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TRANSITION TO PARENTHOOD AFTER DONOR CONCEPTION

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ABSTRACT

Studies on donor conception (DC) in Italy have been few up to now, in part due to the recent access to oocyte donation (OD) and/or semen donation (SD) treatments (Constitutional Court, sentence n.162/2014). This study aims to examine DC mothers' and fathers' psychological status and their maternal and paternal mental representations (MRs) in the perinatal period and to compare them with couples who conceived after Assisted Reproductive Technology with autologous gametes (AUT-ART), and with couples who conceived naturally (NC). Between October 2020 and December 2022, participants were recruited in the Reproductive Unit and Gynaecological and Obstetric Unit at the Institute for Maternal and Child Health IRCCS Burlo Garofolo. They were then followed longitudinally over their transition to parenthood at four time points: around the 14th gestational week, between 26th-30th gestational weeks, 1-2 months postpartum and 4-5 months postpartum. At the first time point, the participants consisted of 85 NC mothers, 45 NC fathers, 28 DC mothers, 21 DC fathers, 35 AUT-ART mothers, and 14 AUT-ART fathers.

To examine the parental psychological status, repeated measures ANCOVA was performed on outcome variables to examine differences among the three groups of mothers and two groups of fathers (the sample of AUT-ART fathers was too small to perform statistical analysis), and within the four phases. The state anxiety was lower in DC mothers than in NC mothers, irrespectively of the time of assessment, while no statistically significant difference was found between the two groups of fathers. There were also no differences among the groups of mothers and fathers regarding the presence of anxiety symptomatology, trait anxiety, depression, parenting stress, and dyadic adjustment. The pregnancy-related anxiety was lower for DC mothers than both NC and AUT-ART mothers, and lower for DC fathers than NC fathers, irrespectively of the time of assessment. ANCOVA showed that the prenatal attachment to the fetus was higher in AUT-ART mothers than in NC mothers and that the postnatal attachment to the baby was higher in DC mothers than NC mothers. No statistically significant differences between DC fathers and NC fathers were found in the prenatal attachment to the fetus, while the postnatal attachment to the baby was higher in DC fathers than in NC fathers.

To investigate the maternal and paternal MRs and detect the distribution of integrated/balanced, restricted/disinvested, and ambivalent/non-integrated categories among

groups and across the four phases, 10 OD mothers, 10 OD fathers, 10 NC mothers, 10 NC fathers, and 10 AUT-ART mothers were selected (the sample of AUT-ART fathers was too small). This selection yielded 200 interviews (50 participants at 4 times each), which were transcribed and analysed, and a descriptive analysis was conducted. We found that all OD mothers, the vast majority of OD fathers and AUT-ART mothers had integrated balanced MRs, while NC mothers and NC fathers had more variegated results across the transition to parenthood. Moreover, we explored qualitatively the 10 OD mothers' representation of resemblance with the child and representation of third-party reproduction. We reported that all 10 OD mothers found physical or psychological characteristics in common with the child, while the representation of third-party reproduction was more complex to elaborate.

We concluded that DC couples are well-adjusted in their psychological status and MRs in the perinatal period. Findings are reassuring for couples that decide to start a DC procedure, clinicians, and DC families.

This work is supported by the University of Trieste and the IRCCS Burlo Garofolo, and is part of a larger and still ongoing longitudinal study (N. of protocol RC 17/2018) involving couples in transition to parenthood after donor conception, directed by Prof. Giuseppe Ricci. The research was designed and supervised by Prof. Maria Anna Tallandini and Prof. Giuseppe Ricci.

*Un fischiello,
mio dolce rumore,
unica pace.*

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ABBREVIATIONS

OD, oocyte/egg donation;

SD, semen donation/donor insemination;

ED, embryo donation;

AUT-ART, Assisted Reproductive Techniques with autologous gametes;

NC, natural conception;

IRMAG, Intervista sulle Rappresentazioni Materne in Gravidanza

IRPAG, Intervista sulle Rappresentazioni Paternali in Gravidanza

IRMAN, Intervista sulle Rappresentazioni Materne dopo la Nascita

IRPAN, Intervista sulle Rappresentazioni Paternali dopo la Nascita

BAI, The Beck Anxiety Inventory

STAI-Y, The State-Trait Anxiety Inventory - form Y

PRAQ-R2, The Pregnancy-Related Anxiety Questionnaire-Revised

PRAQ-F, The Pregnancy-Related Anxiety Questionnaire-Fathers

BDI-II, The Beck Depression Inventory - II

EPDS, The Edinburgh Postnatal Depression Scale

PSI/SF, The Parenting Stress Index/Short Form

DAS, Dyadic Adjustment Scale

MAAS, Maternal Antenatal Attachment Scale

PAAS, Paternal Antenatal Attachment Scale

MPAS, Maternal Postnatal Attachment Scale

PPAS, Paternal Postnatal Attachment Scale

INTRODUCTION

The traditional family model continues to evolve, reflecting the socioeconomic situation of the time and the context (Greil et al., 2009). The impossibility to conceive naturally, for medical or idiopathic reasons, the tendency to have children at an increasingly advanced age, with the resulting infertility consequences, and the access to reproduction for same-sex couples and single mothers have led to new family forms (Golombok et al., 2017a). All of the mentioned changes are deeply connected to the increase in the use of medical treatments to conceive (Wyns et al., 2022). In Europe alone, between 1997 and 2018, more than 11 million treatment cycles have been performed, and 2 million infants were born through the use of medical treatments to conceive (Wyns et al., 2022).

Assisted Reproductive Technology (ART) is defined as the union of all treatments or procedures that include the *in vitro* handling of human gametes, or embryos, to establish a pregnancy, both in the case of couples' gametes or donated gametes. ART includes In Vitro Fertilization (IVF), a sequence of procedures that involves extracorporeal fertilization of gametes, and Intracytoplasmic Semen Injection (ICSI), a procedure in which a single spermatozoon is injected into the oocyte cytoplasm. ART definition also includes gestational carrier cycles (surrogacy motherhood), in which a woman carries a pregnancy with an agreement that she will give the offspring to the intended parent(s). Intra-Uterine Insemination (IUI), a procedure in which semen is placed in the uterus, is not included in the ART definition, even if the semen comes from a donor. IUI is instead part of the broader term Medically Assisted Reproduction (MAR), which includes all medical treatments or procedures to establish a pregnancy (Zegers-Hochschild et al., 2017). In this work, we refer to donor conception (DC) when we talk about reproduction resorting to oocyte donation (OD), and/or semen donation (SD) or embryo donation (ED). We use the term AUT-ART for the condition of Assisted Reproductive Technology with autologous gametes, and the term NC for natural conception. Moreover, we refer to couples who resorted to gamete donation, embryo donation, or surrogacy using the term reproductive donation (RD).

In Europe, different countries adopt different stances regarding the availability of techniques for individuals that cannot conceive naturally, based on the financial, social, cultural and religious context of each country. Given how the majority of studies reported and analysed throughout this dissertation take place in European countries, it is worthwhile to briefly

summarize the complex context of laws governing MAR in the continent. Donated semen is allowed in the majority of European countries, while OD is forbidden in five countries (Bosnia and Herzegovina, Germany, Norway, Switzerland, and Turkey). Four countries (Croatia, Ireland, Italy, and Montenegro) allow only gametes' importation from other countries. The donation of both semen and oocyte is forbidden in 11 countries (Bosnia and Herzegovina, Germany, Norway, Switzerland, Turkey, Armenia, Croatia, France, Montenegro, Slovenia, and Sweden), embryo donation is forbidden in 14 countries (Austria, Armenia, Belarus, Bosnia and Herzegovina, Bulgaria, Denmark, Iceland, Italy, Kazakhstan, Norway, Slovenia, Sweden, Switzerland, and Turkey), and surrogacy is allowed in 15 countries (Albania, Armenia, Belarus, Belgium, Cyprus, Czech Republic, Georgia, Greece, Kazakhstan, Macedonia, Romania, Russia, The Netherlands, UK, and Ukraine). In 11 countries (Albania, Bosnia and Herzegovina, Czech Republic, France, Italy, Lithuania, Poland, Slovakia, Slovenia, Switzerland, and Turkey) only different-sex couples have access to MAR. The anonymity of donors varies sensibly between countries: strict non-anonymity (where the donor's identity is released), anonymity just for the recipients and not for offsprings, a mixed system (anonymous and non-anonymous), and strict anonymity (where no information about the donor's identity is released) (Calhaz-Jorge et al., 2020).

Studies on DC in Italy have been few up to now, in part due to the recent access to gamete donation treatments. Indeed, only in 2004 with Law 40 (Law 2/19/2004, n.40. Rules on medically assisted procreation, G.U. n.45, 2/24/2004), the Italian government allowed access to MAR treatments to couples, and only to those who did not need gamete donation. In 2014, the Italian Constitutional Court then removed the ban on donor conception, allowing both semen and oocyte donation (Constitutional Court, sentence n.162/2014). Nowadays, Italian couples can resort to OD, SD or both, but ED is not allowed. Moreover, only different-sex couples in a stable relationship have access to donor conception, so this procedure is forbidden for same-sex couples and single women. The donor is strict anonymous, and, therefore, the couple and the future child have no information about the donor's identity (Calhaz-Jorge et al., 2020).

In the current scientific literature, the majority of knowledge regarding the psychological aspects of donor conception comes from *The European Study of Assisted Reproduction Families* (Golombok et al., 1995, 1996, 1999, 2002a, 2002b; 2004a; Murray et al., 2006; Owen and Golombok, 2009) and *The UK Longitudinal Study of Reproductive Donation Families* (Golombok et al., 2004a, 2004b, 2005, 2006a, 2006b, 2011a, 2011b, 2013,

2017b; Casey et al., 2013; Blake 2014a, 2014b; Ilioi et al., 2017). Few studies in the published literature include Italian samples (Golombok et al., 1996, 2002a; Cook et al., 1997; Baiocco et al., 2015, 2018; Lingiardi et al., 2016; Carone et al., 2018, 2019), and even fewer studies regard the perinatal period (Goldberg, 2006a, 2006b; Hershberger, 2007; Indekeu et al., 2014; Sälevaara et al., 2016, 2018), or the first year after childbirth (Golombok et al., 2004a, 2004b; Van Rijn-van Gelderen et al., 2018; Imrie et al., 2019a, 2019b, 2020). Moreover, no studies examining the transition to parenthood after donor conception in an Italian sample have been conducted up to now. It is within this context that the results presented in this thesis work augment the existing scientific literature by providing an analysis of the parental psychological status and MRs in the transition to parenthood after donor conception.

RELATIONS IN NEW FAMILY FORMS

Before presenting the main experimental findings of this work, we want to focus on two original systematic and meta-analytic reviews following two main research paths, the couple's relationship and the parent-child relationship. In these works, we decided to investigate the experiences of families who resorted to third-party reproduction. In particular, Zanchettin et al. (2022)¹ performed a meta-analysis and systematic review regarding the quality of parenting in reproductive donation families. Russo et al.² performed a meta-analysis and systematic review regarding the quality of the couple's relationship in donor conception families.

The results from these two reviews are presented in the following paragraphs and introduce the vast scientific literature that is available regarding the family relations in RD families in comparison to AUT-ART and NC ones. This, in turn, provides context for the main results presented in this work on the couples who resort to third-party reproduction to have a family.

1. The absence of a genetic link with the child

The quality of parenting and the couple's relationship in families where there is no genetic and/or gestational link between one or both parents and the child, such as the ones resorting to gamete donation, embryo donation, or gestational carrier, has been largely explored. Numerous studies have focused on the quality of family relations in these types of families, due to concerns regarding the possibility that the absence of a genetic link between the parent and the child may affect the quality of parenting and the couple's relationship.

These concerns regard the fact that the absence of a genetic link with the child may be connected with higher overinvestment in the child (Brewaeys, 2001). Moreover, parents may keep the secret about the method of conception with the child (MacCallum & Keeley, 2012; Tallandini et al., 2016), because of the fear that disclosure will affect the relationship with their

¹ Zanchettin, L., Tallandini, M. A., Gronchi, G., Zito, G., Ricci, G., & Russo, L. R. (2022). The quality of parenting in reproductive donation families: A meta-analysis and systematic review. *Reproductive BioMedicine Online*, 45(6), 1296–1312. <https://doi.org/10.1016/j.rbmo.2022.08.099>

² The couple relationship quality in donor conception families: A meta-analysis and systematic review. Lucia Roberta Russo, Maria Anna Tallandini, Giorgio Gronchi, Gabriella Zito, Giuseppe Ricci, Liviana Zanchettin. (submitted)

children (Readings et al., 2011; Salevaara et al., 2013). In this context, the secrecy around the conception method within the family or the decision to tell the child about his/her origins at an advanced age of the children may affect negatively the parent-child relationship (Ilioi et al., 2017; Paul and Berger, 2007; Jadva et al., 2009). Another important aspect is that parents who resort to third-party reproduction often experience the social stigma of being “older parents”, in addition to stigma related to non-traditional parenthood, sexual orientation and the development of the child’s sexual identity (Tasker, 2010; Carone et al., 2018, 2019; Imrie & Golombok, 2018). In this context, the perceptions of stigma for non-biological connection may affect the parent-child relationship adversely (Cook et al., 1997; Nachtigall et al., 1997).

Couples who resort to oocyte donation or semen donation to conceive have a particular characteristic: a genetic asymmetry between partners in the genetic link with the child, due to the donation of the female gametes or male gametes. This imbalance in the genetic link with the child may lead to an imbalance in the couple’s relationship, due to many factors. For example, feelings of inequality have been found among non-biological parents, due to jealousy of the presence of this genetic asymmetry between partners (Gartrell et al., 1996; Pelka et al., 2009; Raes et al., 2014). Moreover, feelings of inadequacy have been found in donor conception couples where one of the two partners feels the only one responsible for infertility, with negative consequences on sexual satisfaction (Smith et al., 2009). Furthermore, a tendency to protect the non-biological partner, by avoiding discussing resemblance topics (Isaksson et al., 2019), or by giving the non-biological partner the liberty of the disclosure decision (Wyverkens et al., 2015), has been reported. Finally, the disclosure decision has been observed to be more challenging for DC couples than AUT-ART couples (Tallandini et al., 2016), and the decisional processes has been found to possibly induce a crisis in the couple when the two parents are in disagreement (Owens et al., 1993; Isaksson et al., 2012; Gebhardt et al., 2017).

1.1. The quality of parenting in reproductive donation families

In the review on the quality of parenting in reproductive donation (RD) families we performed a meta-analysis of articles in the literature to answer the following question:

Does the absence of a genetic link between one/both parents and the child influence the quality of parenthood, compared to NC families and AUT-ART families?

To answer this question, we selected 11 articles for the meta-analysis. These articles examine, through quantitative measures, the parent-child relationship in parents who resorted to semen donation, oocyte donation, and embryo donation to have a child. Surrogacy was excluded because in such cases the genetic link with the intended parents was not always specified. The authors grouped all variables into 3 clusters, similar to the clusters used by Golombok et al. (2017b, 2018, 2021): positive parenting, negative parenting, and mutuality. Warmth, closeness, pleasure in parenthood, and collaboration between parents in children's care were assigned to the "positive parenting" cluster; conflict, hostility, control, over-involvement, and parenting distress were considered for the "negative parenting" cluster; mutual responsiveness, mutual sensitive responses, and dyadic cooperation formed the "mutuality" cluster. The variables were independently assigned to each cluster by three external judges.

Families in which parents had no genetic link with the child (SD fathers, SD co-mothers, OD mothers, ED mothers and fathers) were compared to NC families and AUT-ART families regarding positive and negative parenting. The "mutuality" cluster was not considered because of the insufficient number of papers. Therefore, four analyses were performed, as shown below:

DC families vs NC families - positive parenting (first analysis)

DC families vs NC families - negative parenting (second analysis)

DC families vs AUT-ART families - positive parenting (third analysis)

DC families vs AUT-ART families - negative parenting (fourth analysis)

A random-effects meta-analysis was used to combine standardized mean differences for each study, and a heterogeneity test was used to assess inconsistency. A meta-regression was used to assess the effect of the publication year. In the first analysis concerning the comparisons between DC parents and NC parents on positive parenting, the homogeneity was acceptable ($Q(8) = 11.09$, $p = .197$, $I^2 = 28\%$) and positive parenting in DC families was higher than NC families (SMD = .229, 95% CI .064 - .395, $z = 2.71$, $p = 0.007$). In the second analysis, DC parents were compared with NC parents on negative parenting; the homogeneity was acceptable ($Q(8) = 9.36$, $p = .229$, $I^2 = 25\%$), and negative parenting in DC families was lower than in NC families (SMD = .222, 95% CI .061 - .383, $z = 2.70$, $p = 0.007$). No effect of the year of publication was found in both analyses ($p = .40$ and $p = .67$, respectively). In the third

analysis, DC parents were compared with AUT-ART parents on positive parenting; the homogeneity was acceptable ($Q(6) = 7.46$, $p = .281$, $I^2 = 20\%$), and no differences between groups were found ($SMD = 0.022$, 95% CI $-0.158 - 0.201$, $z = 0.24$, $p = 0.813$). In the fourth analysis, DC parents were compared with AUT-ART parents on negative parenting; the homogeneity was acceptable ($Q(7) = 12.25$, $p = .093$, $I^2 = 43\%$), and no differences between groups were found ($SMD = 0.005$, CI $-0.196 - 0.206$, $z = 0.05$, $p = 0.962$). No effect of the year of publication emerged also from these last two analyses ($p = .36$ and $p = .56$, respectively). Therefore, the meta-analysis highlights that DC families have higher positive parenting and lower negative parenting scores than NC families while having similar results to AUT-ART parents.

While the meta-analysis was centred on the statistical analysis of data coming from 11 articles, a total of 45 articles regarding different aspects of the quality of parenting in reproductive donation families were selected, and those comparing RD families with AUT-ART and NC families are discussed in the following paragraph.

The majority of the selected articles have shown that different-sex RD parents have higher positive parenting and lower negative parenting scores than NC parents. Indeed, more pleasure, warmth, interaction, and competence (Golombok et al., 1995, 1996, 2002a, b; 2004 a, b, 2005, 2006a, b; Owen and Golombok, 2009; Kovacs et al., 2013), and less conflict, disappointment, parental distress, guilt, and anger with their children (Golombok et al., 1995, 1996, 2002a, 2004b, 2006a; Casey et al., 2013; Kovacs et al., 2013) in RD mothers than NC mothers have been reported. Furthermore, RD fathers have been observed to be more involved in caregiving and to have higher attachment quality, joy, pleasure, and warmth (Golombok et al., 1996, 2002a, b, 2004b, 2005; Kovacs et al., 2013), and lower parental distress and conflict with their children (Golombok et al., 2002a, 2004b, 2006a; Casey et al., 2013; Kovacs et al., 2013) than NC fathers. However, higher levels of over-involvement (negative parenting) in RD families than in NC families have been reported (Golombok et al., 1995, 1996, 2002a, b, 2004a, b; Owen & Golombok, 2009). In a few studies, no differences concerning positive and negative parenting between RD families and NC families have been found (Cook et al., 1997; Golombok et al., 2004, 2006b, 2011a, b, 2013, 2017b; Casey et al., 2013; Ilioi et al., 2017), and in one study RD parents had lower levels of positive parenting than NC parents (Golombok et al., 2011a).

RD children have been found to experience more positive feelings towards their mothers, less perceived criticism from their parents, and less frequent disputes with their fathers in comparison with the NC group (Golombok et al., 2002a, b; Owen & Golombok, 2009). RD families have been found to possess less positive quality of interaction (mutuality) than NC families when the children are 7 years old (Golombok et al., 2011a, b; Casey et al., 2013), but not during adolescence (Golombok et al., 2017b). In another study, published after the submission of this review, Imrie et al. (2022) showed that children in RD families rated their relationships with their mothers as higher in warmth and enjoyment than children in AUT-ART families, while they found no differences between groups regarding the father-child relationship.

Results concerning different-sex RD parents in comparison with AUT-ART parents are less cohesive and more varied. Studies in the literature comparing these two groups have found similar results of positive and negative parenting (Golombok et al., 1996, 2002b; Cook et al., 1997; Steiner et al., 2007), but also higher positive and lower negative parenting for RD families (Golombok et al., 1995, 1999; Mac Callum et al., 2007, 2008), and even higher negative parenting for RD families (Murray et al., 2006; Owen & Golombok, 2009; Imrie et al., 2019a). In one study mutuality was similar between RD families and AUT-ART families (Imrie et al., 2019a).

Studies about same-sex RD families have reported a similar or better quality of parenting in these families with respect to different-sex RD, AUT-ART and NC families (Brewaeys et al., 1997; Vanfraussen et al., 2003a; Borneskong et al., 2014b).

We conclude that the quality of parenting is not influenced by non-traditional family forms in which the couple resort to third-party reproduction, since couples who resort to reproductive donation have a strong and intense desire for parenthood. In some cases, RD parents are even overinvolved, due to the long and often distressing wait for the child (Golombok et al., 1995, 1996, 2002a, b, 2004a, b; Owen & Golombok, 2009). However, the strong desire for parenthood and emotional involvement leads parents to cooperate more in child care and establish close relations, with positive consequences on parenting (Hammemborg et al., 2008).

1.2. The quality of the couple's relationship in donor conception families

In the second review on the quality of the couple's relationship, we performed a meta-analysis of articles in the literature to answer the following question:

Does the asymmetry in the genetic link with the child between partners impact the quality of the couple's relationship after childbirth, compared to NC families and AUT-ART families?

To answer this question, we selected 9 articles that examined quantitatively the couple's relationship quality in parents who resorted to SD or OD to have a child. Embryo donation and double donation were excluded because there is no genetic asymmetry between parents, and surrogacy was also excluded because the genetic link with the intended parents was not always specified in the studies.

For the meta-analysis, DC parents with no genetic link to the child (OD mothers and SD fathers/co-mothers) were separated from DC parents with a genetic link to the child (SD mothers and OD fathers). These two groups were compared with AUT-ART and NC parents, according to their parental roles. Therefore, 4 analyses were performed, as shown below:

DC parents with a genetic link to the child vs AUT-ART parents (first analysis),

DC parents with no genetic link to the child vs AUT-ART parents (second analysis)

DC parents with a genetic link to the child vs NC parents (third analysis)

DC parents with no genetic link to the child vs NC parents (fourth analysis)

A random-effects meta-analysis was used to combine standardized mean differences for each study, and a heterogeneity test was used to assess inconsistency. A meta-regression was used to assess the effect of the publication year.

In the first analysis the homogeneity was acceptable ($Q(5) = 1.76$, $p = .881$, $I^2 = 0\%$ ³) and no differences were found ($z = -0.396$, $p = .692$). No effect of the year of publication was found ($p = .36$). In the second analysis the homogeneity was acceptable ($Q(5) = 9.54$, $p = .089$, $I^2 = 48\%$), and no differences were found ($z = -0.605$, $p = .545$). No effect of the year of publication was found ($p = .34$). In the third analysis the homogeneity was acceptable ($Q(6) = 4.33$, $p = .632$, $I^2 = 0\%$) and no differences were found ($z = -0.578$, $p = .563$). No effect of the year of

³ I² statistics equal to zero may happen when the number of studies is small (von Hippel, 2015). Anyway, the Q statistic testifies to an acceptable level of heterogeneity.

publication was found ($p = .67$). In the fourth analysis the homogeneity was acceptable ($Q(5) = 9.38, p = .095, I^2 = 47\%$) and no differences were found ($z = -0.617, p = .537$). No effect of the year of publication was found ($p = .46$). We concluded that the quality of the couple's relationship is not influenced by the genetic asymmetry between partners, since no differences emerged between DC parents (both in parents with and without a genetic link with the child) and AUT-ART parents and NC parents.

While the meta-analysis was centred on the statistical analysis of data coming from 9 articles, a total of 24 articles comparing the quality of the couple's relationship between donor conception parents and AUT-ART and/or NC parents were selected. We discuss them in the following paragraph.

Numerous studies have reported a similar quality of the couple's relationship between OD couples and NC couples, (Golombok et al., 2004a; Golombok et al., 2004b; Golombok et al., 2005; Golombok et al., 2006), and between OD couples and AUT-ART couples (Imrie et al., 2019b) in the first years of the child. Additionally, in one study (Sydsjö et al., 2014a) OD mothers had a better quality of the couple's relationship than AUT-ART mothers in the first years after childbirth, and in another study (Golombok et al., 1999) mothers of genetically unrelated children had better couple relationship quality than genetically related mothers 4-8 years after childbirth.

Other studies have reported different-sex SD couples and NC couples (Golombok et al., 2004a; Golombok et al., 2005), and different-sex SD couples and AUT-ART couples (Sydsjö et al., 2014b) to have a similar quality of the couple's relationship during the first years after childbirth. In families with older children, a similar (Kovacs et al., 2013; Golombok et al. 1996) or even better quality (Golombok et al., 1995) of the couple's relationship in SD couples compared to NC couples has been reported. During children's adolescence, couples who resorted to gamete donation have been found to have similar quality of the couple's relationship to NC couples and AUT-ART couples (Golombok et al., 2002a; Golombok et al., 2002b; Murray et al., 2006; Owen & Golombok, 2009; Kovacs et al., 2013). In a cross-sectional study, Blake et al. (2012) reported no differences in the quality of the couple's relationship among the groups of SD, OD, and NC parents during the 1st, 3rd and 10th year of children's life. However, in the same study, mothers in NC families had higher levels of the couple's relationship quality than mothers in other groups when the children were 2 years old, while mothers in OD families had the highest levels when the children were 7 years old (Blake et al., 2012).

Results on same-sex couples who resort to SD seem to suggest that these couples are also well-adjusted during the first years after childbirth. Indeed, these couples have been reported to have similar quality of the couple's relationship to AUT-ART couples (Borneskog et al., 2014b; Van Rijn-van Gelderen et al., 2018), showing, however, a better resolution of conflict, economic issues management, and free time as a couple (Borneskog et al., 2014a). In families with older children, numerous studies have reported how same-sex SD couples may have a better couple relationship than NC couples (Bos et al., 2004; Bos et al., 2007; Baiocco et al., 2015, 2018), or at least similar (Brewaeys et al., 1997). Indeed, an important aspect of the couple's relationship is the equal subdivision of parental tasks (Twenge et al., 2003) and same-sex parents often excel at this (Gartrell et al., 1999).

