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Growing Up in Ireland
National Longitudinal Study of Children

Births following fertility treatment in the GUI infant cohort

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About GUI

- **Two cohorts: birth (9 months) and middle childhood (9 years)**
- **Current paper using the birth cohort when parents were interviewed just after the study child turned 9-months-old**
- **11,134 children selected from Child Benefit Register**
- **Questions about fertility treatments were asked of biological mothers during the self-complete section**

Fertility Treatments in Ireland

- **In Ireland, procedures such as IVF are carried out mostly in private clinics**
  - Drug treatments may be available through a GP
- **Difficult to be certain how many Irish births are as a result of fertility treatments**
- **Reports from European Society of Human Reproduction and Embryology**
  - Six (out of 7) clinics reported 465 deliveries between them in 2004 using technologies such as IVF, ICSI and Frozen Embryo Replacement (2008 report)
  - 787 deliveries between six (out of 7) clinics in 2006 (2010 report)

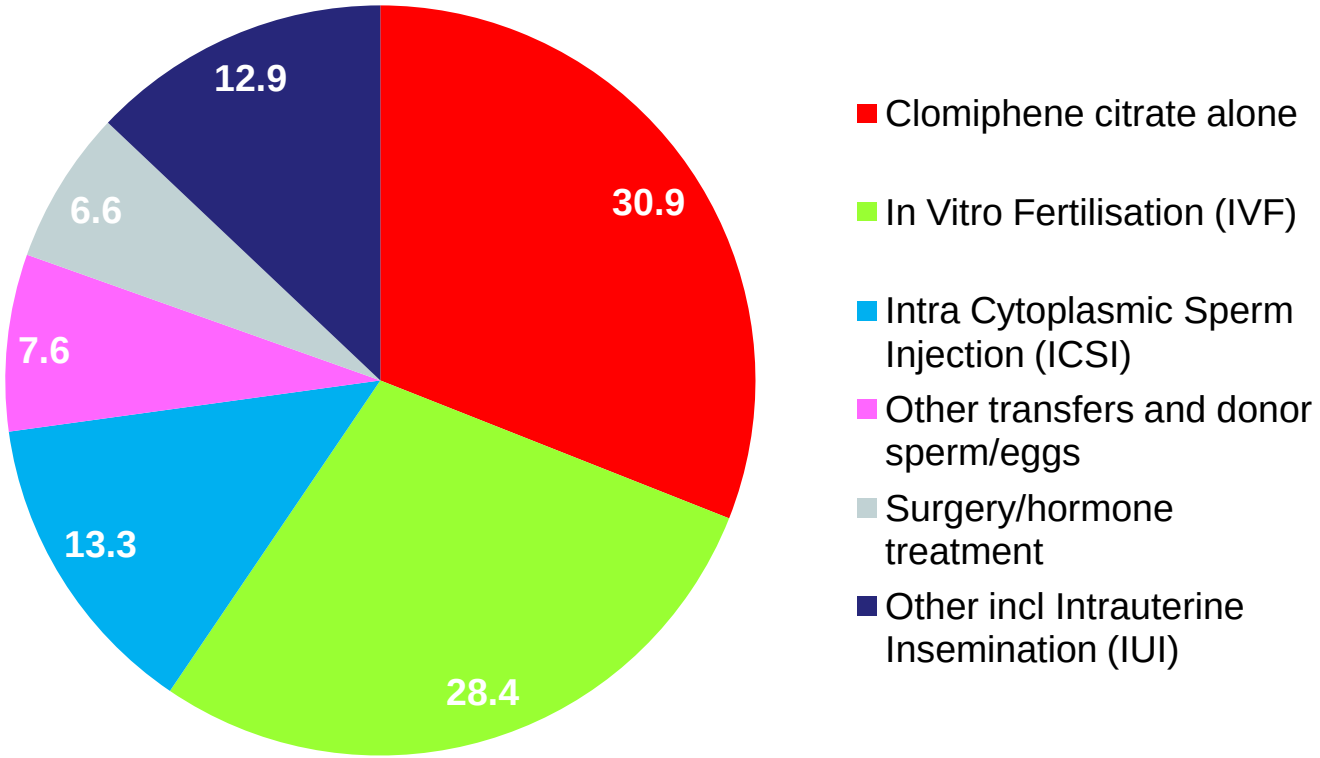
Types of Fertility Treatment

- **Clomiphene citrate**
  - Drug which boosts egg production
- **In Vitro Fertilisation (IVF)**
  - Egg and sperm are fused in a laboratory and then the fertilised egg is placed in the uterus
- **Intra-Cyclic Sperm Injection (ICSI)**
  - Similar to IVF except a single sperm is injected into the egg
- **Frozen Embryo Transfer**
  - Similar to IVF but using an embryo that has been preserved from an earlier cycle
- **Intra-Uterine Insemination**
  - Selected sperm are placed in the womb close to the time of ovulation
- **Donor sperm/eggs**
  - Sperm, egg or both utilised instead of prospective parent's (parents') own genetic material
