TITLE: Do stress and anxiety in *early* pregnancy affect the progress of labour: evidence from the Wirral Child Health and Development Study (WCHADS)

RUNNING HEAD: Stress and anxiety in early pregnancy and labour progression

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ABSTRACT

Introduction: Despite widespread belief that anxiety causes longer labours, evidence of association is inconsistent. Data gathered as part of a prospective epidemiological longitudinal study was used to investigate relationships between antenatal anxiety and pregnancy-specific stress (PSS), and labour progression assessed by duration and use of augmentation.

Methods: Pregnant primiparous women completed measures for anxiety and PSS at 20 weeks gestation ((n=1145). Birth outcome data were extracted from medical records. Regression analyses and a path analysis assessed associations between antenatal anxiety and PSS, and indices of labour progression (labour duration and augmentation,).

Results: Anxiety/PSS were not directly associated with duration of stage 1 labour (HIGH/ LOW Anxiety: Mean Difference=13.94 min, SD 20.66, CI-26.60-54.49, P<0.50,)/(HIGH/LOW PSS:Mean Difference=12.05 min,,SD=16.09, CI -19.52.-43.63 P<0.45). However, anxiety/PSS were associated with epidural use (HIGH/LOW anxiety: 39% vs 31%, P<0.042,/ HIGH/LOW PSS: 38% vs 29%, P<0.001) which was itself associated with longer labour (Mean Difference: 158.79 mins, SD=16.76, CI 125.89-191.68, P<0.001). Anxiety and PSS were associated with increased likelihood of augmentation, but these associations were non-significant after accounting for epidural, which was itself highly associated with augmentation. However, path analysis indicated an indirect effect linking PSS, but not general anxiety, to labour duration and augmentation: elevated PSS led to greater use of epidural, which linked to both increased rates of augmentation, and increased labour duration.

Conclusions: Contrary to general belief, general anxiety and specific pregnancy stress were not directly linked to longer duration of stage one labour. However specific pregnancy stress was associated with epidural use, which in turn was significantly associated with risk of augmentation, and longer stage one labour. Identification of pregnancy specific stress could help to identify women for whom psychological interventions could improve birth experience.

Abbreviations:

PSS: Pregnancy-specific stress

FOC: fear of childbirth

Key message

Higher anxiety/pregnancy specific stress were not directly associated with longer labour. Both predicted epidural use, which was associated with augmentation and longer labour. Only pregnancy specific stress demonstrated a clear pathway via epidural to both augmentation and longer labour duration.

MAIN TEXT

Introduction

Despite widespread belief that maternal stress causes longer labours, evidence of association between antenatal anxiety and rate of progress in labour is inconsistent[1,2]. Prolonged labour may require obstetric intervention, which can negatively influence women's childbirth experience[3–5].

Anxiety in pregnancy can include general anxiety, pregnancy-specific stress or specific fear of childbirth (FOC). Adams et al.[6] found that, at 32 weeks gestation, FOC, but not general anxiety, was independently associated with 47 minutes longer labour. Reck et al[7] found similar patterns but with pregnancy specific stress but not general anxiety at 24 weeks being related to total labour time. Conversely, Sluijs et al[8] suggest that neither anxiety nor fear of childbirth measured at 30 weeks had any relation to the birth-giving process including the first stage of labour although the power of the study may be compromised. Large birth cohort study samples also find mixed results. Laursen et al[9] suggested that fear of childbirth (assessed by a single question repeated in both first and third trimesters)was associated with 'protracted labour' in nulliparous women. Koelewijn et al[8] utilising very large samples and solely first trimester measures found fear of childbirth did show some association with stage one whereas general anxiety did not. However, the labour duration measure was acknowledged as insensitive being categorised by 6-hour blocks. Their research did suggest anxiety was associated with pain relief and sedation. Hall et al[10] found that FOC but not general anxiety (when measured 35-39 weeks of gestation) predicted use of epidural. Some of these complexities of findings may relate to timing and focus of the measures, parity and the way duration of labour is assessed. Overall, pregnancy-specific anxiety or FOC rather than general anxiety appears more likely to be associated with labour duration.

