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ORIGINAL ARTICLE

Birth outcomes by type of attendance at antenatal education: An observational study

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Background: Antenatal education aims to prepare expectant parents for pregnancy, birth, and parenthood. Studies have reported antenatal education teaching breathing and relaxation methods for pain relief, termed psychoprophylaxis, is associated with reduction in caesarean section rates compared with general birth and parenting classes. Given the rising rates of caesarean section, we aimed to determine whether there was a difference in mode of birth in women based on the type of antenatal education attended.

Materials and methods: A cross-sectional antenatal survey of nulliparous women ≥28 weeks gestation with a singleton pregnancy was conducted in two maternity hospitals in Sydney, Australia in 2018. Women were asked what type of antenatal education they attended and sent a follow-up survey post-birth. Hospital birth data were also obtained. Education was classified into four groups: psychoprophylaxis, birth and parenting, other, or none.

Results: Five hundred and five women with birth data were included. A higher proportion of women who attended psychoprophylaxis education had a vaginal birth (instrumental/spontaneous) (79%) compared with women who attended birth and parenting, other or no education (69%, 67%, 60%, respectively $P = 0.045$). After adjusting for maternal characteristics, birth and hospital factors, the association was attenuated (odds ratio 2.03; 95% CI 0.93–4.43).

Conclusions: Women who attended psychoprophylaxis couple-based education had a trend toward higher rates of vaginal birth. Randomised trials comparing different types of antenatal education are required to determine whether psychoprophylaxis education can reduce caesarean section rates and improve other birth outcomes.

KEYWORDS
antenatal education, mode of birth, birth

BACKGROUND

Antenatal education aims to provide expectant parents with information about pregnancy, childbirth, breastfeeding and parenthood.[1] Women may attend antenatal education, in addition to antenatal care, to be informed, obtain advice, have their questions answered, reduce anxiety, meet other parents, have a better labour and/or reduce birth intervention as well as gain parenting advice.[2,3]

Antenatal education is undertaken by a range of healthcare providers including physiotherapists, midwives, as well as specifically trained childbirth and parenting educators.[4] Education varies in content focusing on childbirth fear and pain, pain relief techniques, mode of birth, parenting, breastfeeding, relaxation training as a life skill and/or specifically for labour and birth, and may include breathing and relaxation methods for pain relief, termed psychoprophylaxis. Education may involve couples or women alone, be run in small groups or large classes and have different formats including lectures, role play education, leaflets, telephone and/or online and may have a different number of sessions.[5] The content may also vary from class to class within one program type, and may change over time with different educators.[6]

Over the last few decades, there has been a rise in obstetric interventions during labour and birth in most developed countries.[7] This has led to interest in antenatal education as a strategy to reduce birth interventions, particularly caesarean section. In 2018, the World Health Organization released recommendations about reducing unnecessary caesarean sections which stated that 'health education for women is an essential component of antenatal care'.[7] In addition, they noted that educational interventions and support programs, including childbirth training workshops, nurse-led applied relaxation training, psychosocial couple-based prevention programs and psychoeducation for women with fear of childbirth, are recommended to reduce caesarean births.[7] Systematic reviews and meta-analyses have found that childbirth training workshops for mothers and couples, as well as nurse-led applied relaxation training and psychoprophylaxis couple-based programs, were associated with a reduction in caesarean section and may increase spontaneous vaginal birth rates (relative risk (RR) 2.25, 95% CI 1.16–4.36).[8,9] However, studies included in the meta-analysis were small, included different educational interventions in various maternity settings, and a number had the potential for bias.[8,9]

Given the rise in caesarean section rates and recent evidence suggesting antenatal education may reduce caesarean section rates, we aimed to determine the type of antenatal education classes attended by nulliparous women and evaluate the impact on this on mode of birth and other birth outcomes.

METHODS

Study population

This prospective, cross-sectional study included nulliparous pregnant women with a singleton pregnancy ≥28 weeks gestation planning to have their baby at two hospitals in Sydney, Australia from July 2017 to December 2018. The Royal Hospital For Women (RHW) is a tertiary maternity hospital with approximately 4000 births per annum. St George Hospital (STG) is a maternity hospital within the same area health service, able to care for women giving birth after 32 weeks gestation, with approximately 2500 births per annum, serving a socio-demographically diverse population.

