SYSTEMATIC REVIEW

Comparative Efficacy of Interventions for Analgesia During Heel Prick in Newborn Infants – A Systematic Review and Network Meta-Analysis

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ABSTRACT

Context: Heel prick is one among the common painful procedures in neonates. We performed a systematic review and network meta-analysis (NMA) to compare the efficacy of different interventions for analgesia during heel prick in neonates.

Evidence acquisition: Medline, Cochrane, Embase and CINAHL databases were searched from inception until February 2023. Randomized and quasi-randomized trials that evaluated different pharmacological and non-pharmacological interventions for analgesia during heel prick for neonates were included. Data from the included trials were extracted in duplicate. A NMA with a frequentist random-effects model was used for data synthesis. Certainty of evidence (CoE) was assessed using GRADE. We adhered to the PRISMA-NMA guidelines.

Results: One-hundred-and-three trials comparing 51 different analgesic measures were included. Among the 38 interventions, for pain "during" heel prick, non-nutritive suckling (NNS) plus sucrose [SMD -3.15 (-2.62, -3.69)], followed by breastfeeding, glucose, expressed breast milk (EBM), sucrose, NNS and touch massage, had a high certainty of evidence (CoE) to reduce pain scores when compared to no intervention. Among the 23 interventions for pain at 30 seconds after heel-prick, moderate CoE was noted for facilitated tucking plus NNS plus music, glucose, NNS plus sucrose, sucrose plus swaddling, mother holding, EBM, sucrose and NNS.

Conclusions: Oral sucrose 2 minutes before combined with NNS during the procedure, was the best intervention for reducing pain during heel prick. It also effectively reduced pain scores 30 seconds and 1 minute after the procedure. Other interventions with moderate to high CoE for a significant reduction in pain during and at 30 seconds after heel prick are oral sucrose, oral glucose, EBM and NNS. All these are low-cost and feasible interventions for most of the settings.

Keywords: *Neonatal analgesia, Non-pharmacological pain relief, Pharmacological pain relief, Procedural pain*

Published online: Aug 26, 2024; ***PII***:S097475591600687

INTRODUCTION

Several advances have been made in the recognition and management of neonatal pain in the last few decades. A misconception that a neonate does not perceive pain has since evolved to an understanding that neonates do feel pain and repeated exposure to painful stimuli in the neonatal age has short-term and long-term adverse consequences [1]. These include a change in regional brain volumes and an exaggerated response to painful stimuli in later life, more so in preterm neonates [2].

Common painful neonatal procedures performed in the neonatal intensive care unit (NICU) include heel prick,

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Received: Mar 28, 2024; Initial review: May 10, 2024;
Accepted: Jul 20, 2024

venepuncture, suction/aspiration, naso/orogastric tube insertion, and endotracheal intubation [3]. Of these, heel prick accounts for over a fifth [3]. It has also been reported that heel prick is probably more painful than a venepuncture, at least in full-term neonates [4]. Further, the pain due to the heel prick and its effects might persist for 10 minutes or even more, as shown by pain scores assessed at multiple time points after the heel prick in various trials [5,6]. Several non-pharmacological measures (skin-to-skin contact, breastfeeding, swaddling, facilitated tuck, etc.) and pharmacological agents (sucrose, acetaminophen, topical analgesia, etc.) have been evaluated in clinical trials for reducing pain related to heel prick [7-10]. The recent Cochrane review compared sucrose analgesia with other interventions for pain relief during heel prick [11]. Oral sucrose was superior to placebo, plain water and no intervention. However, there was no head-to-head comparisons among other interventions. Some guidelines and recommendations on the management of procedural pain in neonates have addressed heel prick [12–14]. However, these guidelines have not been updated in the last decade and are restricted to a few analgesic interventions. Thus, there are no comprehensive reviews or guidelines where all the available analgesic measures for heel prick in neonates were analysed, efficacy was rated, and recommendations on their use were made. This gap in literature underscores the need for an updated, comprehensive review of current analgesic practices.

This systematic review compared the efficacy of different analgesic interventions (pharmacological and/or non-pharmacological) to reduce neonatal pain associated with heel prick. A network meta-analysis was performed to rank the different interventions based on direct and indirect comparisons.

METHODS

This systematic review was registered in PROSPERO (CRD42023395327) [15]. The results of the NMA are reported according to PRISMA-NMA guidelines [16,17]. A comprehensive search strategy, including specific search terms and combinations, is detailed in the **Web Table I**.

Inclusion and exclusion criteria

We included all randomized and quasi-randomized controlled trials enrolling neonates of all gestational ages and postnatal ages until 44 weeks postmenstrual age. Any pharmacological or non-pharmacological intervention undertaken to provide analgesia during heel prick was eligible for inclusion. Assessment of pain should have been performed using a multi-component objective scoring system, preferably a validated pain scale such as Premature Infant Pain Profile (PIPP), Premature Infant Pain Profile-Revised (PIPP-R), Neonatal Infant Pain Scale (NIPS), Crying Requires oxygen Increased vital signs Expression Sleep (CRIES), Neonatal Facial Coding System (NFCS), etc. We excluded trials that performed pain assessment using a single parameter or subjective assessments.

Outcome measures

The primary outcomes were: (1) pain assessed using a multi-component pain score during the heel prick and (2) pain score at 30s after the heel prick. The secondary outcomes were pain scores assessed at 1, 2, 3, 5, and 10 minutes after the heel prick, and clinical outcomes such as any adverse event during and/or after heel prick, hypotension, intraventricular hemorrhage, necrotizing enterocolitis, mortality, and neurodevelopmental outcomes assessed at ≥ 18 months using a validated assessment tool.

Search strategy

Medline (from 1966), Embase (from 1980), Central (from 1996) and Cumulative Index to Nursing and Allied Health Literature (CINAHL; from 1982) were searched from inception until February 2023 (**Web Table I**)**.** There were no language restrictions. Articles published in other languages were translated to English using Google translate. PRISMA flow is given in **Web Fig. 1**. Only published literature was included. Two authors independently screened the results using Rayyan-Qatar Computing Research Institute (QCRI) software and assessed the full-text articles for potentially relevant trials [18,19].

Data extraction

Two authors independently extracted data from the included trials in duplicate using a structured proforma.

Assessment of risk of bias (RoB)

Two authors independently evaluated the risk of bias in all included trials using the Cochrane Risk-of-Bias tool, version 2.0 [20]. Differences in opinions were resolved by consensus.

Statistical analysis

A frequentist NMA was performed using R-software (R Foundation for Statistical Computing, Vienna, Austria) [21]. Markov Chain Monte Carlo (MCMC) simulation using vague priors with four chains, burn-in of 50,000 iterations, followed by 10,00,000 iterations and 10,000 adaptations, was used. Model convergence was assessed using Gelman-Rubin Potential Scale Reduction Factor,

trace and density plots. Leverage plots, total residual deviance, and deviance information criteria were evaluated to confirm model convergence. Intransitivity was assessed by comparing the characteristics of included trials and inconsistency by node splitting. A pair-wise meta-analysis of the trials was also performed. Since the included trials used different pain scores, the effect estimates of the NMA were reported as standardized mean difference (SMD) with a 95% confidence interval (CI). While the NMA estimates were illustrated with matrix plots, direct evidence from RCTs was depicted using forest plots. P score was used to depict the ranking of the interventions [22].

We specified a post-hoc limit of 0.5 SMD to indicate a clinically significant reduction in pain score. Hence, interventions with a lower limit of CI > 0.5 were considered to cause a significant reduction in pain scores. This threshold was set to ensure clinical relevance in the interpretation of results.

GRADE assessment

The certainty of evidence (CoE) for the NMA effect estimates for the primary outcomes was assessed according to GRADE recommendations [23]. To assess CoE by GRADE, both direct evidence (from the direct comparisons in the included trials) and indirect evidence (from the indirect comparisons based on first-, second- or third-order loops of the network plots) were considered. CoE of the direct evidence was assessed based on five criteria: risk of bias (ROB), indirectness, inconsistency, imprecision, and publication bias. This was followed by an assessment of CoE using indirect evidence for each comparison. The higher value (direct/indirect) was taken as the CoE of the final NMA effect estimate. The NMA CoE was downrated by one level Where node splitting was significant ($P < 0.05$). The CoE was graded as high, moderate, low and very low.

RESULTS

Search results

Searches identified 928 references. After removing 364 duplicates, 564 titles and abstracts were screened; 163 full texts were retrieved and assessed for inclusion, and finally, 103 trials were included in the systematic review and NMA (**Web Fig. 2)** [6–8, 21–120].

Included studies

The characteristics of the included studies are given in **Table I**. We evaluated 51 interventions for pain relief during heel prick, with no intervention as a control group. This included 29 interventions: Acupressure, Acupuncture, Breastfeeding, Co-bedding, oral Dextrose, expressed breast milk (EBM), Facilitated Tucking, Formula Milk, Fructose, Glucose, Heel Warming, kangaroo mother care (KMC), Mother Heartbeat Sounds, Mother Holding, Mother Voice, Music, non-nutritive sucking (NNS), Odour, Opioid, Paracetamol, Prone Positioning, Sensorial Saturation, Sterile Water, Sucrose, Swaddling, Topical Analgesia, Touch Massage, Vapo Coolant and White Noise, and 22 combinations of interventions: Acupuncture-EBM, Breastfeeding-Music, Facilitated Tucking-NNS, Facilitated Tucking-NNS-Music, Glucose-Facilitated Tucking, Glucose-Mother holding, KMC-EBM, KMC-Music-EBM, KMC-Sucrose, Mother's Voice-Holding, Music-EBM, Music-NNS-Facilitated Tucking, Music-Sucrose, NNS-Music, NNS-Sucrose, NNS-Sucrose-Swaddling, NNS-Sucrose-Vibration, Sucrose-Facilitated Tucking, Sucrose-Swaddling, Sucrose-Vibration, Touch Massage-NNS and White Noise-Holding.

Forty-four studies included preterm neonates [6,9,25,34,35,38,44-46,52,55,57,58,61,62,64,65,68-71,73,75-77,79,81,83,85,87,90,91,95,96,98,101-103,106,108,114,115,117], 40 included term neonates [5, 8,8,10,24,28,33,36,39-41,47,48,50,53,54,56,59,60,72, 74,78,80,82,88,89,97,104,105,109-113,116,118-122], and ten included both term and preterm neonates [31,32, 37,42,43,63,67,86,99,100] (**Table I**). A heel prick was performed using a manual lancet in 36 studies [5,6,24,26, 35,37,40,41,47,48,58,59,63,67,68,71,75,80,85,87-90,95,99,104-106,111,113,114,116,118,121,122],an automatic lancing device in eleven [8,44,49,53,54,56,69, 73, 76,115, 117], and a needle in ten studies [9,43,50,57, 60,74,98,108,110,120]. The soles were squeezed during sample collection in 21 studies [9,10,24,26,35,41, 58,63,73,85,87-90,94,104,105,108,112,116,121]. While 98 (95.1%) trials had used a validated pain scale, five (4.9%) trials had used a self-designed objective scoring system [24,26,48,87,105].

RoB assessment

Among the 103 included trials, 36 had a low risk of overall bias [5,6,9,24,30,39,40,44-47,54,57,61,63, 65,67,68,71, 76,83,93,95,96,99,101-106,109,112-114,117],39 had some concerns [6,8,22,24-26,28,31,33,38,40,46,49,53, 54,57,58,62,67,70,72,75-77,80,82,87,89,92,96,105, 106,109,116,118], and 28 had a high risk of overall bias [26,32,33,35,37,38,42,48,50,51,53,58,62,66,70,73,75, 80,81,90,92,97,100,110,115,116,119,121]. The details of the RoB2 assessment are given in **Web Table II.**

Outcome variables

Primary outcomes

Pain score during heel prick: Seventy-four trials (6,964 infants) evaluating 38 interventions reported this outcome.

Table I Characteristics of included trials

Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
Abbasoglu et al, 2015, Turkey [24]	Acupuncture (*n* = 21)	Low-level laser acupuncture, 0.3 J of energy for 30 sec before 2 min	Manual lancet	Yes	NIPS	37-42 wk
	Sucrose (*n* = 21)	0.5 mL of 24% sucrose orally via syringe 2 min before				
Abbasoglu et al, 2015a, Turkey [25]	Acupressure (*n* = 16)	Acupressure at the BL60 and K3 points for 3 min, immediately before heel prick	NS	NS	PIPP	28-36 wk
	Control (*n* = 16)	No intervention				
Aguirre Unceta-Barrenechea et al, 2008, Spain [26]	NNS (*n* = 50)	2 mL of water 2 min before extraction and NNS during extraction	BD Quick heel lancets	Yes	Modified NFCS	NS
	NNS-Sucrose (*n* = 50)	2 mL of 24% sucrose 2 min before extraction and NNS during extraction				
	Facilitated tucking (*n* = 50)	Specific containment during extraction-lateral decubitus position with containment of hands in midline, flexion of trunk and extremities				
Akcam et al, 2004, Turkey [28]	Fructose (*n* = 34)	0.5 mL of 30% fructose 2 min before heel lance	NS	NS	DAN	37-42 wk
	Glucose (*n* = 34)	0.5 mL of 30% glucose 2 min before heel lance				
	Sterile water (*n* = 34)	0.5 mL of sterile water 2 min before heel lance				
Akcam et al, 2004a, Turkey [27]	Glucose (*n* = 60)	0.5 mL of 30% glucose by syringe 2 min before heel lance	NS	NS	NS	NS
	Sterile water (*n* = 60)	0.5 mL of sterile water 2 min before heel lance				
Akcan et al, 2016, Turkey [29]	Odour (*n* = 26)	Smell of 5 mL amniotic fluid	NS	NS	NS	NS
	Control (***n*** = 25)	Smell of distilled water 20 mL				
Alemdar et al, 2017, Turkey [75]	Odour (*n* = 21)	Smell of amniotic fluid 20 mL 5 cm away	Lancet	NS	PIPP	28-36 wk
	Control (*n* = 22)	No intervention				
Ancy et al, 2022, India [30]	EBM (*n* = 30)	EBM 5 mL+ comfort positioning and general assessment	NS	NS	NIPS	NS
	Control (*n* = 30)	Comfort positioning and general assessment				
Angeles et al, 2015, USA [31]	Control (*n* = 24)	No intervention	NS	NS	PIPP	>800 g
	NNS (*n* = 15)	NNS with sterile water 2 min before a heel lance				
	NNS-Sucrose (*n* = 10)	NNS with 24% sucrose (Sweet-Ease) 2 min before				
Angeles et al, 2020, USA [32]	Glucose (*n* = 47)	30% oral dextrose 2 min before heel prick	NS	NS	PIPP-R	>24 wk
	Facilitated tucking (*n* = 53)	Facilitated tucking 2 min before heel prick				
	Glucose-facilitated	30% oral dextrose and facilitated tucking				

