**Appendix 1. Between- and Within-Family Models (95% CI) of a) Term-Small for Gestational Age and b) Very Preterm of Children Born in Utah in 2009–2017, Children Conceived Through Medically Assisted Reproduction Compared With Naturally Conceived Children**

| | Between-family analysis | | | Within-family analysis | | |
|---|---|---|---|---|---|---|
| | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, smoking, BMI, chronic hypertension) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) |
| a) Term-SGA. Linear probability models (percentage change in the predicted probability) | | | | | | |
| **MAR as one category** | | | | **MAR as one category** | | |
| MAR | 2.8(2.2 to 3.4) | 0.6(0.0 to 1.3) | 2.0(1.4 to 2.7) | 3.7(2.6 to 4.8) | 1.3(0.1 to 2.4) | 1.40(0.2 to 2.6) |
| **By type of treatment** | | | | **By type of treatment** | | |
| FED | 1.8(1.0 to 2.6) | 0.6(-0.2 to 1.3) | 2.2(1.4 to 2.9) | 3.3(2.1 to 4.6) | 1.4(0.1 to 2.7) | 1.5(0.2 to 2.8) |
| AI or IUI | 3.0(1.4 to 4.6) | 0.6(-1.0 to 2.2) | 1.9(0.3 to 3.5) | 4.8(1.8 to 7.9) | 1.9(-1.2 to 4.9) | 2.0(-1.1 to 5.0) |
| ART | 5.6(4.3 to 6.9) | 0.9(-0.5 to 2.2) | 1.7(0.4 to 3.1) | 4.7(1.4 to 8.0) | -0.2(-3.6 to 3.1) | -0.2(-3.5 to 3.2) |
| b) Very preterm. Linear probability models (percentage change in the predicted probability) | | | | | | |
| **MAR as one category** | | | | | | |
| MAR | 2.0(1.8 to 2.2) | 0.6(0.3 to 0.8) | 0.6(0.4 to 0.8) | | | |
| **By type of treatment** | | | | | | |
| FED | 1.1(0.9 to 1.4) | 0.4(0.1 to 0.6) | 0.4(0.1 to 0.6) | | | |
| AI or IUI | 1.9(1.4 to 2.5) | 0.6(0.1 to 1.2) | 0.6(0.1 to 1.4) | | | |
| ART | 4.3(3.9 to 4.7) | 1.0(0.1 to 1.4) | 1.0(0.6 to 1.4) | | | |

Note: MAR refers to all children who were born after either of the following procedures: Artificial insemination or intrauterine insemination (AI or IUI); Assisted reproductive technology (ART); of Fertility enhancing drugs (FED). Term-SGA stands for 'small for gestational age born after 37 weeks of gestation'. Very preterm refers to children born under 32 weeks of gestation. 95%CI are presented in parentheses.

**Appendix 2. Odds Ratios From the Between-Family Logistic Regression Models (95% CI) on a) Low Birth Weight, b) Preterm, and c) Small for Gestational Age of Children Born in Utah in 2009–2017, Children Conceived Through Medically Assisted Reproduction Compared With Naturally Conceived Children**

