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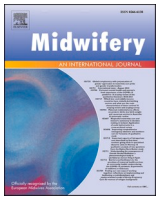

The effect of antenatal hypnosis training on pharmacological analgesia use during labour and birth: A systematic review and meta-analysis

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ABSTRACT

Background: The use of hypnosis as a means of pain management during labour is becoming increasingly popular. While recent reviews have reported on pain perception, relaxation and other psychological benefits the impact of hypnosis on the use of pharmacological analgesia use has not been specifically examined.
Question: For women in labour at term, does antenatal hypnosis instruction compared to no instruction result in decreased use of pharmacological analgesia and influence maternal and infant birth outcomes.
Methods: Databases such as PubMed, CINAHL, Cochrane Central Register of Controlled Trials and Embase were searched with dates ranging from 1947-2024. We included randomised controlled trials (RCTs) that compared antenatal hypnosis training to no hypnosis control groups, published in English and reported on pharmacological analgesia use. The Cochrane's Risk of Bias 2 for RCTs was used to assess design quality. Study selection, quality assessment, data extraction and analysis were undertaken by two independent researchers.
Findings: Six RCTs met the inclusion criteria (n=2937). The use of hypnosis did not result in a significant reduction in the risk of epidural use (RR. 0.79 95% CI 0.39-1.61) or other forms of pharmacological analgesia. Factors such as blinding of care providers to the participants allocated group may have reduced the chances of successful use of hypnosis. Variations in the presentation of hypnosis between studies may also impact on outcomes.
Discussion and Conclusion: This review reports no effect on the use of pharmacological analgesia in women trained in hypnosis antenatally compared with those who were not. Our review does highlight several RCT design characteristics that could impact on the measurement and analysis of the use and efficacy of hypnosis.

Introduction

It has long been recognised that the ideal analgesic for the management of labour and birth pain is one that is safe for both mother and baby and does not alter the normal physiology of labour (Kroger and DeLee, 1943). Whilst several pharmacological pain relief options are currently available, many have unpleasant or potentially harmful side-effects, and may negatively impact on the normal physiology of labour and extra-uterine transition for the newborn. For example, morphine, crosses the placenta and can sedate the fetus causing breathing difficulties at birth (Smith et al., 2018); nitrous oxide gas frequently causes nausea and dizziness (Vallejo and Zakowski, 2019); and epidurals are strongly associated with maternal fever, prolonged labour and assisted vaginal births in nulliparous women (Newnham et al., 2021). Furthermore, these pharmacological agents are largely incompatible with other non-pharmacological pain relieving strategies such as warm water immersion and upright positions during labour (Cluett et al., 2018; Lawrence et al., 2013). However, there is also a clear demand from labouring women for effective analgesia during labour and birth. In Australia, approximately 80% of labouring women used some form of pharmacological analgesia with 46 % of women utilising neuraxial analgesia such as epidurals, 52% nitrous oxide gas and 11% opioids.(Australian Institute of Health Welfare, 2023) Similar rates have been reported in other developed health systems (Seijmonsbergen-Schermers et al., 2020).

DeLee and Greenhill (1939) stated that "the only anaesthetic that is without danger is hypnotism" .(p164). James Braid (1899), a Scottish surgeon, first coined the term 'hypnosis' in 1841 and found that

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trance-like states could be induced by holding a bright object in front of (slightly above) the person. The use of hypnosis in surgery is well documented. Sampimon and Woodruff (1946) performed 29 surgical and dental operations successfully under hypnosis while in a prisoner of war camp in Singapore during the Japanese occupation.(Sampimon and Woodruff, 1946) Historically, in obstetrics Schulz-Rhonof in 1922 reported successful analgesia in 70 of 79 labouring women (Michael, 1952). Similarly Michael reported 23 of 30 women had "painless labours" following training in hypnosis (Michael, 1952, p. 736).

The hypnotic state can be guided by a person such as a clinical hypnotherapist, referred to as hetero-hypnosis or entered into independently (self-guided or self-hypnosis). Often the actual process is a combination of both hetero and self-hypnosis (Eason and Parris, 2024). It is commonly argued that there is no real difference between the two approaches as both require the voluntary participation of the self (Eason and Parris, 2024). Hypnosis can be defined as a state of intense, responsive and attentive concentration characterised by a perceptual shift of awareness (Cosmi, 1995). Hypnosis can also block the somatic and autonomic pathways which transmit the afferent pain impulses (Kroger and DeLee, 1943) The depth of hypnotic state has also been linked to the production of oxytocin (Bryant and Hung, 2013) which is excreted in abundance during labour and birth (Uvnäs-Moberg et al., 2019). The ability of women to instinctively achieve a focused and withdrawn state during labour has been described in qualitative research (Karlsdottir et al., 2014). This suggests that labour and birth is a state that would lend itself to the successful utilisation of hypnosis in pain management.

Recent reviews analysed the relationship between antenatal hypnosis training and psychological outcomes and birth experiences for women (Catsaros and Wendland, 2020, 2023; Gueguen et al., 2021). A number of randomised trials reported pharmacological analgesia, specifically epidural use as their primary outcome (Cyna et al., 2013; Downe et al., 2015; Freeman et al., 1986; Werner et al., 2013). This systematic review and meta-analysis explores whether hypnosis training in the antenatal period affects rates of pharmacological use in labour and any potential influence on birth outcomes for the mother and baby.

Methods

This review aimed to determine if antenatal hypnosis instruction compared to no instruction results in a decreased use of pharmacological analgesia, for women in labour at term gestation. A prospective protocol was prepared according to the preferred reporting items for systematic review and meta-analysis (PRISMA) guidelines (Page et al., 2021) and registered with the PROSPERO (CRD42023445935).

Eligibility criteria

Studies were eligible for inclusion in the review if they were randomised controlled trials (RCTs) that investigated hypnosis training provided to birthing women during the antenatal period compared to control groups receiving either standard antenatal education or other interventions that did not include exposure to hypnosis training. Study protocols, commentaries, and other non-RCT study designs were excluded along with publications not available in English. In keeping with the review objective only the studies that reported on pharmacological analgesia use were included.