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
	tucking (*n = 52)*	2min before heel prick				
Apaydin Cirik et al, 2023, Turkey [33]	Mother's voice (*n* = 31)	Exposed to recording of mother voice during the procedure	NS	NS	PIPP, NIPS	38-40 wk
	White noise (*n* = 31)	Exposed to white noise during the procedure				
	Holding (*n* = 30)	Held by a person, often a nurse or caregiver, during the painful procedure				
	White noise-Holding (*n* = 29)	The neonate was held during the painful procedure while also being exposed to white noise				
	Mother's voice-Holding (*n* = 28)	The neonate was held during the painful procedure and also exposed to a recording of their mother's voice				
	Control (*n* = 29)	Control				
Asmerom et al, 2013, USA [34]	Control (*n* = 42)	Control	NS	NS	PIPP	<36.5 wk >800
	NNS (*n* = 45)	NNS 2 min prior to heel lance				
	NNS-Sucrose (*n* = 44)	NNS + 24% sucrose (2 mL for neonates >2 kg, 1.5 mL for neonates 1.5- 2 kg, and 0.5 mL for neonates that were <1.5 kg)				
Axelin et al, 2009, Finland [35]	Facilitated tucking (*n* = 22)	Facilitated tucking by parents	Medlance	2 squeezes	PIPP	<32 wk
	Glucose (*n* = 22)	Oral Glucose, 0.2 mL, 24%, 2 min before and just after heel prick				
	Sterile water (*n* = 22)	0.2 mL sterile water, 2 min before and just after heel prick				
	Opioid (*n* = 22)	Oxycodone 15 min prior				
Aydin et al, 2019, Turkey [36]	Control (*n* = 50)	Routine care	NS	NS	NIPS	38-42 wk
	Breastfeeding (*n* = 50)	Breastfeeding- 1 min prior, during and 2 min after the procedure				
	Heel warming (*n* = 50)	Heel warming- 40 to 45 degree C, 3 min prior the procedure				
Baba et al, 2010, Arizona [37]	NNS-Sucrose-Vibration (*n* = 20)	0.1 mL sucrose, NNS, 100 Hz vibration	Lancet	NS	NIPS	>35 wk
	NNS-Sucrose (*n* = 20)	0.1 mL sucrose, NNS				
Badiee et al, 2014, Iran [38]	Cobedding (*n* = 50)	Receiving care in the same incubator	NS	NS	PIPP	26 - 34 wk
	Control (*n* = 50)	Receiving care in separate incubators				
Badr et al, 2016, Lebanon [77]	Music (*n* = 42)	Recorded lullaby group- exposed to a recorded lullaby that mothers listened to during pregnancy	NS	NS	N-PASS	28 - 36 wk

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
	Control (*n* = 42)	Received no music but had headphones applied to minimize bias and eliminate ambient noise				
Sundaram et al, 2013, India [108]	Facilitated tucking (*n* = 20)	A physiotherapist provided FT	23 G needle	Yes	PIPP	28 - 36 wk
	Control (*n* = 20)	All individuals except the physiotherapist giving FT performed their assigned roles				
Bembich et al, 2018, Italy [39]	Glucose (*n* = 20)	2 mL glucose, 2 min before the procedure	NS	No squeezing	NIPS	37-42 wk
	EBM (*n* = 20)	2 mL EBM, 2 min before the procedure				
	Glucose-mother holding (*n* = 20)	2 mL glucose, 2 min before + mother holding during procedure				
	Breastfeeding (*n* = 20)	Breastfeeding initiated 2 min before and continued				
Benoit et al, 2021, Canada [40]	Breastfeeding (n = 18)	Breastfeeding initiated 2 min before and continued	Lancet	NS	PIPP-R	>37 wk
	Sucrose (*n* = 19)	0.24 mL of 24% sucrose, 2 min before the procedure				
Bilgen et al, 2001, Turkey [41]	Sucrose (*n* = 35)	25% sucrose- 2 mL 2 min prior to procedure	Lancet	Yes	IBSC	37-42 wk 2380-4300 g
	EBM (*n* = 33)	EBM- 2 mL 2 min prior to procedure				
	Sterile water (*n* = 34)	Sterile water- 2 mL 2 min prior to procedure				
	Breastfeeding (*n* = 28)	Breastfeeding for 2 min				
Bonetto et al, 2008, Argentina [43]	Sterile water (*n* = 19)	1 mL sterile water 2 min before procedure	Hypodermic needle	NS	PIPP, NIPS	≥36 wk
	Glucose (*n* = 19)	1 mL of 25% Dextrose 2 min before heel prick				
	Paracetamol (*n* = 19)	Paracetamol 20 mg/kg 60 min before heel prick				
	Topical analgesia (*n* = 19)	EMLA placed on the heel for 60 min				
Bo et al, 2000, China [42]	Music (*n* = 27)	Music	NS	NS	NIPS	≥28 wk
	NNS-music (*n* = 27)	NNS + music				
Bueno et al, 2012, Brazil [44]	EBM (*n* = 56)	EBM, 2 mL 2 min before procedure	Automated lance device	NS	PIPP	34-36 wk
	Glucose (*n* = 57)	25% glucose, 2 mL 2 min before procedure				
Campbell-Yeo et al, 2012, Canada [46]	Cobedding (*n* = 72)	Cobedding group was cared for in the same incubator or crib	NS	NS	PIPP	28-36 wk >1000 g
	Control (*n* = 62)	Standard care group was cared for in separate incubators or cribs				
Campbell-Yeo et al, 2019, Canada [45]	KMC (n = 81)	KMC, before, during and minimum 15 min after heel prick	NS	NS	PIPP	<37 wk

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
	KMC-Sucrose (n = 80) Sucrose (n = 81)	Combined KMC and sucrose 24%,2 min prior to heel prick Sucrose (sucrose alone, 24%,2 min prior)				
Cantas Ayar et al, 2022, Turkey [47]	White noise (*n* = 40)	White noise machine during heel prick	Lancet	NS	NIPS	38-42 wk 2500-4000 g
	Mother holding (*n* = 40) Facilitated tucking (*n* = 40)	Embraced by their mothers during heel prick Flexed position and tucked with their hands on their cheeks, flexed arms on their chest, and knees flexed towards their abdomen				
	Control (*n* = 40)	Control				
Chang et al, 2020, California, USA [48]	Breastfeeding (*n* = 45)	Breastfeeding before during and after heel prick	Tender foot lancet	NS	N-PASS	38-40 wk 2500-4000 g
	Sucrose (*n* = 42) NNS (*n* = 51) KMC (*n* = 38) Control (*n* = 50)	Oral sucrose, 24% 5 drops (0.33 mL) before the procedure NNS before and during the procedure Skin-to-skin contact, before and during the procedure Control				
Chen et al, 2017, Australia [49]	Acupuncture (*n* = 21)	Magnetic acupuncture, two hours prior to a heel prick	Automatic lancet	NS	PIPP	NS
	Control (*n* = 19)	Control				
Choi et al, 2018, Korea [51]	Control Glucose Vapo coolant	Control Glucose, 30% Vapocoolant spray	NS	NS	NS	NS
Cignacco et al 2012 Switzerland [52]	Sucrose (*n* = 24)	Oral sucrose, 20%, 0.2 mL/kg, 2 min prior to procedure	NS	NS	BPSN	24-32 wk
	Facilitated tucking (*n* = 24)	Facilitated tucking, before the procedure				
	Sucrose-Facilitated tucking (*n* = 23)	Combination of both interventions				
Codipietro et al, 2008, Italy [54]	Breastfeeding (*n* = 51) Sucrose (n = 50)	Breastfeeding before, during and after procedure Oral sucrose, 1 mL, 25%, 2 min prior to procedure 2 min prior	Automated lancet	NS	PIPP	37- 42 wk
Covener Ozcelikn et al, 2022, Turkey [5]	Touch massage (*n* = 50) Control (*n* = 50)	Crochet octopus during heel lance Control	Lancet	NS	NIPS	Term neonates
Davari et al, 2018, Iran [55]	Facilitated tucking (*n* = 40) Control (*n* = 40)	Facilitated tucking 2 min before and for one min after procedure Control	NS	NS	PIPP	32-36 wk >1200 g

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
Dur et al, 2020, Turkey [57]	Touch massage-NNS (*n* = 30)	Steady touch, compassionate caressing, and repetition of steady touch each 5 min for a total of 15 min. Started 5 min before heel prick and lasted until the completion of procedure.	21G needle tip	NS	NIPS	32-36 6/7 wk, appropriate for gestational age
	NNS (*n* = 30)	Pacifiers before and during painful procedures				
Ecevit et al, 2011, Turkey [58]	Acupuncture-EBM (*n* = 10)	The acupuncture group received acupuncture at the Yintang (EX-HN3) acupoint and received 2 mL/kg EBM 2 min before the procedure and NNS with a pacifier during the heel prick.	30G lancet	Yes, gentle	NIPS	<37 wk
	EBM (*n* = 10)	Received 2 mL/kg EBM 2 min before the procedure and NNS with a pacifier during the heel prick.				
Eriksson et al, 1999, Sweden [59]	Glucose (*n* = 30)	Heel stick with glucose administration - Babies received 1 mL of 30% glucose solution before the heel stick	Lancet	NS	PIPP	Healthy full-term newborns
	Control (*n* = 30)	Control				
Erkut et al, 2017, Turkey [60]	Swaddling (n = 37)	Swaddling with legs in flexion and abduction without causing any movement restriction during the heel lance procedure; performed 1 min before the heel lance and maintained for 3 min after the procedure.	21G needle	NS	NIPS	38 - 42 wk 2500-4400g
	Control (*n* = 37)	Control				
Gabriel et al, 2013, Spain [8]	Breastfeeding (n = 35)	Neonates, dressed in a diaper, were held in a prone position with skin-to-skin contact with the mother. Breastfeeding started 5 min before heel lance and continued during sampling.	Automated piercing device	NS	NIPS	37-41
	KMC-Sucrose (*n* = 35)	Neonates were held in prone position between the mother's breasts for 5 min before sampling. They received 2 mL 24% sucrose in their mouths 2 min before heel lance				
	KMC (*n* = 33)	Neonates were held between the mother's breasts as in the sucrose + KMC group, but no sucrose was given.				
	Sucrose (*n* = 33)	Neonates received 2 mL 24% sucrose through a sterile syringe in their mouths 2 min before heel				

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
		lance while lying supine on a cot in the presence of the mother.				
Gao et al, 2018, China [61]	Control (*n* = 21) NNS (*n* = 22) Sucrose (*n* = 21) NNS-Sucrose (*n* = 22)	Control NNS Sucrose 20% 0.2 mL per kg NNS and sucrose	NS	NS	PIPP	<37wk
Gibbin et al, 2003, Canada [62]	NNS-Sucrose (*n* = 64) Sucrose (*n* = 62) NNS (*n* = 64)	NNS and sucrose Sucrose NNS	NS	NS	PIPP	27-31 6/7 wk
Gitto et al, 2011, Italy [64]	Opioid (n = 50) Facilitated tucking (*n* = 50) Sensorial saturation (*n* = 50)	Fentanyl 1-2 ?g/kg Facilitated tucking Sensorial saturation	NS	NS	CRIES	27-32 wk
Hartley et al, 2018, UK [65]	Opioid (*n* = 15) Control (*n* = 16)	100 µg/kg oral morphine sulphate, 1 hour prior to procedure Control	NS	NS	PIPP-R	<32 wk <1501 g
Hseih et al, 2018, Taiwan [66]	EBM (*n* = 20) Glucose (*n* = 20) Sterile water (*n* = 20) Control (*n* = 20)	Breast milk instillation 10% Dextarise water unstallation Sterile water instillation Control	NS	NS	PIPP	NS
Hyesang Im et al, 2007, South Korea [121]	Touch massage (*n* = 33) NNS (*n* = 33) Control (*n* = 33)	Yakson therapeutic touch -The research nurse warmed her hands to 34.0°C, placed one hand under the neonate's back and the other on the abdomen, caressing as if drawing a clockwise circle of approximately 4 cm in diameter every 5 seconds A soft latex nipple packed with sterile gauze was given to the neonate, gently applying pressure to maintain it in the mouth Control	Lancet	Yes	NIPS	>37 wk
Jain et al, 2001, UK [67]	Topical analgesia (*n* = 30) Control (*n* = 30)	1.5 g of 4% amethocaine gel applied to the plantar surface of the left or right heel, covered with an occlusive dressing (Tegaderm) for one hour, and wiped away before heel prick 1.5 g of placebo gel application	Lancet	NS	NFCS	28 - 42 wk

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
Jain et al, 2006, Canada [68]	Touch massage (n = 13)	The outer aspect of the leg chosen for the heel stick was massaged from toes to mid-thigh for 2 min before the heel stick. The heel was then wrapped with a warm cloth for 2-3 min	Tender foots preemie lancet	NS	NIPS	<37 wk
	Control (*n* = 10)	Control				
Johnston et al, 2008, Canada [69]	KMC (*n* = 61)	Skin-to-skin contact with their mother for 15 min before and during the heel lance procedure	A spring-loaded lancet (Tenderfoot®)	NS	PIPP	28 0/7 - 31 6/7 wk
	Swaddling (*n* = 61)	Infants were placed in a prone position, swaddled in a blanket, and placed in the incubator				
Johnston et al, 2012, Canada [70]	Touch massage (*n* = 27)	The therapist used their hands to assess and rebalance the energy field of the patient using several steps, taking an average of 5 min	NS	NS	PIPP	26 0/7 - 28 6/7 wk.
	Control (*n* = 28)	Control				
Kahraman et al, 2020, Turkey [71]	White noise (*n* = 16)	White noise was played at a distance of 30 cm from the infant's ear, starting 5 min before the heel lance and during the procedure.	Manual lancet (19G, incision depth: 1.1 mm).	NS	NIPS	31-36 wk >1500 g
	Mother's voice (*n* = 16)	Mothers' recorded voices were played at a distance of 30 cm from the infant's ear, starting 5 min before the procedure and during it. Sound level was adjusted to 50 db.				
	Control (*n* = 16)	Control				
Kaya et al, 2014, Turkey [53]	Sucrose-Vibration (*n* = 30)	2 mL sucrose 2 min before and 60HZ Vibration by using LC-2002 AB-1 massaging device on the heel for 5 sec	Automatic lancet	NS	NIPS	37 -42 wk
	Sucrose (*n* = 30)	2 mL sucrose 2 min before heel prick				
Kim et al, 2022, South Korea [73]	Odour (*n* = 22)	0.2 mL breastmilk applied under the nose	Automatic needle	Yes	PIPS	28-37 wk
	Control (*n* = 22)	Control				
Leng et al, 2015, China [78]	Sucrose (n = 92)	2 mL of 24% sucrose administered orally	NS	NS	NFCS	37 - 42 wk 2500 - 4000 g
	NNS-Sucrose (*n* = 91)	2 mL of 24% sucrose administered orally and a standard silicone newborn pacifier				
	Sucrose-Swaddling (*n* = 95)	Swaddling with a cotton blanket and 2 mL of 24% sucrose administered orally				
	NNS-Sucrose-Swaddling (*n* = 100)	Swaddling with a cotton blanket, 2 mL of 24% sucrose administered orally, and a standard silicone newborn pacifier.				