| | Model 1 (Baseline) | p value | Model 2 (birth order + multiple birth + child's sex) | p value | Model 3 (Model 2 + maternal age, marital status, education, smoking, BMI, chronic hypertension) | p value |
|---|---|---|---|---|---|---|
| **a) LBW** | | | | | | |
| **MAR as one category** | | | | | | |
| MAR | 2.78(2.65 to 2.93) | <0.001 | 1.23(1.15 to 1.31) | <0.001 | 1.35(1.27 to 1.44) | <0.001 |
| **By type of treatment** | | | | | | |
| FED | 1.96(1.82 to 2.10) | <0.001 | 1.21(1.12 to 1.32) | <0.001 | 1.36(1.25 to 1.48) | <0.001 |
| AI or IUI | 2.46(2.16 to 2.82) | <0.001 | 1.20(1.02 to 1.40) | 0.028 | 1.30(1.10 to 1.52) | 0.002 |
| ART | 5.22(4.83 to 5.65) | <0.001 | 1.26(1.14 to 1.40) | <0.001 | 1.35(1.22 to 1.50) | <0.001 |
| **b) Preterm** | | | | | | |
| **MAR as one category** | | | | | | |
| MAR | 2.56(2.44 to 2.69) | <0.001 | 1.26(1.18 to 1.33) | <0.001 | 1.32(1.25 to 1.41) | <0.001 |
| **By type of treatment** | | | | | | |
| FED | 1.75(1.63 to 1.87) | <0.001 | 1.15(1.06 to 1.24) | 0.001 | 1.22(1.13 to 1.32) | <0.001 |
| AI or IUI | 2.35(2.08 to 2.66) | <0.001 | 1.30(1.13 to 1.51) | <0.001 | 1.37(1.18 to 1.58) | <0.001 |
| ART | 4.99(4.62 to 5.37) | <0.001 | 1.45(1.31 to 1.60) | <0.001 | 1.52(1.38 to 1.68) | <0.001 |
| **c) SGA** | | | | | | |
| **MAR as one category** | | | | | | |
| MAR | 1.34(1.28 to 1.41) | <0.001 | 1.06(1.00 to 1.11) | 0.012 | 1.20(1.13 to 1.26) | <0.001 |
| **By type of treatment** | | | | | | |
| FED | 1.23(1.15 to 1.31) | <0.001 | 1.07(1.00 to 1.15) | 0.039 | 1.25(1.16 to 1.33) | <0.001 |
| AI or IUI | 1.35(1.19 to 1.54) | <0.001 | 1.07(0.93 to 1.22) | 0.335 | 1.19(1.04 to 1.36) | 0.013 |
| ART | 1.62(1.48 to 1.77) | <0.001 | 1.12(1.02 to 0.92) | 0.752 | 1.10(1.00 to 1.22) | 0.053 |

Note: MAR refers to all children who were born after either of the following procedures: Artificial insemination or intrauterine insemination (AI or IUI); Assisted reproductive technology (ART); of Fertility enhancing drugs (FED). LBW stands for 'low birth weight', SGA stands for 'small for gestational age'. 95%CI are presented in parentheses.

**Appendix 3. Between-Family and Within-Family Linear Models on Birth Weight of Children Born in Utah in 2009–2017**

| | Between-family analysis | | | | | | Within-family analysis | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MAR as one category | | | By type of MAR treatment | | | MAR as one category | | | By type of MAR treatment | | |
| | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) |
| MAR (ref: NC) | -179*** | -38*** | -76*** | | | | -111*** | -22** | -25** | | | |
| FED | | | | -101*** | -27*** | -68*** | | | | -77*** | -16 | -18* |
| AI or IUI | | | | -176*** | -57*** | -94*** | | | | -140*** | -52 * | -56** |
| ART | | | | -358*** | -54*** | -85*** | | | | -277*** | -38 | -43* |
| Females | | -117*** | -117*** | | -117*** | -117*** | | -129*** | -128*** | | -129*** | -129*** |
| Multiplicity (twins) | | -925*** | -926*** | | -922*** | -925*** | | -871*** | -867*** | | -867*** | -867*** |
| First-order birth | | -83*** | -59*** | | -83*** | -58.28*** | | -80*** | -69*** | | -79*** | -71*** |
| Maternal age (ref: 25-29) | | | | | | | | | | | | |
| Maternal age 15-24 | | | 2 | | | 2 | | | -3 | | | -4 |
| Maternal age 30-34 | | | -14*** | | | -13*** | | | 20 | | | 21 |
| Maternal age 35-39 | | | -37*** | | | -37*** | | | 45 | | | 45 |
| Maternal age 40+ | | | -85*** | | | -84*** | | | -29 | | | -30 |
| Pre-pregnancy BMI (ref: normal (18.5-24.9) | | | | | | | | | | | | |
| Underweight (<18.5) | | | -135*** | | | -135*** | | | 9 | | | 8 |
| Overweight (25.0-29.9) | | | 70*** | | | 69*** | | | 23 | | | 23 |
| Obesity (>=30) | | | 89*** | | | 89*** | | | 45 | | | 43 |
| Unknown | | | -54*** | | | -54*** | | | -320 | | | -322*** |
| Parental level of education (ref: both below tertiary) | | | | | | | | | | | | |
| At least one parent has tertiary level | | | 70*** | | | 70*** | | | | | | |
| Both unknown/missing | | | -20* | | | -20* | | | | | | |
| Mother married at birth | | | 74*** | | | 74*** | | | | | | |
| Unknown | | | -20 | | | -26 | | | | | | |
| Smoking during pregnancy | | | -176*** | | | -176*** | | | | | | |
| Chronic Hypertension | | | -264*** | | | -264*** | | | | | | |
| Constant | 3275*** | 3395*** | 3286*** | 3275*** | 3295*** | 3297.52*** | 3288*** | 3403*** | 3391*** | 3290*** | 3403*** | 3391*** |
| Number of observations | 248013 | 248013 | 248013 | 248013 | 248013 | 248013 | 11914 | 11914 | 11914 | 11914 | 11914 | 11914 |