Study design and recruitment

The study combined patient data from three sources: a pregnancy survey, a postnatal survey and hospital pregnancy outcome data. The self-administered surveys collected information on socio-demographic characteristics, attendance at antenatal classes, type of class, satisfaction with education and birth outcomes (Appendix S1).

Pregnant women were identified via hospital antenatal classes, clinics, and wards as well as other hospital education sessions (eg free breastfeeding information sessions or hospital tours). Women enrolled in antenatal classes who agreed to being approached about research were identified at the time of online registration. They were sent a participant information sheet and a secure REDCap weblink to the pregnancy survey at around 28 weeks gestation.[10] Women recruited face-to-face were given either a paper survey or sent a secure weblink. Electronic surveys were in English and paper surveys were available in English, Mandarin and Arabic. Women completing the first survey opted in or out to receive a follow-up postnatal survey and/or allow researchers to access their hospital birth records. Women (known to have had a live baby) who consented to receive a postpartum survey, were sent a survey weblink six weeks after the expected due date, with a single reminder. Birth outcome data were obtained from the hospitals' maternity database (e-Maternity, Meridian Health Informatics, Sydney, Australia).

Antenatal class attendance

The study's exposure of interest was attendance at antenatal classes and type of classes attended. Multiple classes were available at the two hospitals, and in the community by a range of non-hospital providers (Table 1). Women chose which, if any class(es), to attend. Antenatal classes provided at each hospital usually incur a fee. Classes were held during the day, evening and/or weekend. We aimed to recruit 100 women doing no classes, and those attending each type of hospital antenatal class. As such, recruitment ceased at different times for different types of classes. However, in the end, recruitment was ceased prior to the anticipated number of women attending no antenatal classes being reached due to limited resources.

Education attendance was self-reported on both the pregnancy and postpartum survey; if women completed both surveys, only information from the postpartum survey was used. For women who attended two or more types of education, education

TABLE 1 Antenatal education at Royal Hospital For Women (RHW), St George Hospital (STG) and in the community

RHW			Cost
Having a Baby (HAB)	6 × 2.5 h or 2 × 8 h	Interactive, small group, comprehensive pregnancy, labour, birth, and parenting program aiming to prepare couples for this vital time in their childbearing years	$330 per couple
Calmbirth (CB)	2 × 6 h	CB strives to reframe birth and empower women to work with their bodies, their partners and caregivers to create the best birth, even if intervention is required. This skills-based program includes psychological and emotional preparation for childbirth and into the weeks of parenthood	**$550 per couple**
Birth Intensive	1 × 4 h	Labour and birth component of HAB but presented lecture-style, for those who are short of time or prefer to learn in a large group, with minimal time given to experiential learning	$135 per couple
Other	4 × 3.5 h	Motherhood Myths and Challenges, a specific stress management program for women only. Ideal for those with a history of anxiety and/or depression	Free
	1 × 1 h	Prenatal Yoga - an ideal preparatory exercise while pregnant, combining the building of strength with the opportunity to relax and let go	$22 per session
STG			
Having Your Baby	6 × 2 h	Similar to RHW's HAB program, just slightly shorter	$250 per couple
Active Birth	1 × 3 h	One session to support and help empower women to achieve a normal birth using active birth techniques	$80 per couple
Community			
She Births	2 × 7 h	Comprehensive labour and birth program that provides couples with a toolkit of skills to support them through pregnancy, labour and also parenthood	$797 per couple
Private classes	Variable lengths	Provided by independent educators and mainly focused just on labour and birth preparation	Variable cost

was categorised into a hierarchy ('She births' > 'Calmbirth' > 'Having a baby (STG or RHW)' > 'birth intensive' > midwife > other), and women were placed into the highest ranked class category reported. For analysis, education was then classified into four groups: psychoprophylaxis ('She births', 'Calmbirth'), birth and parenting ('Having a Baby at the RHW'; 'Having Your Baby' at STG, and other ('Birth intensive', midwife classes, 'Active Birth' at STG, other classes) or none.