    - Typically used in conjunction with the other treatment types
- **Gamete Intra-Fallopian Transfer**
  - Egg and sperm placed in the fallopian tube so that fertilisation takes place internally
- **Other options**
  - Surgery, hormone treatment

Use of fertility treatments

- **4.2% of all children in the sample were born following some form of fertility treatment**
  - Circa 3,000 children in a year's cohort
- **No significant gender difference**
  - 52.5% boys and 47.5% girls
- **Most common techniques (within fertility treatments) were 'clomiphene citrate alone' (30.9%) and IVF (28.4%)**
  - Respondents chose one treatment from a pre-defined list

Types of Fertility Treatment



Socio-Demographic Characteristics

- **62.9% were born in to the top-two income quintiles**
- **95% into two-parent families (at 9-months)**
- **58.9% of all fertility treatment births were to mothers aged 35 years or older**
  - 29.9% born to mothers aged 30-34 years
- **11.3% of all mothers over 40 who gave birth had some sort of fertility treatment**

Common Risk Factors

- **Births following fertility treatment have been associated with a greater risk of multiple birth**
  - Particularly drug treatments and IVF (e.g. Basit et al, 2010; Allen et al, 2008)
  - Multiple births associated with increased risk for pre-eclampsia, diabetes in pregnancy, cerebral palsy, low birth-weight and premature birth (Human Fertility & Embryology Authority, 2006)
- **Low birth-weight/prematurity associated with a higher risk of various health, cognitive and behavioural problems** (e.g. Ashdown-Lambert, 2005; Aylward, 2005)
  - Low birth-weight was associated with lower scores on three out of five developmental indices for GUI infants (Williams et al, 2010)
  - Some negative outcomes not detected until the child is older