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
Liaw et al, 2012, Taiwan [79]	Control (n = 72) NNS (*n* = 72) Facilitated tucking (*n* = 75)	Control Standard silicone newborn pacifier Infant was placed in a flexed posture and gently held by a nurse's warm hands during heel stick, gentle touch and verbal comfort during the heel-stick procedure, standard silicone newborn pacifier used during heel-stick procedure	NS	NS	PIPP	29 - 37 wk
Manalkassab et al, 2020, Jordan [72]	Glucose (*n* = 45) Facilitated tucking (*n* = 45) Control (*n* = 45)	2 mL of dextrose DW 10% was given to each neonate orally 15 seconds before and during the heel lance procedure Neonates were attached to a parent for touch and bonding attachment for at least 2 min before and during the heel prick Control	NS	NS	MBPS	38-40 wk >2500 g
Mir et al, 2018, Iran [80]	Touch massage (*n* = 26) Heel warming (*n* = 26) Control (*n* = 26)	Yakson Therapeutic touch, Containment with 2 hands on chest and back, 15 min before procedure Water bottle with 40?Celsius for 5 min Control	Lancet	NS	NIPS	38 - 42 wk 2.5 - 3.99 kg
Mosayebi et al, 2014, Iran [81]	KMC (*n* = 32) Control (*n* = 32)	KMC 15 min before, during, and 2 min after the procedure Neonate was placed in incubator in a prone position and swaddled with a blanket 15 min before lancing	NS	NS	PIPP	30 - 36 wk
Napiorkowska-Orkisz et al, 2021, Poland [82]	Breastfeeding (*n* = 30) Glucose (*n* = 30) NNS (*n* = 30)	Breastfeeding 2-3 mL of 20% glucose NNS using a pacifier	NS	NS	NIPS	38 - 42 wk >2.5 kg
Ngoc et al, 2019, Vietnam [118]	NNS (*n* = 22) Control (*n* = 22)	NNS 120 sec before, during and 120 sec after heel prick Control	Lancet	NS	N-PASS	37 - 40 wk 2.5 - 4 kg
Nimbalkar et al, 2012, India [9]	KMC (*n* = 28) Control (*n* = 19)	KMC 15 min before, during and 15 min after procedure Control	26G needle	Rhythmic squeezing	PIPP	32 - 36 wk 6 days <2.5 kg
Nimbalkar et al, 2019, India [83]	KMC (*n* = 100) Sucrose (*n* = 100)	KMC initiated 15 min before heel prick 24% sucrose, 2 min before heel prick (0.5 mL for < 32 wk, 1 mL for 32-36 wk)	NS	NS	PIPP	28-36 wk

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
Obeidat et al, 2015, Jordan [84]	Breastfeeding (*n* = 64) Mother holding (n = 64)	Breastfeeding Mother holding	Lancet	NS	PIPP	38-42 wk
Okan et al, 2007, Turkey [85]	Sucrose (*n* = 31) Glucose (*n* = 31) Sterile water (*n* = 31)	2 mL of 20% sucrose, 2 min before heel prick 2 mL of 20% glucose, 2 min before heel prick 2 mL of sterile water, 2 min before heel prick	Micro-lancet	Gently squeezing	NFCS	<37 wk
Orellana et al, 2019, Spain [86]	Sucrose (*n* = 51) Sterile water (*n* = 51)	0.25 to 1 mL of sucrose, 2 min before heel prick 0.25 to 1 mL of sterile water, 2 min before heel prick	NS	NS	NIPS	31-40 wk
Ou-yang et al, 2012, Taiwan [87]	Sterile water (*n* = 44) EBM (*n* = 39) Glucose (*n* = 40)	5 mL of sterile water, 2 min before heel prick 5 mL of human milk, 2 min before heel prick 5 mL of 25% glucose, 2 min before heel prick	Lancet	Yes	N-PASS	<37 wk
Overgaard et al, 1999, Denmark [88]	Sucrose (n = 49) Sterile water (*n* = 47)	2 mL of 50% sucrose, 2 min before heel prick 2 mL of sterile water, 2 min before heel prick	Lancet	Yes	NIPS	Full term
Ozdogan et al, 2010a, Turkey [89]	EBM (*n* = 18)	2 mL of single dose of breast milk	Bluttestpohl Lanzette	Yes	NFCS	>37 wk >2.5 kg
		Sterile water (*n* = 27)	2 mL of single dose of sterile water			
	Dextrose (*n* = 25)	2 mL of single dose of 12.5% dextrose				
Ozdogan et al, 2010a, Turkey [89]	EBM (*n* = 23) Sterile water (*n* = 26) Glucose (*n* = 23)	2 mL of double dose of breast milk 2 mL of double dose of sterile water 2 mL of double dose of 12.5% dextrose	NS	NS		Term
Ozge Deniz et al, 2021, Turkey [56]	Touch massage (*n* = 35)	A 7-min session, including 1 min of relaxation and 6 min of application	Automatic lancet	NS	N-PASS	Term
	Acupressure (*n* = 35)	A 7-min session, including 1 min of relaxation, and 90 seconds of acupressure applied to each point (Ki3 and St36 points)				
	Control (*n* = 35)	Control				
Ozkan et al, 2019, Turkey [74]	Acupunture (n = 46)	Acupunture for 2 min before heel lancing	21G needle	NS	NIPS	Term 2500 - 4000 g
	Touch massage (*n* = 47) Control (*n* = 46)	Foot Massage for 2 min before heel lancing Control				
Patel et al, 2003, Canada [90]	Topical anesthesia (*n* = 10) Control (*n* = 10)	0.5 to 1 gram of 4% Amethocaine gel applied 30 min before heel prick Control	Lancet	Yes	PIPP, NIPS	33 - 37 wk

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
Perroteau et al, 2018, France [91]	Facilitated tucking-NNS (*n* = 30)	Facilitated tucking combined with NNS 15 sec before and 3 min after heel prick	NS	NS	PIPP	28 - 31 wk
	NNS (*n* = 29)	NNS 3 min after heel prick				
Ramenghi et al, 1996, India [92]	Sterile water (*n* = 15)	2 mL of sterile water, 2 min before heel prick	NS	NS	DAN	NS
	Sucrose (*n* = 15)	2 mL of 25% sucrose solution, 2 min before heel prick				
	Paracetamol (*n* = 15)	2 mL of calpol solution, 2 min before heel prick				
Rawal et al, 2018, India [93]	Sterile water (n = 21)	2 mL of Sterile water	NS	NS	PIPP	NS
	Glucose (*n* = 21)	2 mL of 25% Dextrose				
	EBM (*n* = 21)	2 mL of EBM				
R Chiabi et al, 2016, Cameroon [50]	Breastfeeding (*n* = 50)	Breastfeeding	23 gauze needle	NS	NIPS	Term
	Glucose (*n* = 50)	30% glucose, 1-2 mL for 2500-3000 g neonates, 4 mL for >3000 g neonates				
Rushforth et al, 1995, UK [94]	Topical anesthesia (*n* = 15)	0.5 g lignocaine ointment applied 1 hour before heel lancing	NS	Yes	Behavioural response	NS
	Control (*n* = 15)	0.5 g emulsifying ointment applied 1 hr before heel lancing				
Sasidharan et al, 2022, India [95]	Glucose (*n* = 32)	0.5 mL 25% glucose, 2 min before	BD Quickheel Lancet	No	PIPP	28 - 36 wk
	Sucrose (*n* = 32)	0.5mL 24% sucrose, 2 min before				
Sen et al, 2020, Turkey [96]	KMC (*n* = 32)	Kangaroo care started 15 min before heel prick	NS	NS	PIPP	32 - 37 wk < 2500 gram
	Sucrose (*n* = 32)	0.5 mL of 25% oral sucrose given 2 min before heel prick				
Seo et al, 2016, South Korea [97]	KMC (*n* = 26)	Kangaroo care started 10 min before and continued 3 min after sampling	NS	NS	PIPP	> 37 wk > 2.5 kg
	Control (*n* = 30)	Control				
Sezer Efe et al, 2022, Turkey [98]	Touch massage (*n* = 25)	Gentle human touch for 15 min, starting 10 min before, continuing during and ending 5 min after heel lancing	21G needle	NS	NIPS and COMFORT	32 - 37 wk ≥ 1500 g
	Control (*n* = 25)	No intervention				
Shah et al, 2017, Australia [99]	Music (*n* = 35)	Music 20 min before, continuing for 7 min after the procedure	Lancet	NS	PIPP-R	> 32 wk PMA
	Sucrose (*n* = 35)	0.5 mL of 24% oral sucrose, 2 min before heel prick				
	Music-Sucrose (*n* = 35)	Music + sucrose (both)				
Gibbins et al, 2002, Canada [63]	NNS-Sucrose (*n* = 64)	0.5 mL of 24% sucrose, followed by a Wee Soothie pacifier	Lancet	Yes	PIPP	27 - 43 wk

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
	Sucrose (*n* = 62) NNS (*n* = 64)	0.5 mL of 24% sucrose 0.5 mL of sterile water, followed by a Wee Soothie pacifier				
Shu et al 2014 Taiwan [100]	Control (*n* = 25) Swaddling (*n* = 25) Heel warming (*n* = 25)	No intervention for 30 min Swaddling for 30 min until post test No intervention for 25 min and then heel warming for 5 min before procedure	NS	NS	NIPS	31- 41 wk
Shukla et al, 2018, India [101]	KMC (*n* = 50) Sucrose	KMC 10 min before procedure 0.2 mL of 24% sucrose, 2 min before procedure	NS	NS	PIPP	29 - 36 wk
Shukla et al, 2018,[a] India [102]	KMC-EBM (*n* = 50)	2 mL EBM, 2 min before procedure and KMC started 10 min before procedure and continued after procedure as per institutional protocol	NS	NS	PIPP	28 - 36 wk
	Music-EBM (*n* = 49)	2 mL EBM, 2 min before procedure and music therapy, 5 min before and for at least 5 min after procedure				
	KMC-Music-EBM (*n* = 50)	2 mL EBM, 2 min before procedure and music therapy, 5 min before and for at least 5 min after procedure and KMC started 10 min before procedure and continued after procedure				
	EBM (*n* = 51)	2 mL EBM, 2 min before procedure				
Simonse et al, 2012, Netherlands [103]	Breastfeeding (*n* = 23) EBM (*n* = 23)	Breastfeeding before heel prick Supplemental digital contental breast milk by syringe before heel prick	NS	NS	PIPP	32 - 36 wk
	Sucrose (*n* = 25)	1-2 mL of 24% sucrose, 2 min before heel prick				
Slater et al, 2010, UK [104]	Sucrose (*n* = 20) Sterile water (*n* = 24)	1 mL of 24% sucrose, 2 min before heel prick 1 mL of sterile water, 2 min before heel prick	Lancet	Yes	PIPP	37 - 43 wk
Stadler et al, 2021, Austria [105]	Acupunture (*n* = 47)	Laser acupuncture for 60 sec given bilaterally 30 sec before heel prick	Lancet	Yes	PIPP	>37 wk
	Dextrose (*n* = 48)	Oral 30% glucose for 30 sec given 120 sec before heel prick				
Stevens et al, 1999, Canada [107]	Topical anesthesia (*n* = 25)	0.5 g of EMLA for 60 min before heel prick	NS	NS	NS	NS
	Control (*n* = 21)	0.5 g of Glaxal for 60 min before heel prick				
Stevens et al, 1999,	Prone positioning	Infants were positioned prone within the	Lancet	NS	PIPP	27 - 31 wk

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
Canada [106]	(*n* = 122)	snuggleup device, with knees flexed toward the chest, arms close to the midline, and one foot accessible for the heel stick				
	NNS (*n* = 122)	Wee Thumbie pacifier dipped in sterile water (approximately 0.1 mL solution) 5 min and 2 min before the heel lance. The water-moistened pacifier was gently held in place by the research nurse during the entire heel lance procedure				
	NNS-Sucrose (*n* = 122)	Pacifier was dipped in a 24% sucrose solution 5 min and 2 min before the heel lance				
	Control (*n* = 122)	Control				
Kumari et al, 2016, India [76]	Glucose (*n* = 47)	Neonates were placed in a semi-reclining position, and a non-invasive vital sign monitor was applied to their hand or foot. After 2 min, 1 mL of the 25% glucose was administered to the neonate over the anterior part of their tongue over 30 seconds. Heel lancing was performed after 2 min.	Auto lancet (Accu-Chek Softclix, Roche, Germany)	NS	PIPP	Clinically stable preterm infants.
	Sucrose (*n* = 47)	The neonates were placed in a semi-reclining position, and a non-invasive vital sign monitor was applied to their hand or foot. After 2 min, 1 mL of the 24% sucrose was administered to the neonate over the anterior part of their tongue over 30 seconds. Heel lancing was performed after 2 min.				
Taddio et al, 2008, Canada [109]	Sucrose (*n* = 60)	2 mL of 24% sucrose, 2 min before heel prick	NS	NS	PIPP	>36 wk
	Sterile water (n = 60)	2 mL of sterile water, 2 min before heel prick				
Tasci et al, 2020, Turkey [110]	EBM (*n* = 42)	2 mL of breast milk smell before the heel prick blood sampling procedure	22 G needle	NS	NIPS	38-42 wk 2500-4000 g
	Formula milk (*n* = 42)	2 mL of formula milk smell before the heel prick blood sampling procedure				
Tavlar et al, 2022, Turkey [111]	Breastfeeding (*n* = 30)	Breastfed from right breast, 3 min before to 3 min after the procedure	Lancet	NS	ALPS-Neo	38-42 wk 2500-4000 g
	Mother's heartbeat sounds (*n* = 30)	The mother's heartbeat sound, 3 min before to 3 min after the procedure				
	Odour (*n* = 30)	5 mL of breast milk sample taken on cloth placed 3 cm from nose, from 3 min before to 3 min after				

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
		heel prick				
Thakkar et al, 2015, India [112]	Sucrose (*n* = 45)	2 mL of 30% sucrose solution by sterile syringe	NS	Yes	PIPP	≥37 wk >2200 g
	NNS (*n* = 45)	Received NNS with sterile gauze held gently in the neonate's mouth and the palate tickled to stimulate sucking				
	NNS-Sucrose (*n* = 45)	NNS-Sucrose				
	Control (*n* = 45)	Control				
Uematsu et al, 2019a, Japan [114]	Facilitated tucking-NNS-Music (*n* = 25)	Facilitated tucking, Pacifier and Brahms lullaby music, 1 min before heel prick, till 5 min after heel prick	Lancet	NS	PIPP	<36 wk
	Facilitated tucking (*n* = 25)	Facilitated tucking, 1 min before heel prick				
Uematsu et al, 2019b, Japan [114]	Music-NNS-Facilitated tucking (*n* = 15)	Intervention group received the Brahms lullaby and a pacifier, along with facilitated tucking	BD Microtainer Quickheel TM Lancet	NS	PIPP	28-35 wk post-conceptional age
	Facilitated tucking (*n* = 13)	Only facilitated tucking and holding				
Usta et al, 2020, Turkey [115]	Odour (*n* = 31)	Lavender oil was dropped onto a cotton bud, placed near the baby's nostrils, and sniffed by the baby 3 min before, during, and 30 sec after the heel stick procedure	Automatic lancet	NS	PIPP-R	24-37 wk
	Control (*n* = 30)	Distilled, odourless water was dropped onto the same type of cotton buds with the same procedure and time period as the above group				
Uyan et al, 2005, Turkey [116]	EBM (*n* = 20) Sterile water (*n* = 21)	2 mL of milk 2 mL of sterile water	Lancet 3 mm long	Yes	NFCS	≥ 37 wk >2500 g
Velumula et al, 2022, USA [117]	Sucrose (*n* = 44)	0.5 mL 24% sucrose via syringe, combined with swaddling, two min prior to the scheduled heel lance	Automated heel lance	NS	PIPP-R	30 1/7 - 36 6/7 wk
	EBM (*n* = 44)	2 mL EBMvia syringe, combined with swaddling, two min prior to the scheduled heel lance				
Tutag Lehr et al, 2015, USA [113]	Sucrose (*n* = 29)	2 mL of 24% sucrose orally 1 min before heel prick	Lancet (BD Quickheel Lancet)	NS	NIPS	Term newborn
	Sterile water (*n* = 27)	2 mL of sterile water				
Yilmaz et al, 2020,	Swaddling (*n* = 40)	Babies were swaddled safely for 1 min before the	Needle	NS	NIPS	38-42 wk