Study outcomes

The main outcomes of the study were mode of birth, defined as vaginal birth versus caesarean section, use of regional analgesia (epidural, spinal, or combined epidural/spinal) among women having a vaginal birth during labour and birth, and maternal postnatal length of stay (≤3 or >4 days). Secondary outcomes included type of labour, perineal trauma, gestational age, birthweight, and infant feeding at discharge. These outcomes were defined using hospital maternity data. For women who did not consent to provide their hospital data, mode of birth and analgesia use were ascertained from self-reported responses on the postpartum survey. In addition, self-reported satisfaction with birth (five-point Likert scale) measured on the postpartum survey, was also examined with responses dichotomised as satisfied/very satisfied and neither satisfied or unsatisfied/unsatisfied/very unsatisfied.

Statistical methods

Descriptive statistics were used to explore socio-demographic characteristics of women by uptake and classified group of antenatal birth education attended. Pearson's χ^2 tests or Fisher's exact tests and Kruskal-Wallis tests were used to compare differences between socio-demographic characteristics and type of antenatal class group for categorical and continuous variables, respectively.

Multivariable logistic regression was used to examine the association between antenatal birth class attendance and mode of birth, use of regional analgesia among women having a vaginal birth during labour and birth, and maternal postnatal length of stay. Birth class attendance was examined by the four class groups as well as by any class attendance. Models were adjusted for potential confounding variables selected *a priori* including maternal age, body mass index, gestational age, model of antenatal care, and birth hospital. For regional analgesia, we also assessed findings for women without labour and those without emergency or elective caesarean section, respectively. Due to differences between birth populations at the two hospitals, an additional sensitivity analysis was conducted excluding women delivering at B hospital. All analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC, USA) and *P*-values <0.05 were considered statistically significant.

Ethics approval was obtained from the South Eastern Sydney Local Health District Human Research Ethics Committee (Ref no: 17/090 (LNR/17/POWH/198)) with site-specific approval for both sites.

RESULTS

Overall, 723 eligible women completed the antenatal survey, and 505 women (69.9%) with birth data were included in this study (Fig. 1). Demographic characteristics are presented in Table 2. Three-quarters (78%) of all women were tertiary educated. Most women surveyed (89%) attended antenatal education, with 23% attending psychoprophylaxis, 39% birth and parenting and 26% other education. The socio-demographic characteristics of women differed by type of antenatal education attended (all $P < 0.02$), with women not attending classes less likely to be born in Australia/New Zealand, have care in a midwifery group practice, and had lower income and education levels compared to those attending classes.

The median gestation at birth was 39 weeks with a median birthweight of 3385 g (Table 3). Seventy percent of women had a vaginal birth (42% unassisted, 28% instrumental birth) and 30% had a caesarean section, with just over half (56%) having regional analgesia. There was a difference in the type of labour, mode of birth, perineal trauma, gestational age and infant birthweight by type of antenatal education attended, but no difference in infant feeding at discharge (Table 3). Specifically, a higher proportion of women who attended psychoprophylaxis education had a vaginal birth (79%) compared with women who attended birth and parenting, other or no education (69%, 67%, 60%, respectively $P = 0.045$). Compared with women who did not attend antenatal education, women who attended psychoprophylaxis education were more than twice as likely to have a vaginal birth (odds ratio (OR) 2.54, 95% CI 1.28–5.07). However, after adjusting for maternal characteristics, birth and hospital factors, the