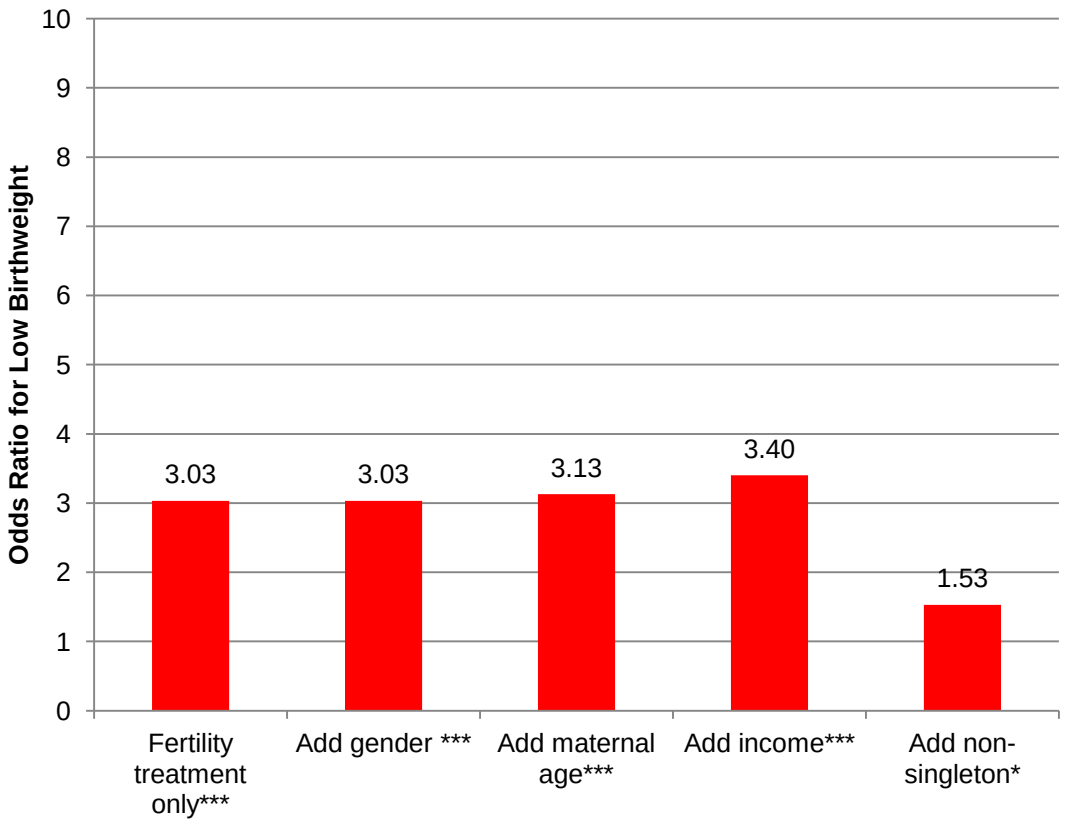
Multiple Births

- **17% of all fertility-treatment pregnancies in GUI resulted in a multiple birth (unadjusted odds ratio of 8.82)**
  - 2.3% for all other pregnancies
- **Higher incidence of multiple births may explain higher rates of low birth-weight and prematurity**
  - Some studies show increased risk post fertility-treatment for singleton births also (Allen et al, 2008)

Low Birth-Weight

- **14.4% of infants born using fertility treatment were low birth-weight (< 2500g)**
  - 5.2% non-fertility births
- **Looking at singleton births only, reduces this comparison to 7.1% (fertility) and 4.0% (non-fertility)**

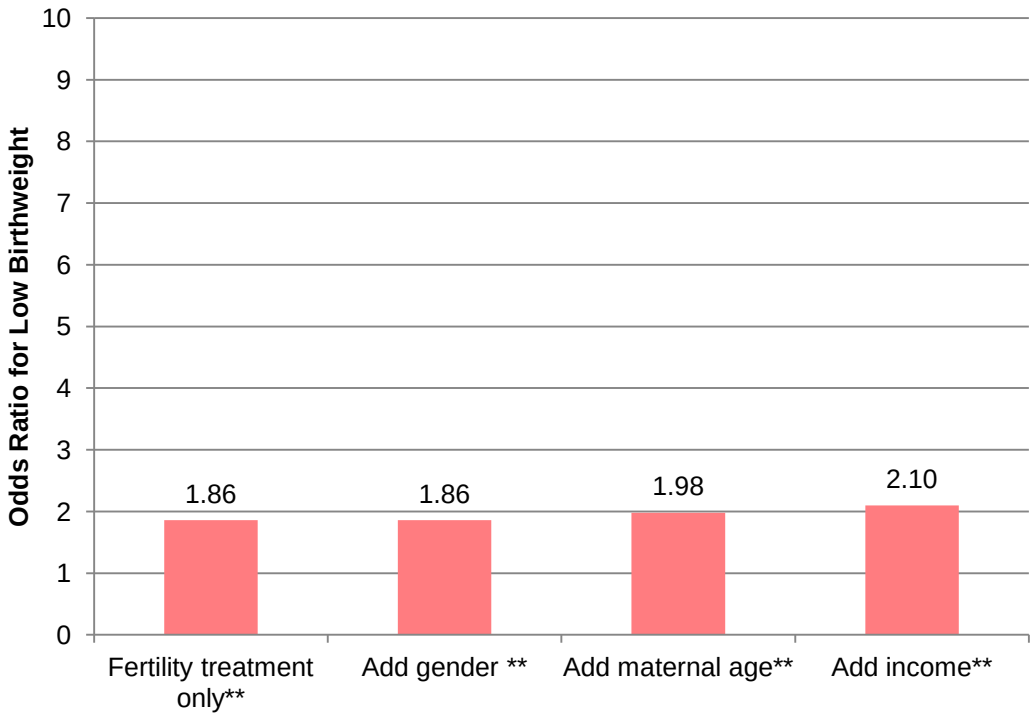
Low Birth-Weight – Model *including twins*



Adjusting for a multiple- birth reduces risk of being low birth-weight for infants born following fertility treatment