∗∗∗ P < 0.0001, ∗∗P < 0.01, ∗P < 0.05

Pelikh A, Smith KR, Myrskylä M. Goisis A. Medically assisted reproduction treatment types and birth outcomes: a between-family and within-family analysis. Obstet Gynecol 2022;139.
The authors provided this information as a supplement to their article.

Note: Coefficients denote the difference in mean birth weight (in grams). High values for the "unknown" BMI category in the within-family analysis refer to the extremely low numbers (<10 for some treatment types).

Pelikh A, Smith KR, Myrskylä M. Goisis A. Medically assisted reproduction treatment types and birth outcomes: a between-family and within-family analysis. Obstet Gynecol 2022;139.
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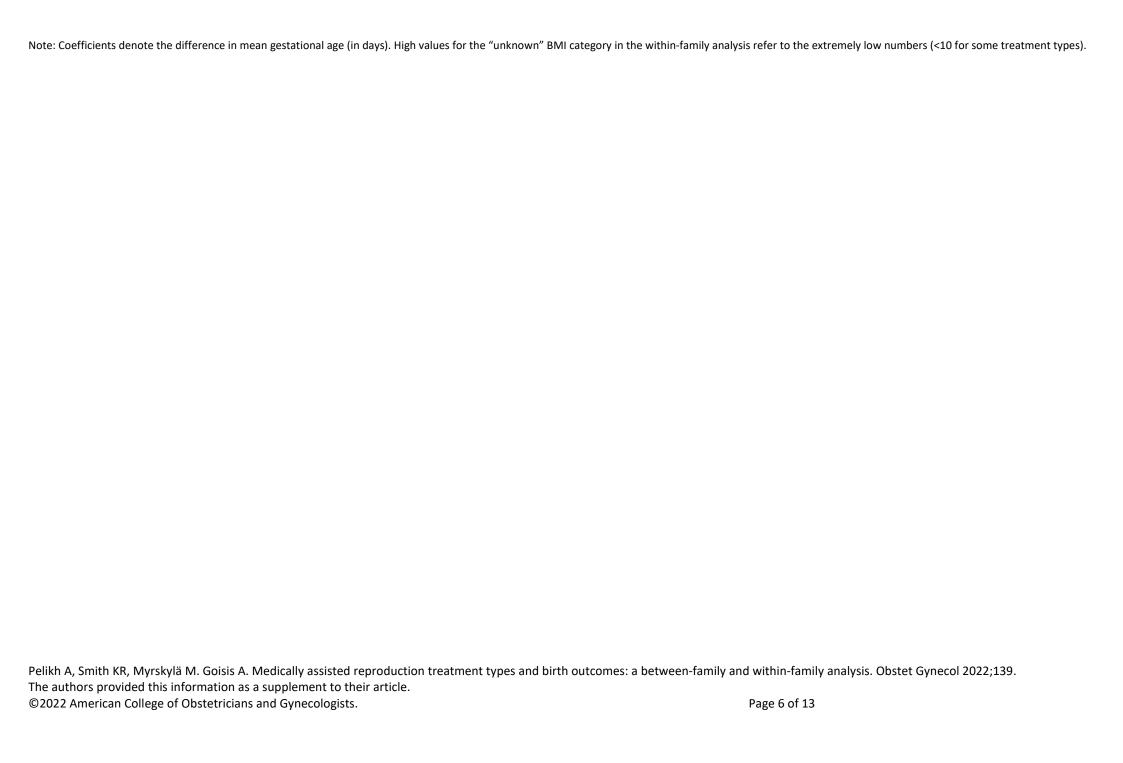**Appendix 4. Between-Family and Within-Family Linear Models on Gestational Age of Children Born in Utah in 2009–2017**