Search strategy

Searches were undertaken on the 5th of January 2024. Key search terms such as ("hypnosis"[MeSH Terms], "hypnosis"], "hypnotism", "hypnotically "parturition"[MeSH Terms],"parturition, "childbirth", "childbirths" "birth s" "birthed" "birthing","labor pain"[MeSH Terms] "labour" were entered into the PubMed database. These were then adapted and entered into databases, Cochrane Central Register of Controlled Trials, CINAHL and, Embase to expand the search results (Supplementary file 1). Hand-searching of reference list and citations of articles of interest was undertaken to identify any studies not included in the database search. Results were uploaded into Covidence systematic review software (Veritas Health Innovation, Melbourne, Australia. www.covidence.org) and duplicates removed.

The titles and abstracts of retrieved studies were independently reviewed for inclusion by two authors (YKL and MW) based on the predescribed inclusion criteria with any discrepancies reviewed by a third author (NL) and resolved by consensus. Studies that appeared to be potential RCTs with a focus on hypnosis and analgesia during childbirth were included in the full text review, which was completed using the same process of individual review and group conflict resolution.

Risk of bias assessment and data extraction

The risk-of- bias for our chosen studies was assessed using the Revised Cochrane risk-of-bias tool (ROB 2 version date 15 March 2019) for randomised trials. Bias was evaluated based on five domains: (1) the randomisation process; (2) deviations from the intended interventions; (3) missing outcome data; (4) measurement of the outcome; and (5) selection of the reported result. The overall risk of bias is determined as 'low risk', some concerns, or 'high risk. The process of the risk-of-bias review was conducted by two reviewers and all discrepancies were resolved during a group discussion with a third author.

The primary outcome for this review is the number of women receiving/not receiving epidural. Secondary outcomes consisted of use of opioids, inhalation analgesia, experiencing spontaneous vaginal birth, assisted vaginal birth, caesarean section, admission to Special or Intensive Care Nursery. Original data relating to the aforementioned variables of interest was extracted independently from each eligible study without modification by two authors (YKL and MW) using a spreadsheet designed specifically for the purpose. Data was then checked for consistency and any errors resolved.

Study authors were contacted for additional data and/or clarification as necessary. The authors Downe et al., (2015) provided unpublished data that was included in the meta-analysis.

Data analysis

Two authors (YKL and MW) completed the data analysis independently. All studies were included in the narrative review. Where available data was extracted for inclusion in the meta-analysis with outcome assessment based on the original allocation and randomisation process. Meta-analysis were undertaken using Meta Mar; Meta Analysis Calculator (Beheshti et al., 2020).

The I^2 statistics were calculated to determine the heterogeneity of the included studies. This demonstrates the percentage of outcome variation that is due to heterogeneity rather than chance. We defined heterogeneity based on an I^2 value of >50%. A random effects model based on Hartung-Knapp adjustment was used if the level of heterogeneity was >50%. Where the I^2 was <50% a fixed-effects model was used. The summary of the findings are represented as a Relative Risk (RR) with 95% Confidence Interval.

Results

Study selection

The PRISMA flow diagram (Fig. 1) illustrates the process of retrieving the relevant articles. The search strategy identified 1347 records. Following deduplication (n=67) 1283 were screened independently by two authors. After screening the title and abstract of each record, 1248 records were excluded. Full text articles were not available for three studies due to the age and origin of the journals therefore the review retrieved 32 studies which were assessed for eligibility. A further

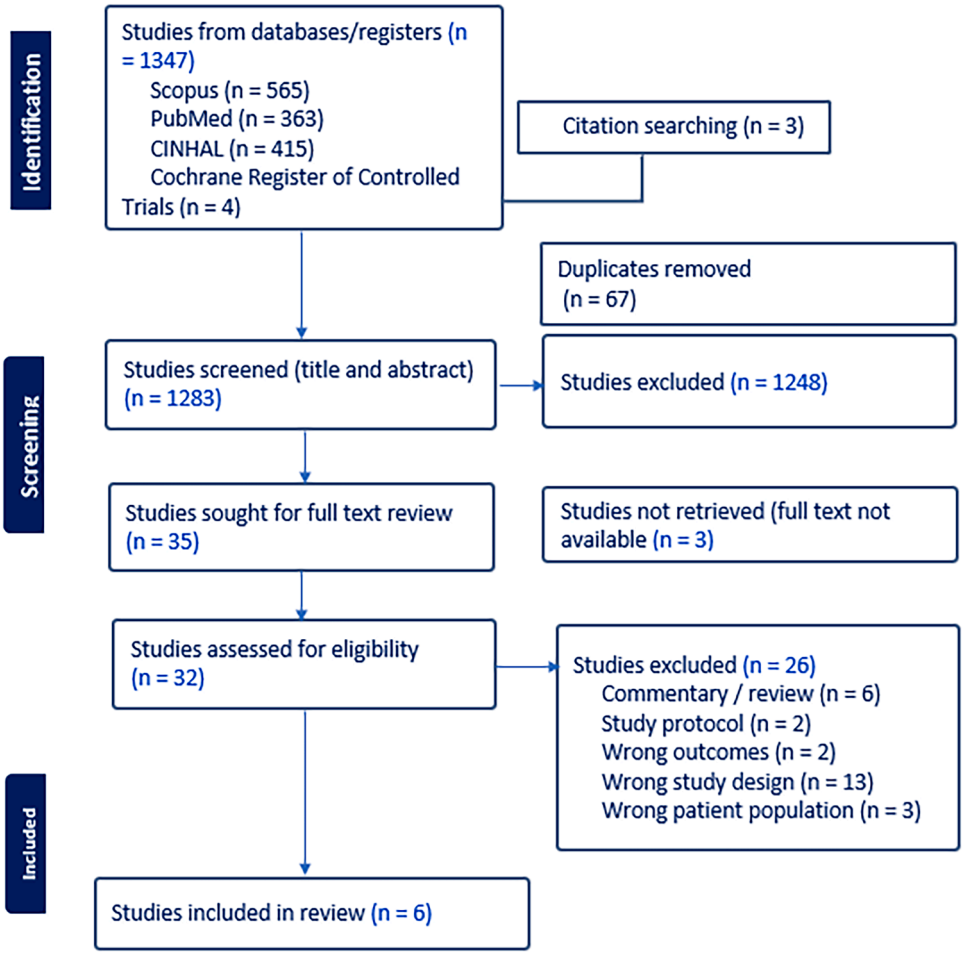

Fig. 1. Fig. 1 PRISMA flow chart of study selection.