*** p <.001, **p<.01, *p<.05

Low Birth-Weight – Model *excluding twins*



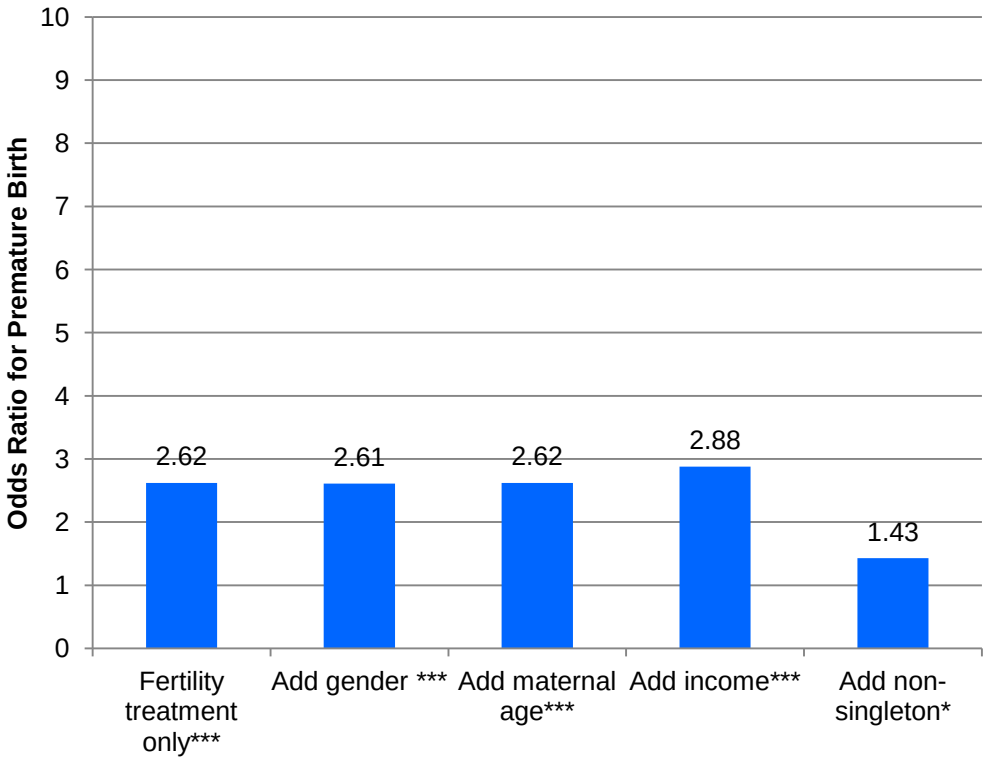
Effect of fertility treatment also significant for singletons

*** p <.001, **p<.01, *p<.05

Premature Births

- **13.8% of all fertility-treatment infants were born at 36 weeks or earlier**
  - Compared to 6.1% of non-fertility infants
- **Rates are 7.4% and 5.2% respectively when looking just at singletons**

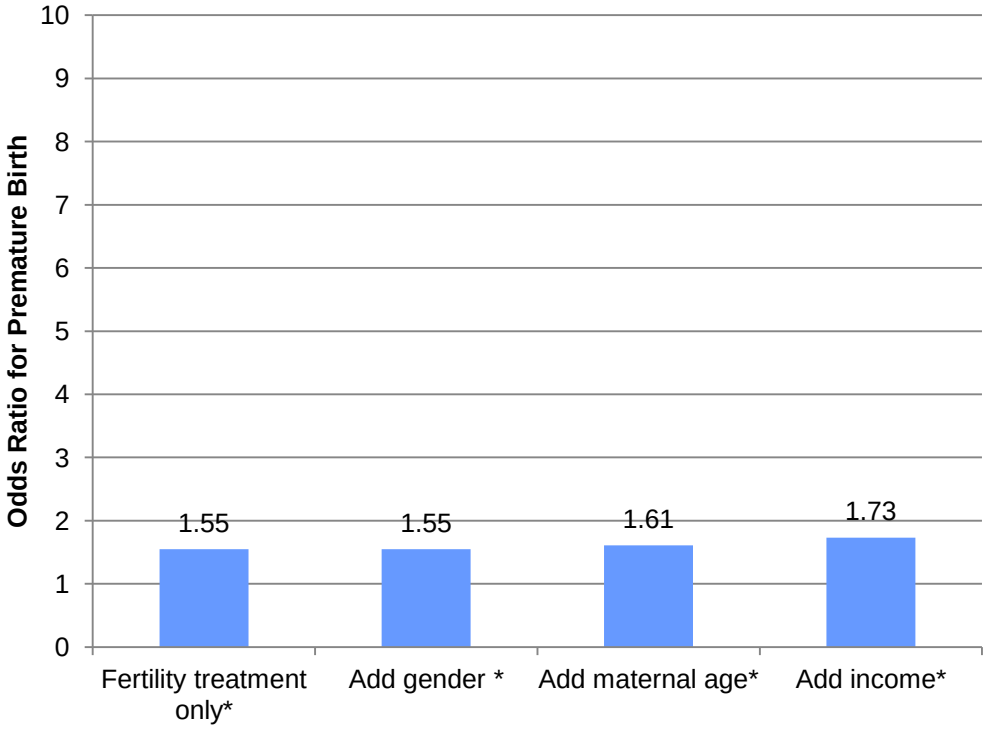
Premature Births – Model *including twins*