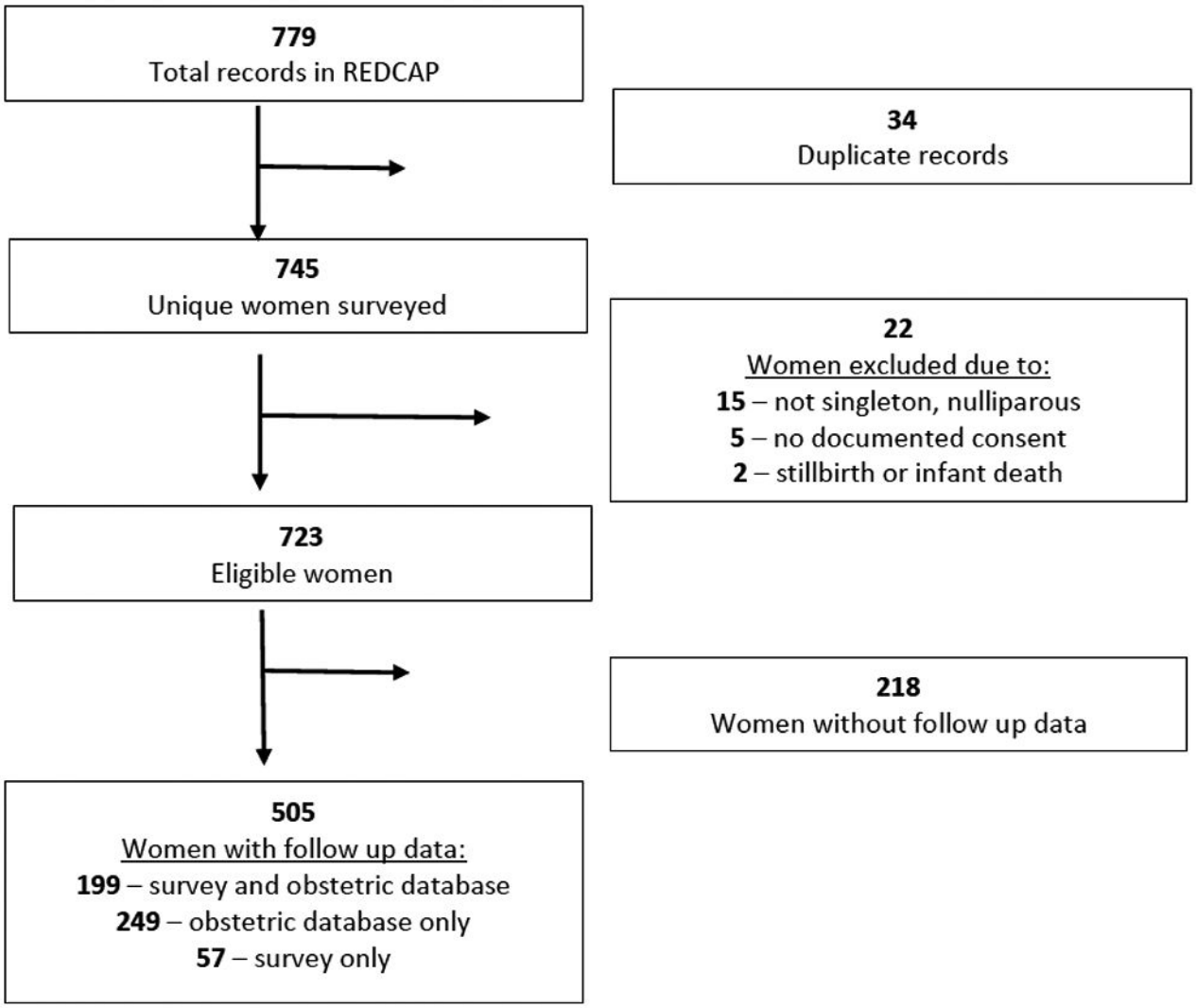

FIGURE 1 Flowchart of the participants in the study.

TABLE 2 Patient demographics by type of antenatal education attendance (*N* = 505)