26 were excluded for reasons such as, absence of required outcomes and excluded study design.

Risk of bias of included studies

Six studies met the inclusion criteria and were included in this systematic review (Cyna et al., 2013; Downe et al., 2015; Freeman et al., 1986; Harmon and Hynam, 1990; Mehl-Madrona, 2004; Werner et al., 2013). The trial by Werner et al. reported outcomes across two publications (Werner et al., 2013, 2013) however we considered these as one study. In all but one of the included studies, blinding of the participants and clinicians were not undertaken due to the nature of the intervention. In the study by Harmon et al. participants in both the hypnosis and control groups were informed that they would be undertaking "additional specialised childbirth training" to blind those in the control group to the purpose of the training (Harmon and Hynam, 1990, p. 526).

Allocation concealment using a computer system which randomly allocated the participants in either the control or intervention group was described in three studies (Cyna et al., 2013; Downe et al., 2015; Werner et al., 2013). In three studies the processes of allocation concealment were not described (Freeman et al., 1986; Harmon and Hynam, 1990; Mehl-Madrona, 2004).

The clinicians providing labour care and collecting data were blinded in three studies (Cyna et al., 2013; Downe et al., 2015; Werner et al., 2013). Blinding of clinicians and assessors was not described in three studies (Freeman et al., 1986; Harmon and Hynam, 1990; Mehl-Madrona, 2004).

Potential deviations from the intended treatment were reported in three studies (Cyna et al., 2013; Downe et al., 2015; Werner et al., 2013). In the study by Cyna et al. 3.9% (n=17) of the total participants attended hypnosis training outside of the trial (hypnosis group n=2/154, CD only n=7/143, control group n=8/151) (Cyna et al., 2013). Downe et al. reported that 9.4% (n=20/216) of the women in the control group reported using hypnosis in labour (Downe et al., 2015). In the Werner et al., (2013), approximately 59% of women attended antenatal training from private providers, though it is unclear if this also included hypnosis.

All studies were at low risk for missing data. Overall, the risk of bias for included studies was assessed as moderate (Fig. 2).

Study characteristics

Data were included on 2937 participants from six RCTs, of which 1253 women were in the hypnosis group and 1,621 women were allocated to either second intervention group (n=627) or a no hypnosis control group (n=997). In one study, group allocation of the 60 participants was not described.(Harmon and Hynam, 1990).

The characteristics of the six included studies are described in Table 1. All studies stated they recruited participants with a low-risk pregnancy. However, low risk was not defined explicitly within any of the included studies. Two trials indicated that they may have included women at risk of birth complications and borderline hypertension (Harmon and Hynam, 1990; Mehl-Madrona, 2004).

The timing at which the participants were recruited differed between studies. The women in Cyna et al's study were enrolled from 34-39 weeks gestation (Cyna et al., 2013), and 27-32 gestation weeks in

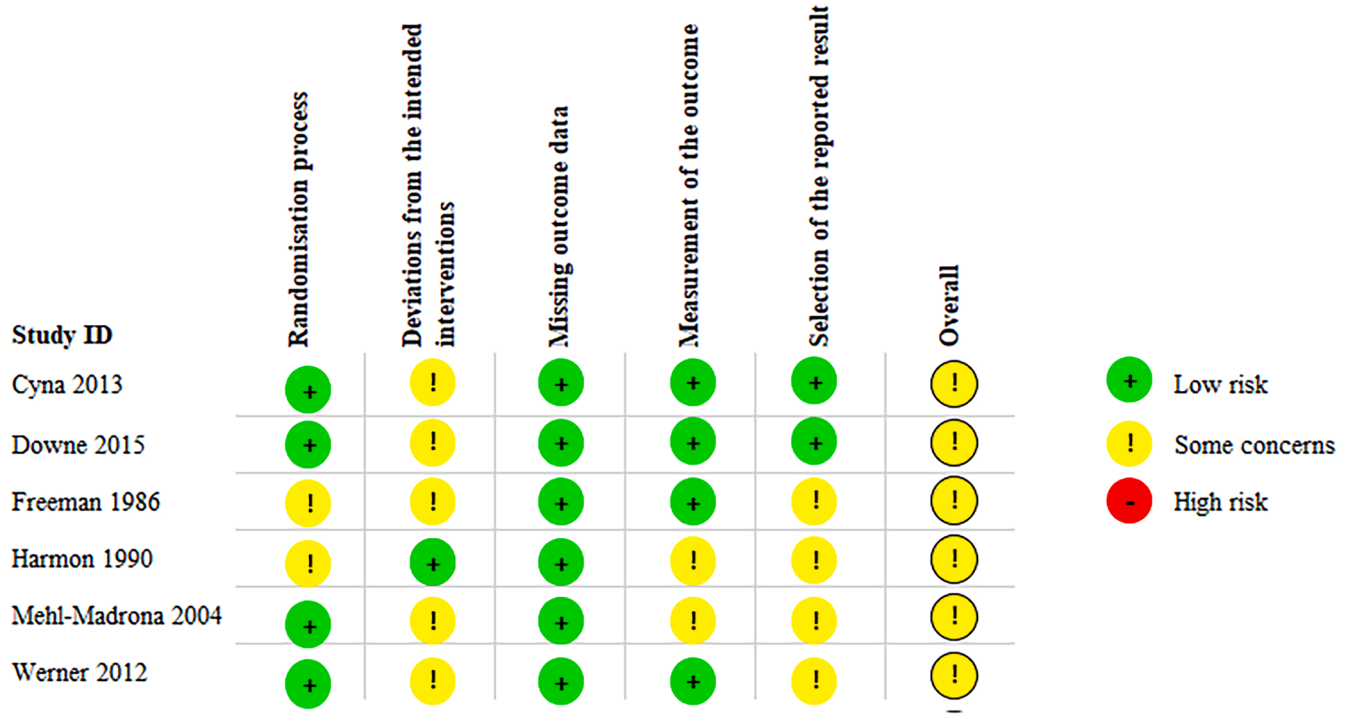

Fig. 2. Risk of bias assessment.