Adjusting for multiple-births reduces risk of premature birth to marginal significance (p = .05)

*** p <.001, **p<.01, *p<.05

Premature Births – Model *excluding twins*



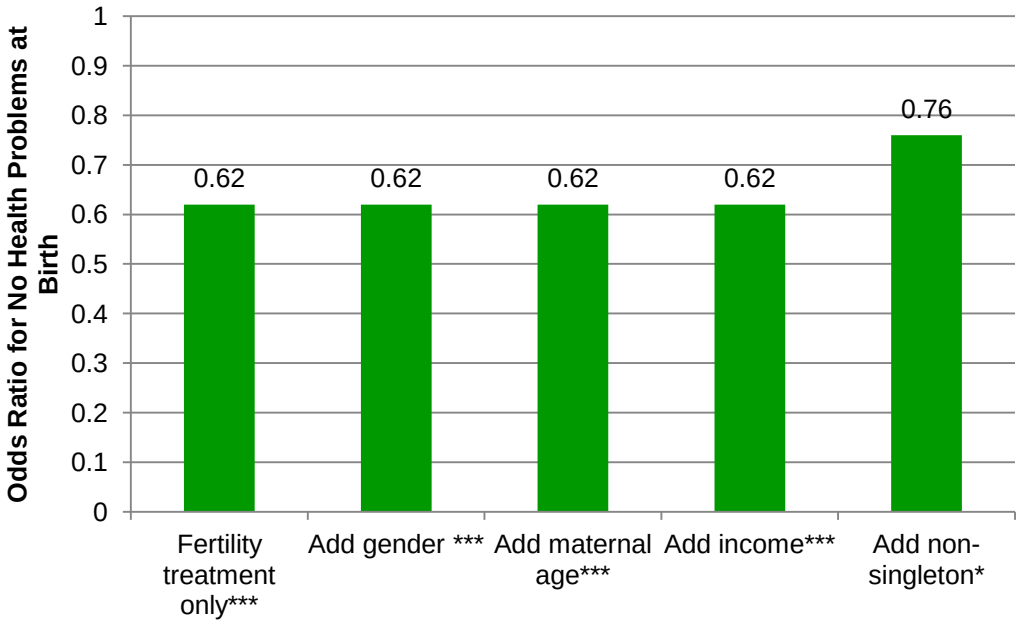
Analysis on singleton births only, shows similar marginal effect of fertility treatment

*** p <.001, **p<.01, *p<.05

Health Status at Birth

- **Infants born using fertility treatments were less likely to have been described as 'very healthy, no problems' at <u>birth</u>**
  - 72.8% (fertility) compared to 80.6% (non-fertility)
- **Difference reduced to 77.1% v 81.2% when looking only at singleton births**