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Authors, Year, Country	*Intervention*	*Technique/method*	*Device used for heel prick*	*Squeezing*	*Pain score*	*GA/ birth weight/ recruitment criteria*
Turkey [120]		heel lance procedure and for 2 min after the procedure				
	Mother holding (*n* = 40)	The babies were swaddled and held by their mothers during and 2 min after the heel lance procedure				
	Breastfeeding (*n* = 40)	The babies were swaddled, held by their mothers, and breastfed immediately before, during, and for 2 min after the heel lance procedure.				
	Control (*n* = 40)	Control				
Yilmaz et al, 2021, Turkey [119]	Touch massage (*n* = 30)	15-20-min foot massage before the heel lance procedure	NS	NS	NIPS	38-40 wk
	Control (*n* = 30)	Control				
Yu et al, 2021, Taiwan [6]	Mother's voice (*n* = 32)	Recordings of the mother's voice reading a children's book	Lancet	NS	NIPS	<37 wk
	Control (*n* = 32)	Control				
Zhu et al, 2015, China [10]	Control (n = 61)	Control	NS	Yes	NIPS	?37 week
	Music (*n* = 62)	Three classical music pieces were played on a loop for at least 5 min before heel lance and maintained during blood sampling				
	Breastfeeding (*n* = 64)	Neonates were breastfed in their mothers' arms, starting 5 min before the procedure and continuing throughout				
	Breastfeeding-Music (*n* = 63)	Neonates were breastfed and classical music was played to them simultaneously				

ALPS-Neo Astrid Lindgren Children's Hospital Pain Scale neonatal version, BPSN Bernese Pain Scale for Neonates, CRIES Crying Requires oxygen Increased vital signs Expression Sleep, DAN Douleur Aiguë Nouveau-né pain scale, EBM Expressed breast milk, G Gauge, GA Gestational age, Min Minute, MBPS Modified Behaviour Pain Scale, NFCS Neonatal Facial Coding System, NIPS Neonatal Infant Pain Scale, NNS Non-nutritive sucking N-PASS Neonatal Pain, Agitation and Sedation Scale, NS Not specified, PIPP Premature Infant Pain Profile, PIPS Premature Infant Pain Scale, PIPP-R Premature Infant Pain Profile-Revised, Wk Week

Fig. 1 shows the network and NMA forest plots with the control group as the common comparator. **Web Fig. 3** shows the league plot that depicts the network estimates for various comparisons. No inconsistency was found in the node-splitting analysis (**Web Fig. 4**, which shows the split between direct and indirect evidence). Forest plots for direct evidence are provided in **Web Fig. 5**. The CoE assessment for pain score during heel prick is listed in **Web Table III**.

There was high CoE for seven interventions, indicating a significant reduction in pain scores during heel prick when compared to the absence of intervention: NNS Sucrose [SMD (95%CI) -3.15 (-2.62, -3.69), breastfeeding [-1.91 (-1.48, -2.33)], glucose [-1.48 (-1.00, -1.96)], EBM [-1.33 (-0.70, -1.96)], Sucrose [-1.31 (-0.87, -1.75)], NNS [-1.25 (-0.85, -1.66)] and Touch Massage [-1.13 (-0.62, -1.64)]. We found moderate CoE for three interventions to reduce pain score during heel prick significantly: Touch Massage-NNS [-3.37 (-1.54, -5.21)], White Noise [-2.21 (-1.56, -2.86)] and Glucose-Mother Holding [-2.04 (-0.94, -3.14)]. Based on the P score ranking and CoE assessment, NNS-Sucrose (P score 0.932) was the best intervention to reduce pain during heel prick.

Pain score at 30 seconds after heel prick: Thirty-three trials (6,238 infants) evaluating 23 interventions reported this outcome. **Fig. 2** shows the network and NMA forest plots with the control group as the common comparator. League plots, node-splitting analysis and forest plots for direct evidence are provided in **Web Fig. 5-7**. The CoE assessment is listed in **Web Table IV**.

We found moderate CoE for eight interventions to cause a significant reduction in pain score at 30s after heel prick when compared to no intervention: Facilitated Tucking and NNS and Music [SMD -2.40 (-1.53, -3.26)], Glucose [-1.60 (-1.29, -1.91)], NNS and Sucrose [-1.68 (-1.26, -2.09)], Sucrose and Swaddling [-1.55 (-1.05, -2.05)], Mother Holding [-1.35 (-0.91, -1.79)], EBM [-1.20 (-0.81, -1.59], Sucrose [-1.14 (-0.79, -1.50)] and NNS [-1.01 (-0.59, -1.43)].

Secondary outcomes

Pain score at 1 minute after heel prick: Thirty-four trials (3412 infants) evaluating 27 interventions reported this outcome. Multiple interventions such as Breastfeeding, Breastfeeding-Music, Glucose, KMC, KMC-EBM, KMC-EBM-Music, KMC-Sucrose, Mother's Voice, Mother's Voice-Holding, Music-EBM, Music-Sucrose,

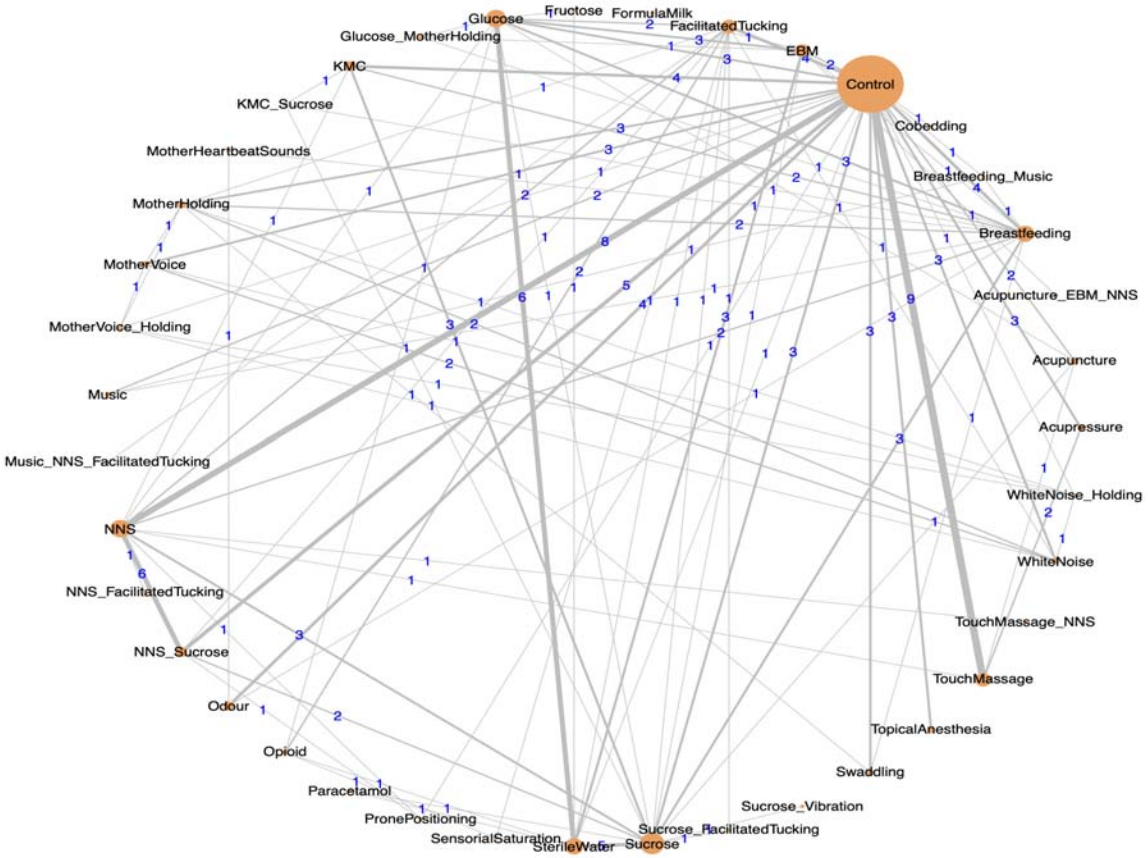

Fig. 1A Network plot depicting pain score during heel prick in neonates

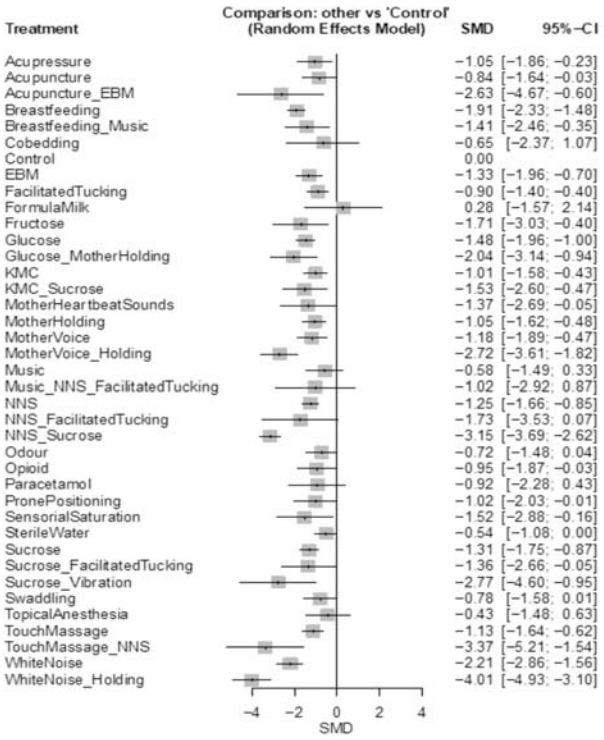

Fig. 1B Forest plot depicting the network estimates [SMD (95% CrI)] of the various interventions with 'control' as the common comparator for pain score during heel prick in neonates

NNS, NNS-Sucrose, Sterile Water, Sucrose, White Noise and White Noise-Holding were found to be beneficial in reducing pain at 1 minute after heel prick when compared to no intervention. Network plots, node-splitting analyses and forest plots for direct evidence are provided in **Web Fig. 8-10**.

Pain score at 2 minutes, 3 minutes, 5 minutes, and 10 minutes after heel prick: Twenty-four trials (2,132 infants, 15 interventions), 14 trials (1,080 infants, 11 interventions), nine trials (1,896 infants, nine interventions) and three trials (266 infants, three interventions), respectively, reported pain scores at the aforementioned intervals after the heel prick. The corresponding network plots, forest plots, node-splitting analyses and forest plots for direct evidence are provided in **Web Fig. 11-21**.

Adverse effects of the intervention and clinical outcomes: One trial assessed apnea and bradycardia as adverse events and reported that none of the infants in either group had any adverse event [40]. None of the trials included in this NMA reported on the short- or long-term clinical outcomes.

DISCUSSION

In this systematic review and meta-analysis, we compared

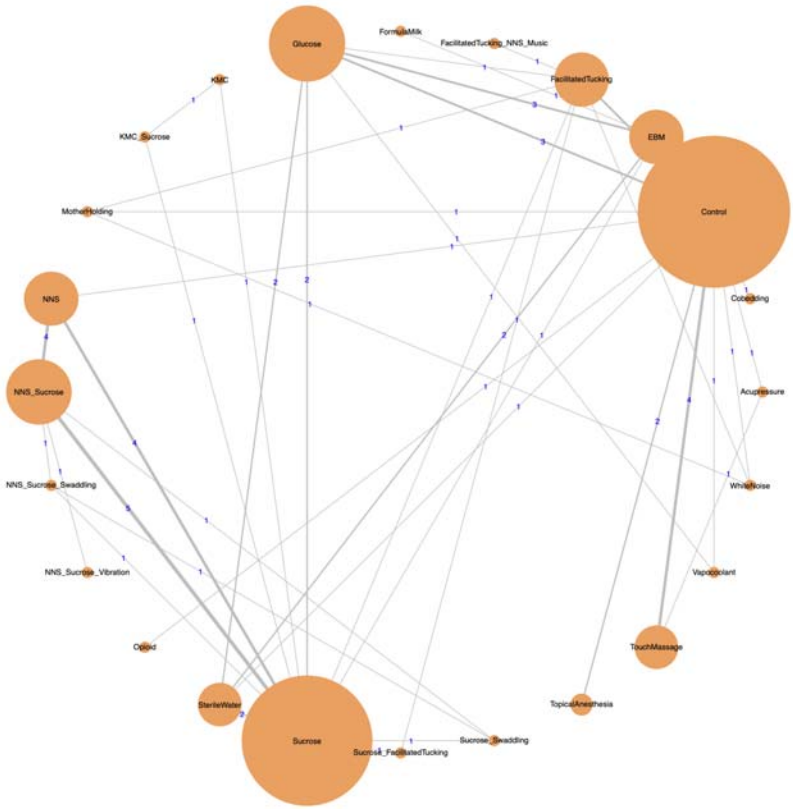

Fig. 2A Network plot for pain score 30s after heel prick in neonates

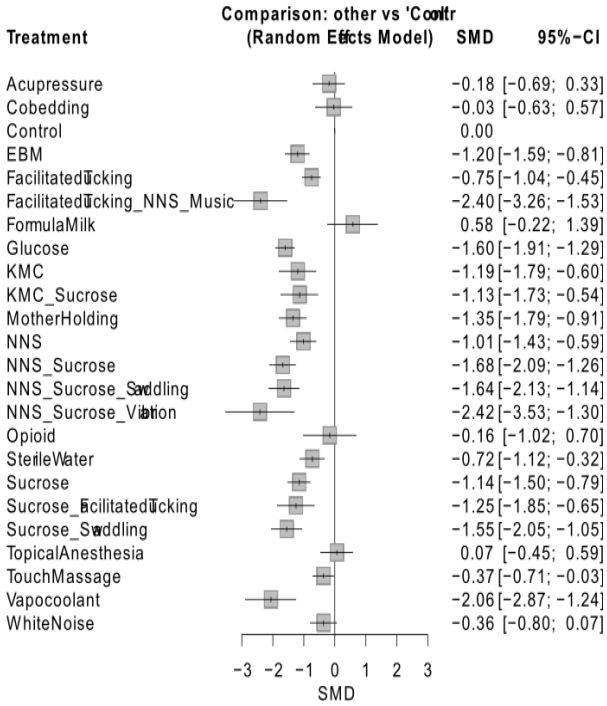

Fig. 2B Forest plot depicting the network estimates [SMD (95% CI)] of the various interventions with 'control' as the common comparator for pain score 30s after heel prick in neonates

the efficacy of various pharmacological and non-pharmacological measures to reduce pain during/ after heel prick in neonates. We included data from 103 randomized controlled trials and evaluated 51 interventions, non-pharmacologic and pharmacologic (29 stand-alone interventions and 22 combinations of interventions) for analgesia during heel prick. These interventions encompassed a wide range of approaches, reflecting the diverse practices in neonatal pain management. Oral sucrose, followed by NNS, was the best intervention to reduce pain during heel prick in neonates (High CoE). Oral sucrose also reduced pain at 30 seconds and 60 seconds after the heel prick. The findings of this NMA indicate that several analgesic measures, often in combination, significantly reduce the severity of pain during and after the heel prick. Other effective interventions were sucrose alone, glucose, EBM and NNS (Moderate to High CoE). All these interventions are low-cost and feasible and should be suitable for all settings.