	Psychoprophylaxis (*n* = 119, 23.4%)		Parenting (*n* = 198, 39.2%)		Other (*n* = 131, 25.9%)		None (*n* = 57, 11.3%)		Total (*n* = 505)		
Characteristics	***n***	**% or (IQR)[†]**	***n***	**% or (IQR)[†]**	***n***	**% or (IQR)[†]**	***n***	**% or (IQR)[†]**	***n***	**% or (IQR)[†]**	***P*-value**
Hospital											<0.001
Royal Hospital for Women	113	95.0	148	74.8	119	90.8	39	68.4	419	83.0	
St George Hospital	6	5.0	50	25.3	12	9.2	18	31.6	86	17.0	
Maternal age											0.067
Median, (IQR) years	33	(31–35)	32	(29–35)	32	(29–35)	31	(28–35)	32	(29–35)	
Body mass index											0.408
Median, (IQR) kg/m^2	22.6	(20.8–24.1)	22.7	(20.7–25.0)	22.7	(20.7–25.2)	23.6	(20.7–25.2)	22.7	(20.7–24.8)	
Model of care											<0.001
GP shared care	60	50.4	126	63.6	79	60.3	24	42.1	289	57.2	
Midwifery group	48	40.3	31	15.7	25	19.1	8	14.0	112	22.2	
Other models	11	9.2	41	20.7	27	20.6	25	43.9	104	20.6	
Country of birth											<0.001
Australia/New Zealand	63	52.9	79	39.9	55	42.0	22	38.6	219	43.4	
UK/Ireland	26	21.9	40	20.2	23	17.6	2	3.5	91	18.0	
Americas	7	5.9	20	10.1	8	6.1	4	7.0	39	7.7	
Asia/Pacific	6	5.0	32	16.2	28	21.4	24	42.1	90	17.8	
Europe/Russia	12	10.1	20	10.1	12	9.2	4	7.0	48	9.5	
Middle East/Africa	5	4.2	6	3.0	4	3.1	1	1.8	16	3.2	
Income											<0.001
<$50 000	4	3.4	9	4.6	14	10.7	11	19.3	38	7.5	
$50–80 000	5	4.2	22	11.1	18	13.7	15	26.3	60	11.9	
$81–125 000	15	12.6	39	19.7	24	18.3	4	7.0	82	16.2	
>$125 000	81	68.1	106	53.5	57	43.5	16	28.1	260	51.5	
Prefer not to say	14	11.8	22	11.1	17	13.0	11	19.3	64	12.7	
Education											0.024
≤Year 12	4	3.4	6	3.0	8	6.1	9	15.8	27	5.4	
Trade/diploma	15	12.6	37	18.7	21	16.0	9	15.8	82	16.2	
Undergraduate	47	39.5	67	33.8	51	38.9	20	35.1	185	36.6	
Postgraduate	53	44.5	87	43.9	49	37.4	19	33.3	208	41.2	
Language spoken											<0.001
English	112	94.1	157	79.3	109	83.2	37	64.9	415	82.2	

Sums of categories may not equal totals due to missing values. *P*-values from Pearson's χ^2 and Kruskal-Wallis tests as appropriate. GP, general practitioner.

[†]Data with no bracket are %, data with bracket = interquartile range (IQR).

association was attenuated (adjusted OR (aOR) 2.03; 95% CI 0.93–4.43) (Table 4). There was no association between mode of birth and attendance at any antenatal class (aOR 1.42; 95% CI 0.74–2.71) and no difference in results when restricting analysis to women from A (Table 4). When comparing use of regional analgesia by antenatal education, women who attended psychoprophylaxis antenatal education were twice as likely not to have an epidural or spinal analgesia for birth than women who did not attend education (OR 2.04, 95% CI 1.01–4.11). However, this association was attenuated after adjusting for confounders (aOR 1.93; 95% CI 0.87–4.29) (Table 4). There was no difference in length of maternal stay by any or type of antenatal education attended. (Table 4). There was no overall difference in satisfaction with birth by type of antenatal class (*P* = 0.082) (Figure S1).

DISCUSSION

Women who attended psychoprophylaxis education were more likely to have a vaginal birth than a caesarean section compared to women who did not attend education. They were also less likely

TABLE 3 Birth outcomes by type of antenatal education attendance (*N* = 505)