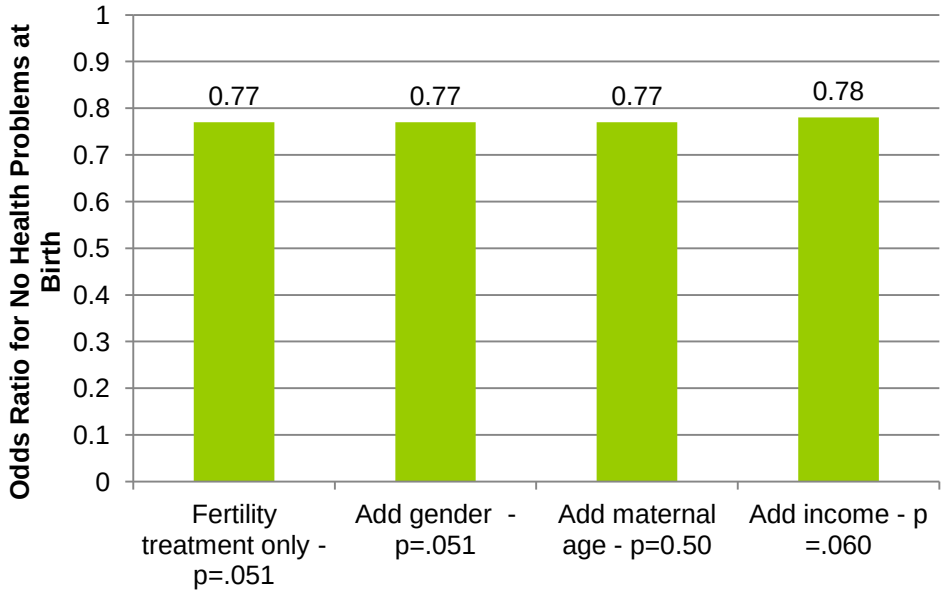
Very Healthy at Birth – *including twins*



The negative effect of fertility treatment on health at birth is reduced post adjustment for multiple births

*** p <.001, **p<.01, *p<.05

Very Healthy at Birth – *excluding twins*



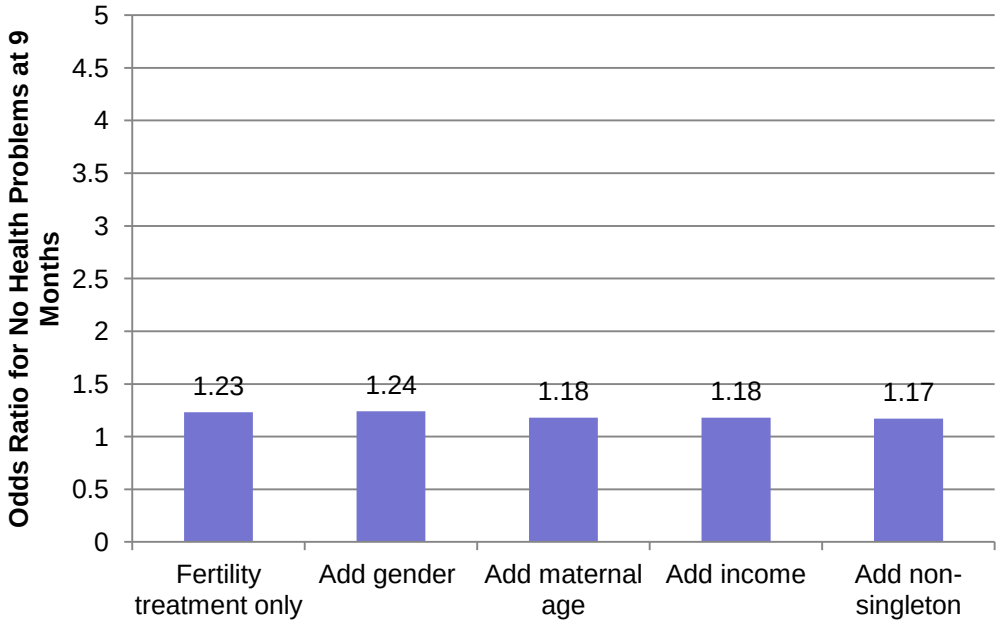
For singletons, the negative effect of fertility treatment is marginally significant

*** p <.001, **p<.01, *p<.05

Health at 9-Months

- **Infants born following fertility treatment were just as likely to be rated as ‘very healthy, no problems’ by <u>the age of 9 months</u>**
  - 85.8% (fertility) to 82.9% (non-fertility)

Health at 9 Months



No effect of fertility treatment on ratings of 'very healthy, no problems' by 9-months-old