Slow progress in the active phase of labour is generally augmented with oxytocin[11]. FOC late in pregnancy has been associated with increased likelihood of augmentation[12]. Slow labour can also

result in emergency cesarean section, but again an association between general/pregnancy-specific anxiety and emergency cesarean section is not consistently reported[10,13,14].If early antenatal anxieties do predict labour progression, then identification allowing timely psychological intervention in pregnancy could reduce risk of prolonged labour and/or associated interventions, improving birth experiences and reducing postnatal psychological difficulties[15,16]. The role of epidural, given its associations with antenatal anxiety and stress[1] and with certain indicators of labour progression[6], also requires examination.

Aims and objectives

To investigate whether, controlling for epidural use, general anxiety or PSS at 20 weeks gestation:

(i)   predicts duration of 1st stage of labour (*hypothesis 1*),

(ii)   predicts use of augmentation (*hypothesis 2*),

Methods

Data were gathered as part of a UK Medical Research Council funded prospective epidemiological longitudinal study of emotional, psychological, social and biological predictors of child development, the Wirral Child Health and Development Study (WCHADS). Data from the study is listed by the UK Medical Research Council Cohort Directory to maximise public benefit from data sets gathered through public funding. Hypotheses were formulated by the research team including the two WCHADS principal investigators prior to any analysis of data relating to these questions. The Cheshire North and West Research Ethics Committee provided approval (REF 05/Q1506/107).

Participants and procedure

Women were having their first baby, aged 18 or above, booked for antenatal care at 12 weeks gestation between 12/02/2007 and 29/10/2008 at the Wirral University Teaching Hospital[17]. This was a consecutive sample of first-time pregnant mothers registering for antenatal care. Wirral socioeconomic conditions range between the deprived inner city and affluent suburbs, but with low numbers of women from ethnic minorities. Clinic midwives approached women attending their 20 weeks gestation screening to ask for their agreement to speak with one of three research midwives. After obtaining written informed consent the study midwives administered questionnaires, and subsequently gathered obstetric outcome data from medical records.

Of the sample, 1286 provided antenatal data at 20 weeks gestation. This represents a response rate of 68% from a potential sample of 1891 women. For the analysis, women with twin births, Emergency cesarean section occurring when not in labour and elective cesarean sections were excluded, as women in the latter two groups did not experience labour. After excluding cases with missing data on required variables, the final sample was 1145 women (Figure 1).

Measures

Demographics: age (years), body mass index (BMI). Socioeconomic status was determined using the revised English Index of Multiple Deprivation (IMD)[18] which assigns a score from least (IMD 32,482) to most deprived (IMD 1). Mothers in the current sample were assigned an IMD rank based on their postcode and a quintile based on the UK distribution of deprivation.

State-Trait anxiety inventory–state version[19] (STAI): the state version consists of 20-items on a four-point scale assessing anxiety, i.e., fear, nervousness, discomfort in the present, as this was the variable of interest rather than trait anxiety or general tendencies. Scores range between 20-80, with higher scores indicating greater anxiety. Cronbach's Alpha for the current study was excellent at 0.92.

Scores were dichotomised at 40 to indicate clinical anxiety (≥40) and non-clinical anxiety (≤39), in line with previous studies with pregnant women (sensitivity 80.95%, specificity 79.75%, PPV 51.5% and NPV 94%)[20].

Pregnancy Stress Scale[21,22] (PSS): This included 4 items assessing feelings about pregnancy using a 5-point scale. Cronbach's Alpha for this scale was an acceptable at 0.82. Scores were dichotomised using the median (5.00) to infer high (>5) and low (≤5) pregnancy-related stress.

Obstetric record: The following variables were extracted from the obstetric records and, if needed, verified by a consultant obstetrician (AW):

Mode of birth: vaginal, ventouse, forceps, emergency cesarean section (all based on midwife case notes)

Epidural: coded Yes/No.

Induction: receipt of prostaglandin induction agents (mechanical induction methods were not in use at that time) with/without oxytocin or artificial rupture of membranes (ARM). In order to create two homogenous, clearly separated datasets, women who only required ARM and/or oxytocin to initiate labour, with no prostaglandins, were excluded from analysis as, according to the operationalised definition, they were neither fully induced nor did they spontaneously begin labour.

