to be an immensely positive option and gift, as they had no gametes themselves. One can speculate that this opportunity is a way to deliver against "all odds", and might alleviate feelings of fear. Nowadays, most OD treatments are performed on women aged over 40 years, who usually have previously undergone several unsuccessful conventional IVF treatments. Whether the fear of childbirth in this group of patients is comparable to that of POI women cannot be concluded from this study.

OD pregnancies are associated with adverse maternal and neonatal outcomes. OD mothers were well informed about these risks before pregnancy even started and that their pregnancy would be followed in a hospital outpatient clinic which may have decreased their concern about child's health and anxiety of pregnancy. Hospitalisation due to pregnancy complications was more common among OD mothers than IVF/ICSI and SC mothers, which was expected. The reasons for hospitalisation were not closely analysed or they were hospitalised with milder symptoms than IVF/ICSI and SC mothers. OD mothers taking part in this study had fewer adverse pregnancy outcomes. This finding may be due to the fact that they were relatively young for OD mothers and risks in OD pregnancies partly associate with advanced maternal age.

Before the treatment started, all couples met a mental health professional at least once and had several meetings with medical personnel to discuss their well-being, parenthood, their future thoughts, and concerns about their child. Support, which OD mothers received during the treatment and during the pregnancy, may have alleviated their fear. Interestingly, OD women were the most confident receiving help and support from the hospital personnel during the pregnancy and delivery. Confidence towards medical personnel can result in satisfaction of care in the fertility clinic. OD women also felt the most confident about the health of their future child. This may be explained by the fact that the oocyte was received from young, healthy women.

Supportive partnership is reported to reduce mother's fear of childbirth (Saisto et al., 1999; Laursen et al., 2008). OD couples represent a specific group whose partnership is strong enough to withstand the stress of infertility. This study may be criticised for not including satisfaction with partnership in the analyses. However, the fertility treatment with donated oocytes is generally postponed or withdrawn by the mental health professionals if any problems in partnership occur until they have been resolved.

Including depression and general anxiety into the analysis would have been important because these are risk factors for increasing fear of childbirth. However, all couples were screened for mental health symptoms by mental health professionals before treatment.

Pregnancy-related anxiety and fear of delivery are at their lowest during the second trimester (Rouhe et al., 2008) when the measurement of FDQ and PAS were done. Formerly infertile women may idealise their pregnancy

and fail to prepare for the realities of giving birth in the second trimester (Hammarberg et al., 2008). Therefore, fear of delivery should have been measured again during the third trimester.

Research on the delivery experience of formerly infertile women is conflicting. Feeling out of control, separation from the baby, and postoperative pain have been associated with negative experience (Hammarberg et al., 2008) leading to difficulties in feeding the infant and anxiety about infant care (Rowe-Murray et al., 2001; Waldenström et al., 2004; Fisher et al., 2012). Very few OD women were dissatisfied with their delivery, which was reassuring. Interestingly, acute operative deliveries were associated with dissatisfaction only in OD mothers, contrary to what has been reported earlier among all mothers. Fear of delivery and intolerable pain was associated with dissatisfaction in all women, which is in line with previous studies (Waldenström et al., 2006; Söderquist et al., 2009; Flykt et al., 2014).

Delivery complications may deepen the sense of failure in being unable to become a mother naturally. Surprisingly, the way of delivery was similar between the groups which made the results naturally more reliable. Caesarean rate was high in all groups and higher than in Finland generally (National Institute of Health and Welfare Statistics, 6/2018). According to a systematic review of OD pregnancies, caesarean rate has been twice as high in OD pregnancies than in IVF/ICSI and SC pregnancies (Storgaard et al., 2016). The reasons for caesareans were not analysed, which was a limitation of the study. One reason for elective caesarean may be fear of childbirth but also several other reasons. Elective caesarean rate was the highest (23%) among OD mothers who feared childbirth less compared with IVF/ICSI and SC mothers whose elective caesarean rates were 20% and 14% respectively.

The results suggest that OD mothers are not at greater risk for fear of childbirth or negative delivery experience, however, acute operative deliveries were associated with delivery dissatisfaction among OD women. Therefore, health care personnel should focus on supporting these women in early parenthood. Because pregnancy risks in OD pregnancies are higher, multiple pregnancies should be avoided by transferring only one embryo and thus alleviating maternal anxiety of fetal well-being and decreasing risks for operative delivery.