Some interventions found to be effective in this NMA, such as white noise, touch/massage and sensorial saturation, require special equipment or trained personnel for implementation. Some interventions, such as breastfeeding and mother holding, may be difficult to practice universally, as the mother may not be available all the time, and some mothers may not be comfortable seeing the heel prick and blood collection of their newborn baby.

Four recent Cochrane meta-analyses assessed the efficacy of non-pharmacological analgesia for acute procedural pain in neonates across various procedures [123-126]. However, these reviews did not provide recommendations specific to heel prick. Only one meta-analysis by Yamada et al. specifically studied analgesia during heel prick [11]. This review compared sucrose analgesia with other analgesic interventions. They found moderate CoE suggesting sucrose was more effective than placebo/ plain water/no intervention in reducing pain scores (as measured by PIPP) during and after 30 seconds and 60 seconds of heel prick. No significant difference was noted between sucrose and other interventions like NNS, glucose, breastfeeding, expressed breastmilk, laser acupuncture, and facilitated tucking. However, a head-to-head comparison of analgesic measures other than sucrose was not performed. In contrast to their findings, our network meta-analysis analysed several interventions, provided higher CoE, and could rank these analgesic interventions based on their superiority in efficacy.

The most recent guidelines on the management of procedural pain were published in 2009 by the Italian Society of Neonatology Pain Study Group [14]. They recommended sucrose, NNS, human milk, and glucose for heel lance. Based on data from two older Cochrane reviews, they suggested combining sucrose with NNS or human milk [127,128]. Although these recommendations are similar to our findings, they did not assess the role of other interventions.

The strength of this meta-analysis is the inclusion of a broad range of pharmacological and non-pharmacological interventions across diverse neonatal populations (term and preterm gestational ages and different postnatal ages), enhancing the applicability of our findings. Although we performed a comprehensive literature search and used robust methods for network meta-analysis, this article still had some limitations. As the pain scores in the included studies varied due to the heterogenicity of scores, we used the SMD to pool data from various studies. We had to use an arbitrary cut-off of 0.5 SMD to decide on the clinically significant reduction in pain score. Hence, the findings of this NMA only reflect a statistically significant reduction in the pain score with the interventions studied and the superiority of one intervention over the other. We could not quantify the reduction in pain scores with each isolated intervention.

Several studies that were included had a high risk of bias or had some concerns of bias. The predominant reasons were the possibility of selective reporting of the findings (as trial protocols of most studies were not registered/published) and problems with the randomi-

zation process. In addition, blinding was not possible for several interventions, resulting in subjectivity and an increased probability of bias.

Differences in term and preterm gestational age influence the pain sensitivity, the behavioural response to pain, and the long-term neurological outcomes related to exposure to repeated painful stimuli across neonates [122]. However, we could not perform a sensitivity analysis that included only extreme preterm or very preterm neonates, as separate data on these populations were unavailable from the included trials. Observational studies have shown that repeated exposure to painful stimuli affects brain growth, long-term neurological outcomes, and sensitivity to pain in later life [2,129-133]. However, none of the studies reported these outcomes.

Various other factors that can affect the pain experienced during heel prick include the device used for heel prick (automatic lancet or needle or manual lancet) [134], the technique of heel prick (warming the heel and squeezing) [36], the indication for heel prick, which in turn influences the quantity of blood drawn (capillary blood gas, dried blood spot, blood glucose estimation) and the number of previous exposures to painful stimuli. Data regarding these aspects was not available in the studies. Thus, we could not ascertain the interaction of these factors with the interventions studied.

CONCLUSIONS

Oral sucrose 2 minutes before, along with NNS during the procedure, was the best intervention for reducing pain during heel prick. It also effectively reduced pain scores 30 seconds and 1 minute after the procedure. Other interventions with moderate to high CoE for a significant reduction in pain during and 30 seconds after heel prick are oral sucrose, oral glucose, EBM and NNS. All these are known to be low-cost and feasible interventions across settings.

Future studies should focus on the adverse events due to analgesic measures, including procedure-related events, the effect of using analgesic measures on short-term neonatal outcomes, outcomes beyond the neonatal period and pain sensitivity in later life.

Contributors: TA, RPA, SR: Conceptualized the systematic review; AKPS: Devised the search strategy, extracted the full texts of the articles included. TA, RPA, NA, TK, VV, PR, NBS: searched the literature, extracted data and assessed for ROB; VVR: Performed the statistical analysis; RPA, TA: GRADE assessment, initial draft of the manuscript; BB, SS, JK, NG, DC, PK: Supervised the search, data extraction, quality assessment, analysis and GRADE assessment, provided further intellectual input and revised the initial draft. All authors approved the final version for submission and agreed to be accountable for all aspects of the work.

Funding: None; *Competing interests:* None stated.

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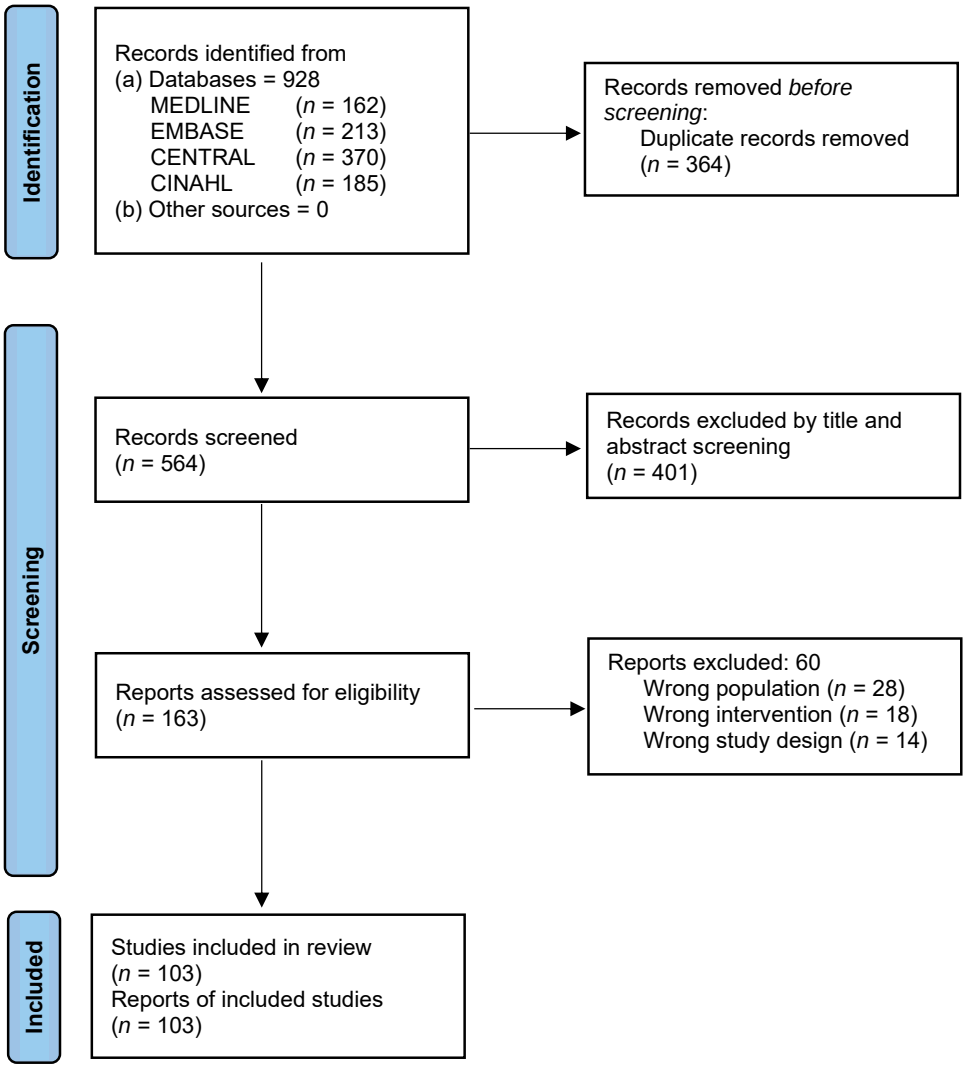
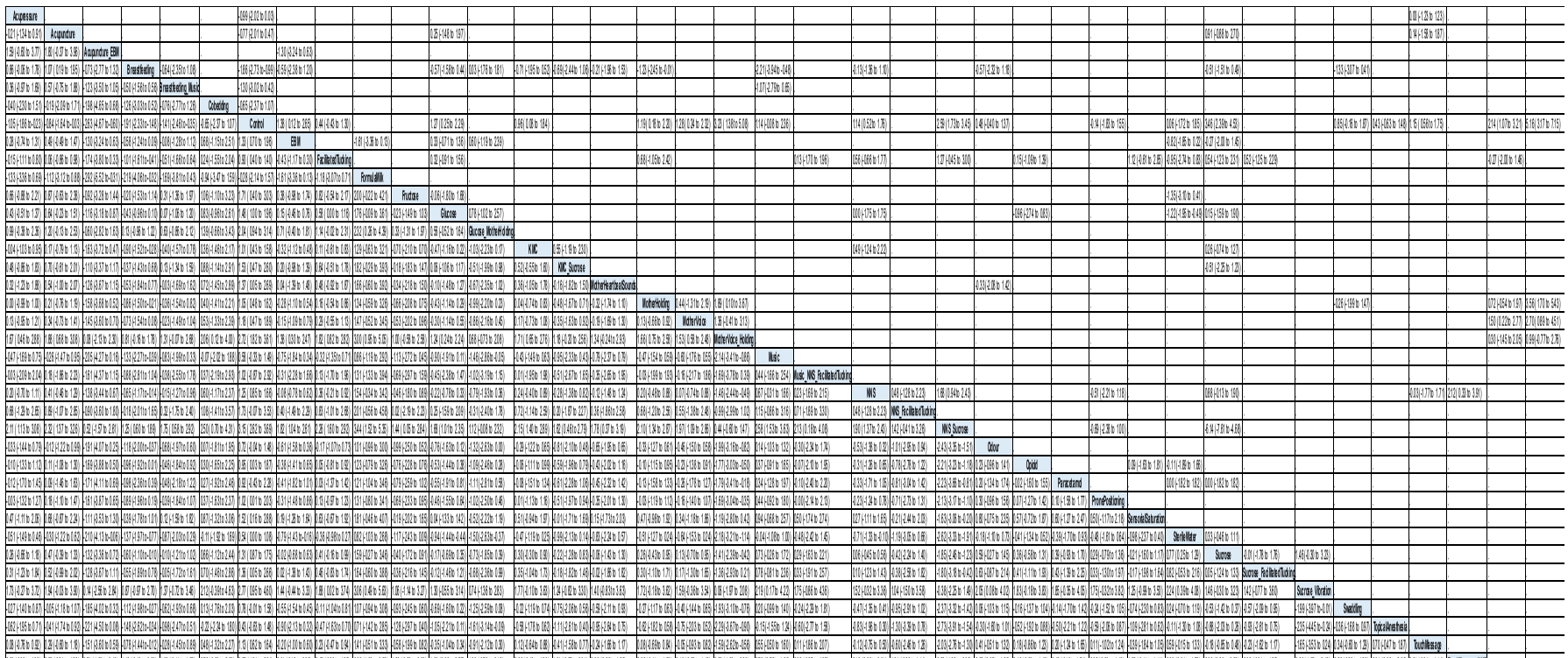
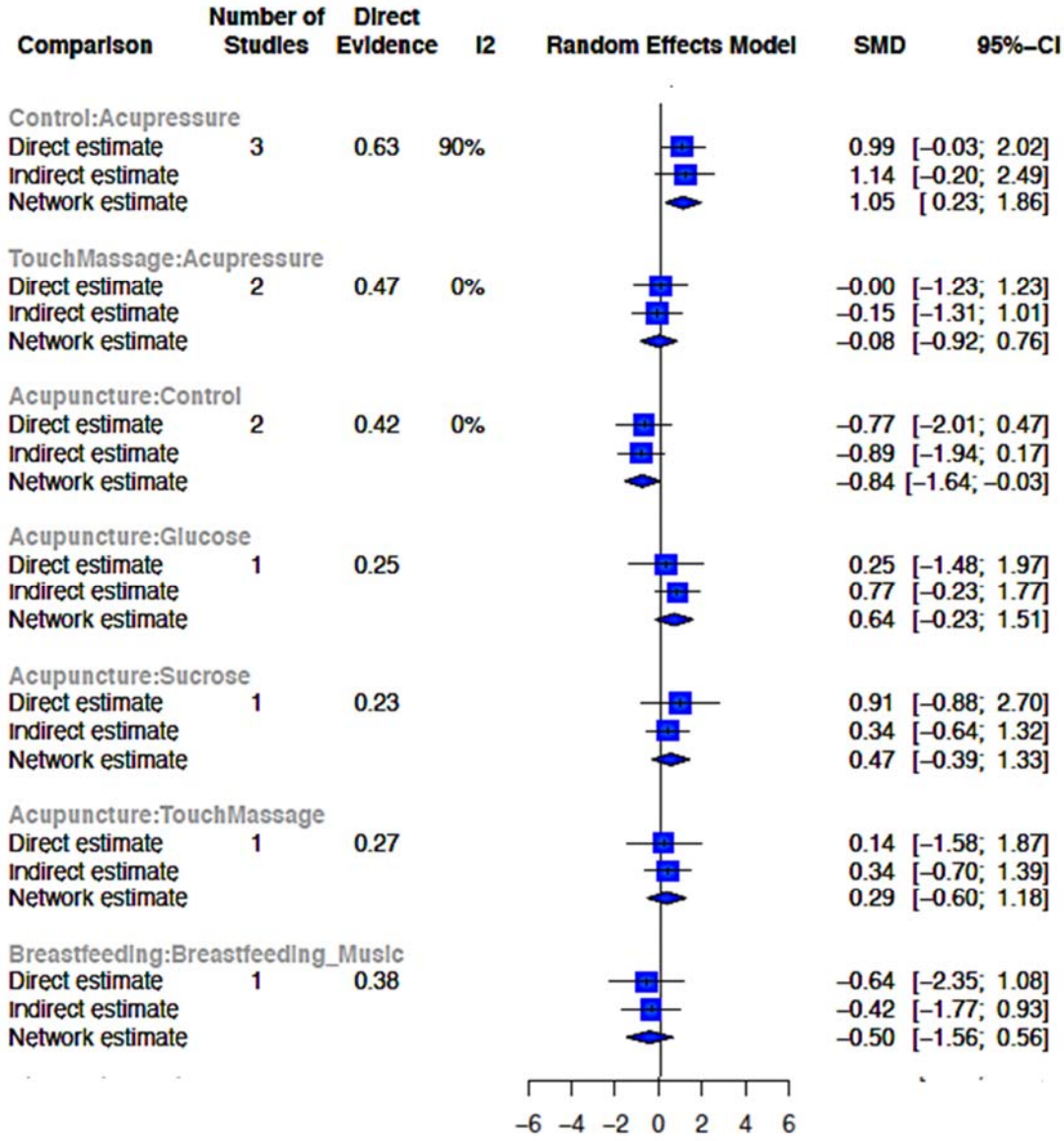