Downe et al., (2015). Mehl-Madrona only recruited women in their first or second trimester as the author was concerned that women who were recruited in the third trimester may not attend sufficient hypnosis sessions to enhance their birth process (Mehl-Madrona, 2004). In the study conducted by Freeman et al., (1986)), all women were instucted to attend weekly hypnosis sessions from 32 weeks. One study only recruited women who were at the end of their second trimester (27 weeks) (Harmon and Hynam, 1990), while another study recruited women after 19 weeks.(Werner et al., 2013)

In four studies the control group consisted of standard antenatal care (Cyna et al., 2013; Downe et al., 2015; Freeman et al., 1986; Werner et al., 2013). In the study by Mehl-Madrona the control group received supportive psychological therapy and the authors describe a non-randomised baseline group selected from external clinics that were matched to the supportive psychotherapy group (Mehl-Madrona, 2004). Relaxation and breathing classes were provided to the control group in the study by Harmon et al., (1990) Two studies included a second intervention group. In the study by Cyna et al. one group were provided with a hypnosis script CD-ROM with instructions for use provided by a midwife not trained in hypnosis (Cyna et al., 2013). While Werner et al. included a group instructed in relaxation and mindfulness techniques provided by the same midwives instructing the hypnosis group (Werner et al., 2013).

Considerable variation existed in the way the intervention was implemented across the studies. Two studies, Downe et al. and Werner et al. adapted the hypnosis program and scripts designed by Cyna et al. In two studies the hypnosis sessions were conducted by physicians trained as clinical hypnotherapists (Cyna et al., 2013; Mehl-Madrona, 2004). Two further studies utilised midwives trained in hypnosis, in one study 15 midwives delivered the intervention (Downe et al., 2015) while in the other two midwives were used (Werner et al., 2013). One study employed a licenced clinical psychologist (Harmon and Hynam, 1990). Hypnosis sessions were provided in groups in four studies (Cyna et al., 2013; Downe et al., 2015; Harmon and Hynam, 1990; Werner et al., 2013) and individually in two trials (Freeman et al., 1986; Harmon and Hynam, 1990; Mehl-Madrona, 2004). Two studies provided three hypnosis training sessions (Cyna et al., 2013; Werner et al., 2013), and one used two 90 minute sessions (Downe et al., 2015). Sessions ranged from two to six in the study by Freeman et al., (1986), Harmon et al (1990) provided weekly sessions from 32 weeks onwards and in the study by Mehl-Madrona participants could attend as often as they preferred. (Mehl-Madrona, 2004) Four studies used audio recordings of hypnosis induction scripts provided to participants in the hypnosis groups (Cyna et al., 2013; Downe et al., 2015; Harmon and Hynam, 1990; Werner et al., 2013). All control groups received standard antenatal care. However this was only defined in one study consisting of a 12-week nuchal translucency scan, a 19- week anomaly scan, and 4-5 antenatal appointments (Werner et al., 2013).

Participant susceptibility to hypnosis was assessed in four studies (Cyna et al., 2013; Freeman et al., 1986; Harmon and Hynam, 1990; Werner et al., 2013) however differing methods were used. In the trial by Cyna et al. the Creative Imagination Scale was adapted and undertaken by all participants (Wilson and Barber, 1978). The Harvard group scale of hypnotic susceptibility was used by both Harmon for both groups and Werner et al. for the hypnosis group only, while Freeman et al. also assessed hypnosis participants with the Stanford hypnotic clinical scale (Morgan and Hilgard, 1978; Shor and Orne, 1962).

Intervention compliance in terms of attendance at the hypnosis sessions was reported in four of the six studies. Attendance ranged from 26% (Cyna et al., 2013) to 84-87% in the remaining three studies. (Downe et al., 2015; Freeman et al., 1986; Werner et al., 2013). Downe et al., (2015) also required participants in the hypnosis group to record their practise of hypnosis skills in a log, of which only 39% (135/343) were returned.

Meta-analysis

Five studies were included in the meta-analysis for epidural use (Cyna et al., 2013; Downe et al., 2015; Freeman et al., 1986; Mehl--Madrona, 2004; Werner et al., 2013). The analysis did not demonstrate a statistically significant difference in epidural use between groups (RR. 0.79 95% CI 0.39-1.61). Heterogeneity across the included trial was high (I^2=93%, p<0.01)) (Fig. 3). We conducted a sensitivity analysis excluding one trial with the highest degree of heterogeneity

Table 1
Characteristics of included studies.