| | Between-family analysis | | | | | | Within-family analysis | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MAR as one category | | | By type of MAR treatment | | | MAR as one category | | | By type of MAR treatment | | |
| | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) |
| MAR (ref: NC) | -4.6*** | -1.4*** | -1.8*** | | | | -1.1*** | 0.3 | 0.2 | | | |
|   FED | | | | -2.5*** | -0.9*** | -1.2*** | | | | -0.4 | 0.4 | 0.3 |
|   AI or IUI | | | | -4.4*** | -2.0*** | -2.4*** | | | | -0.5 | 0.3 | 0.2 |
|   ART | | | | -9.6*** | -2.4*** | -2.8*** | | | | -5.8*** | -0.5 | -0.6 |
| Females | | 0.6*** | 0.6*** | | 0.6*** | -117*** | | 0.6** | 0.6** | | 0.6** | 0.6** |
| Multiplicity (twins) | | -23.3*** | -23.2*** | | -23.1*** | -23.1*** | | -21.7*** | -21.6*** | | -21.5*** | -21.4*** |
| First-order birth | | 1.4*** | 1.8*** | | 1.5*** | 1.8*** | | 1.2*** | 1.4*** | | 1.2*** | 1.4*** |
| Maternal age (ref: 25-29) | | | | | | | | | | | | |
|   Maternal age 15-24 | | | -0.1* | | | -0.1* | | | -0.5 | | | -0.5 |
|   Maternal age 30-34 | | | -0.1 | | | -0.1 | | | 0.3 | | | 0.3 |
|   Maternal age 35-39 | | | -1.1*** | | | -1.1*** | | | 0.3 | | | 0.3 |
|   Maternal age 40+ | | | -2.7*** | | | -2.6*** | | | -3.8* | | | -3.8* |
| Pre-pregnancy BMI (ref: normal (18.5-24.9) | | | | | | | | | | | | |
|   Underweight (<18.5) | | | -1.5*** | | | -1.5*** | | | -0.6 | | | -0.6 |
|   Overweight (25.0-29.9) | | | -0.1 | | | -0.1 | | | 0.1 | | | 0.1 |
|   Obesity (>=30) | | | -0.9*** | | | -0.9*** | | | 0 | | | 0 |
|   Unknown | | | -2.7*** | | | -2.7*** | | | -7.5*** | | | -7.5*** |
| Parental level of education (ref: both below tertiary) | | | | | | | | | | | | |
|   At least one parent has tertiary level | | | 1.4*** | | | 1.4*** | | | | | | |
|   Both unknown/missing | | | -0.5* | | | -0.5* | | | | | | |
| Mother married at birth | | | 0.8*** | | | 0.7*** | | | | | | |
|   Unknown | | | -1.2** | | | -1.2** | | | | | | |
| Smoking during pregnancy | | | -1.7*** | | | -1.7*** | | | | | | |
| Chronic Hypertension | | | -8.5*** | | | -8.5*** | | | | | | |
| Constant | 270.4*** | 269.6*** | 268.7*** | 270.4*** | 269.6*** | 268.7*** | 268.5*** | 268.6*** | 268.6*** | 268.5*** | 268.6*** | 268.6*** |
| Number of observations | 248013 | 248013 | 248013 | 248013 | 248013 | 248013 | 11914 | 11914 | 11914 | 11914 | 11914 | 11914 |

∗∗∗ P < 0.0001, ∗∗P < 0.01, ∗P < 0.05

Pelikh A, Smith KR, Myrskylä M. Goisis A. Medically assisted reproduction treatment types and birth outcomes: a between-family and within-family analysis. Obstet Gynecol 2022;139.