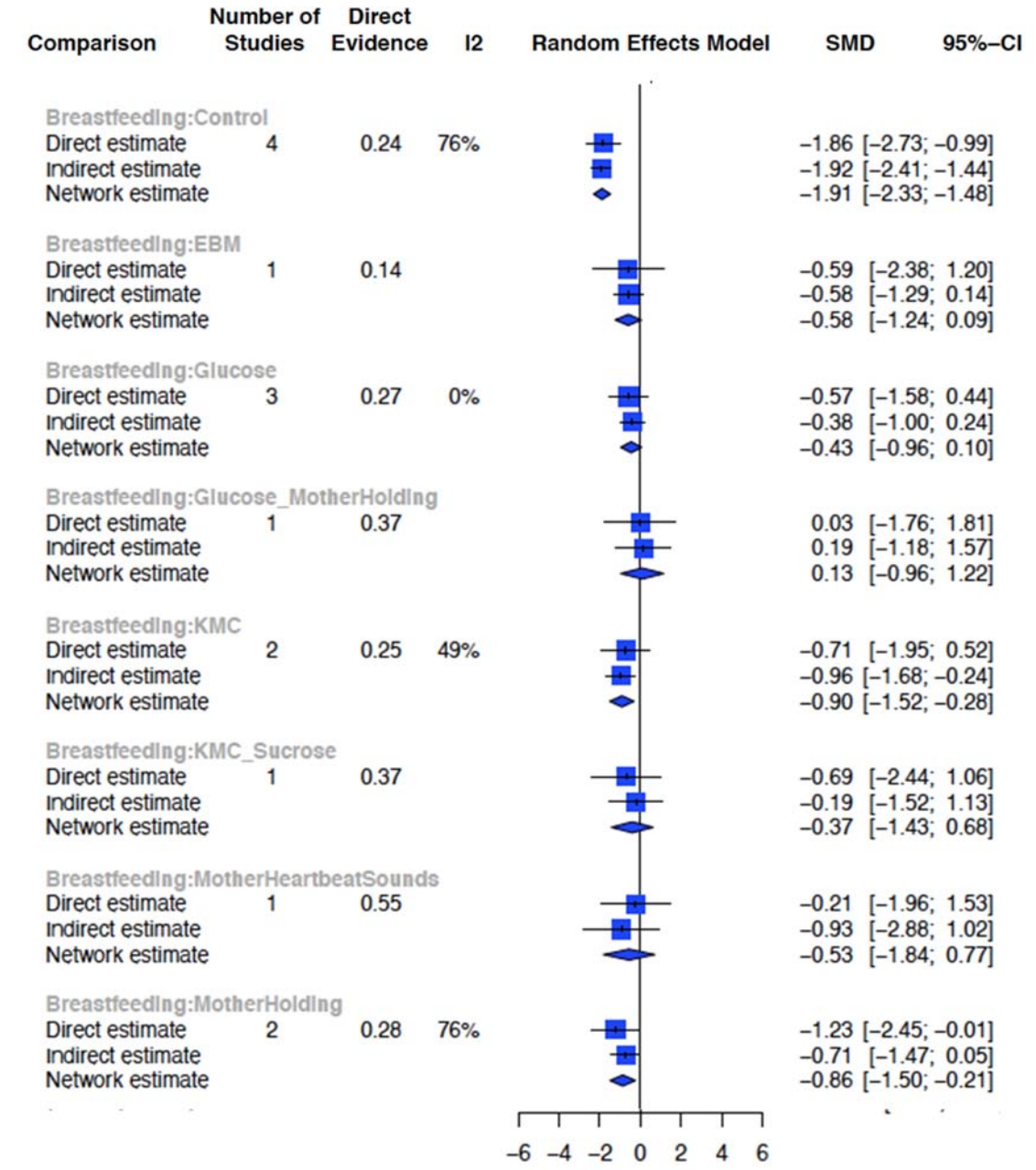
Web Fig. 1 PRISMA flow diagram

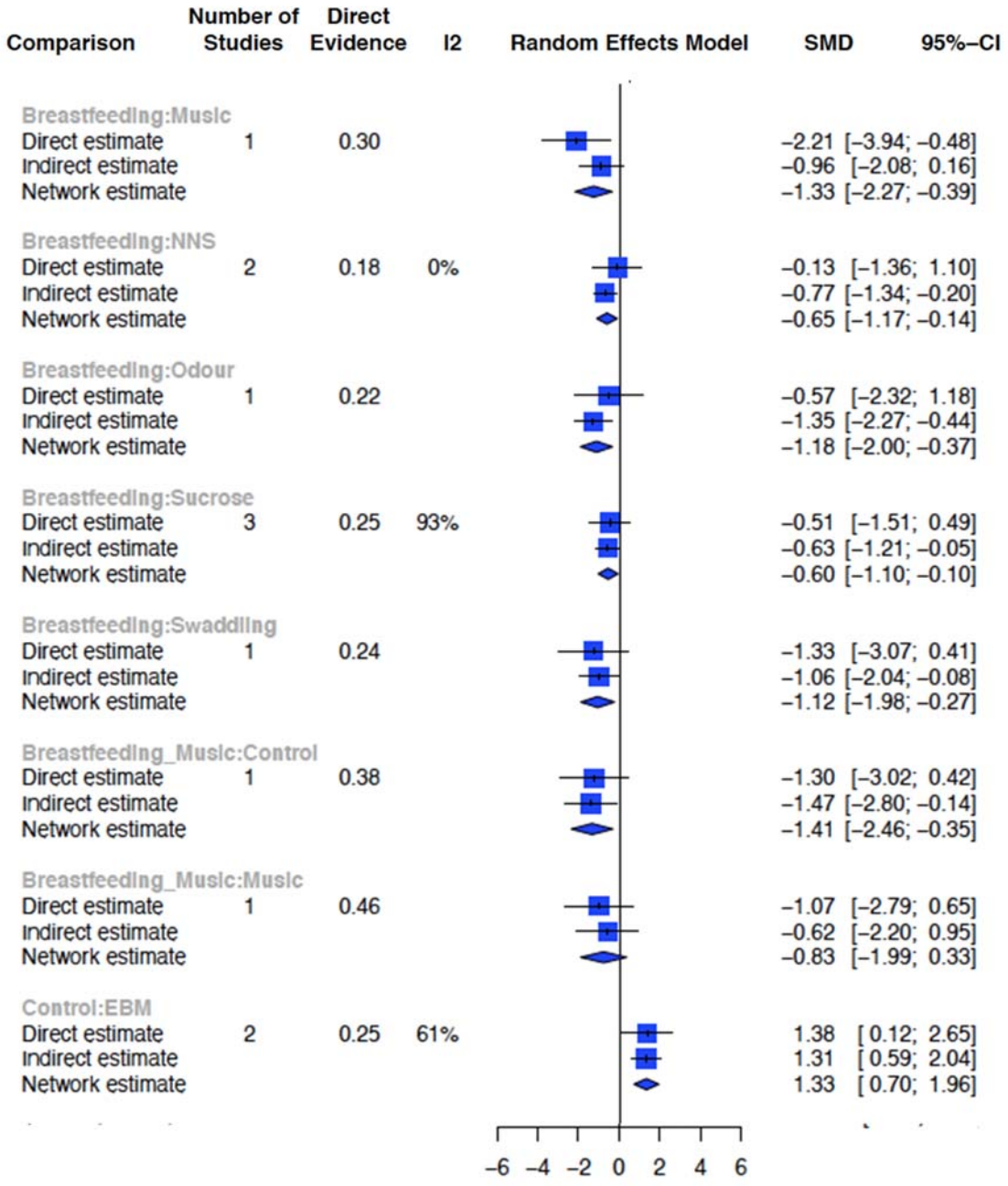
Web Fig. 2. League plot depicting the network estimate [SMD (95% CrI)] for the primary outcome 'pain score during heel prick' in neonates

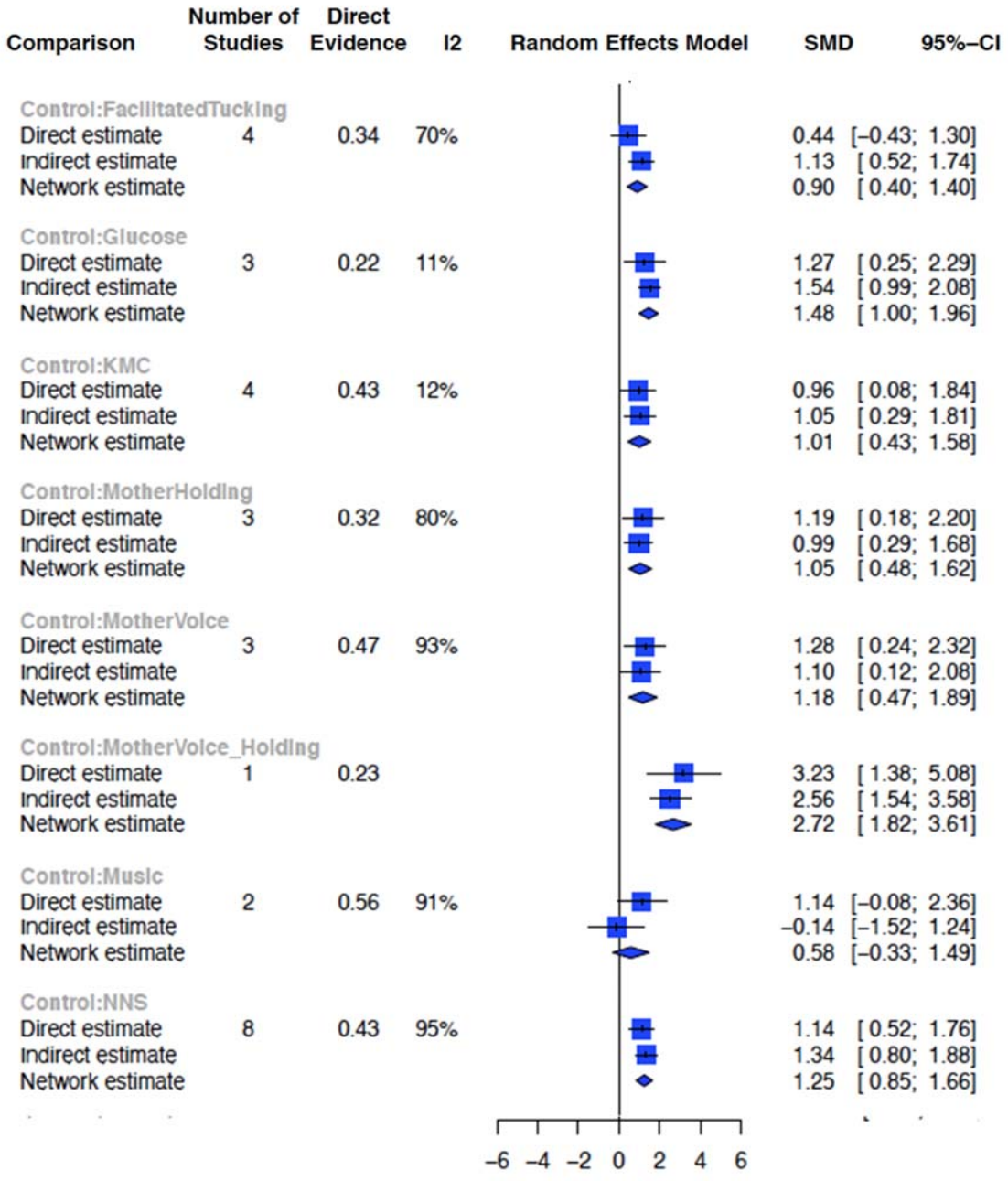


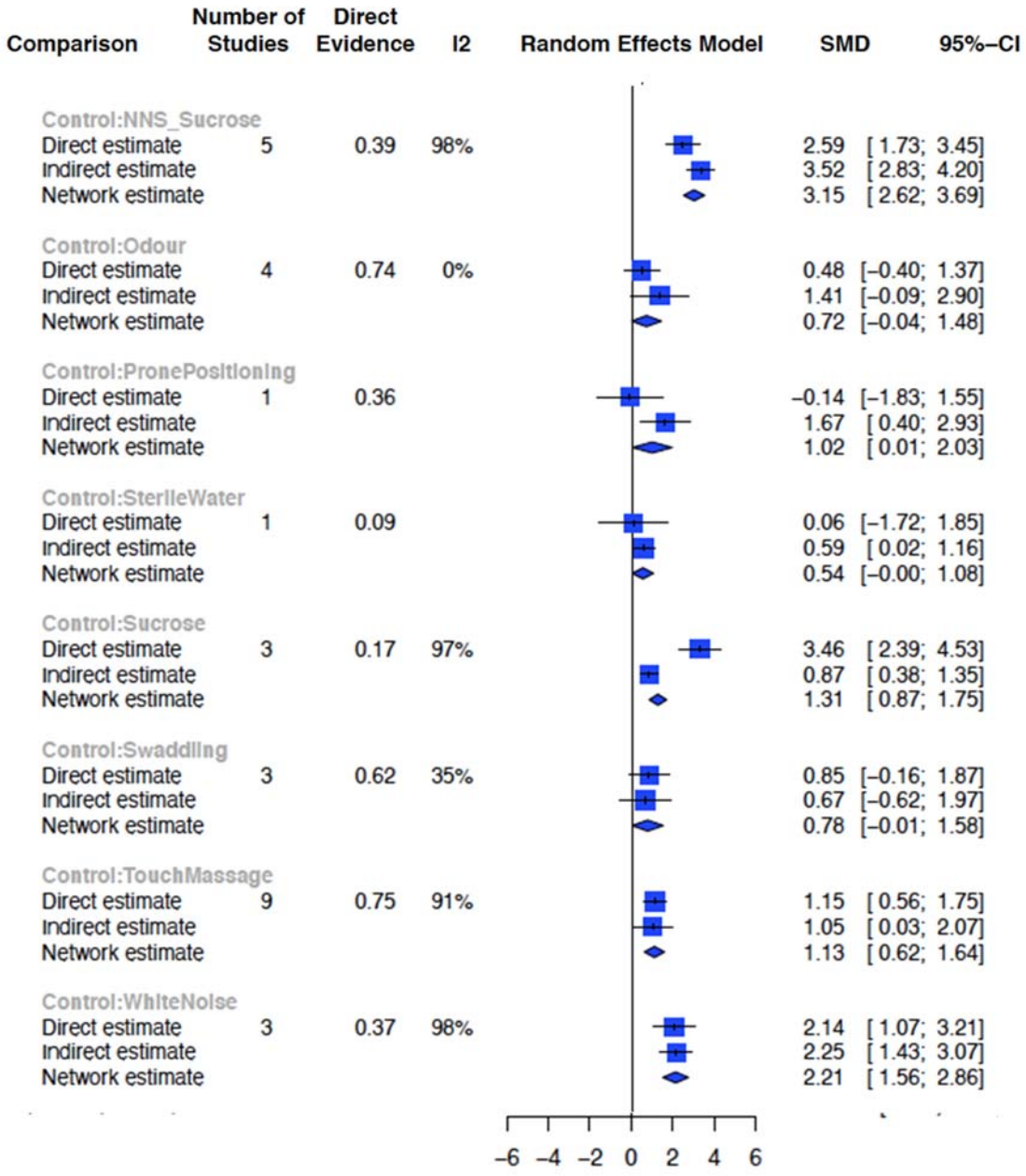
Web Fig. 3. Split between direct and indirect evidence for the primary outcome 'pain score during heel prick' in neonates