Author, Year, Country	Sample Size	Inclusion Criteria	Exclusion Criteria	Intervention	Control	Primary outcome(s)
Freeman et al., 1986 United Kingdom	Total n=65 Intervention n=29 Control n=36	Normal Pregnancy (not defined) Nulliparity Desire to avoid epidural anaesthesia.	Not described	Individual one hour weekly hypnosis sessions from 32 weeks	Routine antenatal care.	Analgesia requirements
Harmon and Hynan, 1990 United States of America	Total n=60 Intervention: N= Not defined Control: N= Not defined	Nulliparous, 18-35 years of age	History of psychiatric hospitalisation, depression during pregnancy or obstetric risk (e.g. pre-eclampsia, diabetes)	Six one hour weekly sessions in groups of 15 Induction was performed by a licensed clinical psychologist who guided the hypnotic induction during session 1 Tape induction at the beginning of session 2-6 Daily practise with audio recordings encouraged	Six one hour weekly sessions in groups of 15 Given an audio recording of "Practice for Childbirth" and breathing techniques Listen to the control audio recording at the beginning of each treatment session Daily practise with audio recording encouraged	Lengths of Stage 1 and Stage 2 labour Apgar scores at 1 min and 5 min stratified by Minnesota Multiphasic Personality Inventory to measure hypnosis susceptibility
Mehl-Madrona, 2004 United States of America	Total n=520 Intervention: 260 Control: 260	First or Second Trimester Nulliparous or multiparous	High Risk Conditions Bona Fide Psychiatric Diagnoses Third Trimester	Hypnosis Conducted by the author (male therapist) Subjects could attend as often as they want	Supportive Psychotherapy Delivered by a female counsellor Subjects could attend as often as they want No contact controlled group (not included in randomisation)	Fear of Birth
Werner et al., 2012 + Werner et al., 2013 Denmark	Total n=1217 Intervention Hypnosis n=493 Intervention Relaxation n=494 Control Usual care group n=230	Low risk nulliparous women ≥ 18 years. At least 19 weeks' gestation. Speaks and understands Danish.	Pre-existing chronic diseases.	Group 1:Hypnosis group Three one-hour classes on self-hypnosis and three 2-minute audio recordings over three consecutive weeks. Facilitated by two midwives trained in hypnosis A 2.5-hour test of "hypnotic susceptibility" conducted in first session. Group 2: Relaxation group Three one-hour long antenatal classes on body awareness, relaxation, and mindfulness techniques. Taught by the same midwives Classes focused. Audio recordings were given for participants home practise.	Standard antenatal care.	(2012) Use of epidural analgesia. (2013) Duration of labour, birth complications, lactation success, caring for the child, and preferred future mode of delivery.
Cyna et al., 2013, Australia	Total n=400 Intervention Hypnosis + CD n=134 Intervention CD only n=133 Control n=133	Singleton nulliparous and multiparous women between 34-39 weeks' gestation.. Planning vaginal labour.	Abnormal presentation Pre-eclampsia Elective CS Previous use of hypnosis Post-randomisation: Failure to attend Hypnosis sessions	Group1: Hypnosis group. Routine antenatal classes combined with three group hypnosis sessions and CD-ROM on hypnosis. Sessions provided by a physician qualified in hypnosis. Group 2: Hypnosis group Listened to CD-ROM only administered by a 'nurse' not trained in hypnotherapy.	Routine weekly antenatal classes	Use of pharmacological analgesia during labour and childbirth
Downe et al., 2015 United Kingdom	Total n=672 Intervention Self-hypnosis training n=337 Control Usual care group) n=335	27-32 weeks' gestation Reads and understands English.	On medication for hypertension or psychological illnesses. Planned caesarean section.	Two 90-minute group sessions on self-hypnosis training, offered three weeks apart between 32 and 35 weeks' gestation 26-minute self-hypnosis CD_ROM for home practise	Standard antenatal care and classes	Use of epidural analgesia

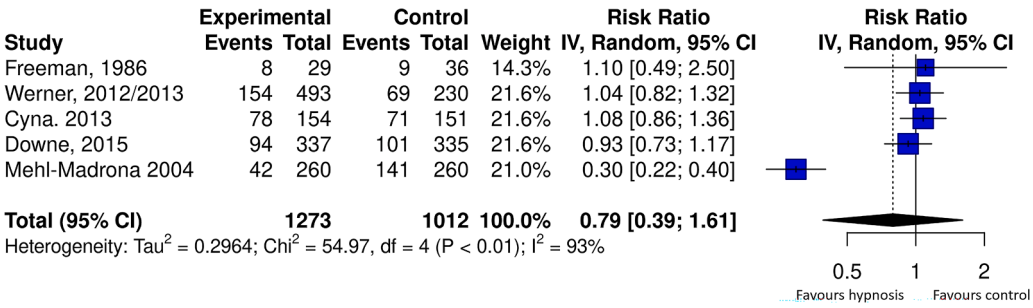

Fig. 3. Meta analysis of epidural use.

(Mehl-Madrona, 2004). The findings of this analysis did not alter the lack of statistical significance (RR1.02 95% CI 0.89-1.16) though the resulting heterogeneity was no longer significant (I^2=0% p=0.82). However, the study by Mehl-Madrona (2004) was the only trial to report a significant difference in risk of epidural favouring hypnosis (RR 0.30, 95% CI 0.22-0.40)

In the meta-analysis of available data extracted from the trials antenatal hypnosis training showed no statistically significant effect on the risk of opioid use, inhalation analgesia, assisted vaginal births (AVB), spontaneous vaginal births, caesarean section or admission to an intensive or special care nursery (Table 2). In the studies that reported on caesarean section rates the study by Mehl-Madrona was again the only study to record a significant reduction in risk (RR 0.42 95% CI 0.30-0.72) which contributed to the level of heterogeneity. The study by Harmon et al. was excluded from the meta-analysis as we were not able to determine the number of participants that had been allocated to the intervention and control groups and within the manuscript outcome data for pharmacological pain relief was presented as percentages (Harmon and Hynam, 1990). However, the authors did report a substantially lower percent of narcotic use in the hypnosis group compared to the control group, particularly in participants deemed to have a high susceptibility to hypnosis (7% vs 53%).

Discussion

This systematic review and meta-analysis compared training in hypnosis provided to women in the antenatal period to those who received no hypnosis training. Our review found that antenatal training in hypnosis did not reduce the proportion of women requesting an epidural during labour or use of other pharmacological analgesics such as opioids or inhalational agents. Mode of birth and neonatal admission to a special or intensive care unit also did not differ between groups. While the findings regarding pharmacological analgesia use do not differ from those presented in the 2016 Cochrane review (Madden et al., 2016), there were several trial design issues that may impact on the findings of the individual trials and independently contribute to the lack of difference between groups demonstrated in the meta-analysis.

In the three larger studies included in the meta-analysis the clinicians providing labour and birth care to participants were unaware if the woman had received antenatal hypnosis training, other intervention or control (Cyna et al., 2013; Downe et al., 2015; Werner et al., 2013). The blinding of assessors or clinicians involved in care is an important aspect of RCT design aimed at reducing bias. Knowledge or observation of the assigned intervention or control group may influence corresponding actions or assessment of clinicians that in turn may directly affect data measurements or influence the response by participants (Hróbjartsson et al., 2012). However, the degree of bias that can be predicted by or attributed to unblinded observers remains contentious (Hróbjartsson et al., 2012; Moustgaard et al., 2020). Studies have reported on the positive effect that the relationship between the woman and the midwife can have on the perception of labour pain and coping strategies. Particularly when the woman's birth plans and choices are known and the midwife is able to support individual strategies (Allen et al., 2017).