The authors provided this information as a supplement to their article.

Note: Coefficients denote the difference in mean gestational age (in days). High values for the "unknown" BMI category in the within-family analysis refer to the extremely low numbers (<10 for some treatment types).

Pelikh A, Smith KR, Myrskylä M. Goisis A. Medically assisted reproduction treatment types and birth outcomes: a between-family and within-family analysis. Obstet Gynecol 2022;139.

**Appendix 5. Between-Family and Within-Family Linear Probability Models on Low Birth Weight of Children Born in Utah in 2009–2017**

| | Between-family analysis | | | | | | Within-family analysis | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MAR as one category | | | By type of MAR treatment | | | MAR as one category | | | By type of MAR treatment | | |
| | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) |
| MAR (ref: NC) | 9.3*** | 1.8*** | 2.2*** | | | | 4.8*** | 0.4 | 0.5 | | | |
| FED | | | | 5.2*** | 1.3*** | 1.9*** | | | | 3.5*** | -0.5 | 0.6 |
| AI or IUI | | | | 7.7*** | 1.6** | 1.9*** | | | | 2.2 | -2.0 | -1.8 |
| ART | | | | 19.3*** | 3.0*** | 3.2*** | | | | 15.1*** | 2.1 | 2.4 |
| Females | | 1.1*** | 1.0*** | | 1.1*** | 1.0*** | | 2.1*** | 3.0*** | | 2.1*** | 2.1*** |
| Multiplicity (twins) | | 50.3*** | 50.2*** | | 50.1*** | 50.0*** | | 48.0*** | 47.9*** | | 47.6*** | 47.3*** |
| First-order birth | | 2.5*** | 2.2*** | | 2.5*** | 2.2*** | | 2.8*** | 2.1*** | | 2.3*** | 2.1*** |
| Maternal age (ref: 25-29) | | | | | | | | | | | | |
| Maternal age 15-24 | | | -0.5*** | | | -0.5*** | | | 0.7 | | | 0.7 |
| Maternal age 30-34 | | | 0.7*** | | | 0.7*** | | | -1.3 | | | -1.3 |
| Maternal age 35-39 | | | 2.0*** | | | 1.9*** | | | -3.1 | | | -3.1 |
| Maternal age 40+ | | | 3.7*** | | | 3.6*** | | | 1.1 | | | 1.0 |
| Pre-pregnancy BMI (ref: normal (18.5-24.9) | | | | | | | | | | | | |
| Underweight (<18.5) | | | 3.3*** | | | 3.3*** | | | -0.5 | | | -0.6 |
| Overweight (25.0-29.9) | | | -0.5*** | | | -0.5*** | | | 0.7 | | | 0.6 |
| Obesity (>=30) | | | -0.2 | | | -0.1 | | | -1.0 | | | -1.0 |
| Unknown | | | 3.4*** | | | 3.4*** | | | 12.6*** | | | 12.5*** |
| Parental level of education (ref: both below tertiary) | | | | | | | | | | | | |
| At least one parent has tertiary level | | | -1.7*** | | | -1.7*** | | | | | | |
| Both unknown/missing | | | 0.8* | | | 0.8* | | | | | | |
| Mother married at birth | | | -1.6*** | | | -1.6*** | | | | | | |
| Unknown | | | 1.4* | | | 1.4* | | | | | | |
| Smoking during pregnancy | | | 5.8*** | | | 5.8*** | | | | | | |
| Chronic Hypertension | | | 10.8*** | | | 10.8*** | | | | | | |
| Constant | 6.1*** | 3.4*** | 5.0*** | 6.1*** | 3.4*** | 5.0*** | 6.6*** | 3.1*** | 3.8*** | 6.5*** | 3.1*** | 3.9*** |
| Number of observations | 248013 | 248013 | 248013 | 248013 | 248013 | 248013 | 11914 | 11914 | 11914 | 11914 | 11914 | 11914 |

∗∗∗ P < 0.0001, ∗∗P < 0.01, ∗P < 0.05

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The authors provided this information as a supplement to their article.