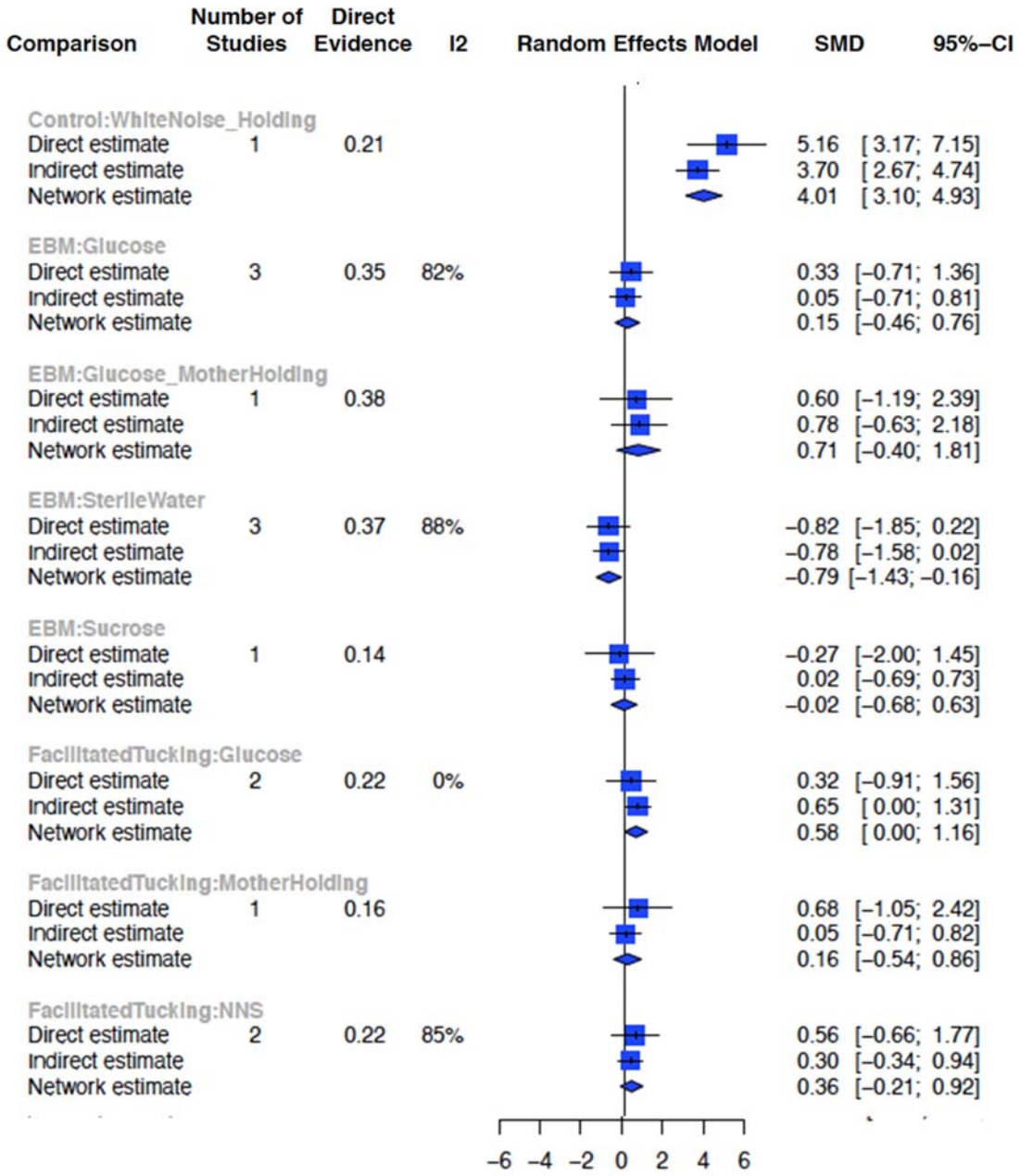


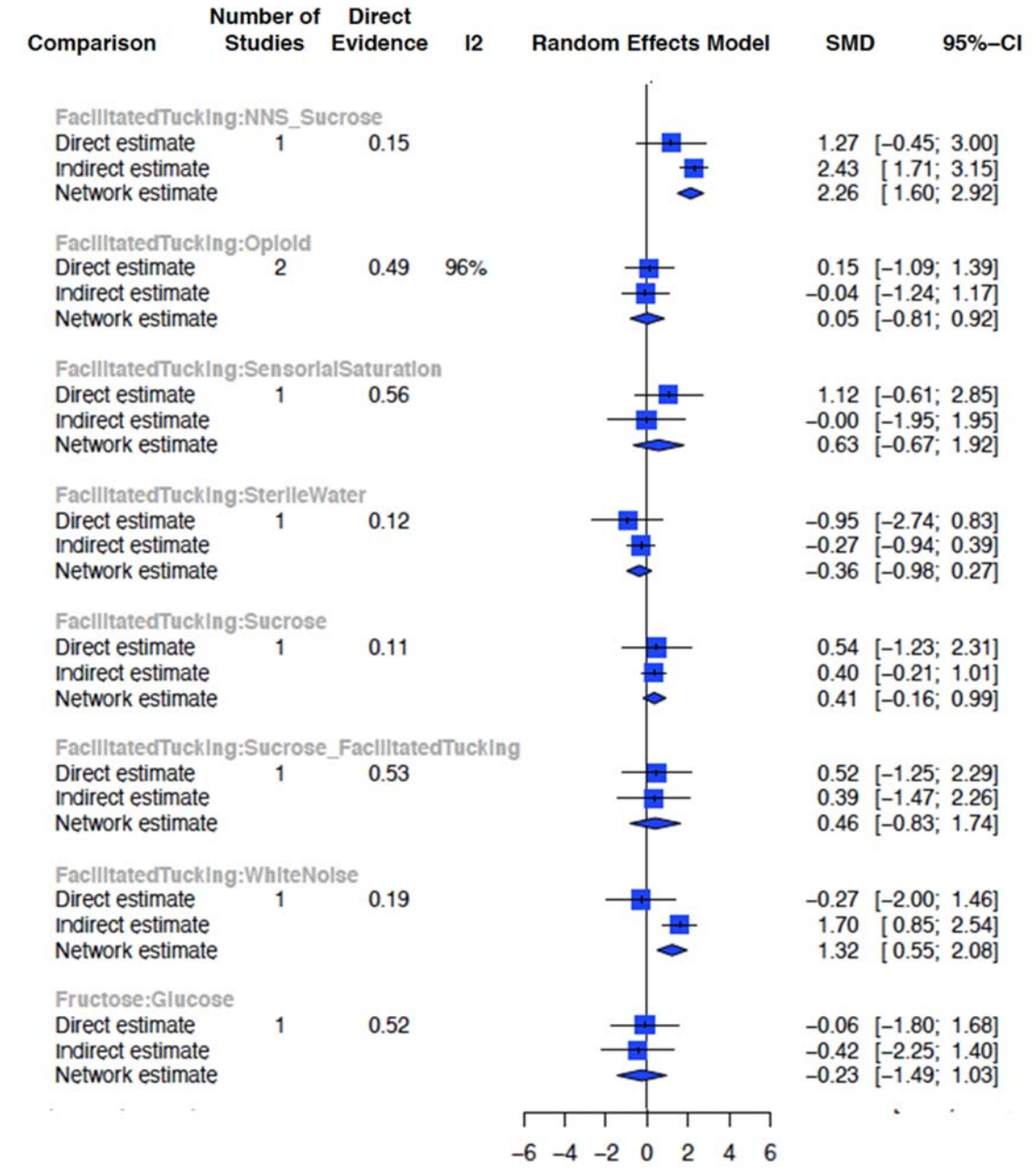

Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
Breastfeeding:Control
Direct estimate 4 0.24 76% −1.86 [−2.73; −0.99]
Indirect estimate −1.92 [−2.41; −1.44]
Network estimate −1.91 [−2.33; −1.48]
Breastfeeding:EBM
Direct estimate 1 0.14 −0.59 [−2.38; 1.20]
Indirect estimate −0.58 [−1.29; 0.14]
Network estimate −0.58 [−1.24; 0.09]
Breastfeeding:Glucose
Direct estimate 3 0.27 0% −0.57 [−1.58; 0.44]
Indirect estimate −0.38 [−1.00; 0.24]
Network estimate −0.43 [−0.96; 0.10]
Breastfeeding:Glucose_MotherHolding
Direct estimate 1 0.37 0.03 [−1.76; 1.81]
Indirect estimate 0.19 [−1.18; 1.57]
Network estimate 0.13 [−0.96; 1.22]
Breastfeeding:KMC
Direct estimate 2 0.25 49% −0.71 [−1.95; 0.52]
Indirect estimate −0.96 [−1.68; −0.24]
Network estimate −0.90 [−1.52; −0.28]
Breastfeeding:KMC_Sucrose
Direct estimate 1 0.37 −0.69 [−2.44; 1.06]
Indirect estimate −0.19 [−1.52; 1.13]
Network estimate −0.37 [−1.43; 0.68]
Breastfeeding:MotherHeartbeatSounds
Direct estimate 1 0.55 −0.21 [−1.96; 1.53]
Indirect estimate −0.93 [−2.88; 1.02]
Network estimate −0.53 [−1.84; 0.77]
Breastfeeding:MotherHolding
Direct estimate 2 0.28 76% −1.23 [−2.45; −0.01]
Indirect estimate −0.71 [−1.47; 0.05]
Network estimate −0.86 [−1.50; −0.21]
−6 −4 −2 0 2 4 6

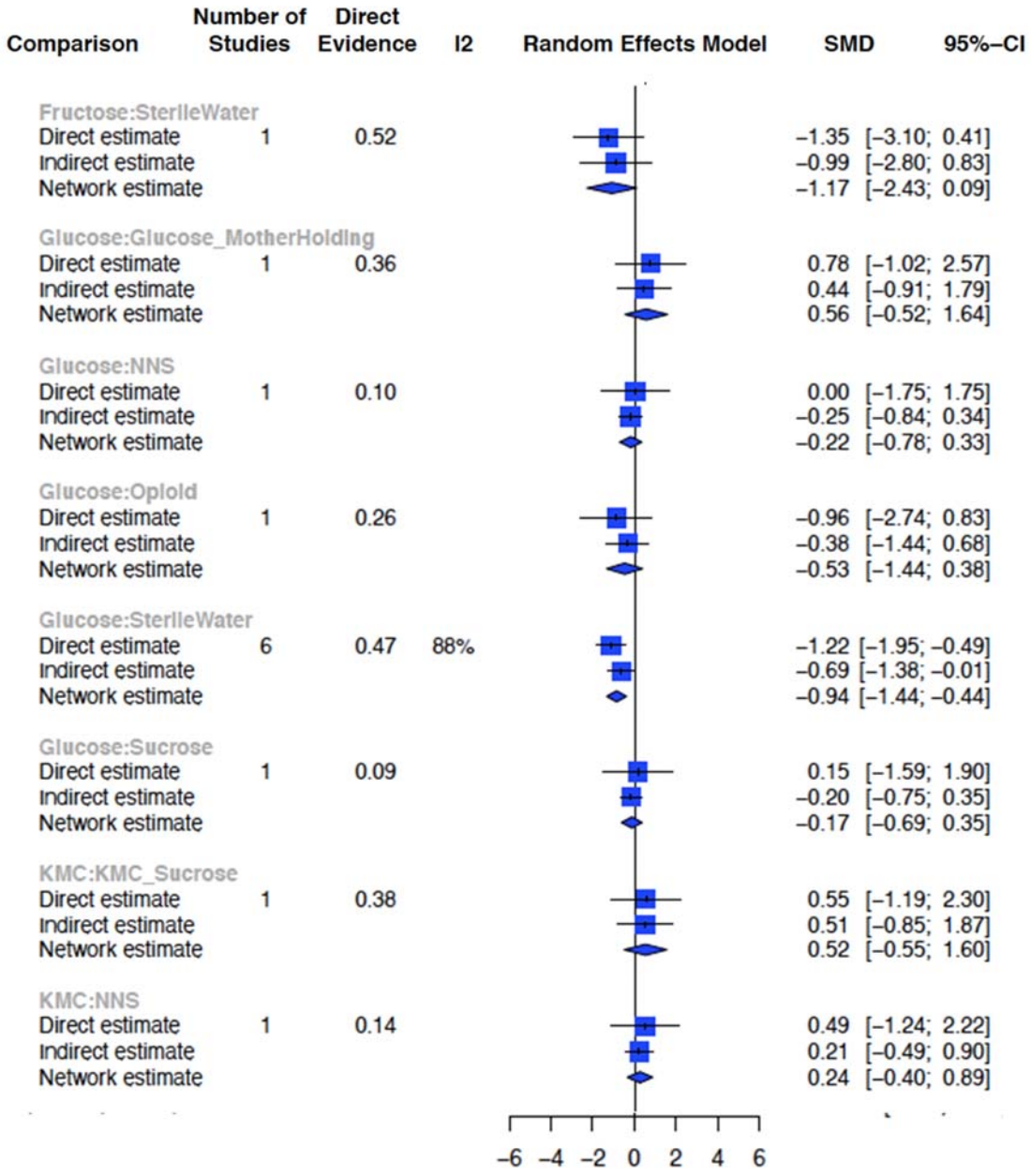

Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
Breastfeeding:Music
Direct estimate 1 0.30 −2.21 [−3.94; −0.48]
Indirect estimate −0.96 [−2.08; 0.16]
Network estimate −1.33 [−2.27; −0.39]
Breastfeeding:NNS
Direct estimate 2 0.18 0% −0.13 [−1.36; 1.10]
Indirect estimate −0.77 [−1.34; −0.20]
Network estimate −0.65 [−1.17; −0.14]
Breastfeeding:Odour
Direct estimate 1 0.22 −0.57 [−2.32; 1.18]
Indirect estimate −1.35 [−2.27; −0.44]
Network estimate −1.18 [−2.00; −0.37]
Breastfeeding:Sucrose
Direct estimate 3 0.25 93% −0.51 [−1.51; 0.49]
Indirect estimate −0.63 [−1.21; −0.05]
Network estimate −0.60 [−1.10; −0.10]
Breastfeeding:Swaddling
Direct estimate 1 0.24 −1.33 [−3.07; 0.41]
Indirect estimate −1.06 [−2.04; −0.08]
Network estimate −1.12 [−1.98; −0.27]
Breastfeeding_Music:Control
Direct estimate 1 0.38 −1.30 [−3.02; 0.42]
Indirect estimate −1.47 [−2.80; −0.14]
Network estimate −1.41 [−2.46; −0.35]
Breastfeeding_Music:Music
Direct estimate 1 0.46 −1.07 [−2.79; 0.65]
Indirect estimate −0.62 [−2.20; 0.95]
Network estimate −0.83 [−1.99; 0.33]
Control:EBM
Direct estimate 2 0.25 61% 1.38 [0.12; 2.65]
Indirect estimate 1.31 [0.59; 2.04]
Network estimate 1.33 [0.70; 1.96]
−6 −4 −2 0 2 4 6