In a qualitative study involving participants in the trial by Downe et al women described how midwives, who were unaware of their participation in the hypnosis arm of the study, misinterpreted their seemingly relaxed approach to labour as lack of progress (Downe et al., 2015; Finlayson et al., 2015). The women commented on the stress they felt

Table 2
Meta-analysis of other pharmacological and birth outcomes.

Outcomes Hypnosis Vs Control	Cyna et al., 2013	Downe et al., 2015	Freeman et al., 1986	Mehl-Madrona, 2004	Werner et al. 2012/2013	Total	I^2 p value	RR (95% CI)
Opioids, n/N (%)	98/154 (63.6%) vs 85/151 (56.3%)	112/332 (33.7%) vs 119/321 (37.1%)	15/29 (51.7%) vs 20/36 (55.6%)	Not reported	Not reported	225/515 (43.7%) vs 224/508 (44.1%)	20%, p=0.27	FE, 1.02 [0.89;1.16]
Inhaled analgesia, n/N (%)	27/154 (17.5%) vs 30/151 (19.9%)	190/331 (57.4%) vs 190/322 (59.0%)	6/29 (20.7%) vs 7/36 (19.4%)	Not reported	Not reported	223/514 (43.4%) vs 227/509 (44.6%)	0%, p= 0.93	FE,0.97 [0.85;1.10]
Spontaneous vaginal birth, n/N (%)	85/154 (55.2%) vs 92/151 (60.9%)	171/337 (50.7%) vs 171/335 (51.0%)	24/29 (82.8%) vs 25/36 (69.4%)	Not reported	336/493 (68.2%) vs 157/230 (68.3%)	616/1013 (60.8%) vs 445/752 (59.2%)	0% p=0.46	FE, 1.00 [0.92;1.07]
Assisted vaginal birth, n/N (%)	31/154 (20.1%) vs 30/151 (19.9%)	78/337 (23.1%) vs 83/335 (24.8%)	5/29 (17.2%) vs 11/36 (30.6%)	Not reported	58/493 (11.8%) vs 36/230 (15.7%)	172/1013 (17.0%) vs 160/752 (21.3%)	0%, p=0.56	FE, 0.88 [0.72;1.07]
Caesarean section, n/N (%)	38/154 (24.7%) vs 29/151 (19.2%)	85/337 (25.2%) vs 78/335 (23.3%)	Not reported	25/260 (9.6%) vs 54/260 (20.8%)	99/493 (20.1%) vs 37/230 (16.1%)	247/1244 (19.9%) vs 198/976 (20.3%)	80%, p<0.01	RE, 0.96 [0.89;2.03]
Admission to ICN/SCN n/N (%)	53/154 (34.4%) vs 51/151 (33.8%)	16/337 (4.7%) vs 17/332 (5.1%)	Not reported	Not reported	67/493 (13.6%) vs 9/230 (3.9%)	136/984 (13.8%) vs 77/713 (10.8%)	82%, p<0.01	RE, 1.45 [-0.24;8.67]

RR = Relative risk; FE= fixed effects model; RE= random effects model.

with this conflict. Werner et al. acknowledge that the blinding of clinicians and in particular midwives, could interrupt the hypnosis process. (Werner et al., 2013). It may be that had the midwives known the allocated group the interaction would have been more supportive and the outcome in terms of analgesia use different. A number of authors have commented on whether a RCT is an appropriate design for complementary therapies such as hypnosis given the often complex relationship between the intervention and the participant, therapy practitioner and health care providers (de Almeida Andrade and Schlechta Portella, 2018; Richardson, 2000). Selection of suitable control groups is also a contributing factor (de Almeida Andrade and Schlechta Portella, 2018; Richardson, 2000). Observational or quasi experimental designs with careful consideration of control of confounding variables and selection of comparable population groups and mixed methods approaches have been debated as potential alternatives (Institute of Medicine Committee on the use of Complementary and Alternative Medicine by the American Public, 2005; Richardson, 2000).

The successful use of hypnosis in childbirth may also rely on an atmosphere of trust, security and motivation (Cosmi, 1995). Therefore, to support women to use hypnosis effectively during labour maternity health care providers not only need to be aware of the woman's preferences but also have sufficient knowledge of the technique. In a small survey of midwives, obstetricians and anaesthetists (n=129) 56% reported minimal or no knowledge of hypnosis. Midwives were more likely than physicians (obstetricians or anaesthetists) to express moderate levels of knowledge and confidence however this was still less than 50% (McAllister et al., 2017). Only two of the reviewed RCTs reported significant differences in pharmacological analgesia use favouring the hypnosis groups (Harmon and Hynam, 1990; Mehl-Madrona, 2004). Harmon et al described the participants in their hypnosis group as being 'highly motivated'. They used the submaximal ischaemic torniquet technique, where a participant squeezes a handspring 20 times after a tourniquet is inflated around their upper arm causing increasing pain (Smith et al., 1966), to demonstrate their growing mastery over pain control whilst under hypnosis. The authors considered this positive feedback increased the motivation towards and effectiveness of hypnosis during labour (Harmon and Hynam, 1990).

Frequency of personal hypnosis practise may also be a contributing factor to the success of hypnosis in childbirth. Only Downe et al. required participants to record their practise in a logbook, although only a third were returned (Downe et al., 2015). Less than a third of the participants in the study by Cyna et al. attended all the hypnosis training sessions which suggests that compliance with personal practise may have been equally low. In a pre-post-test study of antenatal hypnosis training in Malaysia participants were instructed to do daily practise of their hypnosis which was reinforced by follow-up phone calls and questions regarding frequency of practise at subsequent training sessions. While the sample in this study was small (hypnosis n=23, control n=22) none of the women in the intervention group required an epidural (Beevi et al., 2017).

