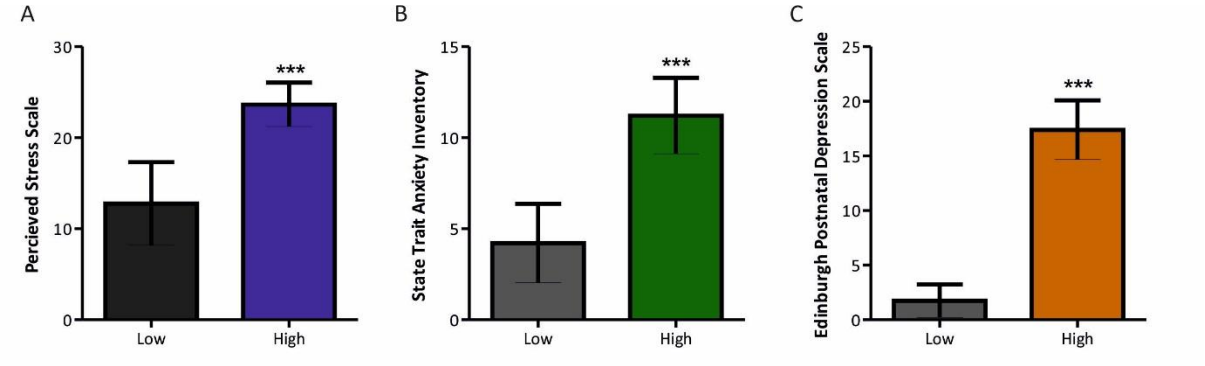
CORA Cork Open Research Archive
Cartlann Taighde Oscailte Chorcaí

Title	Maternal distress in late pregnancy alters obstetric outcomes and the expression of genes important for placental glucocorticoid signalling
Authors	Togher, Katie L.;Treacy, Eimear;O'Keeffe, Gerard W.;Kenny, Louise C.
Publication date	2017-05-08
Original Citation	Togher, K. L., Treacy, E., O'Keeffe, G. W. and Kenny, L. C. (2017) 'Maternal distress in late pregnancy alters obstetric outcomes and the expression of genes important for placental glucocorticoid signalling', Psychiatry Research, 255, pp. 17-26. doi:10.1016/j.psychres.2017.05.013
Type of publication	Article (peer-reviewed)
Link to publisher's version	10.1016/j.psychres.2017.05.013
Rights	© 2017 Elsevier B.V. All rights reserved. This manuscript version is made available under the CC-BY-NC-ND 4.0 license. - https://creativecommons.org/licenses/by-nc-nd/4.0/
Download date	2026-11-02 22:21:49
Item downloaded from	https://hdl.handle.net/10468/5350

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

Supplementary Information

Supplementary *figure 1: Participants groupings based on Questionnaire Scorings*



Supplementary figure 1: Graphical representation of perceived stress scale (A), State Trait Anxiety Inventory (B) and Edinburgh Postnatal Depression Scale (C) scores between women ranked in the low and high categories. Unpaired student t-test show a significant difference between groups $P < 0.001$ ***, N=121.

Supplementary table 1: Global sample means of measured variables

Measure	*Population*	*Low*	*High*
	Mean ± SD (N)	Mean ± SD (N)	Mean ± SD (N)
Perceived Stress Scale	15.88 ± 6.5 (121)	12.75 ± 4.5 (81)	23.65 ± 2.4 (40)
State Trait Anxiety Inventory	6.17 ± 3.8 (121)	4.20 ± 2.1 (87)	11.21 ± 2.0 (34)
Edinburgh Postnatal Depression Scale	9.07 ± 5.6 (121)	6.52 ± 3.7 (90)	16.48 ± 2.9 (31)

Supplementary table 1: Global sample means of measured variables expressed as mean ± SD. High stress (PSS ≥ 20), low stress (PSS ≤ 19). High anxiety (STAI ≥ 9), low anxiety (STAI ≤ 8). High probability of depression (EPDS ≥ 13), low probability of depression (EPDS ≤ 12).