Couples with a donor-conceived child, therefore, have a very good quality of the couple's relationship in comparison with AUT-ART and NC couples, and the genetic asymmetry between them, as shown in the meta-analysis, does not affect the relationship. Sharing a common goal is very important for the quality of the couple's relationship, as it gives the couple an identity and a sense of togetherness (Karimi et al., 2019). The same desire for parenthood is connected with the same involvement in caregiving and a fairer subdivision of parental tasks, and these aspects are very important for couple satisfaction (Pasch et al., 2002; Peterson et al., 2003; Twenge et al., 2003). Indeed, most studies have shown how these couples are well-adjusted, despite their long history of infertility. Couples with relational problems are more subject to discontinuing fertility treatments (Gameiro et al., 2012), showing how couples who persist in the research of pregnancy are a selected group of resilient couples (Repokari et al., 2005; Molgora et al., 2019).

To conclude, both reviews highlight how, in the majority of studies, RD parents have a similar or even better quality of parenting and couple's relationship, in comparison with AUT-ART families and NC families.

BACKGROUND

The results presented in this work pertain to the psychological status and parental mental representations (MRs) of DC parents during their transition to parenthood. To provide the necessary background knowledge to interpret the significance and impact of such results, in the next section, we report the information available in the literature regarding the parental psychological status and parental MRs during the transition to parenthood for parents who conceived naturally or after an infertility history.

1. The parents' psychological status in the transition to parenthood

The arrival of a new member of the family, the baby, requires the reorganization from a dyadic condition to a triadic condition to incorporate the child (Stern, 1995). In this view, the family is a complex system where every individual influences the other, and the dyadic relation, such as the couple's relationship, influences the triadic, such as parenting, and vice versa (Erel & Burman, 1995). Indeed, the couple's capacities to engage in effective marital problem-solving, to provide emotional support for each other and to adapt to stressful events is essential for a successful transition to parenthood (Karney & Bradbury, 1995; Twenge et al., 2003; Doss et al., 2009). This means that the transition to parenthood is also influenced by the phase that the couple goes through at the moment of conception (Karney & Bradbury, 1995). Stressful events, individual vulnerabilities, and life changes are factors that intervene in the parents' well-being, reciprocal dedication, and couple satisfaction. Indeed, the transition to parenthood is a main event that may fulfil couples' life, but may also be stressful for the couple's relationship due to child-care responsibilities, especially when one of the two parents is less involved in caregiving (Gartrell et al., 1999; Twenge et al., 2003; Doss et al., 2009; Castellano et al., 2014). It is common to observe a decline in the functioning of the couple's relationship after childbirth, concerning an increase in conflict and relationship problems and a decrease in conflict management and relationship dedication (Doss et al., 2009). Mothers of infants are usually more dissatisfied with their marriage during the first years after childbirth than men or mothers with older children, suggesting that individuals who are more responsible for the child are at great risk of relationship dissatisfaction, especially in presence of a less equal sharing of responsibilities (Twenge et al., 2003). Moreover, in the postnatal period, fathers may

experience the frustration of not having enough time to spend with the baby, the deterioration of the couple's relationship, a restricted sense of freedom, and a sense of feeling powerless (Genesoni & Tallandini, 2009). Women and men have lower levels of quality of life in the transition to parenthood, showing a decrease in physical, psychological, and social relationship aspects and opportunities for enjoying leisure activities (Gameiro et al., 2010). A satisfying couple's relationship is generally connected with satisfying family relations. Indeed, satisfied fathers cooperate more in childcare and satisfied mothers support their partners more, providing practical and emotional support for each other (Tanner Stapleton & Bradbury, 2012). Moreover, couples who are satisfied possess better physical (Umberson et al., 2006; Robles et al., 2014), and mental health (Proulx et al., 2007), develop also better relations with their children and possess higher parenting skills (Cox, 1989; Perren et al., 2005; Kouros et al., 2014). These virtuous parental behaviours have positive consequences on children's mental health (Nagaraja et al., 2012) and physical health (Gottman & Katz, 1989). In this way, the child possesses better behaviour, and cognitive and emotional skills, and develops better peer interaction and intimate relationships in adulthood (Gottman & Katz, 1989).

Perinatal depression and anxiety are common disorders among women (O'Hara & Wisner, 2014), and are often correlated (Tambelli et al., 2019). In the perinatal period, women are usually more vulnerable to emotional difficulties than men, with more anxiety, depression and parenting stress during pregnancy (Viswasam et al., 2019), and postpartum (Fairbrother et al., 2016; Vismara et al., 2016). Primiparous mothers may, especially, experience fear of childbirth during pregnancy. This fear is associated with a higher score of anxiety and lower scores of couple adjustment (Molgora et al., 2018). Fathers experience anxiety during the perinatal period (Leach et al., 2016), with an increase in anxiety from the antenatal period to the time of birth, and with a decrease in anxiety from the time of birth to the later postnatal period (Philpott et al., 2019). They also experience stress in the perinatal period, due to negative feelings about the pregnancy, role restrictions related to becoming a father, fear of childbirth and feelings of incompetence related to child-care (Philpott et al., 2017). The presence and the persistence of maternal and paternal postnatal depression are influenced by prenatal mental health and by the partner's depression (Ramchandani et al 2008; Vismara et al., 2016; Glasser et al., 2019). The dissatisfaction in the couple's relationship and a history of depression and anxiety are predictors of depressive symptomatology during pregnancy both in mothers and in fathers; moreover, a history of substance abuse, conflictual relationship with the parents, and

bereavement in the past year contribute to depressive symptoms during pregnancy in mothers, but not fathers (Tambelli et al., 2019).

It is fundamental to assess the presence of anxiety and depression because of the impact on the mother's and the child's mental and physical health. Maternal prenatal depression indeed increases the risk of children's preterm birth and low birth weight (Dunkel Schetter & Tanner, 2012; Ghimire et al., 2021; Jahan et al., 2021), slower fetal growth (Diego et al 2009), perinatal complications, increased operative delivery, and postpartum depression (Jahan et al., 2021). Moreover, infants of depressed mothers report a similar physiological profile to their mothers' prenatal physiological profile, such as elevated cortisol, and lower levels of dopamine and serotonin (Field et al., 2006). Anxiety in pregnancy is associated with shorter gestation and has adverse implications for fetal neurodevelopment and child outcomes (Dunkel Schetter & Tanner, 2012). Indeed, infants of depressed mothers have more sleep disorders, more stress behaviours, and lower neurobehavioral assessment scores (Diego et al., 2005). Mothers with perinatal depression and anxiety describe their infant as fussier and with negative emotional reactions, feeding and sleeping dysregulation, and poor flexibility in response to change (Vismara et al., 2021c), to approach novelty, to seek environmental stimulation, and to express/experience positive emotions (Sechi et al., 2020). Maternal depressive symptomatology, especially prenatally, is associated with children's low social competence, low adaptive functioning, and high externalizing problems (Luoma et al., 2001). Maternal perinatal depression and anxiety are associated with poorer offspring social-emotional, cognitive, language, and motor development, in childhood and adolescence (Rogers et al., 2020). Depression in fathers in the postnatal period is also associated with psychiatric disorders in their children, independently of maternal postnatal depression (Ramchandani et al., 2008). Maternal and paternal depression and anxiety affect negatively the quality of parent-child interaction (Ierardi et al., 2019), with less positive and more negative parenting (Wilson & Durbin, 2010). Fathers' anxiety also has a negative impact on parenting skills and paternal self-efficacy (Philpott et al., 2019), and fathers' depressive and anxiety symptoms are related to the perception of a more difficult temperament of the child (Sechi et al., 2020).

1.1. The transition to parenthood after medically assisted reproduction

Preterm birth, low birth weight, and hospitalization are more common in ART pregnancies than in natural pregnancies (Koivurova et al., 2002). In particular, OD mothers

have an increased risk of developing hypertensive disorders of pregnancy, preeclampsia, low birth weight, preterm birth, caesarean section, and postpartum haemorrhage than AUT-ART mothers and NC mothers (Storgaard et al., 2017). These perinatal complications may affect the maternal and paternal emotional state (Gaudet, 2010; Biaggi et al., 2016; Hunter et al., 2017; Agostini et al., 2018; Trumello et al., 2018), as mothers of premature infants are at high risk of anxiety and depression. Moreover, the prematurity of the infant may harm the early bond with the baby, who is seen as more fragile and in danger, and the mother's parental role, which is perceived as low-confident (Trumello et al., 2018). Present/past pregnancy complications and past perinatal loss may increase anxiety and depression (Biaggi et al 2016; Hunter et al., 2017), and grief (Gaudet, 2010) in pregnant women. Usually, DC parents have faced more unsuccessful IVF/ICSI cycles than AUT-ART parents (Imrie et al., 2019a, 2019b), and women who receive multiple unsuccessful IVF/ICSI cycles report an increase in anxiety and depression scores from pregnancy to postpartum when compared with other groups (Agostini et al., 2018). Moreover, infants who were conceived after more than one cycle showed more difficult interactive behaviors than those conceived at the first attempt (Agostini et al., 2020).

AUT-ART parents perceive pregnancy as being riskier and more demanding and report a decrease in their psychological quality of life in comparison with NC parents (Gameiro et al., 2010). AUT-ART mothers have higher pregnancy-focused anxiety than NC mothers during pregnancy (McMahon et al., 1997a, 2013; Ranjbar et al., 2019), regarding the survival (Hammarberg et al., 2008), normality of the babies, possible damage to the babies during childbirth, and the separation from babies after childbirth. These behaviours are particularly evident when the parents have experienced two or more treatment cycles (McMahon et al., 1997a). Because of the potential pregnancy complications associated with AUT-ART, women may have higher physiological stress and anxiety than NC women during pregnancy (García-Blanco et al., 2018). Indeed, studies report AUT-ART women to have higher anxiety than NC women during the third trimester of pregnancy, one week after birth, and three months after birth, and have higher anxiety than AUT-ART men post-partum (Monti et al., 2008). Moreover, ART mothers have lower self-esteem and lower maternal self-efficacy postpartum, and they rate their infants as more temperamentally difficult (McMahon et al., 1997b). A few authors have found AUT-ART women to have higher levels of pregnancy-specific anxiety, and poorer quality of life, but more positive attitudes toward pregnancy demands, and higher levels of maternal-fetal attachment (Gourounti, 2016). Other studies instead have reported AUT-ART women do not have more fear of childbirth or pregnancy-related anxiety than NC mothers

(Poikkeus et al., 2006) and have improved their self-esteem and lower anxiety as the pregnancy progresses (Caruso Klock & Greenfeld, 2000).

When considering fathers, AUT-ART men receive less social support than women (Agostini et al., 2011) and tend to discuss medical treatments with others less than women and this aspect, in presence of a male factor infertility, is associated with men's depressive symptoms (Babore et al., 2017). AUT-ART fathers may have more somatic and psychic anxiety, indirect aggression and less assertiveness postpartum (Hjelmstedt & Collins, 2008). Nonetheless, a study found AUT-ART fathers to perceive themselves as being more competent than fathers who conceived spontaneously (Gameiro et al., 2010).

We observe that findings are variegated regarding anxiety symptoms among AUT-ART parents, with studies reporting lower levels (Fisher et al., 2008), higher levels (Bernstein et al., 1994; Monti et al., 2008), and the same levels (Caruso Klock & Greenfeld, 2000; Stanton & Golombok, 1993; McMahon et al., 1997a; Harf-Kashdai & Kaitz, 2007) of anxiety when compared to NC parents during pregnancy. Similarly, when considering prenatal depression, some studies have found no differences between AUT-ART and NC parents (Caruso Klock & Greenfeld, 2000; Hjelmstedt et al., 2006; Harf-Kashdai & Kaitz, 2007), while other studies have reported both lower (Repokari et al., 2005; Fisher et al., 2008) or higher (Monti et al., 2009) levels in AUT-ART parents when compared to NC parents.

According to some authors, AUT-ART may be a risk factor for postnatal depression (Giardinelli et al., 2012), while for others authors the infertility treatment does not increase the risk of experiencing symptoms of postpartum depression (Ross et al., 2011; Lynch et al., 2014). Indeed, some authors have documented no differences between AUT-ART and NC parents for depression and anxiety in the first post-partum year (McMahon et al., 1997b; Colpin et al., 1999; Gibson et al., 2000b; Greenfeld & Caruso Klock, 2001; Repokari et al., 2005; Cox et al., 2006; Jongbloed-Pereboom et al., 2012), while others have suggested that anxiety and depression levels are higher in ART parents (Monti et al., 2008; Monti et al., 2009). Interestingly, in one longitudinal study, AUT-ART couples showed lower depressive levels than NC couples during pregnancy, which then increased over time and became equal to the ones of NC couples post-partum (Repokari et al., 2005).

Only a few studies have focused on DC parents in the perinatal period. In those few studies, OD mothers have been shown to have the same level of depression, anxiety, sleeping difficulties and social dysfunction as NC and AUT-ART mothers during pregnancy, while OD

mothers have been observed to have less anxiety, sleeping difficulties and social dysfunction than NC and AUT-ART mothers in early parenthood. Moreover, no differences in OD fathers in comparison with control groups have been found (Sälevaara et al., 2018). Another study reported that OD mothers also had lower levels of fear of childbirth than AUT-ART mothers, and lower pregnancy-related anxiety than both AUT-ART and NC mothers (Sälevaara et al., 2016). Interestingly, equal levels of anxiety in the first year after childbirth for OD parents and AUT-ART parents (Imrie et al., 2019b), and DC parents and NC parents (Golombok et al., 2004a) have been reported. A similar situation is observed for depression in the first year after childbirth, where no differences between OD mothers and AUT-ART mothers (Imrie et al., 2019b), and between DC parents and NC parents (Golombok et al., 2004a) have been reported. In a study, OD fathers had higher levels of depression than AUT-ART fathers, but this appeared to be associated with older age rather than with the method of conception (Imrie et al., 2019b). Parenting stress in the first year after childbirth has also been found to be similar between OD parents and AUT-ART parents (Imrie et al., 2019b), and between DC and NC parents (Golombok et al., 2004a). This observation holds also for same-sex DC parents, as no differences were found when compared to AUT-ART parents in a study examining the parental stress, anxiety and depression in the first months of the baby's life (Van Rijn-van Gelderen et al., 2018).

2. Maternal and paternal mental representation in the perinatal period

Mental representations (MRs) may be defined as cognitive-affective schemes of interpretation of reality. These schemes, or internal working models, collect all mental images, the cognitive-affective characteristics of these images, conscious and unconscious fantasies, memory, relevant action plans, and relational dispositions of self and others (Bowlby, 1969). MRs of being a parent and a child are constructed in early life from significant relationships with caregivers and are modulated in the course of personal experiences and relations throughout the life course (Sandler & Rosenblatt, 1962). This means that when a couple becomes parents, they bring with them into their new family the memory template of their past experiences of interaction (Bowlby, 1969). Therefore, the relational schemes and the concept of being a parent and a child is present in the mind of the new parents, and it is possible to explore them in the perinatal period through narratives (Zeanah et al., 1994; Ammaniti et al., 1992, 1995; Vreeswijk et al., 2012). Previous studies on maternal and paternal MRs have

focused on the parent's capacity to specifically represent his/her internal experience of the child and his/her own ongoing experience as a parent, representations not only stored in the memory but that are still being constructed (Aber et al., 1985; Zeanah et al., 1994; Ammaniti et al., 1992, 1995; Slade et al., 2004; Vreeswijk et al., 2012).

Family relations start during pregnancy, with the relationship between expectant parents and the fetus, in an abstract and unidirectional bond between a parent and unborn child, characterized by the cognitive and emotional capacities to conceptualize another human being (Doan and Zimerman, 2003). In this view, the bond with the child starts to develop in the prenatal period through MRs of the unborn child (Trombetta et al., 2021) and MRs of the self as a caregiver (Huth-Bocks et al., 2004, 2011). Indeed, parents' ability to fantasize about the child in the prenatal period allows them to develop a MRs of the child (Soulè, 1990). The representation of the baby is characterized by fantasies, often shared with the partner, on the psychological and physical characteristics, based mostly on the parents' wishes regarding the child and both parents' favourite characteristics (Pedreira & Leal, 2015). This daydreaming can be observed in the choice of a child's name, the preparation of physical space in the home, and expectations about sex, and the imaginary child is built on the mother's desire for maternity and her present relational situation (Lebovici, 1988). These fantasies allow mothers to materialize an intimate relationship and place the baby in the reality (Pedreira & Leal, 2015). Indeed, the woman imagines the fetus as a kind of companion who accompanies her throughout her pregnancy and starts a conversation with the fetus (Ammaniti et al., 1992, 1995). At the beginning of the pregnancy, the mothers and the fetus are in an initial fusion while the fathers may be less involved and aware; as the pregnancy progresses, both parents become more aware of the presence of the child. In the last months of pregnancy, the representation is also influenced by the "real" child, perceived thanks to fetal movements and ultrasounds. The ultrasound is proof that the baby exists and the fetal movements may be used as a kind of interaction. These physical experiences allow parents to recognise the baby as a separate entity, with particular characteristics suggested by the movements and ultrasounds, preparing themselves for the event of birth (Bibring, 1959, 1961; Pines, 1972, 1982; Fava Vizziello et al., 1993; Ammaniti et al., 1992, 1995; Cohen & Slade, 2000; Finnbogadottir et al., 2003).

According to psychoanalytic theory, during the first pregnancy, the mothers' MRs of themselves are modified to prepare the woman for the new parental role and the arrival of the child. Therefore, in this view, the transition to parenthood starts already during pregnancy, when the woman reorganizes her identity to be also a mother, and not only a daughter, a

woman, and a partner (Ammaniti et al., 1992, 1995). During pregnancy, the woman's MRs of maternity is strongly activated and is related to memories of early relationships, family traditions and personal experiences. In the woman's imagination, fantasies, hopes, and fears take place in a continuous work of experimentation of herself in her relationship with the fetus and the future child (Raphael-Leff, 1991). The MRs of the pregnant woman emerge also in dreams full of themes related to pregnancy and childbirth, suggesting that the woman is modelling the MRs of herself as also a mother (Lara-Carrasco et al., 2013). The experience of pregnancy between women and men is different. The fathers may experience less involvement and awareness during the partner's pregnancy, due to the impossibility to sense what the woman feels. Indeed, fathers' identity and imagination are mostly based on their expectations of parenthood and the couple's relationship (Genesoni & Tallandini, 2009; Trombetta et al., 2021). This restructuring process is also influenced by the individual elaboration of each member of the couple concerning their history (Karney & Bradbury, 1995). Indeed, in this period identifying conflicts belonging to the past and concerning family figures can emerge, and may be adequately processed or not, with possible consequences on the coherence and integration of MRs (Ammaniti et al., 1992, 1995).

In this context, mothers with integrated-balanced prenatal MRs describe clearly and coherently the experience of parenthood, providing episodes that communicate emotional involvement and personal elaboration in the relation with the baby, and the ability to face physical, psychological and affective transformations (Zeanah et al., 1994; Ammaniti et al., 1995; Vreeswijk et al., 2012). The mothers' MRs may be, instead, disengaged (Zeanah et al., 1994; Vreeswijk et al., 2012), or restricted/disinvested (Ammaniti et al., 1995). In this case, the story is characterized by emotional control, in which the parent seems emotionally distant from the child and the new experience. An impersonal story is provided, without references to personal experiences, physical and psychological changes, and emotions. The narratives are intellectualized, and mechanisms of rationalization emerge, without fantasies (Zeanah et al., 1994; Ammaniti et al., 1995; Vreeswijk et al., 2012). Mothers' MRs may be also distorted (Zeanah et al., 1994; Vreeswijk et al., 2012), or ambivalent/non-integrated (Ammaniti et al., 1995), which means that narratives may be confused and contradictory, with digressions and difficulties of the woman in communicating clearly and coherently. Their stories communicate an ambivalent involvement concerning parenthood and the child. The parent remains tied to past situations and conflicts that have a negative impact on the openness to change and the

ability to focus on the real characteristics of the infant (Zeanah et al., 1994; Ammaniti et al., 1995; Vreeswijk et al., 2012).

According to the attachment theory, the child seeks care from someone designated as better able to cope. When a caregiver is sensitive and responsive toward the child's needs a secure attachment style is formed, that is the child's propensity to seek and accept comfort and protection from an adult, considered a figure of sustain and help (Bowlby, 1969). The child uses the caregiver figure as a secure base from which to explore the world, sure that the attachment figure will provide comfort and protection (Ainsworth & Bell, 1970). Differently, when a caregiver is not perceived as a protective figure, the infant attachment may be instead insecure-resistant, in which the child seeks and resists comfort, or insecure-avoidant, in which there is an absence of seeking protection (Ainsworth & Bell, 1970). The perinatal MRs are related to the child's attachment (Benoit et al., 1997; Vreeswijk et al., 2012; Tambelli et al., 2020; Sechi et al., 2022). Indeed, parental expectations, thoughts, and fantasies shape the parental working model (Tambelli et al., 2020) influencing the perception of the characteristics of the child (Vismara et al., 2021a), the act of parenting, the parent-child relationship (Vreeswijk et al., 2012; Foley & Hughes, 2018; Trombetta et al., 2021) and the care offered to the newborn (Katznelson, 2014). Integrated-balanced mothers show more positive parenting with their children than mothers with other types of MRs (Dayton et al., 2010), and usually have children with secure infant attachment (Zeanah et al., 1994). Restricted-disinvested mothers are less sensitive, more passive, and provide less encouragement and guidance to their children (Sokolowski et al., 2007). They show poorer affective involvement and communicative exchanges with their babies, in comparison with integrated/balanced mothers (Tambelli et al., 2014), and usually have children with avoidant infant attachment (Zeanah et al., 1994). Ambivalent mothers are more hostile to their babies (Sokolowski et al., 2007; Dayton et al., 2010) and have children with resistant/ambivalent infant attachment (Zeanah et al., 1994). Mothers with non-integrated MRs show a lower quality of mother-baby feeding interaction than mothers with balanced MRs, with possible maladaptive consequences for the child in the area of eating and emotional regulation (Tambelli et al., 2014).

MRs of the family during pregnancy are linked to postnatal family interaction also among fathers, as whenever prenatal MRs are balanced, the interaction with the family is better postnatally (Favez et al., 2013). Moreover, the fathers' MRs of the baby when the child is 6 months old predict the quality of father-child interaction at 24 months old, with balanced MRs connected with more positive fathers' and infants' behaviour (Hall et al., 2014). In this context,

child attachment categories are associated with fathers' capacity to share with the child an emotional connection and to enjoy a mutually fulfilling relationship (Tambelli et al., 2020).

Parental MRs remain relatively consistent after childbirth, with some revision after the birth of the child (Kuersten-Hogan, 2017). MRs may indeed change from pregnancy to childbirth, with an often observed increase of integrated/balanced MRs post-partum due to the birth of a healthy baby and the real interaction with the baby (Tambelli et al., 2014). Parents, therefore, have more balanced MRs of their babies postnatally than prenatally, probably to protect themselves prenatally from disappointment, especially for those couples who have experienced miscarriages (Vreeswijk et al., 2015). Women who have balanced MRs of their children also have more stable MRs over time (during the last trimester of pregnancy and at the child's first birthday) than women who had non-balanced representations (Theran et al., 2005). The father's MRs of the fetus during pregnancy is also associated with the postnatal MRs of the baby, especially in the case of balanced MRs (Vreeswijk et al., 2014). Fathers have overall more disengaged MRs than mothers during pregnancy and after childbirth. A possible explanation is that fathers have fewer opportunities to interact with the baby than mothers, who are the primary caregiver (Vreeswijk et al., 2015).

Mental representations are influenced not only by the experiences of interaction in early life but by all life-long experiences, socio-emotional well-being and contextual factors (Huth-Bocks et al., 2011). Balanced MRs are more common among non-clinical parents, with more positive MRs of the child and self as a mother in women with a high level of socio-emotional well-being (Araneda et al., 2010), while non-balanced MRs are prevalent in mothers with a depressive disorder, mothers experiencing domestic violence, and psychosocially at-risk women (Vreeswijk et al., 2012; Ammaniti et al., 2013; Tambelli et al., 2014). In particular, depressed mothers have more often non-balanced/distorted prenatal MRs in comparison with non-clinical mothers, with an increased risk of prolonged depressive symptoms postnatally (Wood et al., 2004; Ahlqvist-Bjorkroth et al., 2016). Secondly, women who experienced domestic violence during pregnancy have more negative MRs of their babies and themselves as mothers than women who have not experienced domestic violence (Huth-Bocks et al., 2004). Thirdly, traumatized women have more non-balanced MRs of their child (Schechter et al., 2005), similar to drug-abusing mothers, who report more negative MRs of maternity, prenatally and at 4 and 12 months postpartum, with difficulties in developing a realistic and positive view of motherhood (Flykt et al., 2012). Lastly, relational factors are also connected with MRs. A satisfying couple relationship is linked with couples' more balanced prenatal MRs during the

third trimester of pregnancy (Ahlqvist-Bjorkroth et al., 2016), while conflict with the infants' fathers is connected with maternal distorted views of their infants postnatally (Sokolowski et al., 2007). Indeed, mothers and fathers who have an unbalanced and unintegrated parental representation in the prenatal period perceive their couple's relationship as less cohesive. This is also related to a more negative perception of the child's temperament postnatally (Vismara et al., 2021a). Finally, the presence of conflicts with mothers' own mothers is connected with more maternal disengaged MRs of the relationship with their infants (Sokolowski et al., 2007).

2.1. Mental representations after medically assisted reproduction

The advent of infertility can affect the ideal image of oneself as an individual and as a parent. Indeed, when couples resort to medical help, especially women, they may feel grief and anger, living in secret and isolation, with feelings of self-blame and lower self-esteem (Bernstein et al., 1994; Gibson, 2000; Hammarberg et al., 2008; Gameiro & Finnigan, 2017). Moreover, previous failed pregnancy attempts may be associated with a worse representation of themselves as women/men (Paterlini et al., 2021). When the pregnancy has been achieved, the awareness of how much this pregnancy is precious, the fear of not being able to carry the pregnancy to term or of malformation may prevent the woman from investing emotionally in the pregnancy, therefore blocking the expression of emotions and fantasies regarding themselves as a parent and the image of the child. These aspects may be the result of a defensive mechanism that protects the mother from the risk of disappointment, making the elaboration process of the new parental role more difficult (Vanni et al., 2010). Indeed, Vanni et al. (2010) reported fewer fantasies, less investment and less coherence in the representation of themselves as parent and child among ART mothers, but not among ART fathers. This study found a prevalence of restricted/disengaged MRs in ART mothers, and a prevalence of integrated/balanced MRs in non-ART mothers, during pregnancy, while no differences for fathers were found (Vanni et al., 2010). Agostini et al. (2009) reported that ART women have more often ambivalent representations in comparison with non-ART women, during pregnancy and postpartum. Indeed, achieving a pregnancy after a long wait is a time of great joy, but also great fear for infertile couples. Couples who conceive through ART perceive their pregnancies as more rewarding and precious than couples who conceive naturally (Gameiro et al., 2010), and describe the child more positively compared to NC parents (Paterlini et al., 2021). Moreover, ART women have fewer worries about body changes, children's gender, loss of partner's attention and loss of freedom than NC mothers (Caruso Klock & Greenfeld, 2000;

Hjelmstedt et al., 2003a; Gourounti, 2016), and ART fathers experience more joy for pregnancy than NC fathers (Van Balen et al., 1996). Nonetheless, ART women are more exposed to physical problems than NC women during pregnancy and this awareness may enhance fear of pregnancy risks, especially after experiencing treatment failures and miscarriages, causing more negative feelings about fetal normality and survival (McMahon et al., 1997a; Hjelmstedt et al., 2003b), and lower attachment to the fetus (Pellerone & Miccichè, 2014). The first ultrasound is therefore a very stressful moment for ART women, due to fears of malformations or miscarriages (Reading et al., 1989). Moreover, social functioning may be impaired because ART couples hesitate to share the new event with their social network, as the pregnancy is considered riskier (Gameiro et al., 2010; De Pascalis et al., 2012).