This review has a number of strengths and limitations. We undertook a rigorous assessment of the existing literature based on a predetermined protocol and the PRISMA guidelines. We presented a detailed and comprehensive analysis of the extracted data and provide insights into the potential confounding effects of some aspects of RCT design. Overall, the number of included studies was small. It is of some concern that no high quality RCTs have been undertaken in this area since 2015. A search of the International Clinical Trials Registration Platform did not return any planned or current RCTs into the use of hypnosis for childbirth. Several of the studies predate standardised reporting of clinical trials and therefore varied considerably in methods detail and presentation of results. The delivery of the intervention varied considerably between studies which may impact on the efficacy of the intervention and is beyond the capacity of this review to assess given the aforementioned differences in reporting. We did not estimate a prediction interval as the number of included studies was less than would be required to achieve a reliable result (Borenstein, 2023).

Conclusion and implications for research and practice

This review and meta-analysis did not find a significant reduction in pharmacological analgesia use following antenatal instruction in hypnosis. However, the review does highlight how a number of design factors inherent in robust RCT management, such as observer/assessor blinding, may significantly impact on the efficacy of hypnosis in labour pain management. For future research in this field investigators should consider novel designs that are compatible with maintaining the aspects of trust and motivation reportedly inherent in the use of hypnosis whilst achieving effective control of confounders that RCTs are specifically designed to address. Notwithstanding our null result, given the neurohormonal state of labour in facilitating the hypnotic state there should be potential for hypnosis as a form of pain management during childbirth. However maternity care providers would also need to be conversant and confident in their abilities to support women and birthing persons who chose this approach to pain management.

Statement of significance

Problem: Women desire and request safe and effective labour pain management strategies free of side effects

What is already known: Hypnosis has long been cited as a potential non-pharmacological method of labour pain management and recent reviews have documented the positive effect on anxiety and fear of childbirth.

What this paper adds: This review assesses the effect of antenatal hypnosis training on pharmacological analgesia use reported in randomised trials and examines the potential impact of clinical trial design on outcomes.

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Ethical statement

Approving ethics committees

This study did not require ethical approval.

CRediT authorship contribution statement

Ms Yee Kay Lai: Writing – original draft, Formal analysis, Data curation. **Ms Michelle Wong:** Writing – original draft, Formal analysis, Data curation. **Lauren Kearney:** Writing – review & editing. **Nigel Lee:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Supplementary materials

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References

Allen, J., Kildea, S., Hartz, D.L., Tracy, M., Tracy, S., 2017. The motivation and capacity to go 'above and beyond': Qualitative analysis of free-text survey responses in the M@ NGO randomised controlled trial of caseload midwifery. Midwifery. 50, 148–156.

Australian Institute of Health Welfare, 2023. Australia's mothers and babies. https://www.aihw.gov.au/reports/mothers-babies/australias-mothers-babies.

Beevi, Z., Low, W.Y., Hassan, J., 2017. The effectiveness of hypnosis intervention for labor: An experimental study. Am. J. Clin. Hypnosis 60 (2), 172–191.

Beheshti, A., Chavanon, M.-L., Christiansen, H., 2020. Emotion dysregulation in adults with attention deficit hyperactivity disorder: A meta-analysis. BMC. Psychiatry 20 (1), 120. https://doi.org/10.1186/s12888-020-2442-7.

Borenstein, M., 2023. How to understand and report heterogeneity in a meta-analysis: The difference between I-squared and prediction intervals. Integr. Med. Res. 12 (4), 101014 https://doi.org/10.1016/j.imr.2023.101014.

Braid, J. (1899). *Waite on Hypnotism: Neurypnology, Or, The Rationale of Nervous Sleep Considered in Relation to Animal Magnetism or Mesmerism and Illustrated by Numerous Cases of Its Successful Application in the Relief and Cure of Disease* (A. E. Waite Ed.). George Redway.

Bryant, R.A., Hung, L., 2013. Oxytocin enhances social persuasion during hypnosis. PLoS. One 8 (4), e60711.

Catsaros, S., Wendland, J., 2020. Hypnosis-based interventions during pregnancy and childbirth and their impact on women's childbirth experience: a systematic review. Midwifery. 84, 102666.

Catsaros, S., Wendland, J., 2023. Psychological impact of hypnosis for pregnancy and childbirth: a systematic review. Complement. Ther. Clin. Pract. 50, 101713.

Cluett, E.R., Burns, E., Cuthbert, A., 2018. Immersion in water during labour and birth. Cochrane Database Syst. Rev. (5).

Cosmi, E.V., 1995. Hypnosis and birth. Int. J. Prenatal Perinatal Psychol. Med. 7 (4), 461–464.

Cyna, A.M., Crowther, C.A., Robinson, J.S., Andrew, M.I., Antoniou, G., Baghurst, P., 2013. Hypnosis antenatal training for childbirth: A randomised controlled trial. BJOG. 120 (10), 1248–1259. https://doi.org/10.1111/1471-0528.12320 discussion 1256-1247.

de Almeida Andrade, F., Schlechta Portella, C.F., 2018. Research methods in complementary and alternative medicine: An integrative review. J. Integr. Med. 16 (1), 6–13. https://doi.org/10.1016/j.joim.2017.12.001.

DeLee, J.B., Greenhill, J.P., 1939. Year Book Obstetrics and Gynecology. Year Book Publishing Company.

Downe, S., Finlayson, K., Melvin, C., Spiby, H., Ali, S., Diggle, P., Gyte, G., Hinder, S., Miller, V., Slade, P., Trepel, D., Weeks, A., Whorwell, P., Williamson, M., 2015. Self-hypnosis for intrapartum pain management in pregnant nulliparous women: A randomised controlled trial of clinical effectiveness. BJOG. 122 (9), 1226–1234. https://doi.org/10.1111/1471-0528.13433.

Eason, A.D., Parris, B.A., 2024. The importance of highlighting the role of the self in hypnotherapy and hypnosis. Complement. Ther. Clin. Pract. 54, 101810 https://doi.org/10.1016/j.ctcp.2023.101810.

Finlayson, K., Downe, S., Hinder, S., Carr, H., Spiby, H., Whorwell, P., 2015. Unexpected consequences: women's experiences of a self-hypnosis intervention to help with pain relief during labour. BMC. Pregnancy. ChildBirth 15 (1), 1–9.

Freeman, R. M., Macaulay, A. J., Eve, L., Chamberlain, G. V. P., and Bhat, A. V. (1986). *Randomised Trial of self hypnosis for analgesia in labour* (Bmj, Issue.