Women who received no prostaglandins, ARM or oxytocin were defined as spontaneously starting labour.

Augmentation: all women who spontaneously began labour (absence of prostaglandins/ARM/oxytocin) but who subsequently received oxytocin for augmentation.

Duration of the 1st stage of labour: time from the onset of regular painful contractions to the full dilation of the cervix, recorded by the midwife providing care.

Statistical Analysis

Data were analysed using SPSS 19. Bivariate associations were assessed using Pearson's correlation (r), t-test and Chi-square analyses. Analyses involving the STAI and PSS are presented using dichotomised scores; analyses on continuous STAI and PSS scores showed identical patterns of findings and so are not presented.

For hypothesis 1: a stepwise multivariate regression analysis entering potentially confounding variables (BMI, epidural, induction) at block one, STAI at block two and PSS at block three.

For hypothesis 2: two sequential logistic regression analyses were planned to assess predictive utility of either STAI score or PSS alongside epidural use. For both analyses, either STAI or PSS was entered at block 1 and epidural at block 2. Contributions of individual coefficients in each model block were assessed using the Wald test statistic[23]. Odds ratios (OR) with 95% confidence intervals (95% CI) are presented.

Indirect effects related to the models in the first two hypotheses were investigated using a path analysis model, conducted in Mplus 7. Bias corrected bootstrap (5000 samples) was used to estimate indirect effects[24].

Results

Demographic and birth outcome data

Table 1 shows demographic and birth outcome data. Approximately 42% of women (n=474) were in the most deprived UK IMD quintile. Mothers were slightly below average age for first-time mothers (Mean=27.5 years) in England and Wales[25]. National birth statistics for England 2008-2009 indicate that 17% of women received an epidural, 63% had spontaneous vaginal deliveries, 6% needed use of

forceps, 7% ventouse and 15% emergency cesarean section[26]. Comparatively, women in this study experienced higher rates of epidural, ventouse and use of forceps, although national statistics are not directly comparable as they also include multiparous women.

Antenatal anxiety, PSS and obstetric interventions

STAI scores (M=31.54, SD=9.82) and PSS (M=5.66, SD=3.36) were moderately correlated (r=.48, p<.001). 211 women (18.4%) showed STAI scores exceeding the clinical cut-off. No significant difference was found, according to birth mode (vaginal, instrumental, emergency cesarean section), in the proportions of women scoring above or below threshold on the STAI (χ^2(df=2)=3.58, p=.167) or the PSS (χ^2(df=2)=4.29, p=.117). However, a significantly larger proportion of women with high rather than low STAI scores, received an epidural (N=82, 39% vs. N=293, 31%; χ^2(df=1)=4.39, p=.042). A similar pattern emerged for PSS scores and epidural (High:N=194, 38% vs. Low:N=181, 29%; χ^2(df=1)=9.75, *p*<.001).

Hypothesis testing

(1) Do antenatal anxiety or PSS at 20 weeks gestation predict duration of the 1ˢᵗ stage of labour?
After analysis-specific exclusions (Figure 1), data were available for n=934. Bivariate associations between antenatal and confounding variables and labour duration were assessed (Table 2). There was no association between either STAI or PSS and labour duration. In contrast epidural and emergency cesarean section were all associated with longer labour whilst induction was associated with a shorter labour. As neither anxiety variable nor BMI was associated with labour duration they were not entered into the multivariate analysis.

In a stepwise regression (Table 3) all retained independent variables (IVs) (emergency cesarean section, epidural, induction) significantly predicted labour duration (F(3, 930)=48.61, p<.001),

accounting for 13% of the variance (adjusted R^2=.13). emergency cesarean section and epidural were uniquely associated with longer labour, whilst induction uniquely predicted shorter labour (see Table 3).

2) Do antenatal anxiety or PSS at 20 weeks gestation predict requirement for augmentation?