Research on in vitro fertilization (IVF) procedure has revealed how the representation of the future child is full of personal meanings and starts in a very early period of the fetus's life, even when it is still an embryo. The IVF procedure sometimes leads to the creation of more embryos than necessary, which are therefore not transferred in utero but are, instead, cryopreserved to be used during a possible subsequent cycle. Surplus embryos can also be discarded, or donated for research or to another couple, according to the couple's wishes. In this context, the couple's embryo representation is connected with the couple's decision on the final disposition of the embryos, showing how representations guide the couple's beliefs and behaviour. For some couples the embryo is represented as biological material, for others it is a living entity with the capacity to experience discomfort and suffering. For others still, it may be represented as a potential child or even a child (Natchtigal et al., 2005; Bruno et al., 2016). The couples who have a representation of the embryo as a cluster of cells choose more often to donate it for research, focusing on the biological aspects of the embryos. The representation of the embryo as a "potential person" leads couples to donate surplus embryos to other couples, maintaining a distance from the concept of a child and allowing the possibility that someone else will raise the baby (Bruno et al., 2016). In contrast, when the embryo is represented as a child, it is more likely that the couples decide to discard their surplus embryos rather than donate them to another couple. Indeed, the representation of the embryos as a child leads couples to protect the embryo from something out of their control, such as the donation to another couple (Natchtigal et al., 2005; Bruno et al., 2016). In some cases, the embryo is incorporated into the family, for example, considering the frozen embryo as future siblings of their living children, when there is a, sometimes imaginary, plan to use the frozen embryos for a subsequent pregnancy (Natchtigal et al., 2005). Another important consideration is that the

parental representation of the frozen embryos, and, therefore, parents' attitudes and behaviour regarding the final disposition, may change from pregnancy to postpartum. Indeed, couples who resort to assisted reproduction are more willing to donate embryos to another couple during pregnancy, but after childbirth, some change their mind. A possible explanation is that in the prenatal period, the embryo is represented as an opportunity to have a family, but when couples change their identity, becoming parents, and see the potentiality of what the embryo can become, the representation of their embryos changes and symbolizes "virtual" children. Within this context, parents perceive the act of donation as an act of relinquishment, leading them to discard embryos rather than donate them (de Lacey, 2005). On the other hand, couples who resort to gamete donation to conceive are more willing to donate surplus embryos than couples who have conceived with IVF with their gametes. In these couples, the donation of gamete received to conceive is perceived as a gift and their act of donating their surplus embryos is considered a counter-gift. Donating their embryos to other couples is a continuity of what the donor has begun to give happiness to others (Bruno et al., 2016).

The existing literature on DC parents' MRs has examined only the first years after childbirth (Golombok et al., 2005; Imrie et al., 2019a, 2020), while no studies during pregnancy have been conducted. Imrie et al. (2019a) studied OD mothers' MRs in the first year of the child, showing that the OD mothers' MRs of the self as a parent were similar to AUT-ART mothers' MRs. However, they also showed that OD mothers perceived themselves as less confident in comparison to AUT-ART mothers (Imrie et al., 2019a). The process of feeling comfortable with the parental role may take longer for OD mothers, who may have concerns about whether they would bond with their baby, due to the non-genetic parenthood (Imrie et al., 2020). However, according to the authors, the OD mothers' MRs of themselves as less confident parents were associated with their older age (Imrie et al., 2019a). Moreover, OD mothers did not differ from AUT-ART mothers in the MRs of the child (Imrie et al., 2019a). In another study, Golombok et al. (2005) found better MRs of parent-child relationships among OD mothers than the NC mothers, at 2 years of the child. However, no differences for DC fathers, both in the first year (Imrie et al., 2019a) and in the second year of the child (Golombok et al., 2005), have been found.

2.1.1. The donor's presence in mental representations

Medically assisted reproduction involving oocytes, semen or embryos donation provides the opportunity for infertile or same-sex couples to have a family. Indeed, with third-

party reproduction it is possible to experience pregnancy, have a family, reduce the chance of chromosomal abnormalities, and provide a child genetically/gestationally connected with at least one parent (Hershberger et al., 2004, 2007). However, the realization of the biological limits and the loss of a genetic continuity may be traumatic for some people (Hershberger et al., 2004, 2007). Indeed, these parents may have an ambivalence between the desire in having a baby and the loss of the genetic connection with the child (Kirkman, 2008).

The parents' need to be the sole mother and father may lead them to a conflict between the unavoidable presence of the donor in generating the child and the desire to erase it. This erasure facilitates a view of the baby as the daughter or son, putting the family in a normative nuclear form (Grace et al., 2008). One possible way to erase the donor is by choosing an anonymous donor. Indeed, open access to the donor's identifiable information may be perceived as a reminder of the non-traditional family for parents and may cause parents' fears of children's future rejection or questions about parental authority (de Melo Martin et al., 2018). Via donor anonymity, the couples are facilitated in making explicit boundaries between the family and the donor, minimizing the link between the donor and the child (Beatens et al., 2000; Laruelle et al., 2011). This way, the parents also avoid feeling indebted towards their donor (Bertrand-Servais et al., 1993). Such couples feel more indebted to the clinic/professionals than to their donor, experiencing more gratitude than AUT-ART couples toward professionals when they come to the clinic to show the baby (Bertrand-Servais et al., 1993). The choice of an anonymous donor is also a defence against disturbing fantasies, such as the child being claimed by the donor, or sexual union between the woman who donated the egg and the recipient woman's partner (Bertrand-Servais et al., 1993) or the donor who donated the semen and the recipient woman (Burr, 2009; Indekeu et al., 2014). Not only donor anonymity but also secrecy about donation is a high priority for these parents (Nielsen et al., 1995). They choose secrecy because it helps them to preserve conventional family life, maintain the idea of exclusivity within the different-sex relationship, and affirm the parental role of the non-biological parent, who may feel insecure, due to infertility (Burr, 2009; Wyverkens et al., 2017). Moreover, a dialectic tension between feeling "different" and "similar" at the same time has been found in the parents' narratives, due to the tendency to minimize the importance of genetics and, at the same time, to put a lot of effort in preserving strong familial bonds and normalizing the family (Wyverkens et al., 2015).

Studies investigating the representation of the donor, for same-sex, different-sex couples and single mothers, have found different possible representations of the donor during

pregnancy and after childbirth, to feel that the baby is their own. One study in particular, regarding different-sex couples (Imrie et al., 2020), showed that the role of the donor who donated the oocyte is minimized by comparing gamete donation to other, more common, medical procedures, such as blood donation, or by underlining the distinction between just a donated egg and a real infant that grows inside, emphasizing that recipient mothers contribute physically to the baby's development. Another strategy is to normalize the new family form, underlining that the concept of the family is changing nowadays and that the number of children born through donor conception continues to rise. Additionally, these couples emphasize that the good quality of the mother-infant relationship is more important than genetics (Imrie et al., 2020). The donor who donated the semen may be seen either as "the other" or as a "non-person", minimising and dehumanising the donor's significance, or may be represented as a family man or medical student, a "benign" and "intelligent" figure with altruistic motivations, a more acceptable figure able to transmit positive characteristics to the child (Burr, 2009). In this view, Zadeh et al. (2016) illustrated that single mothers' thoughts and feelings about semen donation could be understood with the "presence" and "absence" themes in their narratives. The presence themes referred to the donor as significant to family life, as a gift-giver, a gene-giver, or a potential partner, while the absence themes referred to the donor as an unknown entity, part of a process, or an absent figure (Zadeh et al., 2016). In one study examining the mothers' representation of the donor in same-sex couples, Lingiardi et al. (2016) found that the donor may be represented as an entity, as a medical process, or as a person. Therefore, the donor may be seen as just a genetic instrument, a depersonalized entity, that allows couples to pursue the goal of having the desired baby, erasing any kind of relationship with him. This representation of the donor leads to an image of a "ghost", an intrusive presence. Mothers in same-sex couples may see the donor, alternatively, as a medical process, identified with the doctor/clinic, to feel closer emotionally to the doctor/clinic than the donor, weakening the impact of gamete donation. The image of the donor in this particular view is the image of a "place" where the experience of conception happened. Lastly, these mothers may consider the donor as a person, showing interest in his physical characteristics and possible similarities with the child and/or gratitude for the act of donating life. This last group of couples have a representation of the donor as a good and special person. Such an image of the donor as a kind man allows mothers to recognize the contribution of the donor to the identity and traits of the child (Lingiardi et al., 2016).

A consequence of donor conception is the possibility that the child is not physically similar to the parents. To limit such possibility, matching is a widespread practice in which the physical characteristics of the recipient parents are matched with the donor, to have the highest possible physical resemblance. This practice allows parents to be considered as the child's biological parents and to decide whether or not to tell the child the method of conception. Moreover, the resemblance of both physical and personality traits reinforces family ties and kinship, enhancing feelings of empathy, while non-resemblance may induce a sense of unfamiliarity, confusion and sadness (Imrie et al., 2020; Indekeu et al., 2015). The perception that the new member of the family is "familiar" is part of the process of constructing the child's identity within the family, reinforcing a sense of intergenerational connection and continuity (Becker et al., 2005).

Another challenge for infertile couples who have a donor-conceived child is the resemblance talk coming from the social network. This societal convention may be a reminder of the loss of genetic connection and an intrusion into the private domain of the family. Moreover, parents may have concerns regarding the possible stigmatization of their child for not being similar to them, casting doubt on the legitimacy of their family, and apprehension that the child may feel different from other family members (Becker et al., 2005).

The non-resemblance of physical and non-physical traits constitutes a donor presence, evoking thoughts about the non-genetic connection. To minimize the contribution of the donor and to underline that the baby belongs to the family, the tendency of parents to emphasize the resemblance between the biological parent and the child has been observed (Imrie et al., 2020; Isaksson et al., 2019). Another strategy is to describe the child as unique, lacking any inherited traits. This way of negating the genetic connection with both the biological parent and the donor helps to erase the donor's presence. Moreover, as the child grows up, non-physical traits become important for the non-biological parent to bond with the child, considered easier in presence of personality similarities between the non-biological parent and the child (Isaksson et al., 2019). Some couples prefer to resort to known donations, and, therefore, ask someone they know to donate a gamete. There are different reasons for choosing this type of donation, such as fear of genetic material of unknown origin, and trust in the personality of the donor (Beatens et al., 2000; Laruelle et al., 2011). When an intrafamily donation is chosen, this is because it is perceived as a chance to have a child with similar physical characteristics to the family and a genetic connection with the family and, therefore, a child that belongs to the family (Jadva et al., 2011; Imrie et al., 2020).

AIMS OF THE STUDY

We investigate the parental psychological adjustment and parental MRs in DC couples, during the transition to parenthood.

To study the parental psychological status and the parental MRs, parents who resorted to gamete donation to conceive are compared with parents who conceived with AUT-ART or NC. The comparisons are performed during pregnancy, around the 14th gestational week and at 26-30 gestational weeks, and postpartum, at the first-second month and the fourth-fifth months of the baby's life.

Our aims are:

1. To assess the maternal and paternal psychological adjustment, with a focus on the anxiety and depressive symptomatology, the parenting stress, the couple's relationship, and the prenatal and postnatal attachment. We hypothesize DC parents to have higher levels of anxiety, pregnancy-related anxiety and depression, lower levels of attachment with the fetus, and lower levels of couple adjustment than NC parents during pregnancy. We make these hypotheses since studies have shown more anxiety and depression (Monti et al., 2008, 2009; De Pascalis et al., 2012), lower couple adjustment (Gameiro et al., 2011a, 2011b), more pregnancy-related anxiety (McMahon et al., 1997a, 2013), and lower level of prenatal attachment (Pellerone & Miccichè, 2014) in AUT-ART parents than in NC parents. We also predict to observe no differences between DC parents and NC/AUT-ART parents after childbirth, regarding anxiety, depression, parenting, stress and postnatal attachment, since fears of losing the baby are reduced. Indeed, studies after childbirth have shown DC parents to have a good psychological adjustment (Imrie et al., 2019b; Golombok et al., 2004a).
2. To investigate the characteristics of maternal and paternal MRs, in order to detect the distribution of integrated/balanced, restricted/disinvested, and ambivalent/non-integrated representations among groups and across phases. In this regard, we hypothesize that DC parents' MRs to be less often integrated/balanced than NC parents during pregnancy, especially around the 14th gestational week. We make these hypotheses due to the existing literature in the context of AUT-ART, where AUT-ART women's MRs are identified to be less often integrated/balanced than the ones of non-

ART women in the perinatal period (Agostini et al., 2009; Vanni et al., 2010). These differences emerge because of negative feelings about not being able to carry the pregnancy to term, fetal normality and survival (McMahon et al., 1997a; Hjelmstedt et al., 2003b). Moreover, we predict to observe no difference among groups after childbirth regarding parental MRs, since fears of losing the baby are reduced, as previously found in other works (Golombok et al., 2005; Imrie et al., 2019a).

3. To explore qualitatively (through specific interview questions) the OD mothers' representation of resemblance with the child and the OD mothers' representation of third-party reproduction. We expect OD mothers to find similarities with the child (Becker et al., 2005) and to emphasize the resemblance between the father and the child (Isaksson et al., 2019; Imrie et al., 2020), as part of the process of constructing the child's identity within the family (Becker et al., 2005; Isaksson et al., 2019; Imrie et al., 2020). We expect a tendency to erase the donor from family narratives, in order to minimize the link between the donor and the child (Beatens et al., 2000; Laruelle et al., 2011), such as avoiding to discuss topics about the donor, or comparing gamete donation to other medical procedures, or emphasizing that recipient mothers contribute physically to the baby's development (Imrie et al., 2020).

MATERIALS AND METHODS

1. Participants

The psychologists involved in this longitudinal project (Lucia Roberta Russo, Liviana Zanchettin, and Margherita Battistella) approached DC mothers, AUT-ART mothers, and NC mothers. The inclusion criteria were primiparous mothers, aged 25 or over, with a good level of Italian, with no psychiatric condition nor high-risk pregnancy (e.g., twins). Two hundred and ninety primiparous mothers were approached at the beginning of the pregnancy, of which 152 participated in the first meeting, and 82 of these brought their partners with them. The initial sample was therefore composed of 234 participants: 29 DC mothers, 21 DC fathers, 37 AUT-ART mothers, 15 AUT-ART fathers, 86 NC mothers, and 46 NC fathers. Of these, 6 participants were removed from the data analysis, because 1 DC mother was not primiparous, 1 NC mother was younger than 25 years old, 2 AUT-ART mothers and 1 AUT-ART father had twins, and 1 NC father had a psychiatric disorder. The final sample was therefore composed of 28 DC mothers, 21 DC fathers, 35 AUT-ART mothers, 14 AUT-ART fathers, 85 NC mothers, and 45 NC fathers. Two of the NC mothers started at T1 because of personal problems at T0.

The DC sample is composed of mothers and fathers who resorted to oocyte donation, semen donation, or both, to conceive. However, the large majority in the DC sample resorted to oocyte donation (22 mothers and 18 fathers), while 2 mothers and 2 fathers resorted to double donation, and 4 mothers and 1 father resorted to semen donation. Single parents were not included in the study, because the legislation in our country does not allow single parents by choice to have a child, and to be single not by choice during pregnancy may be associated with a more stressful condition (Cairney et al., 2003).

The participants involved in this study had a stable relationship with their partner for at least one year, and one/both of the two members of the couple were employed at the time of the recruitment.

The percentage of the distribution of Educational Levels of mothers and fathers according to the conception method is presented in Table 1.

Table 1. Educational Levels of mothers and fathers according to the conception method.

Mothers	Primary school	Middle school	High school	Bachelor's degree	Master's degree	Postgraduate
NC	0.0%	1.2%	37.6%	24.7%	28.2%	8.2%
DC	3.6%	3.6%	39.3%	7.1%	28.6%	17.9%
AUT-ART	0.0%	0.0%	28.6%	31.4%	34.3%	5.7%
Fathers	Primary school	Middle school	High school	Bachelor's degree	Master's degree	Postgraduate
NC	0.0%	0.0%	55.6%	17.8%	24.4%	2.2%
DC	0.0%	4.8%	57.1%	4.8%	19.0%	14.3%
AUT-ART	0.0%	14.3%	57.1%	0.0%	28.6%	0.0%

The mean age of participants is shown in Table 2.

Table 2. M and SD of mothers' and fathers' age across groups

Reproduction	Parent	M	SD
DC	Mothers	40.8	4.6
	Fathers	42.1	4.9
AUT-ART	Mothers	35.1	3.7
	Fathers	39.1	4.8
NC	Mothers	32.1	3.6
	Fathers	35.3	5.2

The number of mothers and fathers in each group at each phase is presented in Table 3. The reasons for drop-out were: miscarriages, prenatal complications, prematurity, death of a participant or a child, loss of interest in the research, not having enough free time, psycho-social vulnerability, or impossibility to reach participants. Moreover, the recruitment of participants and the data collection are still ongoing and, therefore, some participants had not finished the assessment.

Table 3. Number of participants in each group at T0, T1, T2, T3

Participants	Time 0	Time 1	Time 2	Time 3
DC mothers	28	24	22	17
AUT-ART mothers	35	29	19	14
NC mothers	83	73	58	53
DC fathers	21	17	15	12
AUT-ART fathers*	14	8	6	5

* not considered for statistical analysis

2. Procedure

Patient recruitment, data collection, and test assessment were carried on by Lucia Roberta Russo, Liviana Zanchettin, and Margherita Battistella. The psychologists contacted the mothers by telephone or in presence at the Reproductive Unit and Gynaecological and Obstetric Unit at the Institute for Maternal and Child Health IRCCS Burlo Garofolo (Italy). At the beginning of the pregnancy, after the ultrasound check, the psychologists explained the objectives of the research. Mothers were often alone in the Hospital, due to Covid-19 restrictions that did not allow NC fathers to go with their partners, and the access for DC fathers and AUT-ART fathers was restricted to the fundamental medical treatments and examinations. Therefore, we could not recruit personally fathers for the research and had to resort to phone calls or asking mothers to come with their partners to meetings. The participants considered in this dissertation were recruited between October 2020 and December 2022. Before taking part in the research, participants received and signed written informed consent. The study protocol was designed in compliance with the Standards of Good Clinical Practice of the European Union and the current revision of the Declaration of Helsinki and was approved by the Regional Ethics Committee of Friuli Venezia Giulia, by the competent Health Authorities or by the delegated Institutions.

The data collection was performed in the Hospital or by zoom meetings and included a first data collection with the parents around the 14th gestational week (Time 0), a second data collection at 26-30 gestational weeks (Time 1), a third data collection between the first and second month of the baby's life (Time 2), and a fourth data collection between the fourth and fifth month (Time 3). At each meeting, the mothers and fathers of each group were interviewed and assessed. Interviews, tests and questionnaires were administered separately to mothers and fathers.

At each phase, mothers and fathers were assessed with the Beck Anxiety Inventory (BAI, Sica et al., 2006), the State-Trait Anxiety Inventory - form Y (STAI, Pedrabissi & Santinello, 1989), the Beck Depression Inventory-II (BDI-II, Ghisi et al., 2006), the Edinburgh

Postnatal Depression Scale (Benvenuti et al., 1999), and the Dyadic Adjustment Scale (DAS, Gentili et al., 2001).

In the prenatal period (Time 0 and Time 1) mothers' MRs were explored with the "Intervista per le Rappresentazioni Materne in Gravidanza" (IRMAG-R, Ammaniti & Tambelli, 2010), and fathers' MRs with the "Intervista per le Rappresentazioni Paternali in Gravidanza" (IRPAG, Ammaniti et al., 2006). During pregnancy (Time 0 and Time 1), the Pregnancy-Related Anxiety Questionnaire-Revised-2 in the Italian version (PRAQ-R2, Dellagiulia et al., 2019) was used for mothers, while for fathers, we developed another version of PRAQ-R2 (See appendix, page n. 131, Pregnancy Related Anxiety Questionnaire For Fathers - PRAQ-F). At 26-30 gestational weeks (Time 1), we administered the Maternal Antenatal Attachment Scale in the Italian version (MAAS, Busonera et al., 2016) to mothers, and the Paternal Antenatal Attachment Scale in the Italian version (PAAS, Della Vedova & Burro, 2017), to fathers.

After childbirth (Time 2 and Time 3), mothers' MRs were examined with the "Intervista per le Rappresentazioni Materne dopo la Nascita" (IRMAN, Ammaniti & Tambelli, 2010), and fathers' MRs with the "Intervista per le Rappresentazioni Paternali dopo la Nascita" (IRPAN, Ammaniti et al., 2006). The Parenting Stress Index/Short Form in the Italian version (PSI/SF, Guarino et al., 2008) was used for mothers and fathers at T2 and T3. Maternal Postnatal Attachment was assessed at T3 with the Maternal Postnatal Attachment Scale in the Italian version (MPAS – Scopesi et al., 2004). For fathers, we administered the Italian translation (See appendix, page n. 132-134) of the Paternal Postnatal Attachment Scale (PPAS – Condon, 2008).

A summary of the interviews, tests and questionnaires administered across the four-time points is presented in Table 4.

Table 4. Interviews, tests and questionnaires for mothers and fathers at T0, T1, T2, and T3.

Times	Mothers' assessment	Fathers' assessment
T0	IRMAG-R	IRPAG
	BAI, BDI, STAI, EPDS, PRAQ-R2, DAS	BAI, BDI, STAI, EPDS, PRAQ-F (father version), DAS
T1	IRMAG-R	IRPAG
	BAI, BDI, STAI, EPDS,	BAI, BDI, STAI, EPDS

	PRAQ-R2, DAS, MAAS	PRAQ-F (father version), DAS, PAAS
T2	IRMAN BAI, BDI, STAI, EPDS PSI/SF, DAS	IRPAN BAI, BDI, STAI, EPDS PSI/SF, DAS
T3	IRMAN BAI, BDI, STAI, EPDS, PSI/SF, MPAS, DAS	IRPAN BAI, BDI, STAI, EPDS, PSI/SF, PPAS (Italian translation), DAS

3. Measures

3.1. Tests and Questionnaires

Anxiety was assessed with 3 self-report instruments, in order to explore different aspects of perinatal anxiety and have a greater guarantee of the truthfulness of the results. The Beck Anxiety Inventory (BAI, Sica et al., 2006) was used for mothers and fathers. This 21-question multiple-choice self-report test allows the assessment of the severity of anxious symptoms in adults and adolescents. The total BAI score is calculated by adding the scores obtained in each of the 21 items. Each symptom is rated on a 4-point scale ranging from 0 to 3. The examinees are asked to indicate the frequency with which they experience symptoms of anxiety: 0. Not at all; 1. A little; 2. Enough; 3. Very. The total score indicates the level of anxious symptomatology, as follows: 0-7 (minimum anxiety); 8-15 (mild anxiety); 16-25 (moderate anxiety); 26-63 (severe anxiety). The State-Trait Anxiety Inventory – form Y (STAI, Pedrabissi & Santinello, 1989) was administered to mothers and fathers. This self-report test is composed of 20 items for the assessment of state anxiety and 20 items for the assessment of trait anxiety. The STAI-Y presents, therefore, a conceptual distinction between anxiety as a transitory state (state) and anxiety as a relatively stable trait (trait) of personality. To respond to the status scale, participants choose the number that best describes the intensity of their feelings: 1. Not at all; 2. A little; 3. Enough; 4. Very much. To respond to the trait scale, participants indicate how they generally feel, evaluating the frequency with which they experience feelings of anxiety: 1. Almost never; 2. Sometimes; 3. Often; 4. Almost always. Scores on both scales, state and trait, can range from a minimum of 20 to a maximum of 80. The adopted cut-off score

is > 40 (Pedrabissi & Santinello, 1989). For mothers, the Pregnancy-Related Anxiety Questionnaire-Revised-2 (PRAQ-R2, Dellagiulia et al., 2019) was used. This 10-item self-report questionnaire allows the assessment of anxiety related to the gestational period. For example, for the feeling “I am anxious about the delivery”, possible answers are: 1. Never true; 2. Almost never true; 3. Sometimes true; 4. Somewhat true; 5. Very true. The total score ranges from 10 to 50. For fathers, we developed a modified, non-validated, version of PRAQ-R2 (See in the appendix, page n. 131, Pregnancy Related Anxiety Questionnaire For Fathers – PRAQ-F), with questions related to fathers’ anxiety related to pregnancy and childbearing. To cite an example from the PRAQ-F test, for the feeling “I am concerned that my partner may be in severe pain for contractions and childbirth”, possible answers are: 1. Never true; 2. Almost never true; 3. Sometimes true; 4. Somewhat true; 5. Very true. The total score ranges from 10 to 50.

Depression was assessed with two self-report instruments, in order to explore different aspects of perinatal depression and have a greater guarantee of the truthfulness of the results. The Beck Depression Inventory-II (BDI-II, Ghisi et al., 2006) was used for mothers and fathers. This 21-question multiple-choice self-report test allows the assessment of the severity of depression in adults and adolescents. The total BDI-II score is calculated by adding the scores obtained in each of the 21 items. Each symptom is rated on a 4-point scale ranging from 0 to 3. The participants indicate the frequency with which they experience symptoms of depression. Each question had a set of responses, ranging in intensity. For example: 0. I don't feel sad; 1. I feel sad most of the time; 2. I always feel sad; 3. I am so sad or unhappy that I can't stand it. The total score indicates the level of depressive symptomatology, as follows: 0-13 (minimum level); 14-19 (mild level); 20-28 (moderate level); 29-63 (severe level). The Edinburgh Postnatal Depression Scale was used for mothers (Benvenuti et al., 1999) and fathers (Loscalzo et al., 2015). This tool is a 10-item self-report questionnaire that allows the evaluation of depressive symptoms related to the perinatal period. For example, for the feeling “I have been able to laugh and see the funny side of things”, possible answers are: 0. As much as I always could; 1. Not quite so much now; 2. Definitely not so much now; 3. Not at all. A score greater than 12 highlights the possibility that there is depression.