Gueguen, J., Huas, C., Orri, M., Falissard, B., 2021. Hypnosis for labour and childbirth: a meta-integration of qualitative and quantitative studies. Complement. Ther. Clin. Pract. 43, 101380 https://doi.org/10.1016/j.ctcp.2021.101380.

Harmon, T.M., Hynam, M.T., 1990. Improved obstetric outcomes using hypnotic analgesia and skill mastery combined with childbirth education. J. Consult. Clin. Psychol. 58 (5), 525–530. https://doi.org/10.1037//0022-006x.58.5.525.

Hróbjartsson, A., Thomsen, A.S.S., Emanuelsson, F., Tendal, B., Hilden, J., Boutron, I., Ravaud, P., Brorson, S., 2012. Observer bias in randomised clinical trials with binary outcomes: systematic review of trials with both blinded and non-blinded outcome assessors. BMJ 344.

Institute of Medicine Committee on the use of Complementary and Alternative Medicine by the American Public, 2005. Complementary and Alternative Medicine in the United States. National Academies Press.

Karlsdottir, S.I., Halldorsdottir, S., Lundgren, I., 2014. The third paradigm in labour pain preparation and management: The childbearing woman's paradigm. Scand. J. Caring Sci. 28 (2), 315–327.

Kroger, W.S., DeLee, S.T., 1943. The use of the hypnoidal state as an amnesic, analgesic and anesthetic agent in obstetrics. Am. J. Obstet. Gynecol. 46 (5), 655–661.

Lawrence, A., Lewis, L., Hofmeyr, G.J., Styles, C., 2013. Maternal positions and mobility during first stage labour. Cochrane Database Syst. Rev. (8).

Madden, K., Middleton, P., Cyna, A.M., Matthewson, M., Jones, L., 2016. Hypnosis for pain management during labour and childbirth. Cochrane Database Syst. Rev. (5).

McAllister, S., Coxon, K., Murrells, T., Sandall, J., 2017. Healthcare professionals' attitudes, knowledge and self-efficacy levels regarding the use of self-hypnosis in childbirth: A prospective questionnaire survey. Midwifery. 47, 8–14.

Mehl-Madrona, L.E., 2004. Hypnosis to facilitate uncomplicated birth. Am. J. Clin. Hypn. 46 (4), 299–312. https://doi.org/10.1080/00029157.2004.10403614.

Michael, A., 1952. Hypnosis in childbirth. Br. Med. J. 1 (4761), 734.

Morgan, A.H., Hilgard, J.R., 1978. The Stanford hypnotic clinical scale for adults. Am. J. Clin. Hypnosis 21 (2-3), 134–147.

Moustgaard, H., Clayton, G.L., Jones, H.E., Boutron, I., Jørgensen, L., Laursen, D.R., Olsen, M.F., Paludan-Müller, A., Ravaud, P., Savović, J., 2020. Impact of blinding on estimated treatment effects in randomised clinical trials: Meta-epidemiological study. BMJ 368.

Newnham, E.C., Moran, P.S., Begley, C.M., Carroll, M., Daly, D., 2021. Comparison of labour and birth outcomes between nulliparous women who used epidural analgesia in labour and those who did not: a prospective cohort study. Women Birth 34 (5), e435–e441.

Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., 2021. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. Int. J Surgery 88, 105906.

Richardson, J., 2000. The use of randomized control trials in complementary therapies: Exploring the issues. J. Adv. Nurs. 32 (2), 398–406.

Sampimon, R.L.H., Woodruff, M.F.A., 1946. Some observations concerning the use op hypnosis as a substitute for anæsthesia. Med. J. Australia 1 (12), 393–395. https://doi.org/10.5694/j.1326-5377.1946.tb33530.x.

Seijmonsbergen-Schermers, A.E., Van Den Akker, T., Rydahl, E., Beeckman, K., Bogaerts, A., Binfa, L., Frith, L., Gross, M.M., Misselwitz, B., Hálfdánsdóttir, B., 2020. Variations in use of childbirth interventions in 13 high-income countries: a multinational cross-sectional study. PLoS. Med. 17 (5), e1003103.

Shor, R.E., Orne, E.C., 1962. Harvard group scale of hypnotic susceptibility, form A. Int. J. Clin. Experiment. Hypnosis.

Smith, G.M., Egbert, L.D., Markowitz, R.A., Mosteller, F., Beecher, H.K., 1966. An experimental pain method sensitive to morphine in man: the submaximtum effort tourniquet technique. J. Pharmacol. Experiment. Therapeutics 154 (2), 324–332.

Smith, L.A., Burns, E., Cuthbert, A., 2018. Parenteral opioids for maternal pain management in labour. Cochrane Database Syst. Rev. (6).

Uvnäs-Moberg, K., Ekström-Bergström, A., Berg, M., Buckley, S., Pajalic, Z., Hadjigeorgiou, E., Kotłowska, A., Lengler, L., Kielbratowska, B., Leon-Larios, F., 2019. Maternal plasma levels of oxytocin during physiological childbirth–a systematic review with implications for uterine contractions and central actions of oxytocin. BMC. Pregnancy. ChildBirth 19, 1–17.

Vallejo, M.C., Zakowski, M.I., 2019. Pro-con debate: Nitrous oxide for labor analgesia. Biomed. Res. Int. *2019*.

Werner, A., Uldbjerg, N., Zachariae, R., Nohr, E.A., 2013. Effect of self-hypnosis on duration of labor and maternal and neonatal outcomes: A randomized controlled trial. Acta Obstet. Gynecol. Scand. 92 (7), 816–823. https://doi.org/10.1111/aogs.12141.

Werner, A., Uldbjerg, N., Zachariae, R., Rosen, G., Nohr, E.A., 2013. Self-hypnosis for coping with labour pain: a randomised controlled trial. BJOG. 120 (3), 346–353. https://doi.org/10.1111/1471-0528.12087.

Wilson, S.C., Barber, T.X., 1978. The creative imagination scale as a measure of hypnotic responsiveness: applications to experimental and clinical hypnosis. Am. J. Clin. Hypnosis 20 (4), 235–249. https://doi.org/10.1080/00029157.1978.10403940.