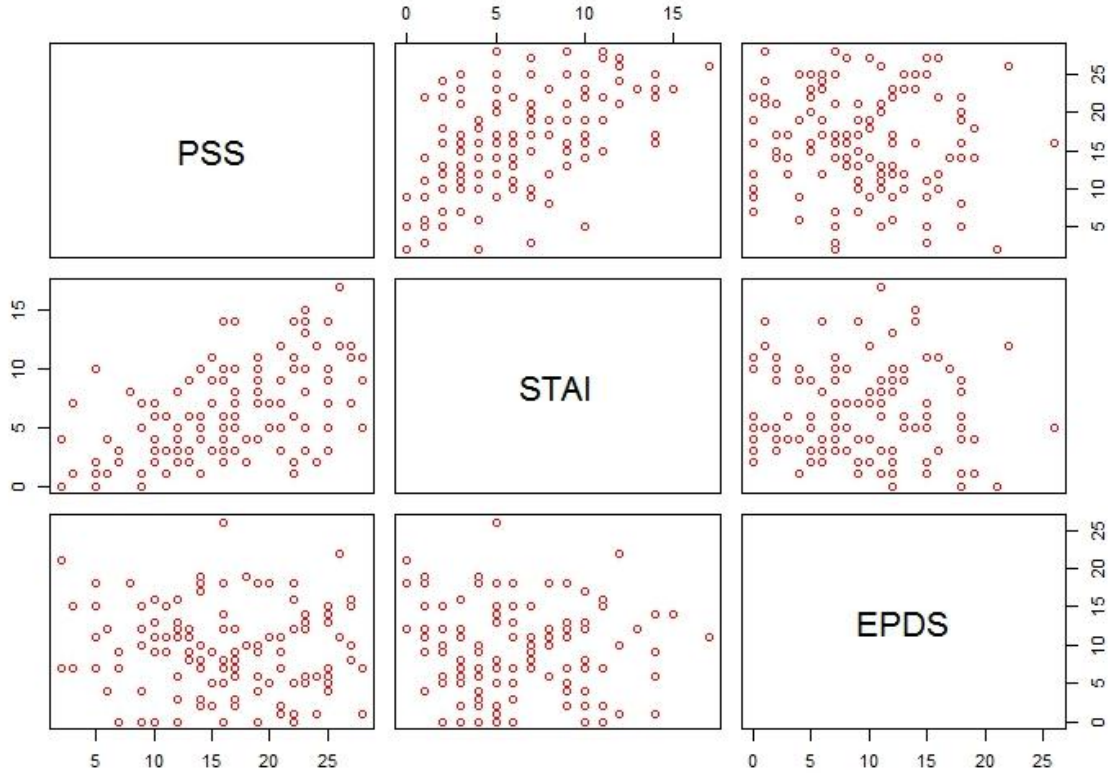
Supplementary table 2: Prenatal stress, anxiety and depression and other neonatal outcomes

Perceived Stress Scale		
	OR (CI ; *p*-value)	aOR (CI ; *p*-value)
Birth centiles	0.429 (0.115 – 1.606 ; 0.209)	0.395 (0.104 – 1.501 ; 0.173)
Neonatal Resuscitation	0.404 (0.109 – 1.501 ; 0.176)	0.460 (0.122 – 1.743 ; 0.253)
NICU Admission	1.405 (0.225 – 8.774 ; 0.716)	1.572 (0.240 – 10.312 ; 0.637)
Stat Trait Anxiety Inventory		
	OR (CI ; *p*-value)	aOR (CI ; *p*-value)
Birth centiles	1.279 (0.407 – 4.019 ; 0.673)	1.272 (0.396 – 4.080 ; 0.686)
Neonatal Resuscitation	1.142 (0.368 – 3.544 ; 0.818)	1.206 (0.375 – 3.873 ; 0.753)
NICU Admission	4.448 (0.708 – 27.954 ; 0.111)	1.109 (0.930 – 1.323 ; 0.250)
Edinburgh Postnatal Depression Scale		
	OR (CI ; *p*-value)	aOR (CI ; *p*-value)
Birth centiles	0.650 (0.172 – 2.456 ; 0.525)	0.602 (0.152 – 2.382 ; 0.469)
Neonatal Resuscitation	0.618 (0.164 – 2.324 ; 0.476)	0.654 (0.165 – 2.593 ; 0.546)
NICU Admission	2.071 (0.329 – 13.032 ; 0.438)	1.857 (0.277 – 12.460 ; 0.524)
Cumulative		
	OR (CI ; p-value)	aOR (CI ; p-value)
Birth centiles	0.363 (0.045 – 2.945 ; 0.342)	0.334 (0.039 – 2.855 ; 0.316)