Figure 1 shows specific inclusion criteria for this hypothesis. Listwise deletion resulted in a sample size of 799. Bivariate associations between IVs (epidural use, BMI, STAI and PSS scores) and use of augmentation were assessed (Table 4). A significantly larger proportion of women with elevated STAI score required augmentation than not (χ^2(df=1)=5.44, p=.025, OR=1.52). The same pattern emerged for PSS scores (χ^2(df=1)=4.27, p=.023, OR=1.36), and for those receiving an epidural (n=55), χ^2(df=1)=180.26, p<.001. BMI and augmentation were not significantly associated, so this was not retained as a confounding variable.

STAI, epidural and augmentation

Block 1 (STAI only): STAI scores significantly distinguished presence and absence of augmentation (X^2(df=1)=5.33, p=.021) (Table 5). STAI scores significantly contributed to prediction (Wald(1)=5.39, p=.020). Odds of requiring augmentation were 1.5 times higher for women with high STAI scores (OR=1.53, CI: 1.07-2.19). However, including STAI scores did not change the correctly identified percentage from the constant-only model (63.7%), indicating only limited contribution of STAI to the model.

Block 2 (STAI and epidural): The model remained significant (X^2(df=2)=179.04, p<.001). Including epidural use, correct classification increased to 76.6%. Epidural was a unique significant predictor (Wald(1)=149.67, p<.001) but STAI was rendered non-significant (Wald(1)=.76, p=.383) (Table 5). The odds of augmentation were nearly 10-fold for women receiving an epidural (OR=9.61, CI: 6.66-13.85). Epidural use appeared to fully account for the association between anxiety and augmentation.

PSS, epidural and augmentation

Block 1 (PSS only): The model including only PSS to predict augmentation was significant (X^2(df=1)=4.26, p=.039), with PSS significantly associated with augmentation (Wald(1)=4.257, p=.039). Odds of requiring augmentation were 1.4 times higher for women reporting high PSS (OR=1.36, CI: 1.02-1.81) (Table 5). Comparison to the constant only model however indicated that the correct classification percentage was unchanged (63.7%), suggesting a limited contribution of PSS.

Block 2 (PSS and epidural): The model remained significant (X^2(df=2)=178.94, p<.001). Epidural was uniquely associated with augmentation (Wald(1)=150.36, p<.001); women receiving an epidural were almost 10 times more likely to also have augmentation (OR=9.75, CI: 6.78-14.03) (Table 5). PSS was rendered non-significant (Wald(1)=.66, p=.418), with epidural use fully accounting for the observed association between pregnancy-specific stress and augmentation in labour.

Indirect effects

Given the pattern of effects that emerged in relation to the first two hypotheses, a path analysis model was run (Figure 2) to investigate the presence of indirect effects, leading from anxiety scores to labour duration and to augmentation use, through epidural.

Notably, in the context of this broader model, all effects related to STAI scores were rendered non-significant, while PSS scores showed a direct pathway to epidural but not augmentation.

Two significant indirect paths emerged from this model: firstly, elevated PSS scores were found to indirectly increase the likelihood of augmentation, through the increase in the likelihood of epidural use (b(SE) = 0.137(0.056), 95% BC CI = 0.035 – 0.261, p = 0.015); secondly, a similar pattern emerged in relation to labour duration, with an increase in this being related to elevated PSS scores,

through the mediation of increased epidural use (b(SE) = 0.022(0.009), 95% BC CI = 0.006 – 0.042, p = 0.015).

Discussion

This paper presents one of the few large-sample studies considering the relationships between antenatal anxiety and labour duration and associated obstetric interventions with appropriate controls for confounding variables. It is important to recognise that despite popular belief, neither anxiety nor pregnancy-specific stress (PSS) were directly associated with longer 1st stage of labour duration. This confirms the finding by Reck et al[7] for generic anxiety but differs for PSS. In the current study PSS was assessed at 20 weeks gestation, whereas Reck et al[7] assessed a similar construct at 33 weeks gestation. The timing of assessment is contentious, since stress nearer to childbirth may be a more potent predictor of obstetric outcome, but for screening purposes an earlier assessment is needed to enable psychological intervention. For Reck et al[7], fear of giving birth was the strongest predictor of labour duration (R^2=.13). In contrast, in the present study, the PSS measure focused on feelings (e.g., feeling scared) about pregnancy, not birth. Large-scale studies are needed to consider the specific role of FOC in relation to birth duration.