Parenting stress was assessed with the Parenting Stress Index/Short Form (PSI/SF, Guarino et al., 2008), for mothers and fathers. This test is a 35-item self-report measure that allows the assessment of the presence of stress related to the parenting situation. For each item, parents choose one of the options: strongly agree, agree, not sure, disagree, or strongly disagree.

The total value is within normal limits if below the 85th percentile, borderline if the score is between the 85th and 89th percentile, clinically statistically significant if the score is between the 90th and 94th percentile, and clinically severe if between the 95th and 99th percentile.

The couple's relationship was assessed with the Dyadic Adjustment Scale (DAS, Gentili et al., 2001), for mothers and fathers. This 32-item self-report measure allows the assessment of the quality of the couple's relationship. The DAS is a multidimensional measure that considers the degree of adaptation being determined by the interaction of multiple underlying factors. The items have different ranges of measures depending on the area of reference: the scores for the agreement are between 0 (always disagree) and 5 (always agree), the scores for frequency have a range between 0 (always) and 5 (never), or between 0 (none) and 4 (all); there are also dichotomous scores between 0 (Yes) and 1 (No) and scores on the quality of the couple between 0 (extremely unhappy) and 6 (perfect). The total score ranges from 0 to 151, with high scores indicating a better couple relationship. In the literature, the cut-off points used to evaluate the quality of the couple's relationship are different, ranging from 92 to 107, and being more often between 95 and 105 (Sabourin et al., 2005). In general, a score above 100 indicates a couple's good adaptation (Garbarini, 2010).

The perinatal attachment was assessed in mothers and fathers with two instruments. The Maternal Antenatal Attachment Scale (MAAS, Busonera et al., 2016) is a self-report questionnaire that allows the assessment of the early mother-child relationship during the gestational period. The questionnaire contains 19 items each rated on a 5-point scale. The score ranges from 19 to 95 with higher scores indicating a higher level of attachment to the fetus. The mean of the total scale was 78.69 (SD=5.64) (Busonera et al., 2016). The Maternal Postpartum Attachment Scale (MPAS, Scopesi et al., 2004) is a self-report questionnaire that allows the evaluation of the early mother-child relationship in the first period after birth. The questionnaire contains 19 items each rated on a 5-point scale. The range of scores was between 19 and 95. The mean of the total scale was 81.5 (SD=6.5) (Scopesi et al., 2004). The Paternal Antenatal Attachment Scale (PAAS, Della Vedova & Burro, 2017) is a self-report questionnaire that measures the early father-child relationship during the gestational period. The questionnaire contains 16 items each rated on a 5-point scale. The range of scores was between 16 and 80. The mean of the total scale was 64.01 (SD=5.70) (Della Vedova & Burro, 2017). For the Paternal Postnatal Attachment, we performed an Italian translation (See in the appendix, page n. 132-134), verified through back-translation, of the Paternal Postpartum Attachment Scale (PPAS, Condon, 2008), a self-report questionnaire that allows the evaluation

of the early father-child relationship in the first period after birth. The PPAS contains 19 items each rated on a 5-point scale. The range of scores was between 19 and 95. The mean of the total scale was 79.2 (SD=9) (PPAS – Condon, 2008). In our Italian sample of NC fathers, the total mean score was 79.0 (SD= 6.89).

3.2. Semi-structured interviews

Each interview was administered, audio-recorded and transcribed verbatim by Lucia Roberta Russo, Liviana Zanchettin and Margherita Battistella, and subsequently evaluated by Lucia Roberta Russo or Margherita Battistella according to the interview coding of Ammaniti et al. (1995). Subsequently, 2 interviews chosen randomly from every 10 evaluated were evaluated also by Prof. Maria Anna Tallandini, until an agreement was reached. In the case of difficult evaluations, the interviews were discussed with Prof. Laura Vismara. The psychologists were not blinded to the mode of conception, as participants described their conception experiences.

Maternal MRs during pregnancy were examined with the “Intervista per le Rappresentazioni Materne in Gravidanza” (IRMAG-R, Ammaniti & Tambelli, 2010), a semi-structured interview for the evaluation of the mother's MRs of herself as a mother and of the child, during pregnancy. Paternal MRs during pregnancy were measured with the “Intervista per le Rappresentazioni Paterne in Gravidanza” (IRPAG, Ammaniti et al., 2006), a semi-structured interview for the assessment of the father's MRs of himself as father and of the child, during pregnancy. Maternal MRs after childbirth were investigated with the “Intervista per le Rappresentazioni Materne dopo la Nascita” (IRMAN, Ammaniti & Tambelli, 2010), a semi-structured interview for the analysis of the mother's MRs of herself as a mother and of the child, after childbirth. The “Intervista per le Rappresentazioni Paterne dopo la Nascita” (IRPAN, Ammaniti et al., 2006), a semi-structured interview for the evaluation of the father's MRs of himself as father and the child, was used for fathers after childbirth.

Since this is a tool designed for parents who conceived spontaneously in the perinatal period, we created a new section to investigate the experiences of the couples who resorted to AUT-ART and DC (See in the appendix, page n. 135-136, Intervista sull'esperienza di PMA in gravidanza; pag. n. 137-139: Intervista sull'esperienza di PMA dopo la nascita). This section for DC and AUT-ART parents was administered at the end of the Semi-structured interview and considered for a qualitative discussion.

The Semi-structured interviews are composed of main questions and additional secondary questions aimed at exploring various thematic areas. The questions should be formulated according to a fixed order, but the interview offers the opportunity to respond freely, bringing out memories, thoughts and feelings, and the narratives are evaluated on the contents and the organization of the narration.

This interview explores how the desire for parenthood emerged, emotions and changes in personal and couple history, during pregnancy and after childbirth. In the prenatal period, the imaginary child and the relation with the baby are explored through fantasies about the physical and temperamental characteristics imagined, the perceptions and emotions experienced during the ultrasound scans and fetal movements, the dreams, the outdoor space prepared for the child, the future expectations regarding the characteristics of oneself as a parent and the characteristics of the child. In the postnatal period, the encounter with the real child and the parent-child relationship are explored, through emotions, changes in everyday life, and challenges in the relationship with the child, the partner and the family.

Seven dimensions are constructed to study the representations of the self as mother/father (A1-A7), and seven dimensions are used to explore the representations of the child (B1-B7).

These seven dimensions are coded on five-point interval scales (poor; limited; moderate; considerable; very accentuated), that examine the following aspects of MRs. The richness of perceptions (A1-B1) refers to the recognition that the parent has as a mother/father and of the fetus/child, providing episodes. The openness to change (A2-B2) investigates the parental flexibility to adapt to the specific physical and psychological changes of the experience, in one's emotional, sexual and relational life. The intensity of investment (A3-B3) measures the extent of the parental psychological involvement in dealing with the experience of pregnancy and emotional involvement in the child. The coherence (A4-B4) of the narration regards the parents' capabilities of providing a well-organized and logical narrative flow of ideas and feelings. The differentiation (A5-B5) evaluates the degree of parental awareness of one's/the child's boundaries, one's/the child's characteristics, one's/the child's specific needs and desires. The social dependence (A6-B6) explores the degree of influence by the opinions, judgments and messages coming from the social network. The dominance of fantasies (A7-B7) measures the emergence of fantasies, images, expectations, fears and desires.

The assignment of the final score identifies three different styles of MRs: integrated/balanced, restricted/disinvested, and not integrated/ambivalent.

The integrated/balanced MRs are characterized by coherent narratives, in which the description of the experience is full of episodes, personal elaboration and intense emotional involvement. The parent is open towards the physical, psychological and emotional transformations that she/he has to face. The restricted/disinvested MRs pertain to poor narrations, without many references to affective experiences, emotions, and changes, and strong emotional control prevails. The narration is stereotyped in an impersonal and abstract story that does not convey particular emotions, images, or personal elaboration. The ambivalent non-integrated MR are characterized by digressions and low coherence. An ambivalent involvement of the parent emerges concerning the experience of parenthood, the child, the partner and/or family of origin, where unresolved conflicts with the family of origin affect the personal development as a parent and the perception of the characteristics of the child.

4. Data analysis

To study the parental psychological status, DC mothers were compared with NC mothers and AUT-ART mothers. DC fathers were compared only with NC fathers because the sample of AUT-ART fathers was too small (14 participants at T0) to perform a statistical analysis and, therefore, only the M and SD of participants' scores were reported in this dissertation. Each test, for each person in each group, was scored and the result was reported in a database. We did include in the analysis participants who did not complete all of the four assessments.

Student's t-test was conducted to identify whether there was a statistically significant difference in mean age among groups, for fathers and mothers, since this is demographic information that strongly differs among groups in MAR research. The Student's t-test between each pair of groups (NC vs DC, NC vs AUT-ART, and DC vs AUT-ART) for mothers, and between NC and DC for fathers, showed that there was a statistically significant difference between groups in mothers' and fathers' age. In detail, DC mothers were older than NC mothers ($p < .001$) and AUT-ART mothers ($p < .001$), and AUT-ART mothers were older than NC mothers ($p < .001$). DC fathers were older than NC fathers ($p < .001$).

Differences among the three groups (DC, AUT-ART, and NC) on outcome variables (psychological tests and questionnaires) within the four phases (T0, T1, T2, T3), for mothers, and differences among two groups (DC and NC) on outcome variable within the four phases (T0, T1, T2, T3), for fathers, were analysed using repeated measures ANCOVA. The participant's age was included as a covariate. In one case, the antenatal score at T1 was not directly comparable to postnatal scores at T3, because different tests were used. Therefore, we performed the comparison among groups at T1 and T3, separately, by means of an ANCOVA including the participant's age as a covariate. Whenever a statistically significant difference was found ($p < 0.05$) between groups or phases, a post hoc analysis using Tukey's test was carried on to determine which pairs of groups or phases yielded statistically different test results. Data analysis was performed by Lucia Roberta Russo and Prof. Giorgio Gronchi.

To study the maternal and paternal MRs, the interviews needed to be audio-recorded and transcribed, and evaluated according to the interview coding of Ammaniti et al. (1995). Therefore, the investigation of maternal and paternal MRs was limited to the number of transcriptions performed since it is a time-consuming procedure, and, for this work, only a descriptive analysis was carried on to investigate the distribution of maternal and paternal MRs among groups and phases. The number of DC participants who completed all four interviews were 10 DC fathers (2 of the 12 fathers presented at Time 3 in Table 3 lack an assessment) and 15 DC mothers. Therefore, we considered the 10 DC fathers and selected randomly 10 DC mothers, 10 NC mothers, 10 NC fathers, and 10 AUT-ART mothers. The sample of AUT-ART fathers who completed the four assessments was too small (5 participants) and, therefore, excluded. This selection meant that we considered for descriptive analysis 40 interviews with DC mothers, 40 interviews with DC fathers, 40 interviews with NC mothers, 40 interviews with NC fathers, and 40 interviews with AUT-ART mothers, for a total of 200 interviews. All 20 DC participants resorted to oocyte donation (OD).

To explore qualitatively the OD mothers' representation of resemblance with the baby, we studied qualitatively the content of the interviews, focusing on the narratives of OD mothers answering the question "*Who does (the child) look like?*". Moreover, to explore the OD mothers' representation of third-party reproduction, we studied qualitatively the content of the interviews, focusing on the narratives of OD mothers answering the question "*Do you ever think about the donor?*". For this purpose, 40 interviews with the 10 OD mothers were considered.

RESULTS

1. Parents' psychological adjustment

1.1. State-Trait Anxiety Inventory

The state anxiety was measured via the STAI-Y1, and the trait anxiety was measured via the STAI-Y2 for mothers and fathers in each group (DC, AUT-ART, NC), in each of the four phases (T0, T1, T2, T3).

1.1.1. Mothers

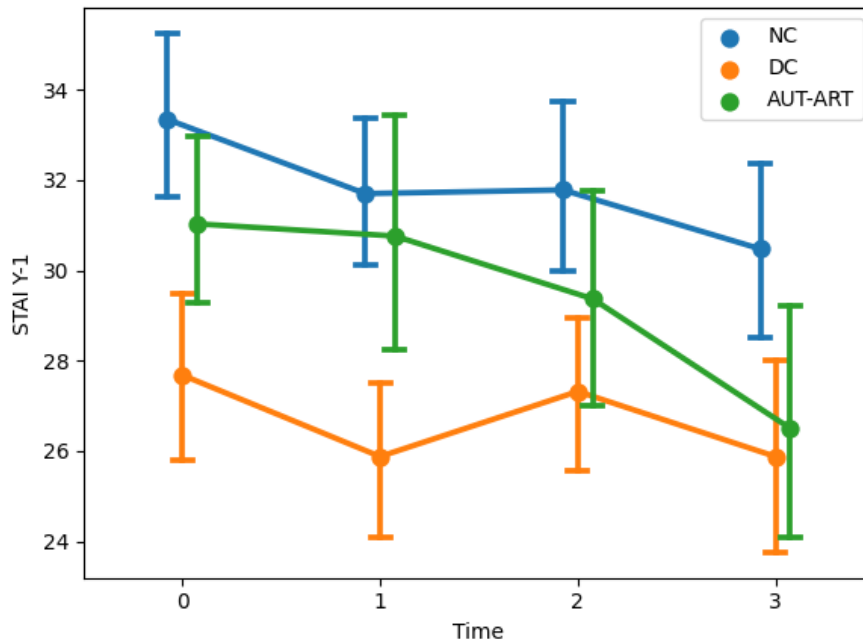
In Table 5, the M and SD of mothers' outcomes, measured by the STAI-Y1, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

Table 5. M and SD of mothers' STAI-Y1 score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC mothers	M	27.7	25.9	27.3	25.9
	SD	5.5	4.3	4.0	4.5
AUT-ART mothers	M	31.0	30.8	29.4	26.5
	SD	5.8	7.5	5.6	4.9
NC mothers	M	33.3	31.7	31.8	30.5
	SD	8.5	7.1	7.7	7.4

Figure 1 presents the mean (coloured dots) with confidence intervals (bars), measured by the STAI-Y1 (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 1. STAI-Y1 outcomes of each group of mothers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed a statistically significant difference among groups ($F(2, 68) = 3.807, p = 0.027$), while no statistically significant difference among phases ($F(3, 204) = 0.635, p = 0.593$), or effect of the age ($F(1, 68) = 0.397, p = 0.531$) was found. Post Hoc comparisons showed a statistically significant difference between DC mothers and NC mothers ($p = 0.032$), where DC mothers had lower levels of state anxiety than NC mothers. The interaction effects between phases and conception method ($F(6, 204) = 0.183, p = 0.095$), and between phases and age ($F(3, 204) = 1.730, p = 0.162$), were non-significant.

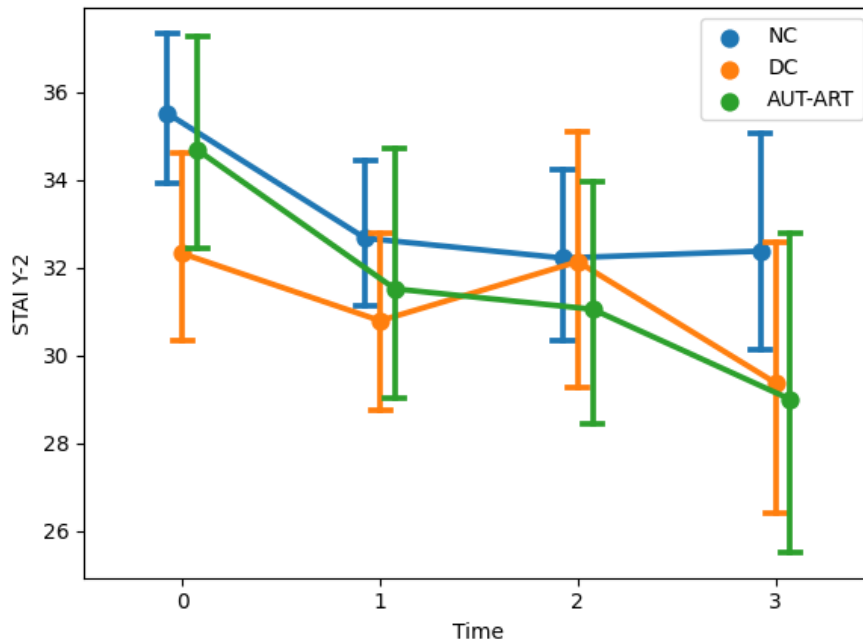
The trait anxiety was measured by the STAI-Y2 in each of the four phases. In Table 6 the M and SD of outcome measures according to the method of conception across time are presented.

Table 6. M and SD of mothers' STAI-Y2 score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC mothers	M	32.3	30.8	32.1	29.4
	SD	6.4	5.2	7.3	6.3
AUT-ART mothers	M	34.7	31.5	31.1	29.0
	SD	7.3	7.8	6.0	6.8
NC mothers	M	35.5	32.7	32.2	32.4
	SD	7.7	7.2	8.2	9.5

Figure 2 presents the mean (coloured dots) with confidence intervals (bars), measured by the STAI-Y2 (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 2. STAI-Y2 outcomes of each group of mothers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference among groups ($F(2, 68) = 0.821, p = 0.444$), among phases ($F(3, 204) = 0.821, p = 0.073$), or effect of the age ($F(1, 68) = 0.274, p = 0.602$). The interaction effects between phases and conception method ($F(6, 204) = 0.183, p = 0.095$), and between phases and age ($F(3, 204) = 1.730, p = 0.162$), were also non-significant.

1.1.2. Fathers

In Table 7, the M and SD of fathers' outcomes, measured by the STAI-Y1, according to the method of conception, across the four-time points, are presented.

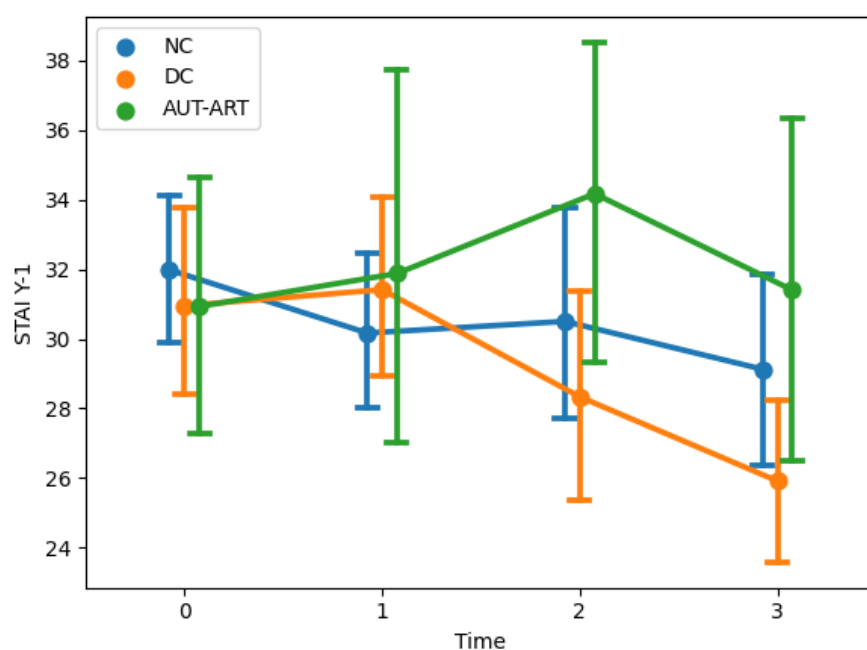
Table 7. M and SD of fathers' STAI-Y1 score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3	
DC fathers	M		31	31.4	28.3	25.9
	SD		6.1	5.8	6.2	4.1
NC fathers	M		32	30.2	30.5	29.1
	SD		7.2	6.9	8	7.1
AUT-ART fathers*	M		30.9	31.9	34.2	31.4

* Not considered in the statistical analysis

Figure 3 presents the mean (coloured dots) with confidence intervals (bars), measured by the STAI-Y1 (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 3. STAI-Y1 outcomes of each group of fathers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference between groups ($F(1, 28) = 3.11, p = 0.089$) or among phases ($F(3, 84) = 2.61, p = 0.057$), while the effect of the age was found to be statistically significant ($F(1, 28) = 7.77, p = 0.009$). The interaction effects between groups and phases were found to be statistically significant ($F(3, 84) = 3.12, p = 0.030$), while the ones between age and phases were found to be not statistically significant ($F(3, 84) = 2.06, p = 0.111$). Post-hoc analysis on the interaction effects between groups and phases revealed a statistically significant difference between DC fathers at time T0 and NC fathers at time T3 ($p=0.025$), where the latter group had higher anxiety scores, and between DC fathers at time T1 and at time T3 ($p=0.008$), where the group had higher anxiety scores at the earlier phase.

In Table 8, the M and SD of fathers' outcomes, measured by the STAI-Y2, according to the method of conception, across the four-time points, are presented.

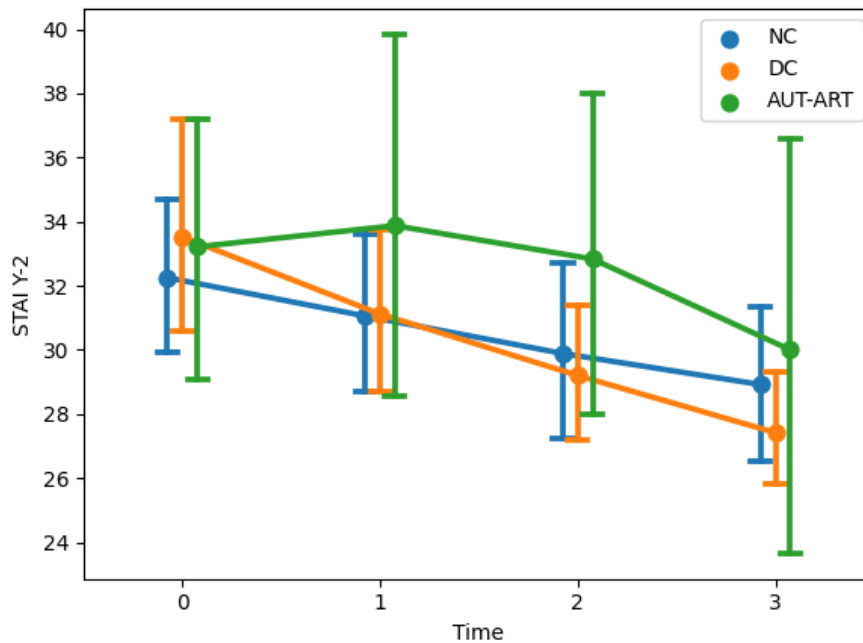
Table 8. M and SD of fathers' STAI-Y2 score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC fathers	M	33.5	31.1	29.2	27.4
	SD	7.9	5.5	4.6	3.2
NC fathers	M	32.3	31.1	29.9	28.9
	SD	8.2	7.4	7.1	6.0
AUT-ART fathers*	M	33.2	33.9	32.8	30.0
	SD	7.9	8.3	6.8	7.3

* Not considered in the statistical analysis

Figure 4 presents the mean (coloured dots) with confidence intervals (bars), measured by the STAI-Y1 (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 4. STAI-Y2 outcomes of each group of fathers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference between groups ($F(1, 28) = 1.48, p = 0.234$), while statistically significant differences between phases ($F(3, 84) = 5.42, p = 0.006$), and effect of age ($F(1, 28) = 4.57, p = 0.041$) were found. Post Hoc comparisons did not, however, reveal a statistically significant difference between any pair of phases. The interaction effects between groups and phases were found to be non-

significant ($F(3, 84) = 1.67, p = 0.179$), while the ones between age and phases were found to be statistically significant ($F(3, 84) = 3.49, p = 0.019$).

1.2. Beck Anxiety Inventory

The anxiety symptoms of mothers and fathers in each group (DC, AUT-ART, NC) were measured by the Beck Anxiety Inventory (BAI) in each of the four phases (T0, T1, T2, T3).

1.2.1. Mothers

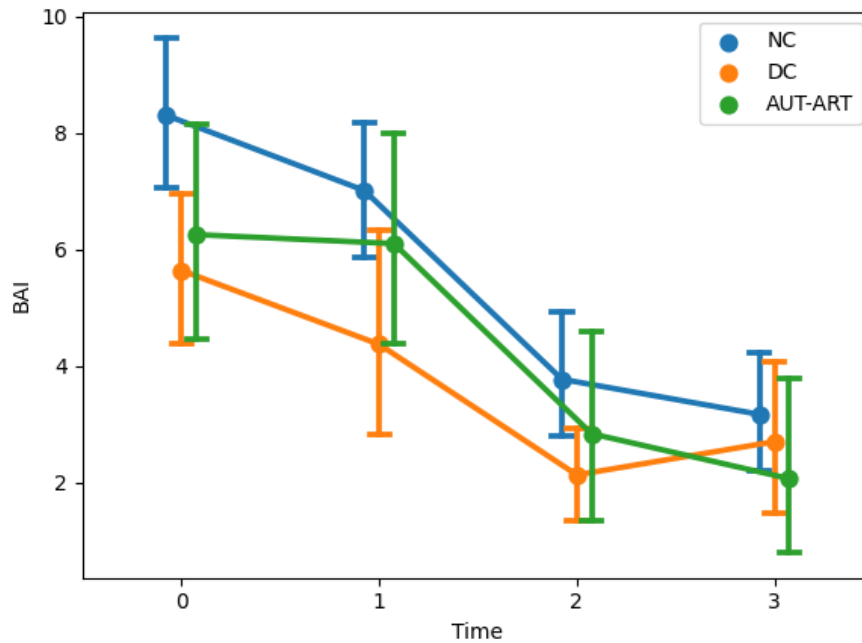
In Table 9, the M and SD of mothers' outcomes, measured by the BAI, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

Table 9. M and SD of mothers' BAI score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC mothers	M	5.6	4.4	2.1	2.7
	SD	3.5	4.5	1.9	2.9
AUT-ART mothers	M	6.3	6.1	2.8	2.1
	SD	5.7	5.2	3.8	2.7
NC mothers	M	8.3	7.0	3.8	3.2
	SD	6.2	5.0	3.9	3.8

Figure 5 presents the mean (coloured dots) with confidence intervals (bars), measured by the BAI (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 5. BAI outcomes of each group of mothers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference among groups ($F(2, 69) = 1.945, p = 0.151$), among phases ($F(3, 207) = 0.846, p = 0.470$), or effect of the age ($F(1, 69) = 0.007, p = 0.933$). The interaction effects between phases and conception method ($F(6, 207) = 0.203, p = 0.063$), and between phases and age method ($F(3, 207) = 0.730, p = 0.535$), were also not statistically significant.