Neonatal Resuscitation	0.764 (0.158 – 3.689 ; 0.738)	0.795 (0.158 – 4.003 ; 0.781)
NICU Admission	4.444 (0.685 – 28.828 ; 0.118)	1.007 (0.878 – 1.155 ; 0.919)

Supplementary table 2: Relationship between scoring in the PSS, STAI, and/or EPDS with infants in the lower 10^{th} birth centile, neonatal resuscitations and NICU Admissions. Binary logistic regression shows no significant difference between groups $P>0.05$. Adjusted for maternal age, BMI and social class.

Supplementary figure 2: Intercorrelations of questionnaire scores



Supplementary figure 2: Correlation matrices showing relationship between PSS, STAI and EPDS scores. Pearson correlation shows each questionnaire is significantly correlated. PSS and STAI ($r = 0.521$; $P < 0.001$ ***), PSS and EPDS ($r = 0.724$; $P < 0.001$ ***) and STAI and EPDS ($r = 0.678$; $P > 0.001$ ***). RStudio.

Supplementary table 3: Prenatal distress with number of newborn adversities

Perceived Stress Scale		
	OR (CI ; *p*-value)	aOR (CI ; *p*-value)
1 adverse outcome	0.669 (-1.245 – 0.442; 0.351)	0.648 (-1.302 - 0.435; 0.328)
2 adverse outcomes	0.341 (-3.276 – 1.122; 0.337)	0.335 (-3.310 – 1.124; 0.334)
3 adverse outcomes	0.852 (-2.607 – 2.287; 0.898)	0.878 (-2.628 – 2.468; 0.474)
Stat Trait Anxiety Inventory		
	OR (CI ; *p*-value)	aOR (CI ; *p*-value)
1 adverse outcome	0.914 (-0.974 – 0.794; 0.842)	0.860 (-1.076 – 0.773; 0.748)
2 adverse outcomes	1.325 (-1.492 – 2.055; 0.756)	1.440 (-1.445 – 2.174; 0.693)
3 adverse outcomes	1.325 (-2.174 – 2.736; 0.822)	0.809 (-2.769 – 2.346; 0.871)
Edinburgh Postnatal Depression Scale		
	OR (CI ; *p*-value)	aOR (CI ; *p*-value)
1 adverse outcome	0.914 (-0.974 – 0.794; 0.842)	0.914 (-1.019 – 0.839; 0.849)
2 adverse outcomes	--	--
3 adverse outcomes	1.325 (-2.174 – 2.736; 0.822)	1.090 (-2.517 – 2.690; 0.948)
Cumulative		
	OR (CI ; p-value)	aOR (CI ; p-value)
1 adverse outcome	1.025 (-1.056 – 1.105; 0.965)	0.986 (-1.148 – 1.120; 0.981)
2 adverse outcomes	--	--

3 adverse outcomes	2.818 (-1.449 – 3.521; 0.414)	1.610 (-2.143 – 3.094; 0.722)

Supplementary table 3: Odds ratios assessing the relationship between prenatal distress and number of newborn adversities. Newborns were grouped into number of adverse birth outcomes based on six parameters (a) Admission to the NICU (b) Newborn Resuscitation received (c) Delivered before 37 weeks gestation (d) 5 minute Apgar score ≤ 7 (e) Birth Temperature $<$ 36.5°C and (f) Birth Centile ≤ 10 or ≥ 90. Ordinal logistic regression analysis revealed no significant effect ($P > 0.05$). Adjusted for maternal age, BMI and social class.