Initial associations between general anxiety and PSS and augmentation became non-significant after epidural use was controlled. Only one other study has investigated the association between antenatal anxiety and augmentation[6] and this reported higher rates of augmentation in women with FOC. However, any potential mediation by epidural was untested. Augmentation of labour is important as it may negatively influence women's experiences of childbirth[10,27]. A key question is therefore whether anxiety leads to a woman having an epidural, which subsequently increases the likelihood of requiring augmentation, or vice versa. Certainly, the path analysis supports the former and clinically this is a

commonly observed progression. However, slow labour is also exhausting and the use of augmentation increases the pain of contractions considerably. In clinical practice therefore, it is also not unusual for an epidural to be sited at the same time as augmentation is started. Path analysis cannot prove causation and merely demonstrates that these data are consistent with the former model of understanding

A key finding was that whilst both general anxiety and PSS showed similar patterns in their association with labour duration, epidural and augmentation only PSS demonstrated the specific indirect pathway via an increased the likelihood of receiving an epidural, to both augmentation and longer labour duration. PSS, being more focussed, may be better linked with sustained anxiety in pregnancy and more evident in the birth context. Women with elevated fear or anxiety during pregnancy are more likely to receive an epidural during labour[6,10]. In turn, there is a consistent association between epidural and longer first stage of labour and assisted birth[28]. Few studies have examined a potential indirect pathway between antenatal anxiety/stress with augmentation or stage 1 labour duration via receipt of epidural[6,29]. Adams et al[6] reported that labour duration was longer for women with FOC, and that women with FOC were more likely to receive an epidural. When both FOC and epidural were entered into a regression model predicting labour duration, the magnitude of association between FOC and duration was attenuated but remained significant. FOC is also a narrower construct then PSS.

Clinical Implications

Whilst assessment of PSS at 20 weeks gestation will not necessarily identify women likely to experience longer labour, it may identify those with greater likelihood of requiring epidurals. Whilst epidurals provide significant benefits in pain relief, women perhaps need to be more aware they may influence labour progression and subsequent need for augmentation. In addition, there may be benefits in identification of pregnancy-specific anxiety and offer of psychological interventions to enhance birth experience and subsequent postnatal mental health. Interestingly a randomised controlled trial of

universal provision of self-hypnosis in pregnancy led to reductions in fear and anxiety experienced in childbirth, but did not reduce epidural rate[30] so intervention targeting may be of value.

Strengths and limitations

The large, representative sample recruited from the Wirral Peninsula sole provider for prenatal care, and use of standardised tools assessing anxiety and PSS are strengths. However, the broader pregnancy specific stress rather than fear of childbirth, possibly more pertinent, was measured. In addition, only the STAI state rather than trait version was used and it could be that the latter would have produced different findings. STAI anxiety levels as would be expected in a consecutive sample were unremarkable although PSS scores were relatively low[20,21,31].Further information and about distributions is already published in previous papers from the WCHADS study[32]., Labour duration was defined as the onset of regular painful contractions to full dilatation of the cervix; merging definitions for latent and first stage of active labour. Women with elective cesareans or with emergency cesarean section when not in labour were obviously excluded as no duration of labour could be measured, as labour was not experienced. However elective cesarean section rates in this service were very low as this was only carried out for specific medical reasons so the sample would have represented the full range of PSS scores. These findings relate only to the first stage of labour and not total labour duration. This paper does not look at prediction of mode of birth.

It must be noted that the data were for a consecutive sample of primiparous women collected in 2008/9. Whilst rates of interventions may differ at different times and localities the important feature of this work is the identification of a particular pathway of effect which is unlikely to be time or place specific.