1.2.2. Fathers

In Table 10, the M and SD of fathers' outcomes, measured by the BAI, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

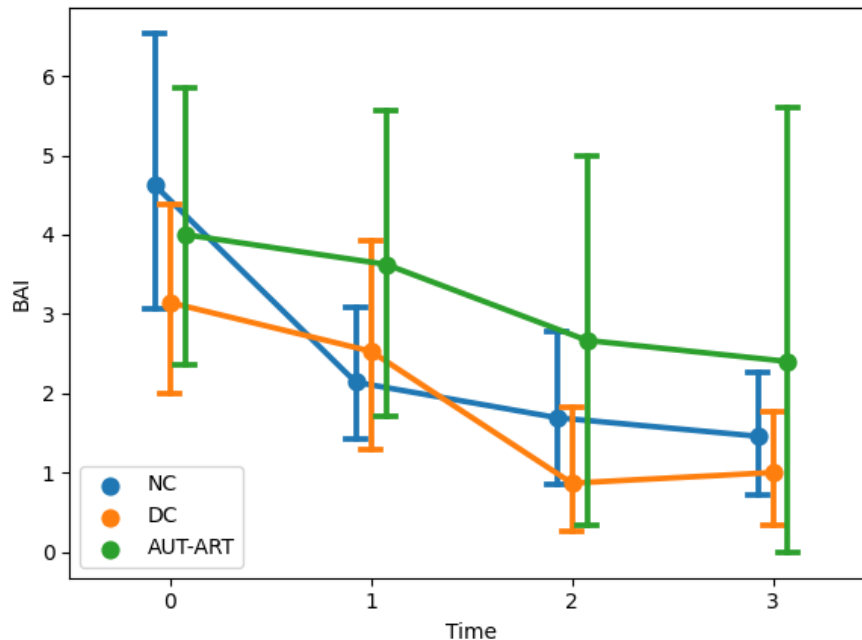
Table 10. M and SD of fathers' BAI score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC fathers	M	3.1	2.5	0.9	1.0
	SD	2.9	2.9	1.6	1.3
NC fathers	M	4.6	2.1	1.7	1.5
	SD	6.5	2.6	2.5	1.9
AUT-ART fathers*	M	4.0	3.6	2.7	2.4
	SD	3.4	2.9	3.1	3.3

* Not considered in the statistical analysis

Figure 6 presents the mean (coloured dots) with confidence intervals (bars), measured by the BAI (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 6. BAI outcomes of each group of fathers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference between groups ($F(1, 28) = 1.48, p = 0.234$), while statistically significant differences among phases ($F(3, 84) = 5.42, p = 0.006$), and effect of the age ($F(1, 28) = 4.57, p = 0.041$) were found. Post Hoc comparisons revealed a statistically significant difference between the BAI test scores at T0 and T3 ($p = 0.040$), where the scores were lower at T3 than at T0. The interaction effects between groups and phases were found to be non-significant ($F(3, 84) = 1.67, p = 0.179$), while the ones between age and phases were found to be statistically significant ($F(3, 84) = 3.49, p = 0.019$).

1.3. Beck Depression Inventory-II

The depressive symptoms of mothers and fathers were measured by the Beck Depression Inventory-II (BDI-II) in each group (DC, AUT-ART, NC), in each of the four phases (T0, T1, T2, T3).

1.3.1. Mothers

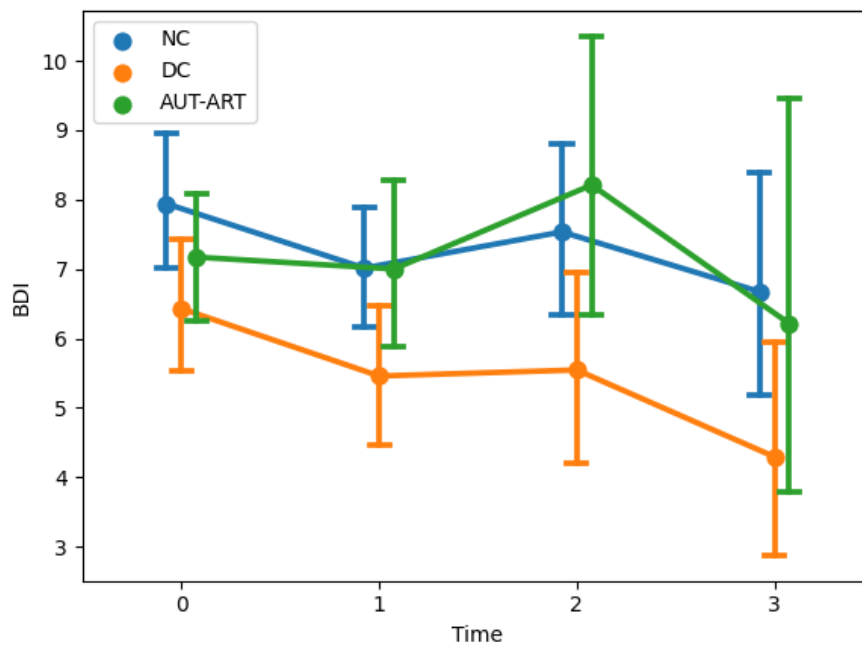
In Table 11, the M and SD of mothers' outcomes, measured by the BDI-II, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

Table 11. M and SD of mothers' BDI-II scores at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC mothers	M	6.4	5.5	5.5	4.3
	SD	2.5	2.5	3.4	3.5
AUT-ART mothers	M	7.2	7.0	8.2	6.2
	SD	2.8	3.3	4.4	5.5
NC mothers	M	7.9	7.0	7.5	6.7
	SD	4.5	3.9	5.0	6.1

Figure 7 presents the mean (coloured dots) with confidence intervals (bars), measured by the BDI-II (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 7. BDI-II outcomes of each group of mothers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference among groups ($F(2, 69) = 1.215, p = 0.303$), or effect of the age ($F(1, 69) = 0.089, p = 0.766$), while a statistically significant difference was found among phases ($F(3, 207) = 3.580, p = 0.015$). Post Hoc comparisons showed a statistically significant difference between phases T0 and T3 ($p = 0.031$), where the BDI-II score was statistically significantly lower at T3 w.r.t. T0.

The interaction effects between phases and conception method ($F(6, 207) = 0.203, p = 0.063$) were non-significant, while the interaction effects between phases and age ($F(3, 207) = 3.580, p = 0.015$) were statistically significant.

1.3.2. *Fathers*

In Table 12, the M and SD of fathers' outcomes, measured by the BDI, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

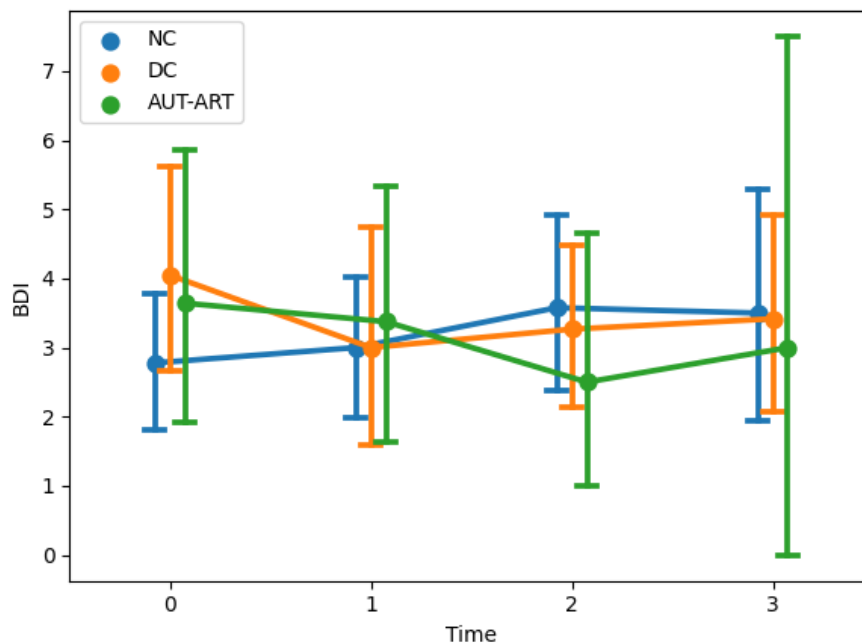
Table 12. M and SD of fathers' BDI score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC fathers	M	4.0	3.0	3.3	3.4
	SD	3.45	3.5	2.5	2.6
NC fathers	M	2.8	3.0	3.6	3.5
	SD	3.5	3.1	3.4	4.2
AUT-ART fathers*	M	3.6	3.4	2.5	3.0
	SD	4.0	2.8	2.4	4.5

* Not considered in the statistical analysis

Figure 8 presents the mean (coloured dots) with confidence intervals (bars), measured by the BDI (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 8. BDI outcomes of each group of fathers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference between groups ($F(1, 28) = 0.03, p = 0.864$), among phases ($F(3, 84) = 2.50, p = 0.065$), and no effect of the age ($F(1, 28) = 2.264, p = 0.144$) was found. The interaction effects between groups and phases were found to be non-significant ($F(3, 84) = 1.08, p = 0.362$), while the ones between age and phases were found to be statistically significant ($F(3, 84) = 3.273, p = 0.049$).

1.4. Edinburgh Postnatal Depression Scale

The perinatal depression of mothers and fathers was measured by the Edinburgh Postnatal Depression Scale (EPDS) in each group, in each of the four phases.

1.4.1. Mothers

In Table 13, the M and SD of mothers' outcomes, measured by the EPDS, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

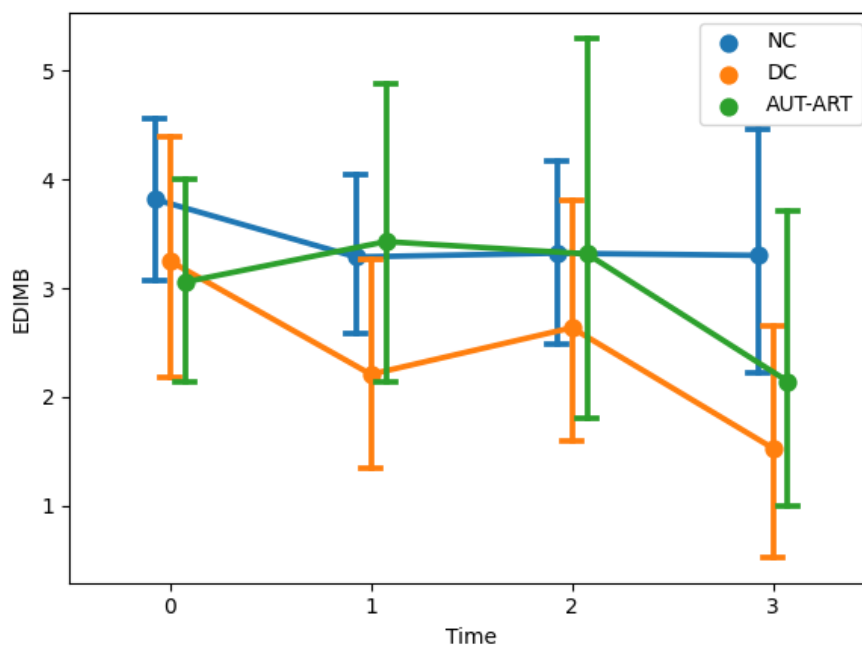
Table 13. M and SD of mothers' EPDS scores at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC mothers	M	3.2	2.2	2.6	1.5
	SD	3.1	2.5	2.7	2.3
AUT-ART mothers	M	3.1	3.4	3.3	2.1

	SD	3.0	3.8	3.9	2.7
NC mothers	M	3.8	3.3	3.3	3.3
	SD	3.5	3.2	3.3	4.4

Figure 9 presents the mean (coloured dots) with confidence intervals (bars), measured by the EPDS (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 9. EPDS outcomes of each group of mothers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference among groups ($F(2, 69) = 0.697, p = 0.501$), and among phases ($F(3, 207) = 2.07, p = 0.105$), and no effect of the age ($F(1, 69) = 0.097, p = 0.755$) was found. The interaction effects between groups and phases ($F(6, 207) = 2.07, p = 0.105$), and between age and phases ($F(3, 207) = 2.28, p = 0.081$), were also found to be non-significant.

1.4.2. Fathers

In Table 14, the M and SD of fathers' outcomes, measured by the EPDS, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

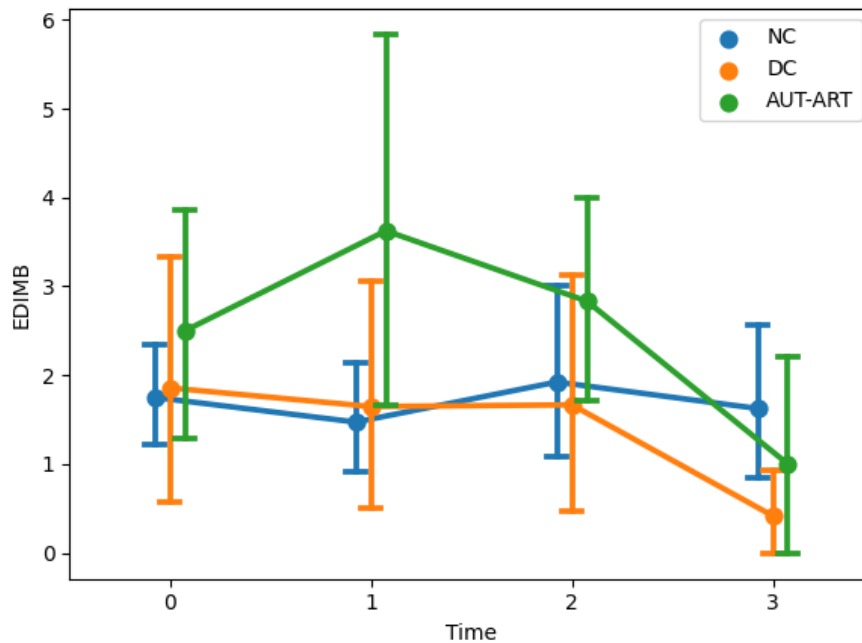
Table 14. M and SD of fathers' EPDS score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC fathers	M	1.9	1.6	1.7	0.4
	SD	3.3	2.9	2.7	0.9
NC fathers	M	1.7	1.5	1.9	1.6
	SD	1.9	2.0	2.5	2.2
AUT-ART fathers*	M	2.5	3.6	2.8	1.0
	SD	2.7	2.9	1.5	1.2

* Not considered in the statistical analysis

Figure 10 presents the mean (coloured dots) with confidence intervals (bars), measured by the EPDS (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 10. EPDS outcomes of each group of fathers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference between groups ($F(1, 28) = 3.74, p = 0.541$), among phases ($F(3, 84) = 0.779, p = 0.509$), and no effect of the age ($F(1, 28) = 2.416, p = 0.131$) was found. The interaction effects between groups and phases ($F(3, 84) = 2.081, p = 0.109$), as well as the ones between age and phases ($F(3, 84) = 0.607, p = 0.612$) were found to be non-significant.

1.5. Dyadic Adjustment Scale

The dyadic adjustment was measured by the Dyadic Adjustment Scale (DAS) for each participant, in each group, in each of the four phases.

1.5.1. Mothers

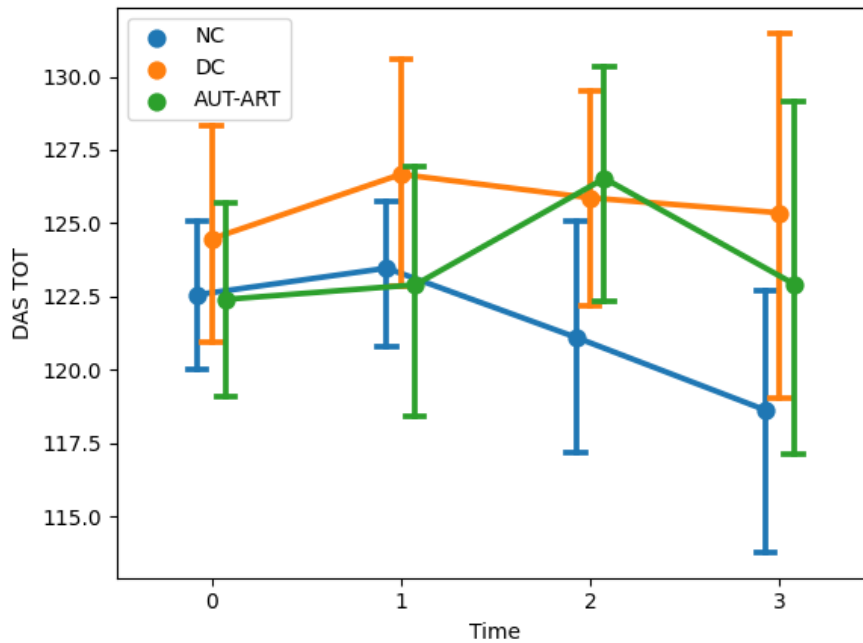
In Table 15, the M and SD of mothers' outcomes, measured by the DAS, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

Table 15. M and SD of mothers' DAS score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC mothers	M	124	127	126	125
	SD	9.7	10.0	9.4	14.1
AUT-ART mothers	M	122	123	127	123
	SD	10.5	11.9	9.3	11.4
NC mothers	M	123	123	121	119
	SD	11.7	11.0	14.9	16.7

Figure 11 presents the mean (coloured dots) with confidence intervals (bars), measured by the DAS (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 11. DAS outcomes of each group of mothers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference among groups ($F(2, 69) = 1.120, p = 0.322$) and among phases ($F(6, 207) = 0.337, p = 0.798$), and no effect of the age ($F(1, 69) = 0.003, p = 0.950$) was found. The interaction effects between groups and phases ($F(6, 207) = 1.444, p = 0.199$), and between age and phases ($F(3, 207) = 0.335, p = 0.800$), were also found to be non-significant.

1.5.2. Fathers

In Table 16, the M and SD of fathers' outcomes, measured by the DAS, according to the method of conception, across the four-time points (T0, T1, T2, T3), are presented.

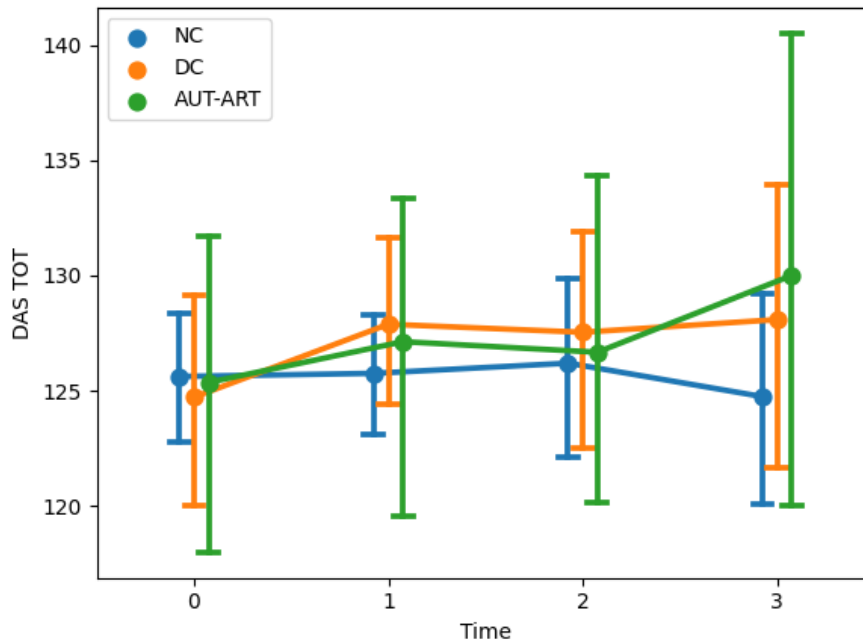
Table 16. M and SD of fathers' DAS score at T0, T1, T2 and T3

Participants		T0	T1	T2	T3
DC fathers	M	125	128	128	128
	SD	11.2	8.0	9.9	10.7
NC fathers	M	126	126	126	125
	SD	8.9	8.5	10.3	11.3
AUT-ART fathers*	M	125	127	127	130
	SD	13	9.9	8.8	11.2

* Not considered in the statistical analysis

Figure 12 presents the mean (coloured dots) with confidence intervals (bars), measured by the DAS (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 12. DAS outcomes of each group of fathers at T0, T1, T2, and T3.



Repeated measures ANCOVA showed no statistically significant difference between groups ($F(1, 28) = 0.174, p = 0.680$), among phases ($F(3, 84) = 0.818, p = 0.488$), or effect of the age ($F(1, 28) = 0.258, p = 0.615$). The interaction effects between groups and phases ($F(3, 84) = 0.066, p = 0.978$), as well as the ones between age and phases ($F(3, 84) = 0.727, p = 0.539$), were found to be non-significant.

1.6. Pregnancy-related anxiety questionnaire

The pregnancy-related anxiety of mothers was measured by the Pregnancy-related anxiety questionnaire (PRAQ-R2) in the two phases of pregnancy (T0 and T1).

1.6.1. Mothers

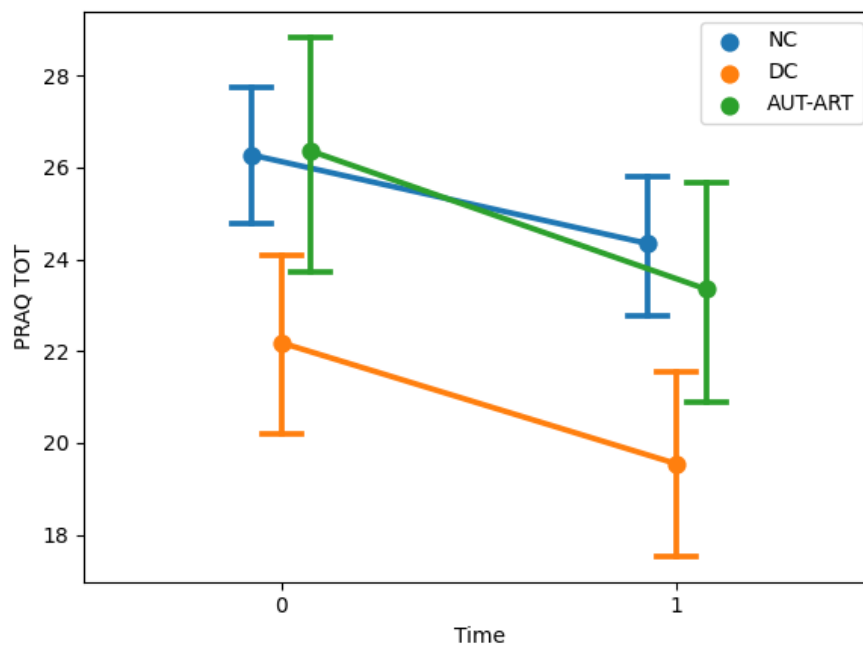
In Table 17, the M and SD of mothers' outcomes, measured by the PRAQ-R2, according to the method of conception, across the two-time points (T0 and T1), are presented.

Table 17. M and SD of mothers' PRAQ-R2 score at T0 and T1

Participants		T0	T1
DC mothers	M	22.2	19.5
	SD	5.2	4.9
AUT-ART mothers	M	26.4	23.3
	SD	7.9	6.6
NC mothers	M	26.3	24.3
	SD	7.1	6.7

Figure 13 presents the mean (coloured dots) with confidence intervals (bars), measured by the PRAQ-R2 (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 13. PRAQ-R2 outcomes of each group of mothers at T0 and T1.



Repeated measures ANCOVA showed a statistically significant difference among groups ($F(2, 119) = 3.689, p = 0.028$), but not between phases ($F(2, 119) = 0.938, p = 0.335$), nor the effect of the age ($F(1, 119) = 0.390, p = 0.533$). Post Hoc comparisons showed a statistically significant difference between NC and DC mothers ($p = 0.027$) and between AUT-ART and DC mothers ($p = 0.047$), where the PRAQ-R2 score was statistically significantly lower for DC mothers in both comparisons. The interaction effects between groups and phases ($F(2, 119)$)

= 0.850, $p = 0.430$), as well as the ones between age and phases ($F(1, 119) = 0.158, p = 0.692$), were found to be non-significant.

1.6.2. Fathers

In Table 18, the M and SD of fathers' outcomes, measured by the modified PRAQ-F (not validated), according to the method of conception, across the two-time points (T0 and T1), are presented.

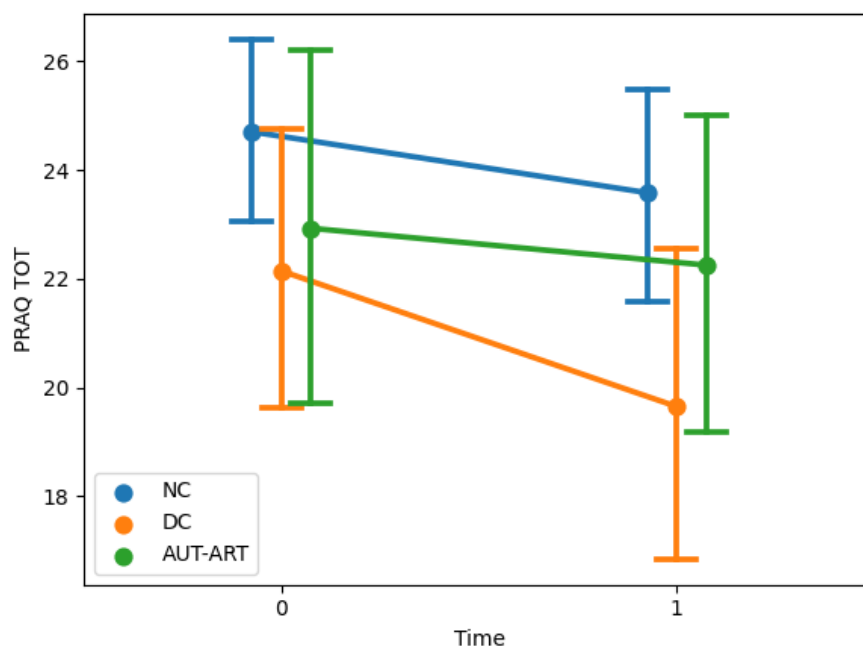
Table 18. M and SD of fathers' PRAQ-F score at T0 and T1

Participants		T0	T1
DC fathers	M	22.1	19.6
	SD	6.2	5.9
NC fathers	M	24.7	23.6
	SD	5.8	5.9
AUT-ART fathers*	M	22.9	22.3
	SD	6.5	4.5

* Not considered in the statistical analysis

Figure 14 presents the mean (coloured dots) with confidence intervals (bars), measured by the PRAQ-F (y axis), according to the method of conception (different colours) for the four-time intervals (x axis).

Figure 14. PRAQ-F outcomes of each group of fathers at T0 and T1.