Supplementary table 4: Linear regression analysis of placental HSD11B2 mRNA expression with maternal distress, demographics and neonatal outcomes

HSD11B2	*R2*	*β-coefficient*	*95% CI*	*p-value*
Birthweight	0.019	0.137	-0.783 – 1.547	0.505
Placental weight	0.037	0.119	-0.144 – 0.382	0.360
PWR	0.030	0.173	0.00 – 0.00	0.408
Birthweight centiles	0.012	0.109	-0.068 – 0.116	0.597
1 min Apgar	0.012	0.109	-0.002 – 0.003	0.597
5 min Apgar	0.011	0.103	-0.001 – 0.002	0.617
Birth Temperature	0.003	0.054	-0.001 – 0.001	0.794
Gravidity	0.000	-0.009	-0.009 – 0.009	0.964
Maternal Age	0.004	-0.064	-0.647 – 0.472	0.472
Maternal BMI	0.062	-0.248	-0.001 –	0.212

			0.000	
Social Class	0.009	-0.095	-0.954 0.594	– 0.636
PSS	*0.137*	*-0.370*	*-0.051* *0.001*	– *0.058*
STAI	0.070	-0.265	-0.025 0.005	– 0.181
EPDS	0.068	-0.260	-0.038 0.008	– 0.190

Supplementary table 4: Placental HSD11B2 expression and continuous variables. Linear regression analysis. $P > 0.05$.

Supplementary table 5: Linear regression analysis of placental NR3C1 mRNA expression with maternal distress, demographics and neonatal outcomes

NR3C1	*R2*	*β-coefficient*	*95% CI*	*p-value*
Birthweight	0.083	-0.288	-1961 – 325.796	0.153
Placental weight	***0.159***	***-0.398***	***-790.258 - -2.667***	***0.049***
PWR	0.086	-0.293	-0.867 – 0.146	0.155
Birthweight centiles	***0.170***	***-0.412***	***-180 - -6.380***	***0.036***
1 min Apgar	0.004	-0.064	-2.870 – 2.111	0.756
5 min Apgar	0.00	0.010	-1.714 – 1.794	0.962
Birth Temperature	0.038	-0.195	-1.267 – 0.455	0.340
Gravidity	0.003	-0.054	-9.854 – 7.583	0.791
Maternal Age	000	0.015	-547.008 – 588.035	0.941
Maternal BMI	0.023	0.151	-0.292 – 0.635	0.453
Social Class	0.005	0.074	-644.397 – 955.528	0.715
PSS	0.075	0.273	-8.437 – 45.959	0.168
STAI	0.003	0.052	-13.496 – 17.405	0.797
EPDS	0.007	0.084	-18.893 – 28.563	0.678