Note: Coefficients denote percentage point change in predicted probability of low birth weight. High values for the "unknown" BMI category in the within-family analysis refer to the extremely low numbers (<10 for some

treatment types).

**Appendix 6. Between-Family and Within-Family Linear Probability Models on Preterm of Children Born in Utah in 2009–2017**

| | Between-family analysis | | | | | | Within-family analysis | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MAR as one category | | | By type of MAR treatment | | | MAR as one category | | | By type of MAR treatment | | |
| | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) |
| MAR (ref: NC) | 10.1*** | 2.1*** | 2.4*** | | | | 4.3*** | -0.6 | -0.5 | | | |
| FED | | | | 5.1*** | 1.1*** | 1.4*** | | | | 2.4*** | -0.8 | -0.7 |
| AI or IUI | | | | 8.8*** | 2.5*** | 2.7*** | | | | 3.3* | -1.0 | -0.7 |
| ART | | | | 22.0*** | 4.6*** | 4.8*** | | | | 16.2*** | 0.8 | 1.1 |
| Females | | -1.0*** | -1.0*** | | -1.0*** | -1.0*** | | -1.5*** | -1.5*** | | -1.5*** | -1.5*** |
| Multiplicity (twins) | | 54.2*** | 54.0*** | | 53.8*** | 53.7*** | | 57.7*** | 57.6*** | | 57.4*** | 57.2*** |
| First-order birth | | 1.2*** | 0.9*** | | 1.1*** | 0.9*** | | 2.1*** | 1.6* | | 2.1*** | 1.5* |
| Maternal age (ref: 25-29) | | | | | | | | | | | | |
| Maternal age 15-24 | | | <0.1 | | | <0.1 | | | 1.6 | | | 1.6 |
| Maternal age 30-34 | | | 0.5*** | | | 0.5*** | | | -0.7 | | | -0.7 |
| Maternal age 35-39 | | | 0.3*** | | | 2.9*** | | | 0.6 | | | 0.6 |
| Maternal age 40+ | | | 4.5*** | | | 4.3*** | | | 6.3 | | | 6.3 |
| Pre-pregnancy BMI (ref: normal (18.5-24.9) | | | | | | | | | | | | |
| Underweight (<18.5) | | | 1.8*** | | | 1.8*** | | | | | | |
| Overweight (25.0-29.9) | | | 0.3* | | | 0.3* | | | | | | |
| Obesity (>=30) | | | 1.4*** | | | 1.4*** | | | | | | |
| Unknown | | | 4.5*** | | | 4.5*** | | | | | | |
| Parental level of education (ref: both below tertiary) | | | | | | | | | | | | |
| At least one parent has tertiary level | | | -1.8*** | | | -1.8*** | | | | | | |
| Both unknown/missing | | | 1.6*** | | | 1.6*** | | | | | | |
| Mother married at birth | | | -1.1*** | | | -1.1*** | | | | | | |
| Unknown | | | 3.0*** | | | 3.0*** | | | | | | |
| Smoking during pregnancy | | | 2.9*** | | | 2.9*** | | | | | | |
| Chronic Hypertension | | | 11.2*** | | | 11.2*** | | | | | | |
| Constant | 7.9*** | 6.8*** | 7.6*** | 7.9*** | 6.8*** | 7.6*** | 9.8*** | 7.9*** | 8.0*** | 9.8*** | 7.9*** | 8.0*** |
| Number of observations | 248013 | 248013 | 248013 | 248013 | 248013 | 248013 | 11914 | 11914 | 11914 | 11914 | 11914 | 11914 |

$***$ P < 0.0001, $**$P < 0.01, $*$P < 0.05

Pelikh A, Smith KR, Myrskylä M. Goisis A. Medically assisted reproduction treatment types and birth outcomes: a between-family and within-family analysis. Obstet Gynecol 2022;139.
The authors provided this information as a supplement to their article.