Birth characteristics	Psychoprophylaxis (*n* = 119)		Parenting (*n* = 198)		Other (*n* = 131)		None (*n* = 57)		Total (*n* = 505)		*P*-value
	n	% or (IQR)[††]	*n*	% or (IQR)[††]	*n*	% or (IQR)[††]	*n*	% or (IQR)[††]	*n*	% or (IQR)[††]	
Type of labour											0.001
Spontaneous	47	39.5	48	24.2	34	26	9	15.8	138	27.3	
Induction	45	37.8	102	51.5	58	44.3	36	63.2	241	47.7	
Spontaneous	25	21	32	16.2	23	17.6	6	10.5	86	17	
Augmented											
No labour	2	1.7	16	8.1	15	11.5	5	8.8	38	7.5	
Mode of birth											0.045
Vaginal birth	94	79	137	69.2	88	67.2	34	59.7	353	69.9	
Caesarean section	25	21	61	30.8	43	32.8	23	40.4	152	30.1	
Analgesia[†]											0.095
Epidural/spinal	42	44.7	86	63.2	49	55.7	19	55.9	196	55.7	
IM/IV narcotics or	34	36.2	40	29.4	26	29.6	11	32.4	111	31.5	
Nitrous oxide gas											
None	18	19.2	10	7.4	13	14.8	4	11.8	45	12.8	
Perineal trauma[‡]											0.002
3rd/4th	3	3.5	5	4.3	11	14.9	0	0	19	6.2	
Episiotomy, 1st/2nd	70	81.4	98	84.5	49	66.2	23	71.9	240	77.9	
Grazes/other	11	12.8	9	7.8	14	18.9	6	18.8	40	13.0	
None	2	2.3	4	3.5	0	0.0	3	9.4	9	2.9	
Gestational age, weeks											0.001
Median (IQR)	40	(39–40)	39	(39–40)	39	(39–40)	39	(37–40)	39	(39–40)	
Birthweight, g											0.019
Median (IQR)	3450	(3160–3700)	3383	(3020–3765)	3400	(3140–3700)	3175	(2950–3500)	3,385	(3080–3695)	
Postpartum LOS, days											0.369
Median (IQR)	2	(1.0–3.0)	2	(2.0–3.0)	3	(2.0–4.0)	2	(2.0–3.0)	2	(2.0–3.0)	
Infant feeding at discharge[§]											0.138
Breastmilk only	90	82.6	120	70.6	85	73.9	35	64.8	330	73.7	
Infant formula	7	6.4	23	13.5	9	7.8	7	13	46	10.3	
Not reported	12	11	27	15.9	21	18.3	12	22.2	72	16.1	

Sums of categories may not equal totals due to missing values.
P-values from Pearson's χ^2 and Kruskal-Wallis tests as appropriate.
IM, intramuscular; IQR, interquartile range; IV, intravenous; LOS, length of stay.
[†]Pain management for patients with a normal vaginal or instrumental birth (*n* = 352). One woman excluded who received general anaesthesia.
[‡]Only for patients with a normal vaginal or instrumental birth and information available from maternity database (*n* = 308).
[§]Information only available from maternity database (*n* = 448).
[††]Data with no bracket is %, data with bracket = IQR.

to have regional anaesthesia for birth. However, after adjusting for confounders, these associations were attenuated, likely due to small numbers.

This reduction in caesarean section and regional anaesthesia rates in women who attended psychoprophylaxis education is similar to findings reported in a recent randomised trial.[11] In that

TABLE 4 Odds of vaginal birth, epidural/ spinal anaesthetic and LOS more than four days by type of antenatal education attended, unadjusted and adjusted for maternal and hospital characteristics