7.2. MENTAL HEALTH OF OD PARENTS

Mental health problems of one or both parents have an impact on the well-being of the whole family (Blake et al. 2014), parent-child relationship, and parental marital relationship during and after fertility treatment. Typically, OD families have been excluded from previous studies.

OD mothers were hypothesised to report higher levels of mental health problems during pregnancy and early parenthood due to their more problematic reproductive background. For fathers, no hypothesis was provided due to lack of studies.

Contrary to the hypothesis, OD women showed lower levels of mental health symptoms during pregnancy and postpartum than IVF/ICSI women and SC women. Differences were statistically significant at 2 months and one year postpartum, but not during pregnancy.

No statistically significant group differences were found in depressive symptoms across the transition to parenthood. This is a reassuring finding because maternal depression may be a risk for infant-mother relationship and interfere fetal attachement (Seimyr et al., 2009; Field, 2011; Dix et al., 2014). It would have been a merit to add the Edinburgh Postnatal Depression Scale (EPDS) questionnaire to screen and detect postnatal depression among mothers.

Child-related stressors are associated with mental health problems among infertile parents (Lynch et al., 2014). A longer stay in the hospital after the delivery or hospitalisation in pregnancy are usually related to health problems among mothers or fetus and newborn. When the results were covariated with hospitalisation in the 2nd and 3rd trimester, and with hospitalisation length postpartum, OD mothers demonstrated better stress tolerance than IVF/ICSI and SC mothers. This may be because OD mothers were better prepared for higher risks for perinatal complications and when they finally had gotten their highly desired child and resolved the infertility trauma, they had created better coping skills. In addition, mothers with a tendency for distress had dropped out before entering OD treatment. Finding that infertile couples cope well with different stressors has been confirmed in earlier studies (Repokari et al., 2005; Poikkeus et al., 2006). This study sample size was too small to permit close examination of the impact of child-related stressors on mental health of OD parents, but it should be examined in the future with a larger study population.

The reasons for the current results indicating that OD mothers had fewer mental health symptoms than IVF/ICSI and SC mothers may lie in their proper preparation for parenthood. At the time of the study, the waiting time for treatment was 1-2 years due to a shortage of donors. Couples had a chance to adapt to parenthood and obtain information about treatment and pregnancy risks. Counselling was available to offer discussions about the

feelings of infertility, future parenthood and child. However, counselling was available for IVF/ICSI patients as well, but it was not similarily included in the treatment process as it was in the OD donation program. Well-being of mothers may also reflect their satisfaction with an almost unreal dream of getting pregnant.

Supportive partnership may have helped both partners in their transition to parenthood. Marital satisfaction was not included in the analyses, which is a limitation for the study. Duration of partnership did not differ between the groups, mean 5 years, but duration does not reflect the quality of the partnership. Couples suffering from any kind of psychological distress might have been more likely to abandon the treatment with donated oocytes as well as support and treatment for their problems, thereby causing selection bias.

The expected results for fathers with an OD child were uncertain compared with IVF/ICSI and SC fathers, due to limited research data. In this study, the mental health of men becoming fathers through OD appeared similar to that of the IVF/ICSI and SC groups at all three time-points. These results are in accordance with some previous studies reporting that anxiety and depression symptoms were similar among IVF/ICSI and SC fathers (McMahon et al., 2002; Gibson et al., 2007).

7.3. INCREASING OPENNESS OF PARENTS IN OOCYTE DONATION FAMILIES

The purpose of this study was to gather information of parental decision-making regarding OD treatment itself, disclosure to the child and to other people, and level of satisfaction up to 15 years after the treatment.

The results revealed that 26% of all children aged 3–14 had already been told about his/her origin and in addition 36% of the mothers and 38% of the fathers had decided to inform the child later. Parents with younger children (aged 1–3) were more likely to inform the child than parents with older children (aged 10–14). These findings are in line with other studies (Gottlieb et al., 2000; Lalos et al., 2007; Daniels et al., 2009; Isaksson et al., 2011). According to a review article on parents' disclosure intentions, 0–51 % had told their child (aged 0–15) about the conception with donated oocytes and over 50% intended to do so (Tallandini et al., 2016). In 1998, fewer parents of this same cohort intended to inform their child about his/her origin and as many as 30% had decided never to inform the child (Söderström-Anttila et al., 1998). This is one of the few known studies reporting parental intentions at two time points, 13 years apart.