Note: Coefficients denote percentage point change in predicted probability of preterm. High values for the "unknown" BMI category in the within-family analysis refer to the extremely low numbers (<10 for some treatment types).

**Appendix 7. Between-Family and Within-Family Linear Probability Models on Small for Gestational Age of Children Born in Utah in 2009–2017**

| | Between-family analysis | | | | | | Within-family analysis | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MAR as one category | | | By type of MAR treatment | | | MAR as one category | | | By type of MAR treatment | | |
| | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, marital status, education, BMI, chronic hypertension smoking) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) | Model 1 (Baseline) | Model 2 (birth order + multiple birth + child's sex) | Model 3 (Model 2 + maternal age, BMI) |
| MAR (ref: NC) | 3.3*** | 0.7* | 2.0*** | | | | 3.7*** | 1.6** | 1.7** | | | |
| FED | | | | 2.2*** | 0.8* | 2.2*** | | | | 3.3*** | 1.6** | 1.8** |
| AI or IUI | | | | 3.4*** | 0.9 | 1.9* | | | | 4.8*** | 2.1 | 2.2 |
| ART | | | | 5.8*** | 0.5 | 1.3* | | | | 4.9*** | 0.3 | 0.4 |
| Females | | -0.1 | -0.1 | | -0.09 | -0.1 | | 1.3* | 1.3* | | 1.3* | 1.3* |
| Multiplicity (twins) | | 14.7*** | 14.7*** | | 14.8*** | 14.8*** | | 14.1*** | 13.9*** | | 14.3*** | 14.2*** |
| First-order birth | | 4.9*** | 4.3*** | | 4.9*** | 4.3*** | | 4.2*** | 3.8*** | | 4.3*** | 3.8*** |
| Maternal age (ref: 25-29) | | | | | | | | | | | | |
| Maternal age 15-24 | | | -0.8*** | | | -0.8*** | | | 0.5 | | | 0.5 |
| Maternal age 30-34 | | | 1.3*** | | | 1.3*** | | | 0.5 | | | 0.5 |
| Maternal age 35-39 | | | 1.4*** | | | 1.4*** | | | -2.3 | | | -2.3 |
| Maternal age 40+ | | | 2.3** | | | 2.4** | | | -4.2 | | | -4.2 |
| Pre-pregnancy BMI (ref: normal (18.5-24.9) | | | | | | | | | | | | |
| Underweight (<18.5) | | | 5.7*** | | | 5.68*** | | | -3.0 | | | -3.0 |
| Overweight (25.0-29.9) | | | -2.5*** | | | -2.53*** | | | -0.5 | | | -0.5 |
| Obesity (>=30) | | | -3.3*** | | | -3.33*** | | | -2.2 | | | -2.2 |
| Unknown | | | 0.7 | | | 0.27 | | | 6.6 | | | 6.6 |
| Parental level of education (ref: both below tertiary) | | | | | | | | | | | | |
| At least one parent has tertiary level | | | -2.0*** | | | -2.0*** | | | | | | |
| Both unknown/missing | | | 1.4** | | | 1.4** | | | | | | |
| Mother married at birth | | | -3.3*** | | | -3.3*** | | | | | | |
| Unknown | | | -1.8 | | | -2.0 | | | | | | |
| Smoking during pregnancy | | | 9.5*** | | | 9.5*** | | | | | | |
| Chronic Hypertension | | | 3.7*** | | | 3.7*** | | | | | | |
| Constant | 11.4*** | 8.2*** | 12.4*** | 11.4*** | 8.2*** | 12.4*** | 9.0*** | 6.7*** | 7.5*** | 9.0*** | 6.7*** | 7.5*** |
| Number of observations | 248013 | 248013 | 248013 | 248013 | 248013 | 248013 | 11914 | 11914 | 11914 | 11914 | 11914 | 11914 |

∗∗∗ $P < 0.0001$, ∗∗$P < 0.01$, ∗$P < 0.05$

Pelikh A, Smith KR, Myrskylä M. Goisis A. Medically assisted reproduction treatment types and birth outcomes: a between-family and within-family analysis. Obstet Gynecol 2022;139.
The authors provided this information as a supplement to their article.