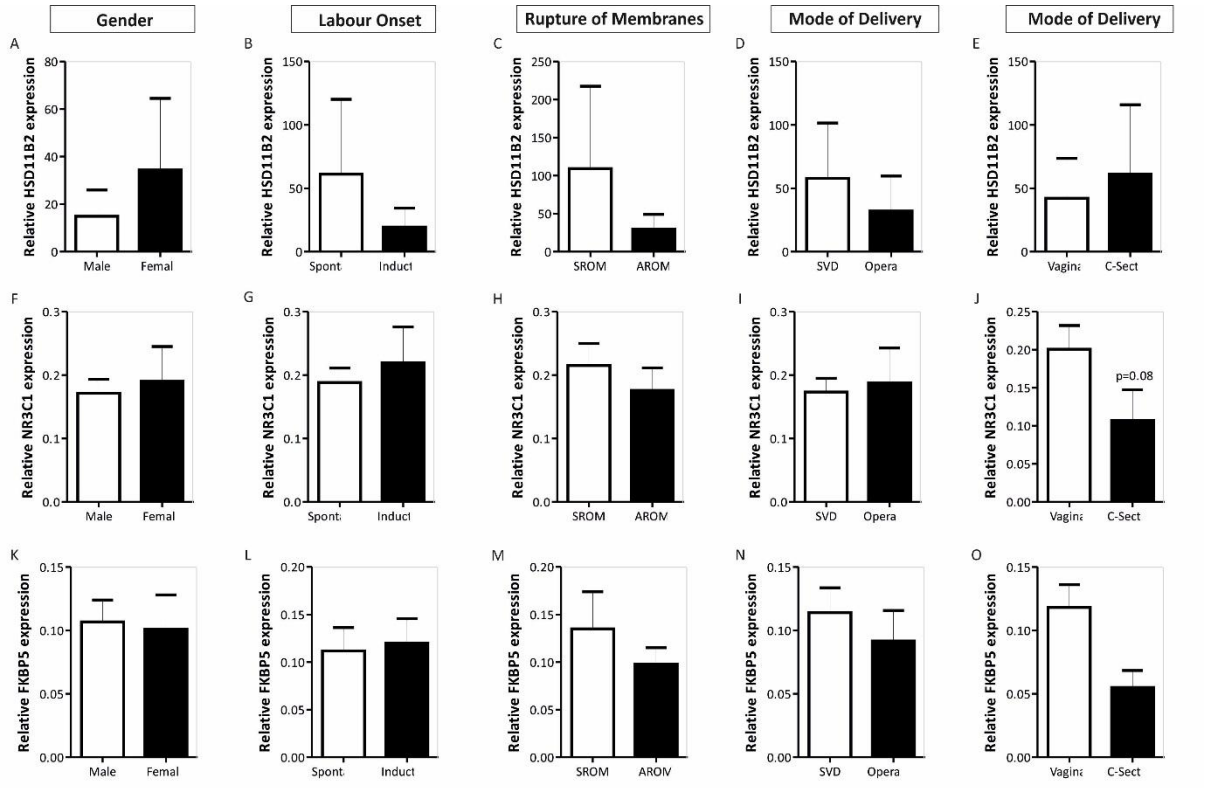
Supplementary table 5: Placental NR3C1 expression and continuous variables. Linear regression analysis. Placental weight and birthweight centiles associated with NR3C1 levels. $P < 0.05$ *.

Supplementary table 6: Linear regression analysis of placental FKBP51 mRNA expression with maternal distress, demographics and neonatal outcomes

FKBP51	*R2*	*β-coefficient*	*95% CI*	*p-value*
Birthweight	0.033	-0.183	-2955.102 – 1147.112	0.372
Placental weight	0.109	-0.330	-1010.482 – 106.235	0.107
PWR	0.020	-0.140	-0.959 – 0.487	0.506
Birthweight centiles	*0.150*	*-0.387*	*-308.452 – 0.616*	*0.051*
1 min Apgar	0.011	0.107	-3.244 – 5.473	0.603
5 min Apgar	0.002	0.05	-2.714 – 3.444	0.809
Birth Temperature	0.015	-0.122	-1.985 – 1.086	0.551
Gravidity	*0.012*	*-0.122*	*-19.559 – 11.174*	*0.579*
Maternal Age	*0.137*	*-0.370*	*-47.048 – 1.302*	*0.063*
Maternal BMI	***0.185***	***0.430***	***3.069 – 42.498***	***0.025***
Social Class	0.023	0.153	-862.086 – 1893.458	0.448
PSS	0.038	0.194	-25.554 – 72.702	0.332
STAI	0.008	0.088	-21.420 – 33.170	0.661
EPDS	0.045	0.212	-1.231 – 3.962	0.289

Supplementary table 6: Placental FKBP5 expression and continuous variables. Linear regression analysis. Maternal BMI positively associated with FKBP5 levels. $P < 0.05$ *.

Supplementary figure 3: Placental gene expression, gender and obstetric outcomes



Supplementary figure 3: Expression of placental HSD11B2, NR3C1 and FKBP5 in relation newborn sex and obstetric outcomes. No significant differences between groups. Unpaired Student's t-test. $P < 0.005$. Spontaneous (Spont), Induction (Induct), Spontaneous rupture of membranes (SROM), Artificial Rupture of membranes (AROM), Spontaneous vaginal delivery (SVD), Operative delivery (Opera) Vaginal delivery (Vagin) and C-Section delivery (C-Sect).