Change in parental intentions may have two explanations. In 1998, children were still too young to be told and/or attitudes of the parents have changed towards more openness during these years. Reasons for changed attitudes

towards more openness have been seen in changes of views towards gamete donation in general, as OD has become a more accepted method to treat infertility. Change in public attitudes toward more openness led Finland also to pass an ART Law to allow only open-identity gamete donors. At the same time, the role of mental health professionals in all kinds of ART treatments were more acknowledged (Benward, 2015). As general attitudes changed, professionals started to more actively encourage the parents towards openness as family secrets were considered harmful for the whole family (Indekeu et al., 2013).

At the time of the study, the majority of donors were anonymous but 15% of couples had decided to use a known donor. This had no effect on parental disclosure decisions. Furthermore, indication for treatment, socioeconomic status, marital relationship, or difficulties in decision making regarding OD treatment did not influence parental disclosure intentions. Those who had told or intended to do so, did it because they felt it was fair and because the child had the right to know. On the other hand, those who did not plan to tell the child thought that the information is unnecessary or that it could harm the child. Non-disclosers were also more influenced by other people's opinions. The majority of the parents had told the nature of their child's conception to other people, mothers more often than fathers. This can be seen as a signal towards greater openness. However, many had not told the child yet, so they were ready to take the risk for accidental disclosure. Half of the parents reported thought that they will inform the child to spare him/her from accidental disclosure, which can be a traumatic experience for the child.

One of the very positive findings of this study was that a great majority of parents had maintained their marital relationship despite infertility problems and long waiting time for fertility treatment. This result has been confirmed by Repokari et al. (2007), when they showed that shared stress may strengthen the marital relationship. Furthermore, it was also reassuring that 90% of the parents reported that the decision to start the treatment with donated oocytes was easy and that they had very few concerns about the characteristics of the anonymous donor. All parents wrote that they felt that the child was really their own.

The fact that almost half of the parents felt that psychological support had been insufficient requires attention. The parents wished they would have had a chance to discuss with the counselor immediately after the delivery and at the time to inform the child to receive guidance regarding when and how to tell. This criticism should be taken seriously and encourage parents to seek support after the child is born. At that point, professionals could learn more about the parents' feelings after successful treatment to be able to better inform future parents-to-be and alleviate their fear of the unknown. Continuity of support for the parents and the children have become of utmost importance today in Finland, with an open-identity donor system and possibility for donor offspring to have contact with the donor some day in the future.

This study only included parents who were treated before the ART law came into act in 2007. Parental opinions about the new law were sought, and only one third of mothers and one quarter of fathers favoured requirements for open-identity donation. Nevertheless, 40% of the parents reported that the law would not impact on future parents' disclosure intentions.

7.4. ATTITUDES AND DISCLOSURE DECISIONS OF DI/DIVF PARENTS

This study involved the collection of information on parental disclosure intentions regarding 240 children born after DI/dIVF treatment during a 15-year period.

The main finding was that 16.5% of parents had told their child about their donor conception. This is in line with earlier studies, which have reported that 11–35% of parents have told (Gottlieb et al., 2000; Lycett et al., 2005; Isaksson et al., 2012; Frith et al., 2018). The highest percentages (93%) have been reported among single mother and lesbian couples (Scheib et al., 2003). Oocyte donation parents generally show greater openness than sperm donation parents (van den Akker, 2006). This was also found in this study as 26% of OD children had received information on the donor conception.

Differences related between sperm and oocyte donation may be explained by the fact that a woman is related to her child genetically but also through gestation, but a man only genetically through his sperm (Isaksson et al., 2011). In addition, men are in general less likely to talk about the infertility problem they face (Hjelmstedt et al., 1999). A genetic tie with the child seems to be very important for men (Ravin et al., 1997). Those men who need donated sperm cells are more secretive than women who need donated oocytes (Isaksson et al., 2011). Almost 19% of parents had disagreement with their disclosure decision and there is evidence that when parents disagree or are unsure, they later choose not to tell (Daniels et al., 2009). This study examined whether parental disclosure decisions were different if there was also a female infertility factor present and hence partners were equally involved in their infertility problem. It lacked any separate effect on the decision.