Repeated measures ANCOVA showed statistically significant difference between groups ($F(1, 50) = 5.980, p = 0.018$), but not among phases ($F(1, 50) = 0.329, p = 0.569$), nor effect of the age ($F(1, 50) = 0.572, p = 0.435$). Post Hoc comparisons showed a statistically significant difference between NC and DC fathers ($p = 0.018$), where the PRAQ-F score was statistically significantly lower for DC fathers. The interaction effects between groups and phases ($F(1, 50) = 0.062, p = 0.804$), as well as the ones between age and phases ($F(1, 50) = 0.077, p = 0.783$), were found to be non-significant.

1.7. Parenting Stress Index - Short Form

The parenting stress of mothers and fathers was measured by the Parenting Stress Index - Short Form (PSI/SF) in the two phases after childbirth (T2 and T3).

1.7.1. Mothers

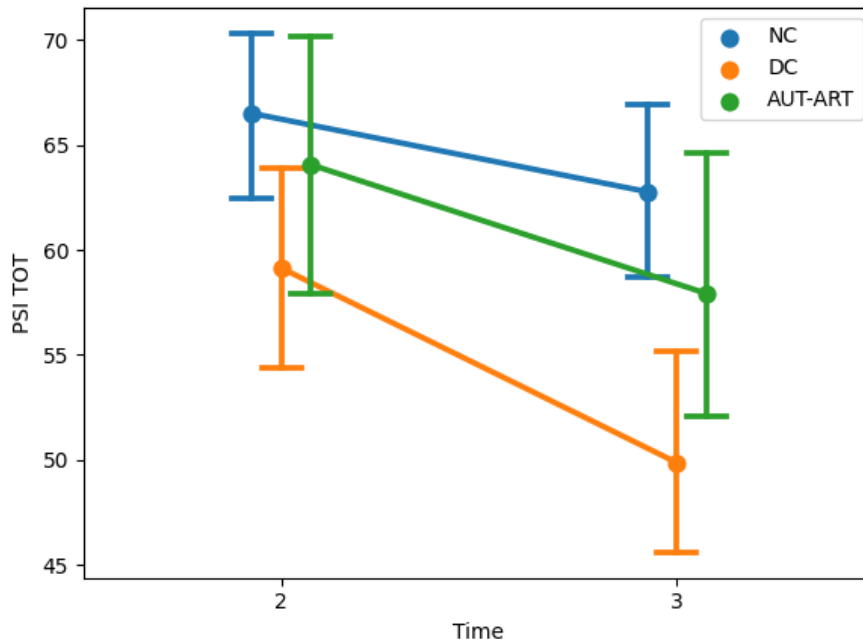
In Table 19, the M and SD of mothers' outcomes, measured by the PSI/SF, according to the method of conception, across the two-time points (T2, T3), are presented.

Table 19. M and SD of mothers' PSI/SF score at T2 and T3

Participants		T2	T3
DC mothers	M	59.1	49.9
	SD	11.3	10.0
AUT-ART mothers	M	64.1	57.9
	SD	13.6	11.9
NC mothers	M	66.5	62.8
	SD	14.9	15.4

Figure 15 presents the mean (coloured dots) with confidence intervals (bars), measured by the PSI/SF (y axis), according to the method of conception (different colours) for the two-time intervals (x axis).

Figure 15. PSI/SF outcomes of each group of mothers at T2 and T3.



Repeated measures ANCOVA showed no statistically significant difference among groups ($F(2, 71) = 1.434, p = 0.245$), among phases ($F(2, 71) = 2.309, p = 0.133$), or effect of the age ($F(1, 71) = 0.281, p = 0.598$). The interaction effects between groups and phases ($F(2, 71) = 0.780, p = 0.462$) were not statistically significant, while the ones between age and phases ($F(1, 71) = 4.403, p = 0.039$) were statistically significant.

1.7.2. Fathers

In Table 20, the M and SD of fathers' outcomes, measured by the PSI/SF, according to the method of conception, across the two-time points (T2 and T3), are presented.

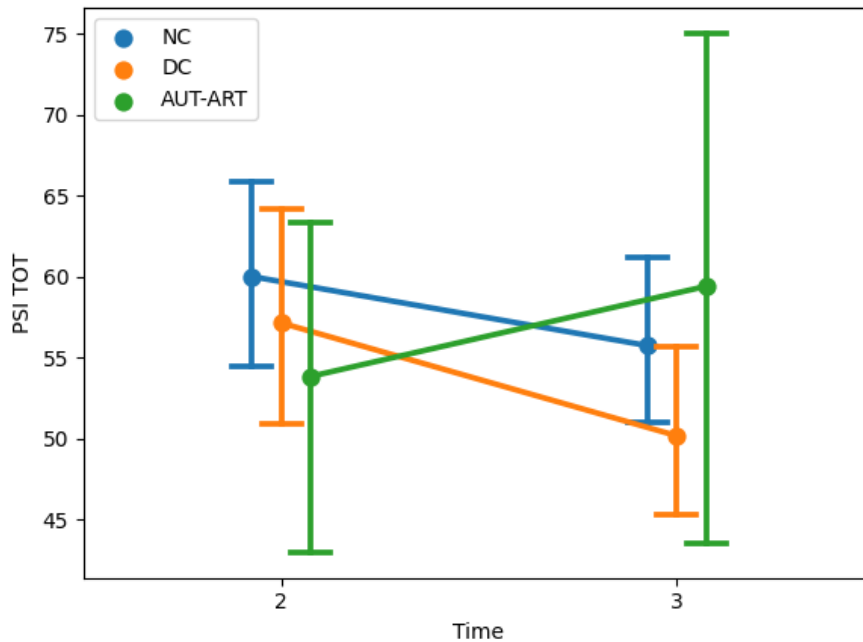
Table 20. M and SD of fathers' PSI/SF score at T2 and T3

Participants		T2	T3
DC fathers	M	57.1	50.2
	SD	12.9	9.9
NC fathers	M	60.0	55.7
	SD	15.0	12.1
AUT-ART fathers*	M	53.8	59.4
	SD	13.2	16.1

* Not considered in the statistical analysis

Figure 16 presents the mean (coloured dots) with confidence intervals (bars), measured by the PSI/SF (y axis), according to the method of conception (different colours) for the two-time intervals (x axis).

Figure 16. PSI/SF outcomes of each group of fathers at T2 and T3.



Repeated measures ANCOVA showed no statistically significant difference between groups ($F(1, 28) = 3.87, p = 0.061$), or effect of the age ($F(1, 28) = 3.82, p = 0.059$), while statistically significant differences were found among phases ($F(1, 28) = 6.06, p = 0.020$). Post Hoc comparisons showed a statistically significant difference between phases T2 and T3 ($p = 0.048$), where the PSI/SF score was statistically significantly lower for phase T3. The interaction effects between groups and phases ($F(1, 28) = 1.42, p = 0.244$) were found to be non-significant, while the interaction effects between age and phases ($F(1, 28) = 05.01, p = 0.033$) were found to be statistically significant.

1.8. The attachment's questionnaires

Antenatal scores are not directly comparable to postnatal scores as the antenatal (MAAS/PAAS) and postnatal (PPAS/PPAS) scales differ (Condon et al., 2013). Therefore, we presented the comparison between groups at T1 and T3, separately.

1.8.1. Mothers

In Table 21, the M and SD of mothers' outcomes, measured by the MAAS at T1 and by MPAS at T3, according to the method of conception, are presented.

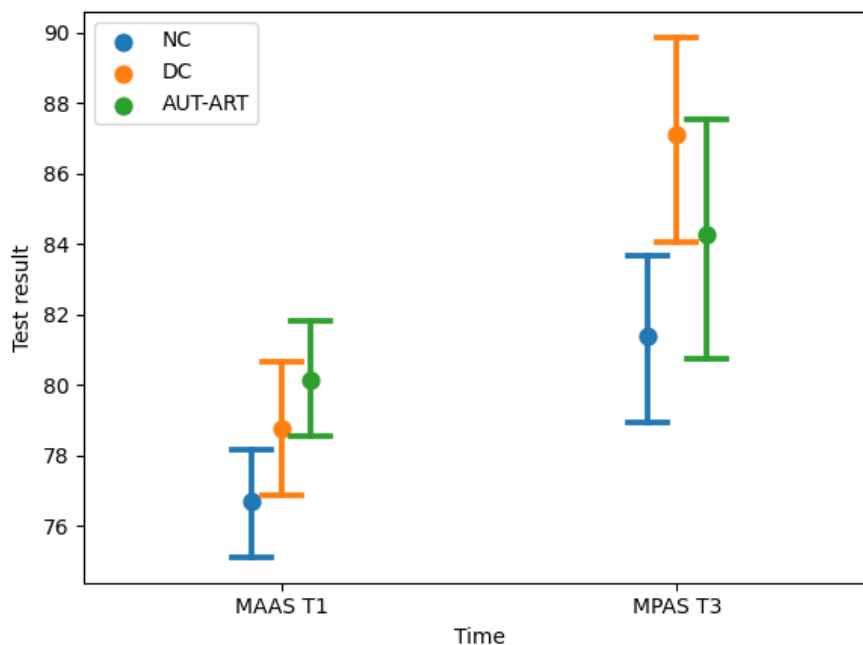
Table 21. M and SD of mothers' scores at T1 (MAAS) and T3 (MPAS)

Participants		T1*	T3*
DC mothers	M	78.8	87.1
	SD	4.6	6.1
AUT-ART mothers	M	80.1	84.3
	SD	4.5	6.9
NC mothers	M	76.7	81.4
	SD	6.6	8.9

* Antenatal and postnatal scales differ

Figure 17 presents the mean (coloured dots) with confidence intervals (bars), measured by the MAAS and MPAS (y axis), according to the method of conception (different colours) for the two-time intervals (x axis).

Figure 17. MAAS outcome at T1 and MPAS outcome at T3 for each group of mothers



ANCOVA analysis on the MAAS test at T1 showed a statistically significant difference among groups ($F(2, 121) = 3.607, p=0.012$), and no statistically significant effect of the age ($F(1, 121) = 0.203, p = 0.653$). Post Hoc comparisons on the MAAS test at T1 showed a statistically

significant difference between NC and AUT-ART mothers ($p = 0.024$), where the latter had a higher test result. ANCOVA analysis on the MPAS test at T3 showed a statistically significant difference among groups ($F(2, 78) = 4.730, p=0.011$), and no statistically significant effect of the age ($F(1, 78) = 2.660, p = 0.107$). Post Hoc comparisons on the MPAS test at T3 showed a statistically significant difference between NC and DC mothers ($p = 0.010$), where the latter had higher results.

1.8.2. *Fathers*

In Table 22, the M and SD of mothers' outcomes, measured by the PAAS at T1 and by PPAS at T3, according to the method of conception, are presented.

Table 22. M and SD of fathers' score at T1 (PAAS) and T3 (PPAS)

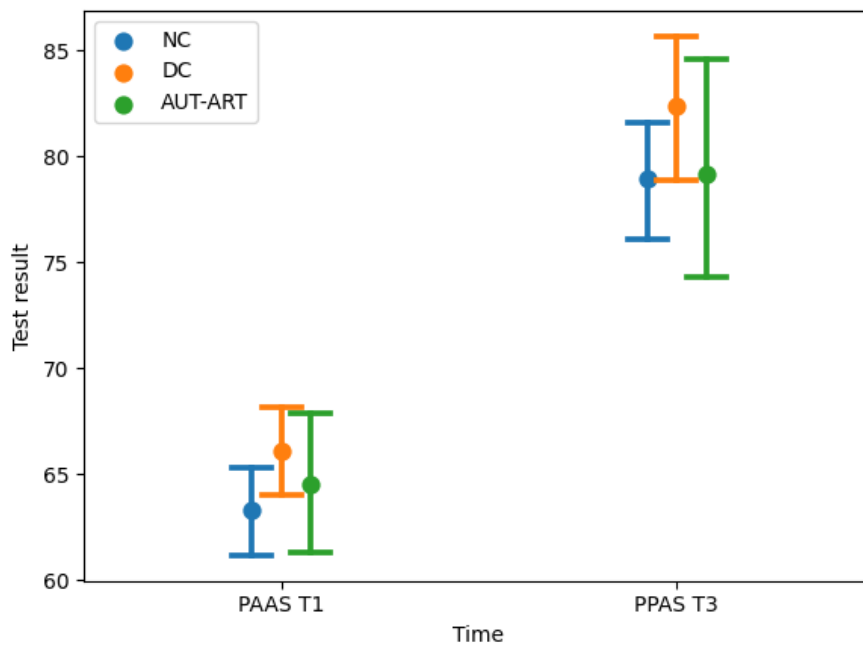
Participants		T1*	T3*
DC fathers	M	66.1	82.4
	SD	4.5	6.1
NC fathers	M	63.3	79.0
	SD	5.9	6.9
AUT-ART fathers**	M	64.5	79.2
	SD	5.2	6.2

* Antenatal and postnatal scales differ

** not considered in the statistical analysis

Figure 18 presents the mean (coloured dots) with confidence intervals (bars), measured by the PAAS and PPAS (y axis), according to the method of conception (different colours) for the two-time intervals (x axis).

Figure 18. PAAS outcome at T1 and PPAS outcome at T3 for each group of fathers



ANCOVA analysis on the PAAS test at T1 showed no statistically significant difference between groups ($F(1, 50) = 2.41, p=0.126$), and no statistically significant effect of the age ($F(1, 50) = 0.016, p = 0.898$). ANCOVA analysis on the PPAS test at T3 showed a statistically significant difference between groups ($F(1, 32) = 5.240, p=0.029$), and no statistically significant effect of the age ($F(1, 32) = 3.62, p = 0.066$). Post Hoc comparisons on the PPAS test at T3 showed a statistically significant difference between NC and DC fathers ($p = 0.029$), where the latter had higher results.

2. Parental mental representations

2.1. Descriptive analysis

2.1.1. Mothers

In Table 23 we present the percentage of the distribution of mothers' MRs among groups and for all phases.

Table 23. Percentage and number of mothers' MRs among groups across time

Reproduction	Mental Representations	Time 0		Time 1		Time 2		Time 3	
		%	N	%	N	%	N	%	N
NC	integrated-balanced	50%	5	70%	7	80%	8	70%	7
	ambivalent/not-integrated	10%	1	10%	1	0%	0	0%	0
	restricted-disinvested	40%	4	20%	2	20%	2	30%	3
DC	integrated-balanced	100%	10	100%	10	100%	10	100%	10
	ambivalent/not-integrated	0%	0	0%	0	0%	0	0%	0
	restricted-disinvested	0%	0	0%	0	0%	0	0%	0
AUT-ART	integrated-balanced	90%	9	90%	9	80%	8	80%	8
	ambivalent/not-integrated	0 %	0	0 %	0	0 %	0	0 %	0
	restricted-disinvested	10 %	1	10 %	1	20 %	2	20 %	2

Around the 14th gestational week (T0), all 10 DC mothers showed integrated/balanced MRs. In the AUT-ART sample, 9 mothers had integrated/balanced MRs and 1 mother had restricted-disinvested MRs. Within the NC sample, 5 mothers had integrated/balanced MRs, 4 mothers had restricted-disinvested MRs, and 1 mother had ambivalent/not-integrated MRs. Therefore, at T0 DC mothers had a more similar situation to AUT-ART mothers than to NC mothers. At 26-30 gestational weeks (T1) all the 10 DC mothers had integrated/balanced MRs, 9 AUT-ART mothers had integrated/balanced MRs, and 1 AUT-ART mother had restricted-disinvested MRs, just like at T0. NC mothers presented a different distribution at T1; 7 NC mothers had integrated/balanced MRs, 2 NC mothers had restricted-disinvested MRs and 1 NC mother had ambivalent/not-integrated MRs. After childbirth, when the child was 1-2 months old (T2), all the 10 DC mothers had, again, integrated/balanced MRs. For the AUT-ART and the NC samples the distribution changed, and in both cases 8 mothers had integrated/balanced MRs while 2 mothers had restricted-disinvested MRs. Therefore, after childbirth AUT-ART mothers became more similar to NC mothers. When the child was 4-5 months old (T3), all the 10 DC mothers had integrated/balanced MRs, and the AUT-ART sample contained 8 mothers with integrated/balanced MRs and 2 mothers with restricted-disinvested MRs, showing no changes in both groups from T2. The distribution changed slightly for NC mothers at T3, where 7 NC mothers had integrated/balanced MRs and 3 NC mothers had restricted-disinvested MRs.

When focusing on longitudinal modifications, no change was observed for the 10 DC mothers, who all had integrated/balanced MRs at T0, T1, T2, and T3. Prenatally, only half of NC mothers had integrated/balanced MRs at the beginning of the pregnancy; then, at 26-30 gestational weeks, 7 out of 10 NC mothers had integrated/balanced MRs. Postnatally, 8 out of 10 NC mothers had integrated/balanced MRs 1-2 months post-partum, and 7 out of 10 NC mothers had integrated/balanced MRs at 4-5 months of the baby's life. The 9 AUT-ART mothers that had integrated/balanced MRs at the beginning of the pregnancy had integrated/balanced MRs also at 26-30 gestational weeks, while after childbirth (T2 and T3) 8 mothers had integrated/balanced MRs and 2 mothers had restricted-disinvested MRs. Therefore, the majority of AUT-ART mothers, and all of the DC mothers, had integrated/balanced MRs both during pregnancy and after childbirth.

2.1.2. Fathers

In Table 24 we present the percentage of the distribution of fathers' MRs among groups and phases.

Table 24. Percentage and number of fathers' MRs between groups across time

Reproduction	Mental Representations	Time 0		Time 1		Time 2		Time 3	
		%	N	%	N	%	N	%	N
NC	integrated-balanced	40 %	4	50 %	5	60 %	6	50 %	5
	ambivalent/not-integrated	0 %	0	0 %	0	0 %	0	0 %	0
	restricted-disinvested	60 %	6	50 %	5	40 %	4	50 %	5
DC	integrated-balanced	90 %	9	90 %	9	100 %	10	80 %	8
	ambivalent/not-integrated	0 %	0	0 %	0	0 %	0	0 %	0
	restricted-disinvested	10 %	1	10 %	1	0 %	0	20 %	2

Around the 14th gestational week (T0), 9 DC fathers had integrated/balanced MRs, and 1 father had restricted-disinvested MRs, while the majority of NC fathers (6) had restricted-disinvested MRs and the other NC fathers (4) had integrated/balanced MRs. With the development of the pregnancy, at T1, DC fathers presented the same situation as at T0, with 9 DC fathers with integrated/balanced MRs, while half of NC fathers had integrated/balanced MRs and the other half of NC fathers had restricted-disinvested MRs. After childbirth, at T2, all 10 DC fathers had integrated/balanced MRs, the majority of NC fathers (6) had integrated/balanced MRs and

the minority (4) of NC fathers had restricted-disinvested MRs. When the child was 4-5 months old (T3), the two groups of fathers had a decrease in the distribution of integrated-balanced MRs, with half of NC fathers who had integrated/balanced MRs, and 8 out of 10 DC fathers who had integrated/balanced MRs.

Longitudinally, the majority of DC fathers had integrated/balanced MRs from pregnancy to postpartum (T0, T1, T2, and T3), while the distribution of integrated/balanced MRs in NC fathers gradually increases from the first months of pregnancy (T0) to postpartum (T2), with a decrease at T3.

2.2. The experience of resemblance

Despite the absence of a genetic link with the child, all the 10 OD mothers found some resemblance with the baby, physical or psychological. These mothers found clear similarities in physical aspects or gestures or tried to find at least one characteristic in common with the child to feel a connection with the baby. The possible characteristics coming from the donor were not mentioned in the majority of cases and, instead, a tendency to emphasize the resemblance between the biological parent and the child, or the gestational connection between mother and child, emerged. Only one mother noticed that the child had some features not belonging to the family and mentioned that these characteristics could come from the donor, showing interest in the donor's presence in the baby's features. Here transcripts of DC mothers answering the question “*Who does (the child) look like?*” regarding resemblance experience after childbirth are reported. The asterisks are used in place of names, to protect privacy.

Seven mothers found most of the physical similarities of the child with the biological partner, but, at the same time, they found at least one characteristic in common with themselves.

The first mother noticed that the baby looked like the father, but maybe had her nose:

*“... è *(the partner) in miniatura, secondo me ha proprio le guanciotte e il taglio del viso di *(the partner), gli occhi il colore abbiamo capito che ancora non si capisce, si capirà più avanti. Nasino forse un po' è il mio, come forma, però proprio anche i capelli, a parte che magari diventeranno ricci più avanti spero, però per adesso è proprio *(the partner) piccolo”.*

Translation:

*“He is a miniature version of *(the partner), in my opinion he has the same cheeks and facial features as *(the partner). We haven't figured out the colour of his eyes yet, but we will know more later. His nose might be a bit*

*like mine in shape, but even his hair, maybe it will become curly later, I hope, but for now he is a small version of * (the partner)".*

The second mother said that the baby looked like the father, but maybe had her skin type:

“Ma allora, appena nato, ma veramente in tante cose è molto molto uguale a mio marito. Proprio anche il tipo di pelle molto scuro, ora è chiarissimo quindi è cambiato tutto. Direi chiaro come me, però anche più chiaro. Quindi anche nei colori ora si è un po' schiarito prima appena nato, era proprio scuro. Capelli neri, ora cambiato totalmente, ha i piedi uguali identici a quelli di mio marito. Delle cose proprio uguali. Vedremo man mano che cresce.”

Translation:

“But then, when he was born, in many things he was very, very similar to my husband. Even the type of dark skin, now it is very light so everything has changed. I would say light like me, but even lighter. So even the colours have lightened a bit, before he was born he was very dark. Black hair, now totally changed, has feet identical to my husband's. Same things really. We'll see as he grows.”

The third mother at T3 found similarities with both the mother and the father, and, at the same time, mentioned the impossibility of this, due to oocyte donation, enhancing similarities with the family of the partner.

“Ma di più a suo papà. Gli occhi azzurri come i miei, capelli lisci come me, perché papà ha i capelli ondulati. Ma sennò per adesso a papà. O sennò tanti dicono a mia mamma, ma essendo che non è...come si dice...mi sfugge la parola. Essendo che non sono i miei ovuli in pratica, dire che assomiglia a me, nel senso che è un po' difficile che, sì, ma insomma, dai, mi ha capito forse. Da parte di mia suocera, di mio marito, ecco, tanto da quella parte. Proprio le gambotte di mia suocera”.

Translation:

“But more like his dad. Blue eyes like mine, straight hair like me, because dad has wavy hair. But for now it's more like dad. Or else many say he looks like my mother, but since it's not... how do you say... I can't find the word. Since it's not my eggs in practice, to say he looks like me, in the sense that it's a bit difficult, yes, but in any case, you understand, maybe. From my mother-in-law, my husband, so much from that side. The legs are just like my mother-in-law's”.

The same mother at T2 found a feature in common with the child as a reassurance, a clear characteristic that belonged to her, a presence of the mother:

“ (...) gli occhi sono azzurri come la mamma, questo è sicuro. Intanto dopo, se cambiano più avanti non lo so, ma intanto io so che sono della mamma”.

Translation:

“...the eyes are blue like mom, that's for sure. If they change later I don't know, but in the meantime I know that they belong to the mother”.

The fourth mother found that the baby was physically resemblant to the father but temperamental resemblant to her:

*“(...) già quando abbiamo fatto un video con l'ecografia nella pancia io ero così sicura, ho fatto vedere ad altre persone "come il viso di papà". Quando ho fatto la foto con *(the partner) che (the baby) è sul petto, vedi veramente tutti e due visi sono identici veramente. E molto probabilmente carattere... testa dura ovviamente abbiamo tutti e due, invece che lei è piuttosto una persona di mattina e non la sera, questo invece da me, cioè molto probabilmente perché siamo sempre insieme, e io non sono così allegra alla sera, io sono invece allegra la mattina, invece *(the partner) la mattina serve un po' di tempo, un po' di più tempo della gente normale no? Invece lei ride sempre, allegra già alla mattina. Invece la sera, un po', vuole avere la sua pace”.*

Translation:

*“(...) already when we made a video with the ultrasound in my stomach, I was so sure, I showed it to other people "like his father's face." When I took the picture of * (the partner) with (the baby) on the chest, you can really see that both faces are identical. And probably character... We both are stubborn, and the fact that she is more of a morning person and not a night owl, probably because we're always together and I'm not so cheerful in the evening, I'm cheerful in the morning, instead * (the partner) needs some time in the morning, more than normal people, right? Instead she always laughs, she's happy already in the morning. Instead in the evening, a bit, she wants her peace”.*

Also, the fifth mother found that the baby was physically resemblant to the father but temperamental resemblant to her:

“Beh, fisicamente sicuramente gli occhi e la bocca sono del papà. Caratterialmente più tranquilla dai, serena, come me”.

Translation:

“Well, physically the eyes and mouth are definitely dad's. Temperamentally calmer, come on, serene, like me”.

The sixth mother immediately found physical similarities with the baby at T2. She saw the pictures when she was a child and noticed a physical resemblance with the baby:

“(...) una cosa che mi ha colpito tantissimo è che ho guardato le mie foto di quando ero piccola e mi assomiglia. Sì, mi assomiglia, è una cosa incredibile, mi assomiglia! E quindi io trovo che sia bellissimo. Poi assomiglia di più a mio marito eh, però ci sono delle cose, che cioè saranno quei tratti somatici che magari si trovano un po' in tutti e io li ritrovo nelle mie foto. Però c'è anche questa cosa qua che trovo delle somiglianze con me (...)”.

Translation:

“(...) one thing that struck me a lot is that I looked at my photos from when I was little and it looks like me. Yes, it looks like me, it's incredible, it looks like me! And so I find it beautiful. Then he looks more like my husband eh, but there are some things, that is, they will be those somatic traits that maybe are found in everyone and I find them in my photos. But there's also this thing here that I find similarities with me (...)”.

This mother mentioned clearly the possibility that the donor contributed to the baby's features at T3. Indeed, she found that the baby had some characteristics that did not belong to the family. However, she found features in common between her and the child, while embracing, at the same time, the possibility that these characteristics came from the donor.

“ (...) ci sono poi delle cose ignote che immagino siano somiglianze con la donatrice. E io ci vedo anche delle cose che assomigliano a me, nel senso che cioè secondo me sono delle coincidenze, nel senso che io ho queste labbra un po' disegnate e lui le ha così. E ora è sicuramente una coincidenza, magari ce l'ha così la donatrice. Non lo so, però è una cosa che comunque mi assomiglia”.

Translation:

“(...) then there are some unknown things that I imagine are similarities with the donor. And I also see things that look like me, in the sense that in my opinion they are coincidences, in the sense that I have these slightly drawn lips and he has them like this. And now it's definitely a coincidence, maybe the donor has it like this. I don't know, but it's something that looks like me anyway”.