Type of antenatal education	Vaginal birth[†] (*n* = 353) *n* (%)	Caesarean section (*n* = 152) *n* (%)	OR (unadjusted)	OR (adjusted)[§]
Education - four groups				
Psychoprophylaxis (*n* = 119)	94 (79.0)	25 (21.0)	2.54 (1.28–5.07)	2.03 (0.93–4.43)
Parenting (*n* = 198)	137 (69.2)	61 (30.8)	1.52 (0.83–2.79)	1.36 (0.69–2.71)
Other (*n* = 131)	88 (67.2)	43 (32.8)	1.38 (0.73–2.63)	1.16 (0.56–2.40)
None (*n* = 57)	34 (59.6)	23 (40.4)	1.00 (Reference)	1.00 (Reference)
Education - any/none				
Any (*n* = 448)	319 (71.2)	129 (28.8)	1.67 (0.95–2.95)	1.42 (0.74–2.71)
None (*n* = 57)	34 (59.6)	23 (40.4)	1.00 (Reference)	1.00 (Reference)
Royal Hospital for Women - four groups				
Psychoprophylaxis (*n* = 113)	91 (80.5)	22 (19.5)	1.63 (0.70–3.76)	1.54 (0.60–3.94)
Parenting (*n* = 148)	103 (69.5)	45 (30.4)	0.90 (0.41–1.96)	0.83 (0.34–1.99)
Other (*n* = 119)	82 (68.9)	37 (31.1)	0.87 (0.39–1.93)	0.84 (0.35–2.06)
None (*n* = 39)	28 (71.8)	11 (28.2)	1.00 (Reference)	1.00 (Reference)
	No epidural/spinal[‡] (*n* = 159) *n* (%)	**Epidural/spinal (*n* = 301) *n* (%)**		
Education - four groups				
Psychoprophylaxis (*n* = 115)	52 (45.2)	63 (54.8)	2.04 (1.01–4.11)	1.93 (0.87–4.29)
Parenting (*n* = 180)	53 (29.4)	127 (70.6)	1.03 (0.52–2.03)	1.03 (0.48–2.22)
Other (*n* = 113)	39 (34.5)	74 (65.5)	1.30 (0.64–2.66)	1.19 (0.53–2.65)
None (*n* = 52)	15 (28.8)	37 (71.2)	1.00 (Reference)	1.00 (Reference)
Education - any/none				
Any (*n* = 408)	144 (35.3)	264 (64.7)	1.35 (0.71–2.54)	1.27 (0.62–2.61)
None (*n* = 52)	15 (28.8)	37 (71.2)	1.00 (Reference)	1.00 (Reference)
Royal Hospital for Women - four groups				
Psychoprophylaxis (*n* = 110)	49 (44.5)	61 (55.5)	1.61 (0.73–3.53)	2.16 (0.81–5.77)
Parenting (*n* = 133)	46 (34.6)	87 (65.4)	1.06 (0.49–2.31)	1.34 (0.52–3.49)
Other (*n* = 104)	38 (36.5)	66 (63.5)	1.15 (0.52–2.56)	1.24 (0.47–3.26)
None (*n* = 36)	12 (33.3)	24 (66.7)	1.00 (Reference)	1.00 (Reference)
	≤3 days postpartum LOS (*n* = 351) *n* (%)	**Four or more days postpartum LOS (*n* = 95) *n* (%)**		
Education - four groups				
Psychoprophylaxis (*n* = 108)	87 (80.6)	21 (19.4)	1.35 (0.61–2.96)	1.22 (0.50–2.94)
Parenting (*n* = 170)	139 (81.8)	31 (18.2)	1.46 (0.70–3.05)	1.30 (0.58–2.93)
Other (*n* = 115)	85 (73.9)	30 (26.1)	0.92 (0.43–1.95)	0.91 (0.39–2.11)
None (*n* = 53)	40 (75.5)	13 (24.5)	1.00 (Reference)	1.00 (Reference)
Education - any/none				
Any (*n* = 393)	311 (79.1)	82 (20.9)	1.23 (0.63–2.41)	1.15 (0.54–2.43)
None (*n* = 53)	40 (75.5)	13 (24.5)	1.00 (Reference)	1.00 (Reference)

(Continues)

TABLE 4 (Continued)

Type of antenatal education	Vaginal birth[†] (*n* = 353) *n* (%)	Caesarean section (*n* = 152) *n* (%)	OR (unadjusted)	OR (adjusted)[§]
Royal Hospital for Women - four groups				
Psychoprophylaxis (*n* = 104)	84 (80.8)	20 (19.2)	1.62 (0.67–3.88)	1.35 (0.52–3.53)
Parenting (*n* = 127)	101 (79.5)	26 (20.5)	1.49 (0.64–3.49)	1.44 (0.57–3.64)
Other (*n* = 105)	77 (73.3)	28 (26.7)	1.06 (0.45–2.47)	1.03 (0.41–2.61)
None (*n* = 36)	26 (72.2)	10 (27.8)	1.00 (Reference)	1.00 (Reference)

LOS, length of stay; OR, odds ratio.
[†]Vaginal birth includes instrumental vaginal birth and spontaneous vaginal birth.
[‡]Elective caesarean sections excluded.
[§]Adjusted for maternal body mass index, maternal age, model of care, gestational age, and hospital.