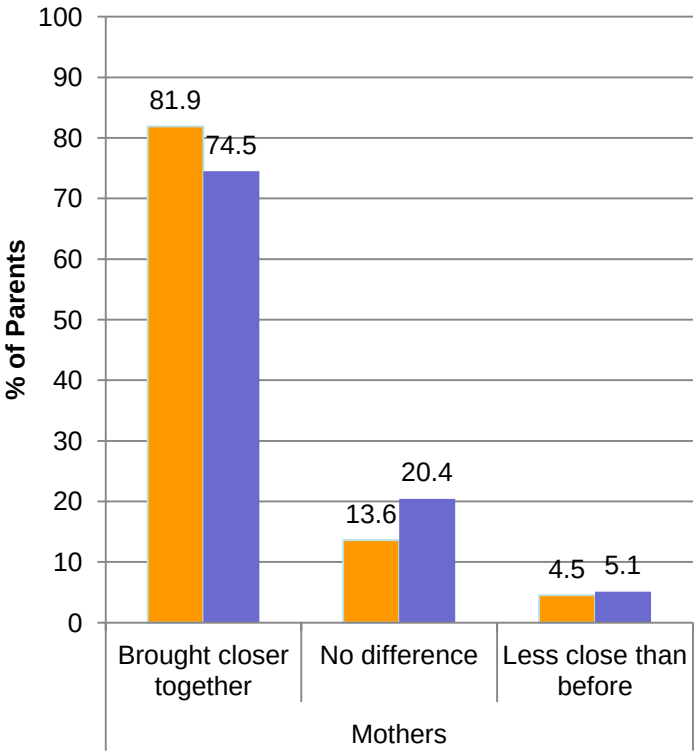
Maternal Attachment

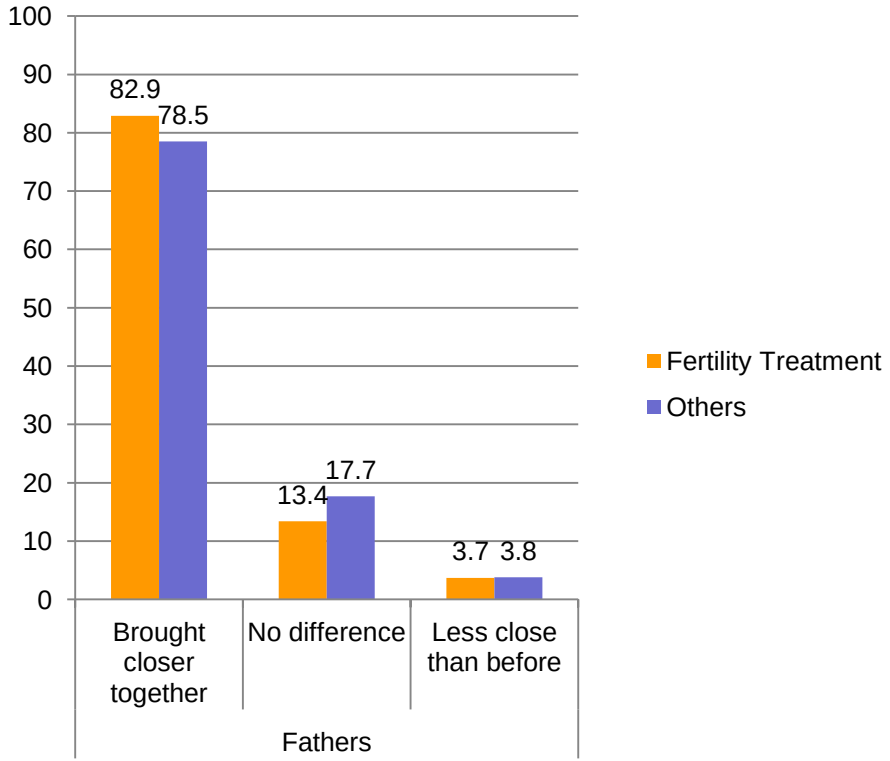
- **Some research (e.g. Golombok et al, 1996) suggests mothers who have used fertility treatment feel more positively towards their infants**
- **Maternal attachment measured at 9 months in GUI using Condon & Corkindale 'quality of attachment' subscale**
  - All mothers completed likert-type scales during main interview
    - E.g. "I feel <child> is very much my own baby"
- **No difference between mothers on basis of fertility treatment (mean =42.4) compared to other mothers (mean=42.6)**
  - Very high levels of attachment reported across the sample