Note: Coefficients denote percentage point change in predicted probability of small for gestational age. High values for the "unknown" BMI category in the within-family analysis refer to the extremely low numbers (<10 for some treatment types).

**Appendix 8. Between-Family and Within-Family Models of Birth Outcomes of Children Born in Utah in 2009-2017, Children Conceived Through Medically Assisted Reproduction Compared With Naturally Conceived Children, Singletons Only (95% CI)**

| Between-family analysis | Within-family analysis |
|---|---|
| Model 3 (birth order, child's sex, maternal age, marital status, education, smoking, BMI, chronic hypertension) | Model 3 (birth order, child's sex, maternal age, BMI) |
| **a) Birth weight (g). Linear models** | |
| **MAR as one category** | |
| MAR    -84(-93 to -74) | -29(-46 to -13) |
| **By type of treatment** | |
| FED    -75(-87 to -63) | -23(-42 to -5) |
| AI or IUI    -98(-123 to -73) | -68(-112 to -24) |
| ART    -102(-123 to -81) | -31(-79 to 17) |
| **b) Gestational age (days). Linear models** | |
| **MAR as one category** | |
| MAR    -1.9(-2.2 to -1.7) | 0.1(-0.3 to 0.5) |
| **By type of treatment** | |
| FED    -1.4(-1.7 to -1.2) | 0.2(-0.3 to 0.6) |
| AI or IUI    -2.5(-3.1 to -1.9) | -0.1(-1.2 to 1.0) |
| ART    -3.1(-3.6 to -2.6) | -0.3(-1.5 to 0.9) |
| **c) LBW. Linear probability models (percentage change in the predicted probability)** | |
| **MAR as one category** | |
| MAR    2.6(2.1 to 3.0) | 0.7(-0.1 to 1.6) |
| **By type of treatment** | |
| FED    2.3(1.8 to 2.9) | 0.9(0.0 to 1.8) |
| AI or IUI    2.1(1.0 to 3.2) | -0.7(-3.0 to 1.5) |
| ART    3.6(2.6 to 4.5) | 0.9(-1.6 to 3.4) |
| **d) Preterm. Linear probability models (percentage change in the predicted probability)** | |
| **MAR as one category** | |
| MAR    2.7(2.2 to 3.2) | -0.1(-1.1 to 0.9) |
| **By type of treatment** | |
| FED    1.7(1.1 to 2.3) | -0.2(-1.3 to 0.9) |
| AI or IUI    3.5(2.3 to 4.8) | 0.5(-2.2 to 3.1) |
| ART    5.1(4.1 to 6.2) | <0.1(-2.9 to 2.9) |
| **e) SGA. Linear probability models (percentage change in the predicted probability)** | |
| **MAR as one category** | |
| MAR    2.1(1.4 to 2.7) | 1.6(0.5 to 2.6) |
| **By type of treatment** | |
| FED    2.1(1.4 to 2.9) | 1.5(0.3 to 2.7) |
| AI or IUI    1.9(0.3 to 3.4) | 3.3(0.4 to 6.2) |
| ART    1.9(0.6 to 3.2) | 0.2(-2.9 to 3.4) |

Note: MAR refers to all children who were born after either of the following procedures: Artificial insemination or intrauterine insemination (AI or IUI); Assisted reproductive technology (ART); of Fertility enhancing drugs (FED). LBW stands for 'low birth weight', SGA stands for 'small for gestational age'. 95%CI are presented in parentheses.