The same mother said that she was in difficulty when resemblance talk came from the social network because forced her to lie:

“(...) perché poi arriva l'amica di turno e dice a chi assomiglia? Fammi guardare. (...) Somiglianze del cavolo che tutti devono fare e noi siamo lì a fingere, “Sì, assomiglia? Ah dici?” E però è difficile da gestire proprio come cosa (...)”.

Translation:

“(...) because then comes that one friend that says who does he look like? Let me look. (...) Damn similarities that everyone has to try to find and we're there pretending, “Yeah, does it look like? Oh you say so?” And yet it is difficult to manage (...)”.

The seventh mother said that she was studying epigenetics to find the possibilities of resemblance between her and the baby in the future. Moreover, at the same time, she tried to find behavioural similarities with the child to feel closer to the baby and “not just an incubator”.

“(...) Beh inevitabile fisicamente tantissimo a mio marito perché vabbè adesso non si vede ha gli occhietti chiusi però sì...amore bello! (ride) Fisicamente dovrebbe avere anche gli occhi chiari (...)”

“ (...) Io il legame lo sento, poi magari non mi assomiglia però mi sto documentando eh quindi calma...mi sto documentando sull'epigenetica, la biochimica, quindi calmi ragazzi qui non parliamo a sproposito...mi sto documentando quindi non è detta l'ultima parola (ride) non è detto eh vedremo magari tra decenni vedremo, adesso ne sappiamo poco e capisco che ne sanno poco, non io, i grandi professionisti ne sanno poco ancora ma non è detto non è detto, io adesso sto studiando i geni l'espressione dei geni quindi dipende dalla mamma, non è solo una un'incubatrice, quindi non lo so, sto studiando non... somiglianza non lo so, sembra che non ci possa essere, io dico sembra ma comunque no non c'è, però vedo dei gesti che magari avevo, per esempio dorme come ho dormito io per 9 mesi, mette la mano esattamente come la mettevo io per 9 mesi e mi sono fatta uscire sta ruga,

sperando che andrà via, però ecco dai non so se è una carezza che mi do per sentirla più vicino, anche sotto quel profilo non lo so, però vedremo. Non lo so (ride). Lei conoscerà benissimo l'argomento, sto leggendo sto studiando qualcosa per capire un po' di più, no però no somiglianze adesso non vedo. Vedo magari la postura la posizione delle mani, queste cose sono simili alle mie però non so se è suggestione o altro ecco, magari è suggestione".

Translation:

"(...) Well physically inevitably (looks) a lot like my husband because oh well now you can't see it she has his little eyes closed but yes... beautiful love! (laughs) Physically she should also have light eyes (...)"

" (...) I feel the bond, then maybe it doesn't look like me, but I'm researching so calm down... I'm researching epigenetics, biochemistry, so calm down guys, let's not talk inappropriately here... so I'm researching the last word has not been said (laughs) it has not been said eh we will see maybe in decades we will see, now we know little and I understand that they know little, not me, the great professionals still know little but it is not said it is not said, I now I'm studying genes the expression of genes so it depends on the mother, it's not just an incubator, so I don't know, I'm studying not... similarity I don't know, it seems there can't be, I say it seems but in any case, no, there isn't, but I see some gestures that maybe I had, for example, she sleeps as I slept for 9 months, she puts her hand exactly like I used to do it for 9 months and I let this wrinkle out, hoping it will go away, but come on, I don't know if it's a caress I give myself to feel her closer, not even from that point of view I don't know, but we'll see. I don't know (laughs). You will know the subject very well, I'm reading, I'm studying a little bit to understand a little more, no but no similarities now I don't see. Maybe I see the posture, the position of the hands, these things are similar to mine but I don't know if it's a suggestion or something else here, maybe it's a suggestion".

One mother did not mention the resemblance with the partner and found a resemblance between her and the baby in the temperamental and psychological features:

"(...) se penso a me da piccola non mi assomiglia (ride) se penso a me da grande potrebbe assomigliarmi e...poi per quanto riguarda il mio compagno, a lui da grande non gli assomiglia, lui da piccolo (...) a me da piccola no, avevo un altro carattere e a me da grande sì assomiglia (ride) ecco, il mio compagno da grande no, è più sottomesso (...)"

Translation:

"(...) if I think of me as a child, she doesn't look like me (laughs) if I think of me as an adult, she might look like me and... then as far as my partner is concerned, she doesn't look like him as an adult, he as a child (...) Not to me as a child, I had a different character and to me when I grew up it looks like (laughs) here, my partner when I grow up no, he is more submissive (...)"

A mother at T2 said that she had some difficult moments in the past because of the possibility that the child would not have a physical resemblance to her. In the narration emerged the mother's hope that the donor was resemblant to her and relief when the social context found features in common with the mother.

“Inizialmente ammetto che ero molto preoccupata perché sai ti trovi un bambino che magari di te non avrà nulla e magari lo guardi un po’... ero un po’ preoccupata che guardandolo di non riconoscermi... di non riconoscermi in lui perché alla fine ci potrà essere anche quello...ho avuto momenti un po’ di cedimento con il mio compagno perché ero preoccupata del fatto che di me non avrebbe avuto dei tratti che mi ricordassero, però chi non lo sa in realtà poi mi dice "assomiglia a te per questo per quell'altro" (ride) e quindi poi chiamo il mio compagno "Hai sentito? Ha il mio naso!" (ride) in realtà sarà poco probabile che avrà il mio naso, però non si sa mai perché magari abbiamo sempre qualche sosia in giro per il mondo (...).”

Translation:

“Initially I admit that I was very worried because you know you find a child who maybe won't have anything of you and maybe you look at him a little... I was a little worried that looking at him I might not recognize me... that I wouldn't recognize me in him because eventually in the end there could also be that... I had moments when I gave in a bit with my partner because I was worried that he wouldn't have any traits that reminded me, but who does really know... he then tells me "he looks like you for this for that" (laughs) and then I call my partner "Did you hear? He has my nose!" (laughs) in reality it will be unlikely that he will have my nose, but you never know because maybe we always have some doubles around the world”.

The same mother at T3 tried to find some features in common with the child:

“... anche se non ha il mio patrimonio genetico, cerco comunque di trovare qualcosa che lo accomuni a me quindi...Non saprei, comunque ha i capelli chiari come me (ride). Perché il mio compagno è scuro, si sta schiarendo sempre di più. Era nato castano scuro, adesso invece castano chiaro con qualche riflesso rosso (ride). Si chiederanno a chi assomiglia (ride). E anche gli occhi si stanno schiarendo. E non ha la carnagione scura tra l'altro, quindi ha la carnagione rosata (ride). Sarà curioso vederlo quando sarà più grande.”

Translation:

“...even if he doesn't have my genetic heritage, I still try to find something that unites him to me so...I don't know, however he has fair hair like me (laughs). Because my partner is dark, he is getting lighter and lighter. He was born dark brown, now instead light brown with some red reflections (laughs). They'll wonder who he looks like (laughs). And his eyes are clearing too. And he doesn't have a dark complexion by the way, so he has a rosy complexion (laughs). It will be interesting to see him when he is older.”

Another mother answered that the important thing was the good health of the child and that she did not notice any resemblance with parents. However, in the same interview, this mother said that there was a resemblance between the mother and the child, due to the gestational connection, without mentioning a particular feature in common, enhancing the gestational connection as the most important bond with the child.

“(...) Non importa, guarda l'importante è che stia bene e che sia sereno. Non so veramente, non saprei dirti. Su questa domanda glisso perché non vado neanche mai a vedere quando sono così piccoli i tratti rispetto ad altri bambini di altri genitori. Ecco, secondo me sono troppo piccoli per poter individuare dei tratti somatici di somiglianza, ecco, con uno o con l'altro genitore. Staremo a vedere”.

“(...) visto che comunque ci sono dei geni che non sono miei, però in realtà cioè ti rendi conto che comunque è tuo figlio e ti assomiglia, non so come dire. Forse naturalmente essendo portato in pancia alla fine ti assomiglia, non so spiegare. Però è tutto molto naturale. Ed è bello che sia così, eh guai, cioè non oso immaginare se fosse stato diverso”.

Translation:

“It doesn't matter, the important thing is that he's fine and calm. I really don't know, I can't tell you. I gloss over this question because I never even compare the traits with other children of other parents, when they (children) are so young. Here, in my opinion they are too small to be able to identify somatic traits of similarity, well, with one or the other parent. We'll see”.

“...since there are some genes that aren't mine, but in reality, that is, you realize that he's your son anyway and he looks like you, I don't know how to say. Maybe of course being carried in the belly at the end makes it look like you, I can't explain. But it's all very natural. And it's good that it is like this, I dare not imagine if it had been different”.

2.3. The experience of the third-party reproduction

Except for one woman who said that she did not have thoughts about the donor in each of the phases, the other 9 expressed their images of the donor at a certain phase. The representations that emerged in these narratives were the donor as a good person, the donor as an organ donor or the donor as an opportunity to experience a healthy pregnancy. When the donor was represented as a good person, there was often the presence of feelings of gratitude and curiosity about the characteristics that the donor gave to the child. In some cases, the donor was perceived as an intrusion, something to erase from family construction. Here, transcripts of DC mothers answering the question “*Do you ever think about the donor?*” are reported.

Five mothers thought about the donor as a good person, in each of the phases of the transition to parenthood.

The first mother said in each of the four phases that she wanted to say thanks to the donor. She wanted to hug the donor or to write a letter to her:

“(...) sono grata, io vorrei abbracciarla, non credo che sia possibile mai, ma non so perché spero che sia possibile un giorno, anche se so che la magistratura non consente, ma la vorrei sentire, o scrivere una lettera (...)”

Translation:

“(…) I am grateful, I would like to hug her, I don't think it will ever be possible, but I don't know why I hope it will be possible one day, even if I know that the judiciary does not allow it, but I would like to hear from you, or write a letter (…).”

The second mother in each phase believed that a person that does an act of generosity like that is good and special:

“(…) a mio avviso è una persona comunque veramente buona. Perché cioè, chi al giorno d'oggi di ragazzi di oggi, se possiamo dire perché comunque è una giovanissima e cioè va comunque in ospedale, diecimila analisi da fare senza comunque essere pagata, cioè, parliamoci chiaro... è una persona da apprezzare secondo me”.

“(…) perché lei in questo momento ha raccolto un nostro sogno, un mio sogno, e qui la ringrazio sempre. Quello sì, solo in questo. Ecco perché probabilmente non è che mi interessa capire com'è. No, però quello sì, la ringrazio sempre quando ci penso”.

Translation:

“(…) in my opinion she is a really good person. Because that is, who among today's kids, if we can say that because she is still very young, goes to the hospital, (undergoes) ten thousand analyses without being paid anyway, that is, let's be clear ... she is a person to be appreciated in my opinion.”

“(…) Because at this moment she has gathered a dream of ours, a dream of mine, and here I always thank her. That I do, but only in this. That's why I'm probably not interested in understanding what she's like. No. but then yes, I always thank her when I think about it.

The third mother thought that the baby will inherit the features of her husband, who she loved, and the donor's characteristics, that is a good person. Moreover, she enhanced the gestational connection with the child, which is stronger than genetics.

“(…) se una donna che ha deciso di donare qualcosa a un'altra donna a titolo gratuito, vuol dire già che è un buon animo, quindi vuol dire che comunque se questo è l'animo le avrà anche passato qualcosa di buono, no?”

“(…) comunque avrà il patrimonio genetico di mio marito. Io amo mio marito, quindi di conseguenza non posso non amarla”.

“(…) i nove mesi nella pancia, questo ho maturato, si forma un legame che appunto non è genetico, ma è molto più forte”.

Translation:

“(…) if she is a woman who has decided to give something to another woman free of charge, it already means that she is a good soul, therefore it means that in any case if this is her soul, she will also have given her something good, no?”

“(…) In any case, (the baby) will have my husband's genetic heritage. I love my husband, so consequently I can't not love her.”

“(…) the nine months in my belly, this I have matured, a bond is formed which is not genetic, but is much stronger”.

The fourth woman experienced gratitude for the donor’s gesture and curiosity about the future features of the child coming from the donor in each of the four phases. However, she also expressed concerns about possible physical defects:

T0 *“(…) da una parte tantissima stima perché vent’anni, cioè io a vent’anni manco ci avrei mai pensato di fare una roba del genere. Dall’altra ci penso più che altro con curiosità, cioè come sarà fisicamente. Come sarà come tipa non lo so, ma più che altro legato al bambino che potrà avere delle caratteristiche sue no? E quindi mi incuriosisce più che altro per quello. Però così nel senso una cosa di curiosità. Oltre, anzi, oltre alla stima per la cosa fatta, ecco”.*

T1: *“(…) Allora mi capita di pensarci della serie oddio chissà com’è questa, soprattutto fisicamente. Chissà cosa può aver.... Vabbè, adesso la metto sul ridere. Però un po’ il pensiero che...pensiero banale per carità, di non sapere quali difetti possa avere fisicamente, che magari può avere trasmesso al bambino, banalizzo, non so, le orecchie a sventola, le gambe storte, che vabbè, chi se ne frega, però ogni tanto ci penso (...)”.*

Translation:

T0: “(…) on the one hand, a lot of esteem because when I was twenty years old, I would have never thought of doing something like this. On the other hand, I think about it mostly with curiosity, that is, how it will be physically. What she (the donor) is like, I don’t know, but I think about the child who may have characteristics of her, right? And so I’m more curious about that than anything else. But so in the sense of a thing of curiosity. Beyond, indeed, beyond the esteem for the thing (the donor) has done, that’s it”.

T1: “(…) Then it happened to me to think something like God, who knows what this she is like, especially physically. Who knows what she may have.... Well, now I’m laughing it off. But the thought that... trivial thought for heaven’s sake, of not knowing what defects she may have physically, which perhaps she may have transmitted to the child, I trivialise, I don’t know, protruding ears, crooked legs, oh well, who cares, but every now and then I think about it (...)”.

The fifth mother expressed concern about the impossibility to know the donor. She was worried about the future needs of the baby to meet the donor that could be not fulfilled. Moreover, in the narration emerged the hope that the donor was a good person because the baby will inherit her features.

“Sì, mi capita ma perché ho pensato se per assurdo, legalmente non è possibile, almeno non lo consentono, però per assurdo sì penso se mio figlio in futuro dovesse chiedermi di voler conoscere, potrei essere d’accordo nel fargli conoscere la donatrice, non penso che legalmente sia possibile perché è fatto nell’anonimato, però io per il bene del bambino il benessere del bambino, lo farei(...)”.

“(…) Sapendo che c’è ci sarà tanto tanto della donatrice nella bambina... io penso speriamo sia una persona in gamba, questo penso, spero sia una persona in gamba, una persona che meriti, una persona...poi penso anche

bah chissà... no vabbè a parte che non c'è modo, ma chissà se lei vorrà conoscerla, non c'è possibilità adesso non so se si può non si potrà, però sì faccio dei pensieri”.

Translation:

"Yes, it happens to me but because I thought if, hypothetically, legally it's not possible, at least they don't allow it, but hypothetically, yes, I think if my son in the future were to ask me to know, I could agree to let him know the donor, I don't think it's legally possible because it's done anonymously, but I would do it for the good of the child (...)"

"(...) Knowing that there will be so much of the donor in the child... I think we hope she is a smart person, this I think, I hope she is a smart person, a person who is worthy, a person...then I also think "bah, who knows..." oh well apart from that there's no way, but who knows if she'll want to meet her, there's no possibility now I don't know if it's possible now, it won't be possible, but yes I'm thinking".

One mother expressed annoyance that those who knew about the donation find it difficult to talk about the topic of the child's resemblance, making her uncomfortable, while, after childbirth, she did not think about the donor anymore.

"(...) io non ci penso, ma ho la sensazione che siano più chi sa come è stata concepita che ci pensa, per esempio mia sorella che ovviamente è tutto al corrente, ad esempio non aveva il coraggio di dirmi che la bambina assomigliava molto a mia sorella da piccola (...)"

Translation:

"(...) I don't think about it, but I have the feeling that those who know how it was conceived think about it more, for example my sister, who obviously knows everything, for example, she didn't have the courage to tell me that the little girl looked a lot like my sister as a child (...)"

A woman emphasised the fact that the donation was just an extra help that allowed her to have a healthy pregnancy and that the baby was her baby.

"(...) in realtà no, cioè quando la nomino e perché appunto nelle visite mi chiedono quanti anni ha, oppure mi chiedono da dove viene. Ecco anche oggi ho detto io non ho questo tipo di informazioni, so solo quanti anni ha e so solo che la banca era spagnola, però cioè non ti so dare altre tipologie di indicazioni e va bene così, perché non...Perché sì è mio! (ride), in realtà è mio figlio adesso quindi non ho bisogno di sapere nient'altro, anzi, sono contenta che sia che sia giovane che questo mi sta permettendo, probabilmente di avere una gravidanza tranquilla e sana perché comunque anche oggi mi ha detto, cioè proprio bello è sano, quindi mi fa felice”.

"(...) non penso che cambi nulla, né al bambino, sapere che magari è frutto di una donazione onestamente, che però è cresciuto nella mia pancia, cioè non cambia...Non cambia il risultato finale. Per capirsi, è brutto da dire però quello che sarà lui è comunque frutto di mio e di mio marito. Solo con un aiuto in più, ecco”.

Translation:

“(…) not actually, that is when I name her and precisely because in the visits they ask me how old she is, or they ask me where she comes from. Here again today I said I don't have this type of information, I only know how old she is and I only know that the bank was Spanish, but that is, I don't know how to give you other types of information and that's okay, why not... Why yes it's mine! (laughs), he's actually my son now so I don't need to know anything else, on the other hand, I'm glad that she's young and this is allowing me, probably, to have a peaceful and healthy pregnancy because even today he said to me, that is, really beautiful, it is healthy, so it makes me happy”.

“(…) I don't think anything will change, nor for the child, knowing that maybe it's the result of a donation honestly, but that it grew in my belly, that is, it doesn't change... The final result doesn't change. It's bad to say so but what he will be is still the result of me and my husband. Just with a little extra help, that's it.”

Two women were in difficulty when speaking about the donor. One woman experienced gratitude at the beginning of the pregnancy and when the child was four-five months old, but she also chose to avoid answering the question at 26-30 gestational weeks and after childbirth. The other woman experienced gratitude during pregnancy and compared the oocyte donation to other types of organ donation, but also felt the donor was an intruder in the family atmosphere. In these two cases, we reported transcripts of each phase.

The first woman expressed gratitude at the beginning of the pregnancy (T0) and at the 4th-5th month of the baby (T3), but at 26-30 gestational weeks she said that she did not think about the donor (T1), and at the 1st-2nd month of the baby (T2) she did not answer the question and changed topic.

T0: *“No, sinceramente no. Sinceramente no. Mi imagino che avrà qualcosa anche di lei perché è ovvio. Ma insomma io ringrazio tanto perché fare questa roba qua vuol dire essere generosi nei confronti di quelli che non ce la fanno. Però...no, non ci penso più di tanto”.*

T1: *“No (ride) sinceramente no”.*

T3: *“Cosa posso dire? Grazie, perché grazie a lei abbiamo portato a casa la meraviglia. E dopo... Sì, quello sì, se no... Intanto sì intanto...Questo e basta”.*

Translation:

T0: “No, honestly not. Honestly not. I guess he'll have something of her too because it's obvious. But in short, I thank her so much because doing this stuff here means being generous towards those who can't make it. But... no, I don't think about it much anymore”.

T1: “No (laughs) honestly not”.

T3: “What can I say? Thank you, because thanks to her we brought home the wonder. And afterwards... Yes, yes, if not... In the meantime, yes in the meantime... That's all”.

The other woman during pregnancy (T0 and T1) compared the gamete donation to the donation of other organs. When the baby was one-two months old (T2) she expressed the possibility that the child was resemblant to the donor and not to her. In this case, the donor was perceived as a “third person in the middle”. At T3, it emerged that the woman had dreams in which the partner betrayed her, and she interpreted these dreams because of the presence of third-party reproduction.

T0: *“(...) Delle donne così generose da donare una parte di loro per dare modo ad altri di avere dei figli è una cosa bella alla fine, alla fine donare un gamete piuttosto che donare le cornee alla fine è lo stesso modo no? (...)”*

T1: *“(...) Sì beh ogni tanto ci penso sì, beh poi alla fine è come una donazione di un organo no? (...)”*

T2: *“Sì, anche perché in quegli aspetti in cui non assomiglierà a me assomiglierà alla donatrice, quindi c'è sì una terza persona in mezzo”.*

T3: *“(...) c'è stato un periodo che sognavo che il mio compagno mi tradiva. E secondo me è ricollegato a questa terza persona, secondo me (...)”*

Translation:

T0: *“(...) Women who are so generous as to donate a part of themselves to give others the opportunity to have children is a beautiful thing in the end, in the end donating a gamete or donating corneas is the same thing in the end, isn't it? (...)”*

T1: *“(...) Yes, well, sometimes I think about it, yes, well, in the end it's like an organ donation, isn't it? (...)”*

T2: *“Yes, also because in those aspects in which she will not look like me she will look like the donor, so there is yes a third person in the middle”.*

T3: *“(...) there was a time when I dreamed that my partner was cheating on me. And in my opinion he is connected to this third person, in my opinion (...)”*

DISCUSSION

This study aims to examine DC parents' psychological status and parental MRs in the transition to parenthood and to expand the knowledge regarding the experience of DC parents in the perinatal period (Golombok et al., 2004a, 2004b; Goldberg, 2006a, 2006b; Hershberger, 2007; Indekeu et al., 2014; Sälevaara et al., 2016, 2018; Van Rijn-van Gelderen et al., 2018; Imrie et al., 2019a, 2019b, 2020). Existing literature indicates that DC families function well in terms of the levels of depression, anxiety, parenting stress, parent-child relationship quality, attachment to the fetus/child and couple's relationship quality (Brewaeys, 2001; Golombok & MacCallum, 2003; Hershberger, 2004; Bracewell-Milnes et al., 2016; Golombok, 2017; Imrie & Golombok, 2018; Golombok, 2020; Zanchettin et al., 2022). This work complements such literature and reports that DC couples are well adjusted in the transition to parenthood, concerning both the parental psychological status and the parental MRs.

In the following paragraphs, we discuss the results of this work concerning the outcomes of tests and questionnaires and semi-structured interviews.

We hypothesized DC parents to have higher levels of anxiety than NC parents during pregnancy, and similar levels postpartum. The statistical analysis performed on the results of the tests contradicted our hypothesis. DC mothers showed significantly lower levels of state anxiety than NC mothers, measured via the STAI-Y1, irrespectively of the time of assessment ($p = 0.032$). No differences emerged among the groups of mothers on the trait anxiety, measured with the STAI-Y2, nor between the DC and NC fathers regarding both the state (STAI-Y1) and trait anxiety (STAI-Y2). No differences emerged also in the anxiety levels measured by BAI between DC mothers and the two control groups, and between DC fathers and NC fathers. Having a donor-conceived child does not seem to increase the risk of the presence of anxiety in the perinatal period. In a previous work (Sälevaara et al., 2018), NC and AUT-ART parents were reported to have similar levels of anxiety in the perinatal period, whereas, in early parenthood, OD mothers were observed to experience even less anxiety than NC and AUT-ART mothers. These results are in line with our work. Other studies on DC couples have found similar results between OD parents and AUT-ART parents (Imrie et al., 2019b), and between DC parents and NC parents (Golombok et al., 2004) also during the first year after childbirth. Within the Italian context, a previous study found more anxiety in AUT-ART parents than in NC parents (Monti et al., 2008). These results are in contrast with our

study, as we did not find more anxiety in AUT-ART mothers. Regarding longitudinal modifications, we found that state anxiety decreased from T1 to T3 for DC fathers ($p=0.008$), and that trait anxiety decreased from pregnancy to postpartum for all fathers ($p = 0.006$), independently of the procreation group. Similarly, BAI scores decreased from T0 and T3 ($p = 0.040$) for all fathers, independently of the procreation group. It is possible that the relief about fetal normality and survival, and the good conclusion of the childbirth may have decreased the anxiety in fathers (McMahon et al., 1997a; Hjelmstedt et al., 2003b). The higher longitudinal stability of anxiety scores in mothers from pregnancy to postpartum may suggest that mothers have primary care responsibilities after pregnancy (Gartrell et al., 1999; Twenge et al., 2003; Doss et al., 2009; Castellano et al., 2014).

We predicted DC parents to also have higher pregnancy-related anxiety than NC parents. Our results contradicted our initial hypothesis, since DC mothers showed lower levels of pregnancy-related anxiety, measured via PRAQ-R2, than both NC ($p = 0.027$) and AUT-ART ($p = 0.047$) mothers, irrespectively of the time of assessment. In a previous work (Sälevaara et al., 2016), lower fear of childbirth in OD mothers than in AUT-ART mothers, and lower pregnancy-related anxiety in OD mothers than both AUT-ART and NC mothers were found, in line with our results. Moreover, we found a statistically significant difference in PRAQ-F scores between DC fathers and NC fathers ($p = 0.018$), irrespectively of the time of assessment, where DC fathers had lower levels of pregnancy-related anxiety than NC fathers. No studies regarding DC fathers have been previously conducted, but pregnancy-related anxiety has been reported to be higher in AUT-ART fathers than NC fathers in previous studies (Hjelmstedt et al., 2003a,b).

We hypothesized DC parents to have higher levels of depression than NC parents during pregnancy, but not postpartum. Results in this work, measured both via the BDI-II and EPDS, contradicted our hypothesis about the prenatal period since no differences emerged among the three groups (DC, AUT-ART and NC) of mothers and between the two groups (DC and NC) of fathers. This is in line with results shown in other works for the perinatal period (Sälevaara et al., 2018), and during the first year after childbirth (Golombok et al., 2004; Imrie et al., 2019b). A previous study reported higher levels of depression in AUT-ART parents than in NC parents within the Italian context (Monti et al., 2009), but we did not find lower results for AUT-ART mothers with respect to NC mothers. Regarding longitudinal modifications, we found a difference for the BDI-II in all mothers between phases T0 and T3 ($p = 0.031$), where the score was significantly lower at T3 than at T0. However, these results may be related to the

postpartum decrease in pregnancy symptoms such as tiredness, appetite, low energy, sleepiness, and difficulties in sexual life, which are all measured by the BDI-II. Indeed, when the woman is pregnant, a higher cut-off is required to examine the presence of depression with this test (Holcomb et al., 1996).