Conclusion

Early assessment of antenatal state anxiety or pregnancy-specific stress did not directly aid prediction of the duration of the first stage of labour . Pregnancy-specific stress but not general anxiety was particularly linked to both longer labour and augmentation via indirect pathways through epidural Pregnancy specific stress rather than general anxiety may need to be the focus of any psychological screening in pregnancy. Interventions for pregnancy-specific stress now need systematic testing with psychological measures and also epidural as outcomes.

Contribution to Authorship: Conceived and designed the original study: JH, HS; data collection: JH, HS, CB, KL, BT; developed the specific hypotheses and data analysis: PS KS SW ADW HS, conducted the path analysis: LDP, wrote and edited the manuscript: PS, KS, HS; PS, KS, ADW, SW, JH, HS LDP.

Details of ethics approval: Ethical approval was granted by the Cheshire North and West Research Ethics Committee on the 27th June 2006 (REF 05/Q1506/107).

Table 1. Participant characteristics and birth outcome data

	N	M (SD)
Age	1145	26.7 (5.7)
BMI	1141	26.1 (5.3)
Duration 1st Stage[a] (minutes)	1038	401.55 (243.48)
	N[a]	%
Epidural	375	32.8
Preterm labour (<37 weeks gestation)	25	2.2
Spontaneous Vaginal Delivery	680	59.5
Ventouse	152	13.3
Forceps	133	11.6
Emergency Cesarean Section	180	15.7
Induction[b]	237	22.4
Augmentation	297	25.9

NOTE. [a]Total N=1145 unless otherwise indicated; [b]Duration total N= 1038 after exclusion for uncertain labour duration(N=107); [c]Induction total N= 1059 after exclusion for uncertain onset (N=86)

Table 2. Initial T-Tests and bivariate correlations for stage 1 labour duration in mins, anxiety and obstetric interventions

		N	M	SD	Test	p	Cohen's d	Mean (SE) difference (in labour duration)	CI of difference
Emergency Cesarean Section	Yes	66	563.55	255.66	t= 5.26	<.001	.65	161.58 (30.73)	101.26: 221.89
	No	868	401.97	239.52					
Epidural	Yes	274	525.59	275.92	t= 9.40	<.001	.64	158.79 (16.76)	125.89:191.68
	No	660	366.81	213.09					
Induction	Yes	193	356.12	296.10	t = -3.68	<.001	.27	-72.18 (19.59)	-110.63: -33.72
	No	741	428.30	226.49					
STAI	≥40	171	424.78	230.46	t= .68	.500	.06	13.94 (20.66)	-26.60: 54.49
	≤39	763	410.83	247.12					
PSS	>5	412	420.12	233.05	t= .75	.454	.05	12.05 (16.09)	-19.52: 43.63
	≤5	522	408.07	252.56					
BMI	-	934	-	-	r= .01	.849	-		-

Note. Total N= 934 after application of exclusion criteria (Figure 1).

Table 3. Multiple linear regression analysis predicting the duration of the first stage of labour

	b	(95% CI)	*SE (b)*	β
Constant	379.10**	(360.61 - 397.58)	9.42	
Emergency cesarean section	131.56**	(73.69 - 189.43)	29.49	.14
Epidural	162.99**	(130.12 - 195.86)	16.75	.30
Induction	-110.43**	(-147.08 - -73.79)	18.67	-.18

Note. N= 934; *p<.05; **p<.001; b, unstandardised coefficient; 95% CI, 95% confidence intervals for B; SE(B), standard error for b; *β,* standardised coefficient.

Table 4. Bivariate associations between epidural, BMI, STAI and PSS scores with augmentation

		STAI		PSS		Epidural		BMI
		High	Low	High	Low	Yes	No	
Augmentation	Yes	68	222	167	123	158	132	288
	No	85	424	245	264	55	454	509
Test		Chi^2		Chi^2		Chi^2		T-test
		5.44		6.61		180.26		1.51
p		.025		.012		<.001		.131

N= 799 after exclusions for induction, uncertain/missing onset of labour, premature birth and gestational diabetes (total exclusions 346).