Relationship to Spouse/Partner

- **Mothers and fathers were asked if the birth of the study child had made them closer to their partner, less close or made no difference**
- **Mothers, and fathers, of infants born using fertility treatments were more likely to report that the birth brought them closer together**
  - More marked for mothers than fathers

Relationship to Spouse/Partner





Summary - Infants

- **Infants born following fertility treatments are:**
  - Much higher risk of being part of a multiple birth
  - Greater risk of low birth-weight and premature births
    - Largely accounted for by greater risk of multiple birth
  - Less likely to be in excellent health at birth, but no difference by the time he/she is 9-months-old

Summary - Mothers

- **<u>Mothers</u> of infants born following fertility treatments are more likely to:**
  - Be in higher income groups
  - Be over 30 years
  - Live with a spouse/partner
  - Report that the birth of the child had brought she and her partner closer together, but do not differ in terms of their attachment to the infant

Limitations

- **Infants were selected at age nine-months**
  - Excludes fertility-treatment pregnancies that resulted in miscarriages, still births or early neonatal deaths
- **Even with a large sample, small cell sizes are reached quickly when dividing into subgroups**
- **Need to disentangle apparent effects of a fertility treatment from the biological reason that such a treatment was required**
- **Don't know if parents who used fertility treatments would be more or less likely to participate in a study of this kind**
  - GUI somewhat higher than overall UK rate (2006) for assisted *technologies*

Advantages of GUI data

- **Children were selected randomly from the population**
- **Comparison to children not resulting from fertility treatments**
  - Possibility of matching on other shared characteristics
- **Data collected within a year of the child's birth**
- **Wide range of other data collected**
  - Health of children and parents, pregnancy complications, development, socio-demographic characteristics
- **Data will be longitudinal**
  - Fieldwork on age 3 visit completed this year

Possibilities for Future Study

- **Comparison on developmental indicators**
  - Is higher risk of low birth-weight/prematurity balanced by greater likelihood of other socio-economic advantages?
  - Cross-sectional and longitudinal possibilities
- **Relative risk for pregnancy, birth or health complications**
  - Possibly by type of treatment
  - Dependent on sufficient cell size
- **Family dynamics as the child gets older**

References

- Allen, C., Bowdin, S., Harrison, R.F. et al. (2008). Pregnancy and perinatal outcomes after assisted reproduction: A comparative study. *Irish Journal of Medicine Sciences, 177,* 233-241.
- Aylward, G.P. (2005). Neurodevelopmental outcomes of infants born prematurely. *Developmental and Behavioral Pediatrics, 26*, 6, 427 – 440.
- Ashdown-Lambert, J.R. (2005). A review of low birth weight: predictors, precursors and morbidity outcomes. *The Journal of the Royal Society for the Promotion of Health, 125*, 2, 76-83.
- Basit, I., Johnson, S., Mocanu, E., Geary, M., Wingfield, D. & Daly, S. (2010). Mode of conception of triplets and high order multiple pregnancy in Dublin – a 10-year review [Poster presentation at the 14th British Maternal and Fetal Medicine Society Annual Conference]. Archives of Disease in Childhood – Fetal and Neonatal Edition, 95, Supplement 1.
- de Mouzon, J. , Goossens, V., Bhattacharya, S. et al. (2010). Assisted reproductive technology in Europe, 2006: Results generated from European Registers by ESHRE. *Human Reproduction, 25, 8*, 1851-1862.
- Golombok, S., Brewaeys, A., Cook, R., Giavazzi, M. T., Guerra, D., Mantovani, A., van Hall, E., Crosignani, P.G. & Dexeus, S. (1996) *The European Study of Assisted Reproduction Families. Human Reproduction, 11,* No 10, 2324-2331.
- Human Fertility & Embryology Association. (2006). Multiple Pregnancies and Births: Considering the Risks [factsheet]. Available from http://www.hfea.gov.uk/cps/rde/xbcr/SID-3F57D79B-CC25CD59/hfea/multiple_births_final_Nov06.pdf.
- Nyboe Andersen, A., Goossens, V. Ferraretti, A.P. et al. (2008). Assisted reproductive technology in Europe, 2004: Results generated from European Registers by ESHRE. *Human Reproduction, 23, 4*, 756-771.
- Williams, J., Greene, S., McNally, S., Murray, A. & Quail, A. (2010). *Growing Up in Ireland: The Infants and Their Families.* Dublin: Stationery Office.