We expected DC parents to have a worse couple adjustment than NC parents during pregnancy. Indeed, studies on AUT-ART couples in the prenatal period have shown that they may be more fragile in their couple adjustment once the pregnancy is achieved (Gameiro et al., 2011a, 2011b). Our results, measured via DAS, contradicted our initial hypothesis since no differences among the three groups (DC, AUT-ART and NC) of mothers and between the two groups (DC and NC) of fathers were found. These results are in line with previous studies that focused on the couple adjustment in the early months of the baby's life (Imrie et al., 2019b), and in line with our meta-analysis performed in the systematic review of the couple's relationship. Indeed, the meta-analysis showed no differences between DC parents and AUT-ART and NC parents in the quality of the couple's relationship (Russo et al. *submitted*).

We predicted to observe no differences in the parenting stress among groups postpartum. Indeed, studies after childbirth have shown DC parents to have a good psychological adjustment (Golombok et al., 2004; Imrie et al., 2019b). Our findings are in line with our hypothesis since we found no differences among the groups of mothers and between the groups of fathers. When analysing longitudinal modifications, we found a statistically significant difference in the PSI/SF for all fathers between phases T2 and T3 ($p = 0.048$), where the score was significantly lower at T3 than at T2. It is possible that the delivery may be more stressful in the first 2 months than after 4-5 months for fathers, due to their partners' higher need of assistance and to their own insecurity about the child-care, restricted sense of freedom, and a sense of feeling powerless (Genesoni & Tallandini, 2009).

We hypothesized to observe lower levels of prenatal attachment in DC parents than in NC parents, and the same level of postnatal attachment among groups. Indeed, a previous study in the Italian context showed lower levels of prenatal attachment in AUT-ART women than in NC women (Pellerone & Micciché, 2014). We found, however, no differences between DC mothers and NC mothers, but reported AUT-ART mothers to have higher levels of prenatal attachment than NC mothers ($p = 0.024$). Moreover, we found no differences between DC and NC fathers prenatally. Our results are in line with the majority of studies that have shown AUT-ART parents having higher, or at least similar, levels of prenatal attachment than NC parents

(Ranjbar et al., 2019). Postnatally, a statistically significant difference was found between DC and NC mothers ($p = 0.010$), and between DC and NC fathers ($p = 0.029$), where DC parents had higher levels of postnatal attachment. These results are in line with Golombok et al. (2004a), who reported a better postnatal attachment to the baby in DC mothers than NC mothers. The same study did not, however, find differences among groups of fathers (Golombok et al., 2004a).

We hypothesized maternal and paternal MRs for DC parents to be less often integrated/balanced than NC parents during pregnancy, especially around the 14th gestational week, when the fears of losing the pregnancy are strong and the fetus is not intensively active. We made this hypothesis due to the existing literature in the context of AUT-ART, where these parents have reported fewer integrated/balanced representations in comparison with non-ART parents in the prenatal period (Agostini et al., 2009; Vanni et al., 2010), because of negative feelings regarding the inability of being able to carry the pregnancy to term, fetal normality and survival (McMahon et al., 1997a; Hjelmstedt et al., 2003b). Our results contradicted our hypothesis for both mothers and fathers. We found that all the DC mothers and the majority of AUT-ART mothers had integrated/balanced MRs, both around the 14th gestational week and 26-30 gestational weeks, while only half of NC mothers had integrated/balanced MRs around the 14th gestational week, and at 26-30 gestational weeks the number of NC mothers with integrated/balanced MRs increased. The majority of DC fathers had integrated/balanced MRs both around the 14th gestational week and at 26-30 gestational weeks, while less than half of NC fathers had integrated/balanced MRs around the 14th gestational week and a half at 26-30 gestational weeks. Interestingly, all the DC mothers, and the majority of DC fathers and AUT-ART mothers, had integrated/balanced MRs during the early months of pregnancy, while this did not happen for NC parents. Indeed, it is common among NC women to have a feeling of unreality at the beginning of the pregnancy and to become more aware of the presence of the child as the pregnancy progresses. Moreover, it is common for NC fathers to have more feelings of unreality than mothers during pregnancy, due to the impossibility to sense what the woman feels (Ammaniti et al., 1995; Genesoni & Tallandini, 2009; Trombetta et al., 2021). Our results on AUT-ART parents during pregnancy seem to differ from previous Italian literature (Agostini et al., 2009; Vanni et al., 2010) but are in line with Flykt et al. (2009), showing no more dysfunctional aspects of parental MRs in AUT-ART couples with respect to NC couples. AUT-ART couples seem, indeed, able to find their parental roles sooner than NC parents, due to the long wait for becoming parents (Flykt et al., 2009).

Moreover, we hypothesized to observe no differences in MRs among groups after childbirth, due to previous literature regarding DC parents postnatally (Golombok et al., 2005; Imrie et al., 2019a, 2020). We found that 1 month after childbirth, all the DC mothers and all the DC fathers had integrated/balanced MRs. AUT-ART mothers and NC mothers had similar results, with the majority of mothers having integrated/balanced MRs, and more than half of NC fathers having integrated/balanced MRs. When the child was 4-5 months old, all the DC mothers, the majority of AUT-ART mothers, and more than half of NC mothers had integrated/balanced MRs. All fathers had a decrease in integrated/balanced MRs, with only half of NC fathers and the majority of DC fathers having integrated/balanced MRs. From these results, we conclude that DC couples and AUT-ART mothers seem to have more stable MRs in the transition to parenthood than NC couples, as the majority of DC and AUT-ART parents showed integrated/balanced MRs both during pregnancy and postpartum. Results on NC mothers are in line with previous literature, showing that during pregnancy mothers have less often integrated balanced MRs in the prenatal period compared to the postnatal period (Tambelli et al., 2014). The fact that NC fathers reported fewer integrated/balanced MRs than other groups is also in line with previous literature, as fathers have fewer opportunities to interact with the baby than mothers (Vreeswijk et al., 2015), and are less effectively and emotionally involved with the child than mothers or fathers who have conceived with ART (Paterlini et al., 2021), showing that they may need more time to adjust to the baby's arrival (Paterlini et al., 2021). The stability of DC and AUT-ART parents' MRs across the transition to parenthood may be related to the fact that, prenatally, pregnancy is itself perceived as rewarding (Hammarberg et al., 2008), and that, postnatally, ART parents have more positive representations of the child and of their ability to interact with their baby than NC parents (Paterlini et al., 2021), and reported a good quality of mother-infant interactions during the first 3 months of the baby's life (Tallandini et al., 2012). Our postnatal results on DC mothers are in line with Golombok et al. (2005), who reported higher levels of joy/pleasure in the relationship with the child in OD mothers with respect to NC mothers 2 years after childbirth. Our results are also in line with Imrie et al. (2019a) who reported that the OD mothers' representation of the self as a parent was perceived as high in warmth, joy, child focus and competence, and low in disappointment and anger, and the mothers' representation of the child was perceived as affectionate and happy, with low levels of angry, rejecting, or controlling behaviours (Imrie et al., 2019a).

We hypothesized OD mothers to find something in common with their children. In our study, we focused on mothers of children aged 1-5 months and found that, despite the very young age of the children, all the OD mothers were able to find something in common with their children, through physical and/or psychological features. These findings enlighten how the perception of resemblance is not merely a consequence of matching practice but is instead part of the construct of the child's identity within the family, which happens immediately after childbirth, and which reinforces a sense of connection (Becker et al., 2005). The perception of the resemblance is, therefore, part of a parent-child relationship construction, a strategy that enhances feelings of empathy and a sense of familiarity (Becker et al., 2005; Indekeu et al., 2015; Imrie et al., 2020). A similar tendency to emphasize resemblances between the child and themselves has also been observed within the context of adoption (Howell & Marre, 2006). Moreover, in our work, possible characteristics coming from the donor were not mentioned in the majority of cases, and a tendency to emphasize the resemblance between the biological parent and the child, or the gestational connection between the mother and the child, emerged, as previously shown in other works (Isaksson et al., 2019; Imrie et al., 2020). Indeed, DC couples have been shown to work hard to construct kinship connections in the absence of genetic connection (Hargreaves, 2006) and to make an effort in the bonding process, finding strategies to establish their identity as the child's parent, therefore adjusting successfully to parenthood (Imrie et al., 2020).

We hypothesized OD mothers to erase the donor from family narratives, in order to protect the parent-child relationship. We did not find, however, such a clear tendency. In our study, half of the women considered the donor as a positive presence, fundamental for the family construction, and worthy of gratitude, and did not minimize the role of the donor or put effort into normalizing the family. The representation of the donor as a good person was associated with positive feelings, as previously investigated (Lingiardi et al., 2016). In other cases, however, the representation of the donor as an organ donor or as an opportunity to experience a healthy pregnancy emerged in the mother's narrative. In some cases, the donor was perceived as an intrusion, something to erase from family construction. In particular, one woman did not answer the question about the donor at 26-30 gestational weeks and 1 month postpartum, and another woman dreamed about a sexual union between a woman, whom she interpreted to be the donor, and her partner, and perceived the third-party reproduction as a "third person in the middle". Similar representations of the donor have been previously found in other works (Bertrand-Servais et al., 1993; Burr, 2009; Lingiardi et al., 2016; Imrie et al.,

2020). In another work, the awareness of the donor has been shown to progressively increase through the transition to parenthood, from being of minimal importance during pregnancy to being part of the family narrative in the first year of the child (Indekeu et al., 2014). We did not find such a clear increase from pregnancy to postpartum, but we found a constant awareness of the donor in the perinatal period in the majority of the mothers.

The first studies of narratives focused on the representations of the adult's own childhood caregiving experiences and, in particular, on the adult's capacity to develop a coherent description of these experiences (George et al., 1984; Main et al., 1985). In this context, the concept of reflective functioning emerged, which is the adults' ability to reflect upon childhood relationships with their parents and describe the impact upon the development of their own experience (Fonagy et al., 1991, 1998). This ability is fundamental to develop intimate relationships, to fully experience emotion, to be an autonomous individual (Fonagy et al., 2002), and to develop a better parent-child relationship (Vismara et al., 2021b). A lower reflective function is associated with higher perinatal depressive symptoms and parenting stress both in mothers and fathers (Vismara et al., 2021b), and higher prenatal and postnatal maternal reflective functioning is associated with balanced caregiving representations (Alismail et al., 2022). Moreover, mothers with low reflective functioning have been found to perceive their infants as sadder, while fathers have been found to perceive their children as more negatively reactive (Vismara et al., 2021b). In the context of infertility, it has been shown how dysfunctional thoughts, feelings, and behaviours are connected with less satisfaction in intimate relationships, due to difficulties in demonstrating needs to the partner and in obtaining emotional support (Renzi et al., 2020). Indeed, the couple's capacity to reflect on the personal experience of infertility is crucial to the quality of the couple's relationship and parent-child relationship (Cudmore, 2005). The concept of reflective functioning has never been investigated in the context of medically assisted reproduction, but we can speculate that DC couples may have a high reflective functioning. Indeed, in our work, we found that DC parents had a better psychological status than NC parents, such as less state anxiety for mothers and less pregnancy-related anxiety for both mothers and fathers. We also found both DC mothers and DC fathers to have higher postnatal attachment to the baby than NC parents. Moreover, all the DC mothers and the majority of DC fathers had integrated-balanced MRs, providing a coherent and logical narrative flow of ideas and feelings across the transition to parenthood. It was furthermore possible to notice the effort of DC mothers in finding strategies to establish their identity as the child's parent by their perception of parent-child resemblance (Imrie et al.,

2020), with the associated positive consequences in developing intimate relationships with children. Indeed, Zanchettin et al. (2022) showed how DC parents had higher positive and lower negative parenting than NC parents. Therefore, it is possible that the process of going through the mourning for the impossibility of having a biological child, and, therefore, through the necessity to cope with frustrations, suffering, conflicts, fears and bad feelings, may lead couples to accept a new way of becoming parents (Montagnini et al., 2022; Kirkman, 2008; Hershberger, 2007). These couples are, therefore, “forced” to reflect on internal thoughts, feelings, past experiences, and desires, with positive consequences on their psychological status and parental MRs. However, we did not explicitly consider the reflective functioning in this work, therefore, future research should investigate the role of reflective functioning in DC parental psychological health and MRs.

The cognitive and emotional capacity to conceptualize another human being (Doan & Zimmerman, 2003) and the ability to fantasize about the child allows parents to develop parental MRs (Soulè, 1990). The fact that, in our study, 10 out of 10 DC mothers, 9 out of 10 DC fathers, and 9 out of 10 AUT-ART mothers had integrated/balanced MRs at the beginning of the pregnancy seems to suggest that this work of conceptualization happens in a very early stage of transition to parenthood for these parents. The studies on the representation of frozen embryos, after oocyte retrieval for IVF/ICS procedure and storage of embryos, and the connected representation of the embryos as potential children (Nachtigal et al., 2005; Bruno et al., 2016), suggest that MRs of the fetus and the parent-child relationship may start in a very early stage within infertile couples. We can speculate that the reconstructing process of transition to parenthood may have started even before pregnancy, through the wish for a child and thoughts on the personal meaning of parenthood. Such a restructuring process is also influenced by the individual elaboration of each member of the couple concerning their history (Karney & Bradbury, 1995). Interestingly, DC parents who are ready to start infertility treatments expect to have a chance to compensate for their parents’ deficits during their own childhood, to receive high feelings of fulfilment from parenthood, and to experience a positive impact of parenthood on the couple’s relationship (Indekeu et al., 2012). Another study (Agostini et al., 2009) found that AUT-ART women, both before and after delivery, had a more intense need of differentiating their personal experience of motherhood from their own mother’s experience than NC mothers. The sacrifices and efforts that couples cope with during the long history of medical procedures have led them to support each other and to cooperate (Peterson et al., 2011), and to reflect upon the family they want to have, with positive

consequences on the transition to parenthood, as shown in this work, and on the parent-child relationship, as shown in Zanchettin et al. (2022). The strong desire for parenthood and emotional involvement leads parents to cooperate more in child care and establish close relations, with positive consequences on parenting (Hammernberg et al., 2008) and couple's relationship (Russo et al. *submitted*). Indeed, the same desire for parenthood is connected with the same involvement in caregiving and a fairer subdivision of parental tasks (Pasch et al., 2002; Peterson et al., 2003; Twenge et al., 2003; Flykt et al., 2009), showing how couples who persist in the research of pregnancy are a selected group of resilient couples (Repokari et al., 2005; Molgora et al., 2019).

This work is part of a larger and ongoing longitudinal project and, due to the small size of DC and ART samples, the findings reported in this thesis should be considered preliminary. Therefore, due to the small size of participants, especially among fathers, we studied the experience of mothers and fathers separately, in order to include mothers who participated alone. Future works within this research project should also examine the experiences of couples, comparing DC couples with AUT-ART and NC couples without separating mothers' and fathers' results. We furthermore note that some of tests and questionnaires are organized in subscales. These subscales were not considered in this work to avoid the risk of drawing fine-grained observations from a limited number of participants. We also highlight that we avoided using a chi-square test, such as Fisher's exact test, to study the maternal and paternal MRs. This is because, even though these tests are recommended for small sample sizes, they should not be employed for repeated measures.

The large majority of parents who participated in this research have resorted to oocyte donation, and the interviews considered in this dissertation come all from oocyte donation parents. This work, therefore, lacks the experiences of couples who resorted to semen donation, embryo donation and surrogacy. This is an important aspect to be taken into account since semen donation and oocyte donation have different psychological implications for parents. When different-sex couples resort to oocyte donation, the mothers experience the privileged period of pregnancy, where exchanges between mother and fetus take place, and the early mother-infant bonding, where mothers are the primary caregivers and are involved in the primary child-care. When different-sex couples resort to semen donation the fathers are, instead, not involved in pregnancy and primary child care (Raoul-Duval et al., 1992). Future studies should also examine the parental psychological status and maternal and paternal MRs after semen donation, embryo donation and surrogacy, during the transition to parenthood. Another important aspect

to consider is that, within the Italian context, the donor is strictly anonymous. For this reason, this study does not include the experiences of couples who resorted to an identity-release and known donor. This legislation helps parents to put boundaries with the donor (Bertrand-Servais et al., 1993; Beatens et al., 2000; Laruelle et al., 2011; de Melo Martin et al., 2018). Therefore, future studies should also examine the parental psychological status and maternal and paternal MRs of parents who resorted to an identity release or known donation, during the transition to parenthood. We also need to point out that at IRCCS Burlo Garofolo DC couples have access to psychological consultation before medical treatments involving a third-party reproduction as a standard procedure, while AUT-ART and NC couples can have access only when requested by patients or when a psychological need emerges. This might be an external factor that is unaccounted for in results, as the psychological counselling for couples who resort to gamete donation, and therefore the integrated approach between doctors and psychologists, is a fundamental path for the parents' psychophysical well-being. Finally, this study does not consider same-sex couples' experiences since MAR procedures are not allowed for same-sex couples in Italy.

Despite the limitations of this work, the results presented in this dissertation augment the existing scientific literature by providing an analysis of the parental psychological status and parental MRs in the transition to parenthood after donor conception. We found that DC couples are well-adjusted in their psychological status and parental MRs in the perinatal period. Overall, findings are reassuring for infertile couples that decide to start a DC procedure, clinicians that work in this field, and DC families.

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APPENDIX

Pregnancy Related Anxiety Questionnaire for Fathers (PRAQ-F)

Versione per i padri a cura di M.A. Tallandini e L.R. Russo

NOME: _____ COGNOME: _____ DATA: _____

Per cortesia segni la risposta che meglio descrive la sua situazione con una crocetta.

1= Mai vero 2= Quasi mai vero 3= Qualche volta vero 4=Abbastanza vero 5=Molto vero

1. Sono ansioso riguardo il parto	1	2	3	4	5
2. Sono preoccupato che la mia compagna possa soffrire molto per le contrazioni e il parto	1	2	3	4	5
3. Sono preoccupato riguardo al fatto che la mia compagna possa non recuperare la linea dopo il parto	1	2	3	4	5
4. Qualche volta penso che il bambino possa essere di salute cagionevole o possa ammalarsi facilmente	1	2	3	4	5
5. Sono preoccupato di non essere più attraente per la mia compagna	1	2	3	4	5
6. Sono preoccupato di non essere in grado di controllarmi durante il travaglio	1	2	3	4	5
7. Sono preoccupato per il grandissimo aumento del peso della mia compagna	1	2	3	4	5
8. Ho paura che il bambino possa nascere con delle disabilità	1	2	3	4	5
9. Sono preoccupato che possa capitare qualcosa di grave al bambino durante il travaglio	1	2	3	4	5
10. Ho paura che il nostro bambino abbia un difetto fisico o che ci sia qualcosa che non vada a livello fisico	1	2	3	4	5

Paternal Postpartum Attachment Scale (PPAS) – Condom et al., 2008

Versione italiana a cura di M.A. Tallandini e L. Zanchettin

Queste affermazioni riguardano i suoi sentimenti e pensieri sul bambino. Per cortesia scelga una sola risposta per ciascuna affermazione.

1) Quando mi occupo del bambino mi capita di provare sentimenti di fastidio o irritazione

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Mai

2) Quando mi occupo del bambino ho la sensazione che sia intenzionalmente difficile o cerchi di infastidirmi

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Mai

3) Potrei descrivere i miei sentimenti per il bambino nelle ultime due settimane come:

- Di antipatia
- Sentimenti non intensi verso di lui
- Di leggero interesse
- Di moderato interesse

- Di intenso interesse

4) Posso capire quello che il mio bambino vuole o ha bisogno

- Quasi sempre
- Di solito
- A volte
- Raramente
- Quasi mai

5) Riguardo il mio livello medio di interazione con il bambino io credo di essere:

- Molto più coinvolto degli altri padri
- Un po' più coinvolto degli altri padri
- Coinvolto come gli altri padri
- Un po' meno coinvolto degli altri padri
- Molto meno coinvolto degli altri padri

6) Quando sto con il bambino mi sento annoiato

- Molto spesso
- Spesso
- A volte

- Raramente
- Quasi mai

7) Quando sto con il bambino e sono presenti altre persone mi sento orgoglioso del bambino

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Quasi mai

8) Cerco di coinvolgermi il più possibile nell'accudimento del bambino e nel prendermi cura di lui

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Quasi mai

9) Mi scopro a parlare del bambino con le altre persone (diverse dalla mia compagna/moglie)

- Molte volte al giorno
- Alcune volte al giorno
- Una o due volte al giorno
- Raramente
- Quasi mai

10) Quando devo separarmi dal bambino trovo la cosa difficile e mi sento triste

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Mai

11) Quando sto con il bambino

- Provo sempre molto piacere e soddisfazione
- Provo spesso molto piacere e soddisfazione
- Provo occasionalmente molto piacere e soddisfazione
- Provo raramente molto piacere e soddisfazione
- Non provo mai molto piacere e soddisfazione

12) Quando non sto con il bambino mi trovo a pensare a lui

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Mai

13) Quando sto con il bambino cerco di prolungare il tempo da passare con lui

- Molto spesso
- Spesso
- Qualche volta
- Raramente

- Mai

14) Quando sono stato lontano dal bambino per un po' di tempo provo un forte piacere all'idea di rivederlo

- Sempre
- Spesso
- Qualche volta
- Raramente
- Mai

15) Negli ultimi tre mesi mi sono ritrovato seduto ad osservare il bambino che dormiva per cinque minuti o più:

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Mai

16) In questo momento sento che "questo bambino è davvero mio"

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Mai

17) Mi dispiace aver dovuto rinunciare a molte cose per la presenza del bambino

- Moltissimo
- Molto
- Abbastanza
- Un po'
- Per nulla

18) Negli ultimi tre mesi ho sentito di non avere abbastanza tempo per me stesso o per seguire i miei interessi:

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Mai

19) Quando sto con il bambino mi capita di essere impaziente

- Molto spesso
- Spesso
- Qualche volta
- Raramente
- Mai

INTERVISTA SULL'ESPERIENZA DI PMA IN GRAVIDANZA

A cura di M.A. Tallandini, L.R. Russo, L. Zanchettin

(da somministrare a conclusione dell'IRMAG/IRPAG)

1. *Decisione*

- **Come vi siete avvicinati alla PMA?**

Uno dei due era più propenso ad intraprendere questo percorso? Eravate d'accordo?

Avete preso in considerazione l'adozione?

2. *Relazioni familiari*

- **Con chi ne ha parlato?**

Cosa pensano i suoi genitori di questa scelta? E i genitori del compagno/compagna?

3. *Procedure mediche*

- **Come è andato il percorso in PMA?**

Come ha vissuto questa esperienza? E il suo compagno/compagna?

4. *Sogni*

- **Ha fatto dei sogni durante questa esperienza?**

In quale occasione?

5. *Disclosure*

- **5a. Ha pensato se dirà qualcosa al bambino?**

E suo marito cosa pensa?

- **5b. Avete parlato con altre persone del ricorso alla donazione? (solo per PMA**

eterologa)

Con chi? Come hanno reagito?

6. *Maternità*

- **Pensa che l'esperienza di PMA possa influire sul suo modo di essere madre/padre?**

E per il suo compagno/compagna?

7. *Rapporto di coppia*

Ritiene che l'esperienza della fecondazione assistita possa aver influenzato il suo rapporto con il suo compagno/compagna?

In che modo?

8. *Immagini del donatore/donatrice (solo per PMA eterologa)*

Le capita mai di pensare al donatore/donatrice? Come la fa sentire questo pensiero?

9. *Pensieri rispetto alla donazione (solo per PMA eterologa)*

9a. Pensa che il fatto che lei/il suo compagno non abbia un legame genetico con vostro figlio possa in qualche modo influenzare la qualità del rapporto con il bambino? E nelle vostre famiglie?

In che modo? Quale rapporto si immagina possa essere modificato dalla donazione?

9b. Pensa che l'essere stato concepito attraverso la donazione possa influenzare in qualche modo il futuro di suo figlio/figlia?

In che modo? Sondare preoccupazioni particolari rispetto alla non corrispondenza genetica: malattie, somiglianze, matrimoni accidentali tra consanguinei.

10. *Valutazione complessiva dell'esperienza di PMA*

C'è qualche consiglio o avvertimento che darebbe ad una coppia che pensasse di intraprendere un percorso di procreazione medicalmente assistita?

E il suo compagno/compagna cosa direbbe?

INTERVISTA SULL'ESPERIENZA DI PMA DOPO LA NASCITA

A cura di M.A. Tallandini, L.R. Russo, L. Zanchettin

(da somministrare a conclusione dell'IRMAN/IRPAN)

1. *Percorso di PMA*

Adesso che il bambino/a è nato/a guardando indietro nel tempo come considerate il vostro percorso PMA?

2. *Immagini del concepimento*

2a. Le capita mai di pensare a come il bambino è stato concepito?

2b. Le capita di pensare al donatore/donatrice ora che il bambino è nato? (solo per PMA eterologa)

Come la fa sentire questo pensiero?

3. *Relazioni e comunicazione*

3a. A chi avete comunicato che il bambino è nato?

3b. Ora che il bambino/a è nato come considerate la vostra decisione rispetto al comunicare a familiari ed amici il percorso che avete fatto per avere il/la bambino/a? E i vostri familiari come la pensano?

3c. Dopo la nascita del bambino avete avuto dei contatti con il personale sanitario che ha seguito il vostro percorso di PMA?

4. *Parto*

Il parto com'è andato?

E quando ha visto il bambino?

E la prima notte? (ai padri: e la prima volta che se l'è trovato in braccio?)

5. *Sogni*

Da quando il bambino è nato ha fatto dei sogni?

In quale occasione?

6. *Disclosure*

Ora che il bambino è nato ha ripensato alla decisione di dire/non dire qualcosa al bambino su come è stato concepito?

7. *Maternità/paternità*

7a. Sente che l'esperienza di PMA sta influenzando il suo modo di essere madre/padre? In che senso/modo?

7b. Pensa che la modalità di concepimento influenzi il modo in cui il/la suo/a compagno/a guarda al bambino?

8. *Rapporto di coppia*

Ora che il bambino è nato pensa che il tipo di concepimento influenzi il rapporto di coppia?

9. *Pensieri rispetto alla donazione (solo per eterologa)*

9a. Pensa che il fatto che lei/il suo compagno non abbia un legame genetico con vostro figlio/a stia influenzando il rapporto con il/la bambino/a?

E nelle vostre famiglie?

9b. Ora che il bambino è nato ha avuto dei pensieri su come la donazione possa influenzare il futuro del bambino?

10. *Considerazioni conclusive*

Ora che il bambino è nato c'è qualche consiglio o avvertimento che darebbe ad una coppia che pensa di intraprendere un percorso di procreazione medicalmente assistita?

E il suo compagno/compagna cosa direbbe?

11. *Valutazione complessiva dell'esperienza di PMA*

Come valuterebbe la sua esperienza di PMA da 1 a 7?