Table 5. Stepwise logistic regression predicting augmentation by 1) STAI and epidural and 2) PSS and epidural

			B	SE B	OR	(95% CI)
Model 1	Block 1	STAI	.42*	.18	1.53	(1.07- 2.19)
(STAI)		Constant	-.65	.08	.52	
	Block 2	STAI	.18	.21	1.20	(.80- 1.82)
		Epidural	2.27**	.19	9.72	(6.75- 14.00)
		Constant	-1.27	.11	.28	
Model 2 (PSS)	Block 1	PSS	.31*	.15	1.36	(1.02- 1.81)
		Constant	-.70	.10	.50	
	Block 2	PSS	.14	.17	1.15	(.82- 1.60)
		Epidural	2.28**	.19	9.75	(6.78- 14.03)
		Constant	-1.29	.12	.27	

Note. N= 799; *p<.05; **p<.001
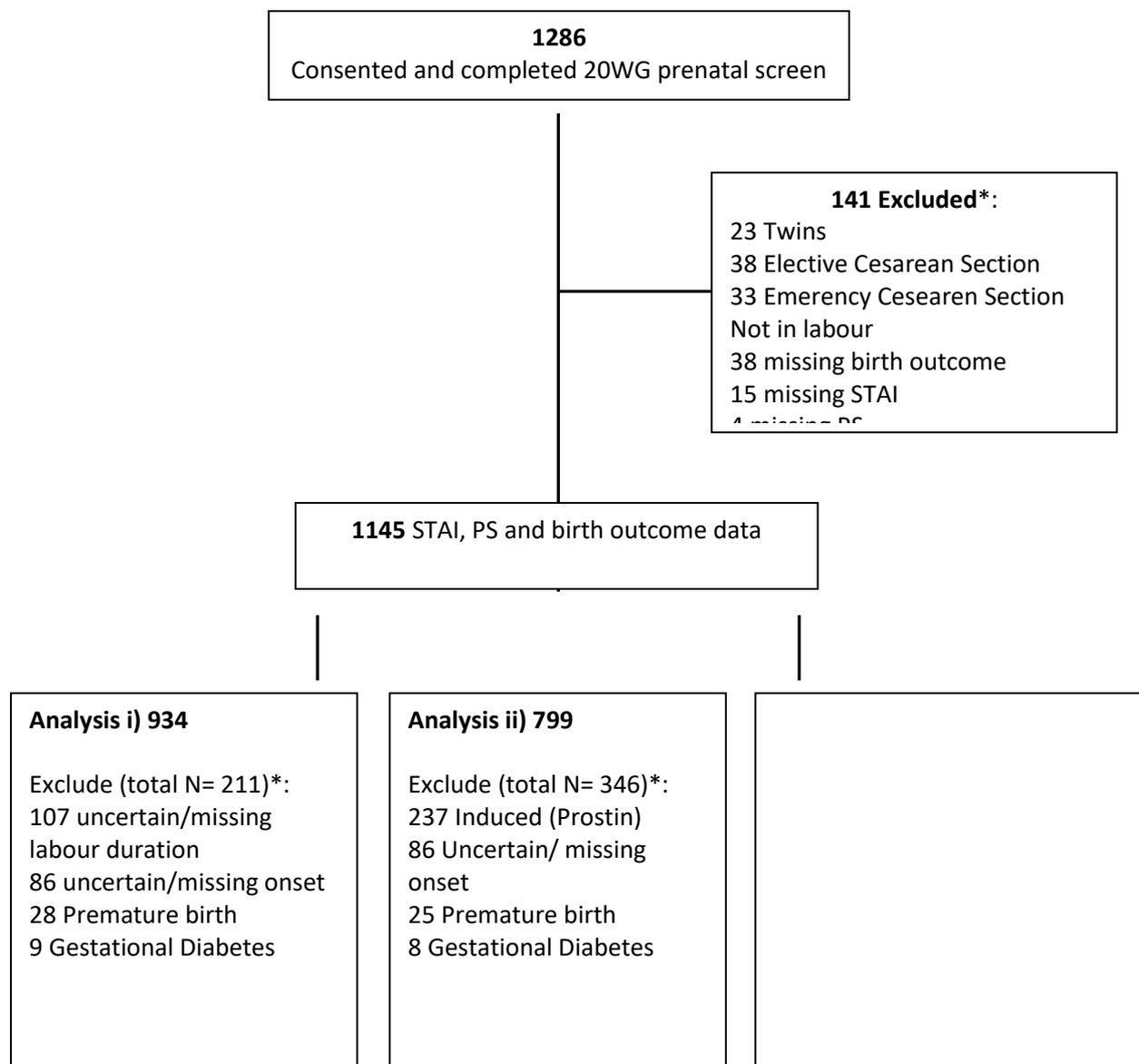
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Figure 1. Sampling and inclusion for each analysis. Note.*categories are not mutually exclusive. ªCombined factors, delay in second stage or cephalopelvic disproportion, miscellaneous, missing indication information.
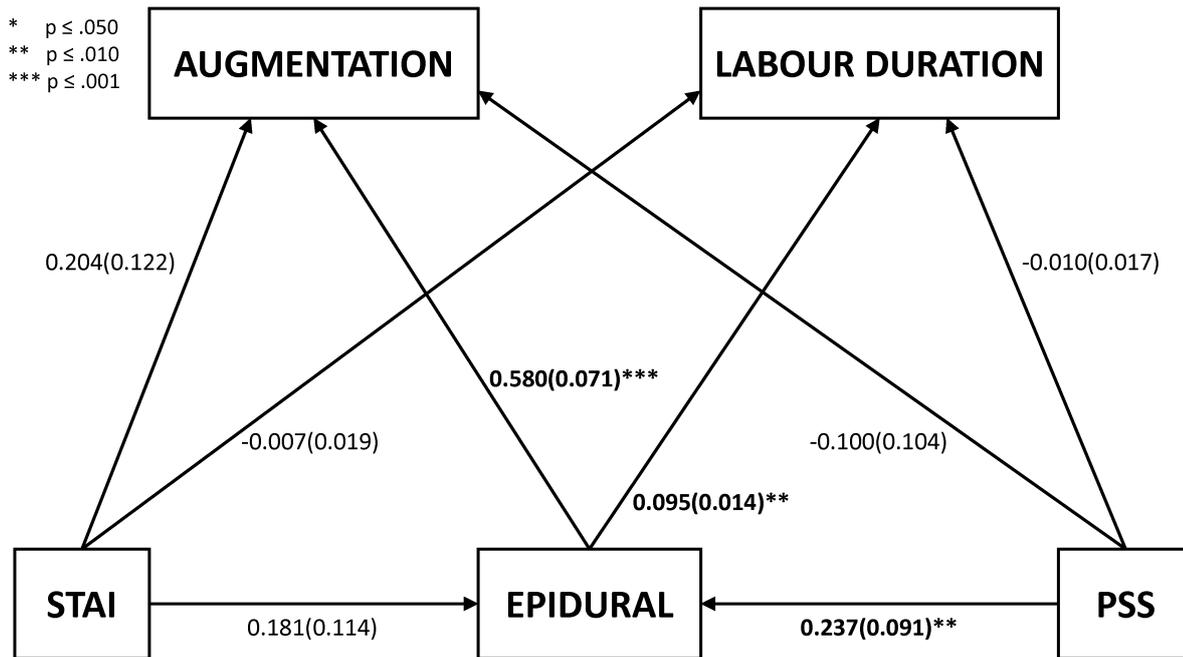
Figure 2. Path analysis (coefficients reported as b(SE))

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 Legends

Table 1. Participant characteristics and birth outcome data

Table 2. Initial bivariate T-tests and correlations between stage 1 labour duration in mins, anxiety and obstetric interventions

Table 3. Multiple linear regression analysis predicting the duration of the first stage of labour

Table 4. Bivariate associations between epidural, BMI, STAI and PSS scores with augmentation

Table 5. Stepwise logistic regression predicting augmentation by 1) STAI and epidural and 2) PSS and epidural

Figure 1. Sampling and inclusion for each analysis.

Note.*categories are not mutually exclusive.

 aCombined factors, delay in second stage or cephalopelvic disproportion, miscellaneous, missing indication information.

Figure 2. Path analysis (coefficients reported as b(SE))