Parents with younger children were more willing to tell the child about his/her conception. This is most likely a result of counselling which increasingly started to emphasise the importance of being honest. In the 1980s and 1990s, secrecy was recommended by some professionals. At the beginning of the study period counselling was not mandatory as it is today. The results showed that parents whose child was born before 2000 were more often unsatisfied with the psychological support they received

compared with parents after 2000. This finding may partly explain parental disclosure decisions and why so many were left unsure with their decision to disclose or not. In line with the OD parents, the parents with donor sperm offspring reported a great need for support, not only before the treatment but when the child was born and when it was time to tell. Rumball and Adair (1999) reported a need for ongoing support for parents after gamete donation treatment as well.

About half of the parents had informed other people about the donor conception. Fathers were more secretive compared with mothers, when nearly 50% of them had not told anyone about the donor conception. Higher tendency for secrecy among fathers has been reported before (Isaksson et al., 2011). Of those who had told other people, very few regretted. Some parents commented though that they should not have told the medical personnel about the donor treatment because these persons had talked about the donor conception when the child was present. Contrary to an OD pregnancy, DI/dIVF pregnancy is not considered to be high-risk. Oocyte donation mothers are thus advised to inform medical personnel and this risk explains why OD mothers inform medical personnel more often than DI/dIVF conceived mothers (82% vs. 50%).

It is a reassuring finding that parental satisfaction about the treatment decision was high. About 20% of parents answered that the decision to start the treatment with donated sperm cells was difficult and sadly two mothers reported regretting the treatment. All parents felt that the child was their very own. They had very few concerns about the characteristics of the donor, which can be interpreted as a confidence in the donor screening program. In this study, only 15% of parents were divorced and similar results have been reported earlier except for one study where 46% of couples had separated (Daniels et al., 2009). A high rate of separation may be a result of insufficient psychological support for these couples.

This study was conducted at the time when donors were anonymous and it must be kept in mind that the results might be different today. All couples had received treatment in only one fertility clinic in Helsinki. Clinics vary in their clinical practices and thus the results should be interpreted with caution.

8. SUMMARY AND CONCLUSIONS

"Infertility touches all aspects of a person's life. It affects how individuals feel about themselves, their relationships, and their life perspective. Stress is only one of a myriad of emotional realities that couples facing infertility deal with, often for extended periods of time", Hart (2002) described very well what couples face when the infertility problem is present.

Our results are encouraging. OD mothers showed less fear of childbirth and pregnancy-related anxiety than their IVF/ICSI and naturally conceived controls. This study was the first to examine fear of childbirth among OD mothers and their experience of delivery. Higher levels of fear of childbirth and pregnancy-related anxiety were expected because of their previous problematic reproductive background. However, the OD mothers' experience of childbirth was similar to that of IVF/ICSI and SC mothers.

Fear and/or anxiety during pregnancy and dissatisfaction with delivery may affect maternal attachment with the fetus and most importantly mother-infant relationship, especially when there is no genetic connection between mother and the infant. One might conclude that low levels of mental health problems among OD mothers are partly reflecting lower levels of fear of childbirth and pregnancy-related anxiety, as well as support they received from the fertility clinic, maternity health care, and hospital outpatent clinics.

In contrast with the main hypothesis, parental mental well-being was similar or better than IVF/ICSI and spontaneously conceiving parents. Pretreatment preparation may have helped OD mothers and fathers to cope with the distress they face. Unfortunately, parental well-being when there are child-related stressors present could not be examined. OD couples consist of a selected group of infertile women and men and it can cause bias to the results. They were screened for mental health symptoms and problems in their marital relationship and received treatment and support before being allowed to start the treatment. Couples who are unable to withstand stress are more likely to drop out earlier and not even consider starting treatment with donor gametes.

Secrecy is inevitably the most challenging issue that parents face when they have a child conceived with donated gametes. These studies showed that parental openness towards the child had increased during the years. The same tendency was seen both among parents who had a child with sperm donation and among parents whose child was born with donated oocytes. As expected, based on earlier reports, sperm donation parents were more secretive than OD parents. Those who had decided to tell the child about the donor conception had told or intended to tell because they want to be open and honest and the child has the right to know. Those parents who had decided not to tell were afraid that the information would do harm for the

child. In addition, some parents felt that telling is unnecessary when they cannot provide any further information on the anonymous donor.