study women were randomised to either a two-day program that included acupressure, relaxation, visualisation, breathing, massage, yoga techniques including partner support and standard care, or standard care alone. They found a reduction in caesarean section from 32.5 to 18% (RR 0.52, 95% CI 0.31–0.87) and a reduction in the rate of epidural (from 69 to 24%, RR 0.35, 95% CI 0.23–0.52).[11] Psychoprophylaxis antenatal education aims to prepare women and their partners for childbirth through education on physiological/ hormonal birth; build women's confidence in their ability to labour and give birth through psychological preparation for normal labour (positive mindset) and support their ability to give birth without pain relief using evidence-based tools for birth preparation.[12] A recently published Cochrane review found acupuncture may increase satisfaction with pain relief compared to sham acupuncture, and probably reduces the use of pharmacological analgesia; however, there was no difference in caesarean section.[13] Acupressure compared to a sham control was associated with a reduction in caesarean section rate (RR 0.44, 95% CI 0.27–0.71, four trials, 313 women). However, many studies included in the meta-analysis were at high or unclear risk of bias. A further Cochrane review compared relaxation methods, yoga, music and mindfulness, on pain management in labour, found the use of some relaxation therapies, yoga, or music may possibly be helpful with reducing the intensity of pain, and in helping women feel more in control and satisfied with their labours; however, findings were limited by the low-quality studies.[14] A protocol for an individual participant meta-analysis on types of birth classes has recently been published, and studies are planned to evaluate the effectiveness of a new low-cost psychoprophylaxis child birth education program on caesarean section rates.[12]

Studies have found that not only do the content and format of antenatal classes differ widely, but also there is a lack of evidence-based guidelines about what and how education should be offered. One study found no difference in epidural analgesia rates or obstetric interventions with small group antenatal education compared to auditorium standard lectures.[15] Paz-Pascual used Delphi methodology to survey health professionals and non-health professionals to identify topics which should be included in antenatal education programs.[16] They found there was consensus on content items, including: care during the initiation and establishment of breastfeeding; information for shared decision-making with regard to childbirth; identification of problems in the postpartum period and coping tools; advice about healthy lifestyle; and information on options for pain management during labour and birth.[16]

Given the rates of increasing obstetric intervention including caesarean section in Australia and other countries and the high costs of caesarean section to the health service and government,[17] implementation of universal free antenatal education to nulliparous women could contribute to a reduction in associated costs. An economic analysis of the study by Levett et al found that an effective antenatal education program could lead to cost savings of $659 per woman in Australia.[18] Further research needs to determine whether antenatal education leads to differences in obstetric interventions, but also the cost effectiveness of antenatal education interventions in a range of populations. In addition, during COVID19 lockdowns, antenatal education moved online; however, it has now moved back to face-to-face or a hybrid model. It is not known whether there are any differences with face-to-face education compared to online models.

The strengths of this study include the prospective design, that it was conducted in two hospitals with a multicultural population, in nulliparous women. Nulliparous women were included as the mode of first birth strongly influences subsequent births, and if education leads to improved outcomes, then nulliparous women have the most to gain. We included women who attended a range of different types of antenatal education or no education and used both survey data and routinely collected data to obtain obstetric outcomes. Limitations of the study included the low response rate to the postnatal survey, although we obtained birth outcome data from both survey and hospital data. In addition, we do not know whether women who chose certain types of antenatal education were more motivated to have a vaginal birth than women who went to other types of education or to women who did not attend education. Unanticipated staffing problems

led to closing of the study without the targeted sample size being obtained. In addition, the women in the study were highly educated compared to the general population.

In conclusion we found nulliparous women who attended psychoprophylaxis couple-based antenatal education programs had a trend toward higher rates of vaginal birth and lower rates of epidural use. Given the high and rising rates of caesarean section and impact on costs and maternal health outcomes, antenatal education may provide an effective strategy to reduce these. Future high-quality randomised trials in a broader range of populations comparing different types of antenatal education without economic barriers to attendance, are required to determine whether psychoprophylaxis education can improve obstetric outcomes.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Figure S1. Maternal satisfaction with birth by type of antenatal education.

Appendix S1. Antenatal classes pregnancy survey.