Parents were given a chance to discuss with mental health professionals about the issues of secrecy. Parents' opinions were sought about the support they received. Both sperm donation parents and OD parents reported dissatisfaction because they had needed ongoing support when the child was born and when it was time to disclose. This criticism should be taken seriously and clinics should encourage families to make contact with mental health professionals as well as peer support groups whenever they needed. On the other hand, OD mothers' pretreatment support may have helped them to cope with pregnancy-related stress. Yet, issues regarding disclosure are either so complicated or the quality of counselling did not meet this purpose.

Since these studies were conducted, much has changed in the field of donor ART. General attitudes towards gamete donations have changed towards openness leading many countries including Finland to change their legislation. Today, all donors in Finland are open-identity donors and the offspring have a right to obtain identifying information of the donor at the age of 18. Change of legislation may have influenced parental disclosure intentions and should be examined in the future.

Legislation varies in many countries leading to the rise of cross-border donation treatments. Worries have increased whether these couples travelling abroad receive counselling in their home country in their own language or do they enter the treatment without this guidance. Secrecy issues concerning gamete donation can be very different in different cultural and social environments.

Until now, the use of anonymous donors has not allowed donor-conceived offspring to find out their genetic parent. International genetic databases and genetic testing make it possible for a donor conceived offspring to find their genetic relatives. Genetic testing may uncover secrets about one's donor conception. Furthermore, gamete donors who choose nonidentifiable donation have to be informed that their anonymity is not guaranteed. It is impossible to say yet how genetic testing is going to impact on parental disclosure decisions, or does it have an impact on recruiting donors.

Finally, when a couple comes and requests treatment with donated gametes, decision to proceed or not should always be in the best interest of the future child. Research will reveal what is the best interest of the child by asking donor-conceived children about their experiences. Mahlstedt and Greenfeld wrote wisely in 1989 about the need for patient preparation: "To most couples wanting to have children, conception is the first step toward the fulfillment of that goal. To the infertile couple who has been through years of emotional turmoil and physical pain, conception is the goal and represents the end of very grueling process. To specialists in reproductive medicine, conception means success of treatment. To the hoped-for children, however, conception is the beginning of their lives."

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APPENDIX

Table 9. Fear of Delivery Questionnaire (FDQ)
Each question to be answered yes = 1 or no = 0.
Score being the sum of the answers.
1. Do you have difficulties relaxing because you are thinking of the delivery?
2. Do you prefer a caesarean section to an ordinary delivery?
3. Are you afraid of rupturing during the delivery?
4. Have you had nightmares about the delivery?
5. Have you sometimes thought of dieing during the delivery?
6. Are you afraid of losing control of yourself at the delivery?
7. Are you afraid of painful injections during the delivery?
8. Have you always been afraid of giving birth?
9. Are you afraid of being seized with panic at the delivery?
10. Are you afraid of being left alone?
11. Are you afraid of unhealthy child?

Table 10. Pregnancy Anxiety Scale (PAS)
Answers on five-point scale: 1 = not at all, 2 = a little, 3 = some, 4 = yes, 5 = a lot
Score being the sum of the answers.
1. Has anyone frightened you about having a baby?
2. Have you read anything that frightened you about having a baby?
3. Do you fear that you would fall and hurt your baby?
4. Are you afraid the pain of childbirth would be bad?
5. Are you going to ask for pain medicine in delivery?
6. Do you fear about being cut when the baby is born?
7. Are you afraid your baby would not be normal?
8. Are you afraid you would be alone in the hospital?
9. Are you worried that the doctors might not be friendly?
10. Are you worried that the nurses might not be friendly?

Table 11. Delivery Satisfaction Scale (DSS)
Answers on five-point scale: 1 = not at all, 2 = a little, 3 = some, 4 = yes, 5 = a lot
Score being the sum of the answers.
1. Was the delivery a positive experience?
2. Did you receive sufficient support from the obstetric ward personnel?
3. Did you receive sufficient support from your partner?
4. Was the labor painful?

5. Did you receive efficient pain relief during labor?
6. Did you feel safe during the labor?
7. Did you have enough influence on the treatment you received during labor?
8. Did the obstetric ward personnel patronise you too much during labor?