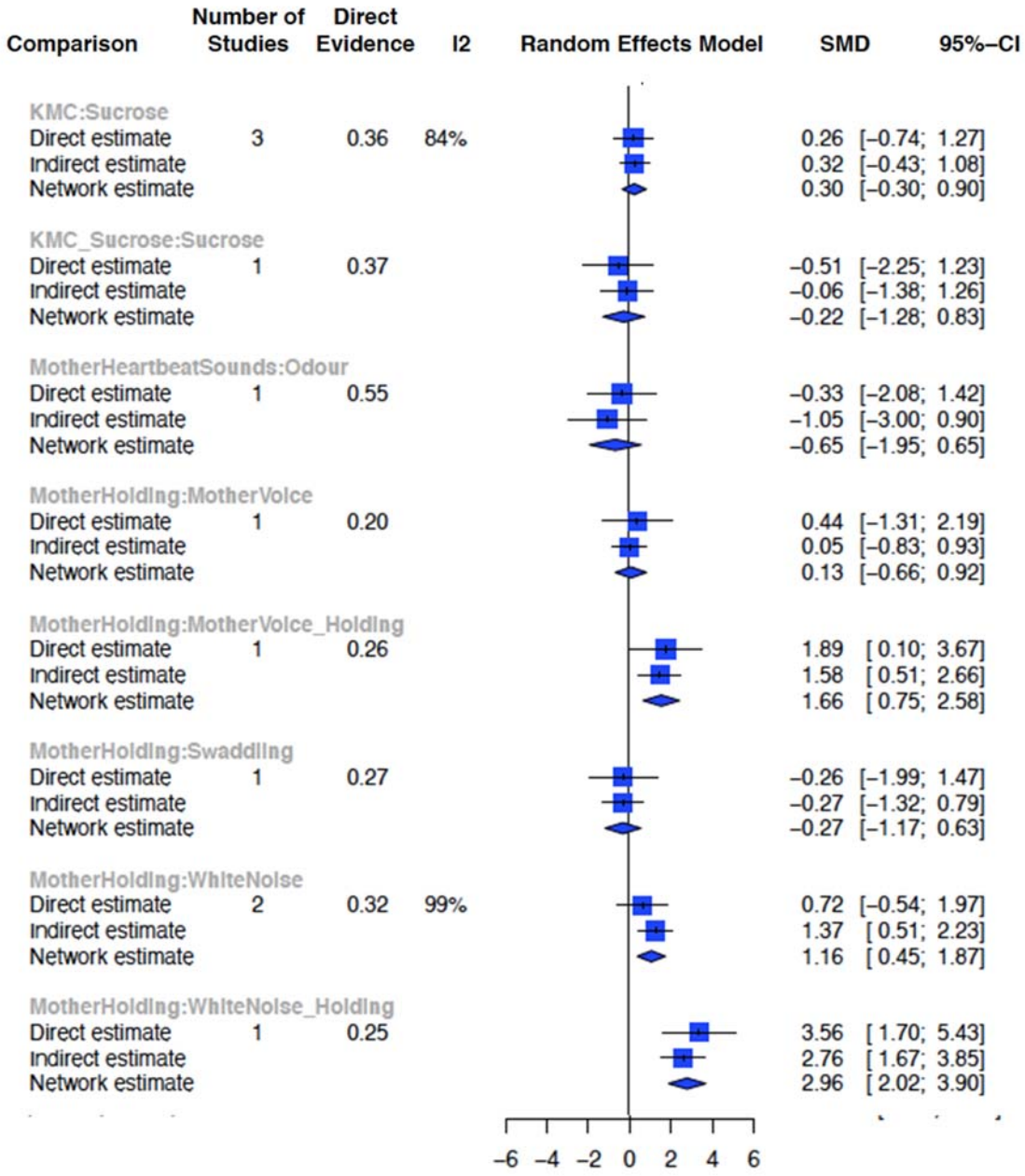

Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
Control:FacilitatedTucking
Direct estimate 4 0.34 70% 0.44 [–0.43; 1.30]
Indirect estimate 1.13 [0.52; 1.74]
Network estimate 0.90 [0.40; 1.40]
Control:Glucose
Direct estimate 3 0.22 11% 1.27 [0.25; 2.29]
Indirect estimate 1.54 [0.99; 2.08]
Network estimate 1.48 [1.00; 1.96]
Control:KMC
Direct estimate 4 0.43 12% 0.96 [0.08; 1.84]
Indirect estimate 1.05 [0.29; 1.81]
Network estimate 1.01 [0.43; 1.58]
Control:MotherHolding
Direct estimate 3 0.32 80% 1.19 [0.18; 2.20]
Indirect estimate 0.99 [0.29; 1.68]
Network estimate 1.05 [0.48; 1.62]
Control:MotherVoice
Direct estimate 3 0.47 93% 1.28 [0.24; 2.32]
Indirect estimate 1.10 [0.12; 2.08]
Network estimate 1.18 [0.47; 1.89]
Control:MotherVoice_Holding
Direct estimate 1 0.23 3.23 [1.38; 5.08]
Indirect estimate 2.56 [1.54; 3.58]
Network estimate 2.72 [1.82; 3.61]
Control:Music
Direct estimate 2 0.56 91% 1.14 [–0.08; 2.36]
Indirect estimate –0.14 [–1.52; 1.24]
Network estimate 0.58 [–0.33; 1.49]
Control:NNS
Direct estimate 8 0.43 95% 1.14 [0.52; 1.76]
Indirect estimate 1.34 [0.80; 1.88]
Network estimate 1.25 [0.85; 1.66]
–6 –4 –2 0 2 4 6

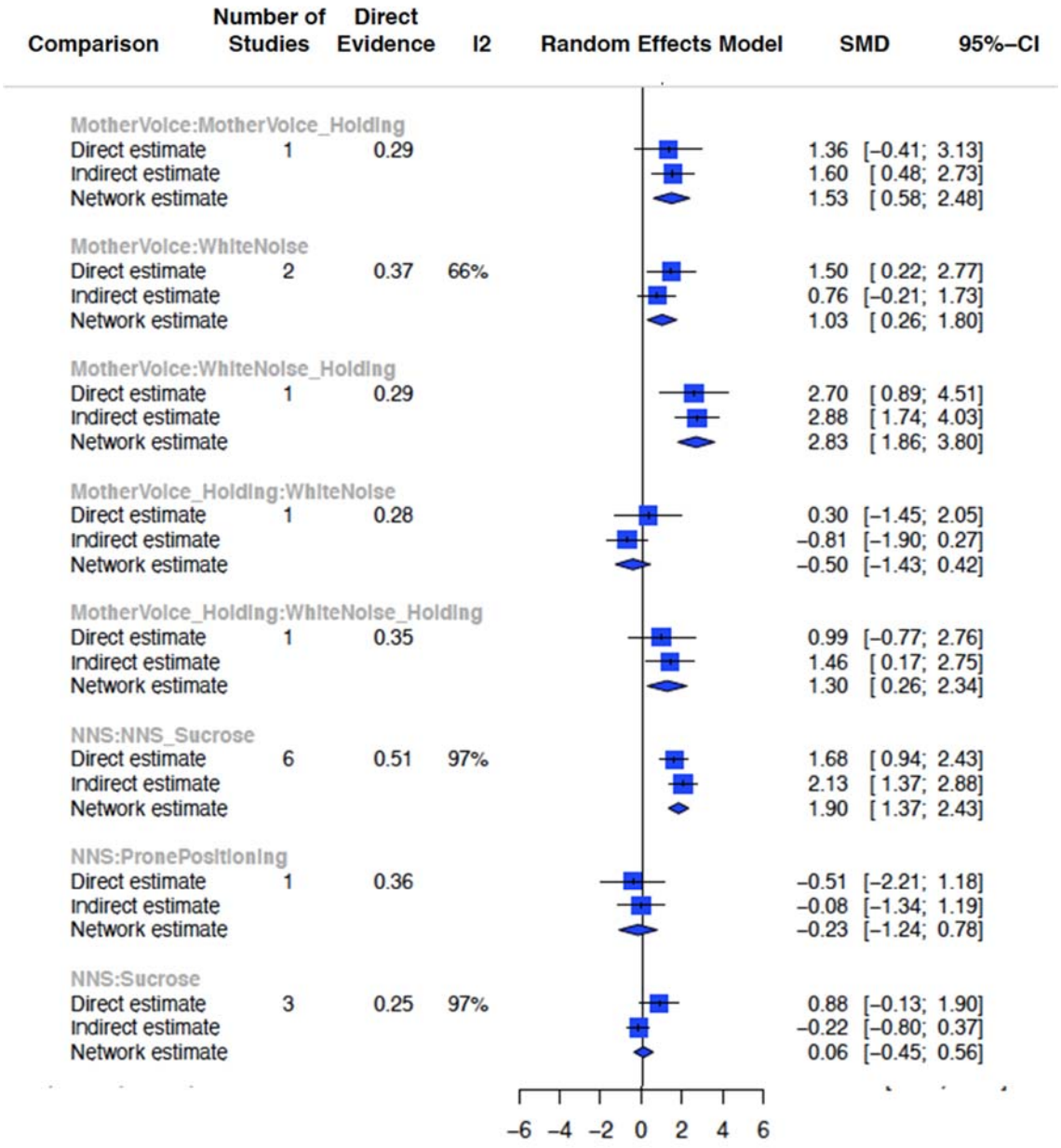

Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
Control:NNS_Sucrose
Direct estimate 5 0.39 98% 2.59 [1.73; 3.45]
Indirect estimate 3.52 [2.83; 4.20]
Network estimate 3.15 [2.62; 3.69]
Control:Odour
Direct estimate 4 0.74 0% 0.48 [–0.40; 1.37]
Indirect estimate 1.41 [–0.09; 2.90]
Network estimate 0.72 [–0.04; 1.48]
Control:PronePositioning
Direct estimate 1 0.36 –0.14 [–1.83; 1.55]
Indirect estimate 1.67 [0.40; 2.93]
Network estimate 1.02 [0.01; 2.03]
Control:SterileWater
Direct estimate 1 0.09 0.06 [–1.72; 1.85]
Indirect estimate 0.59 [0.02; 1.16]
Network estimate 0.54 [–0.00; 1.08]
Control:Sucrose
Direct estimate 3 0.17 97% 3.46 [2.39; 4.53]
Indirect estimate 0.87 [0.38; 1.35]
Network estimate 1.31 [0.87; 1.75]
Control:Swaddling
Direct estimate 3 0.62 35% 0.85 [–0.16; 1.87]
Indirect estimate 0.67 [–0.62; 1.97]
Network estimate 0.78 [–0.01; 1.58]
Control:TouchMassage
Direct estimate 9 0.75 91% 1.15 [0.56; 1.75]
Indirect estimate 1.05 [0.03; 2.07]
Network estimate 1.13 [0.62; 1.64]
Control:WhiteNoise
Direct estimate 3 0.37 98% 2.14 [1.07; 3.21]
Indirect estimate 2.25 [1.43; 3.07]
Network estimate 2.21 [1.56; 2.86]
–6 –4 –2 0 2 4 6

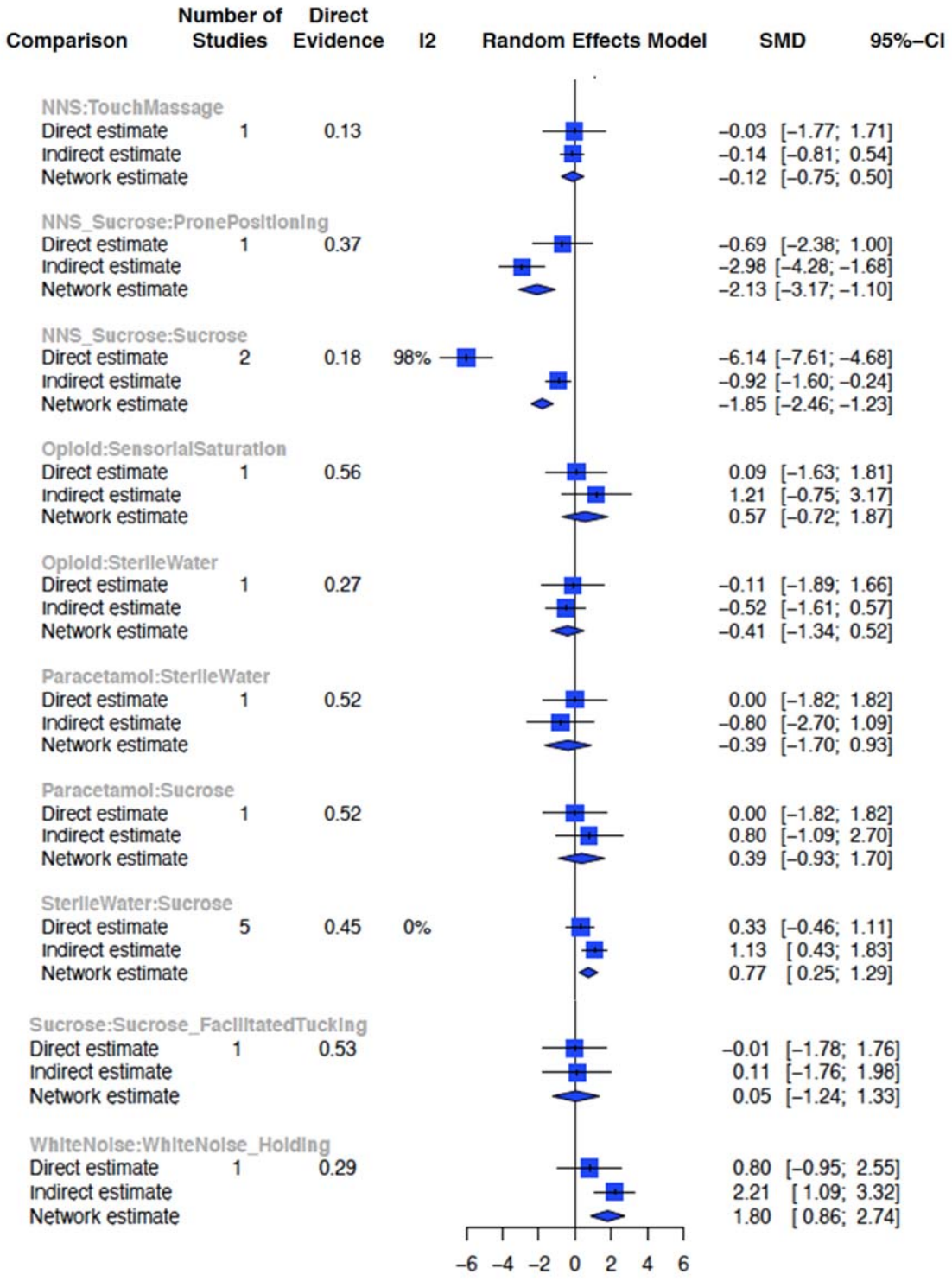

Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
Control:WhiteNoise_Holding
Direct estimate 1 0.21 5.16 [3.17; 7.15]
Indirect estimate 3.70 [2.67; 4.74]
Network estimate 4.01 [3.10; 4.93]
EBM:Glucose
Direct estimate 3 0.35 82% 0.33 [−0.71; 1.36]
Indirect estimate 0.05 [−0.71; 0.81]
Network estimate 0.15 [−0.46; 0.76]
EBM:Glucose_MotherHolding
Direct estimate 1 0.38 0.60 [−1.19; 2.39]
Indirect estimate 0.78 [−0.63; 2.18]
Network estimate 0.71 [−0.40; 1.81]
EBM:SterileWater
Direct estimate 3 0.37 88% −0.82 [−1.85; 0.22]
Indirect estimate −0.78 [−1.58; 0.02]
Network estimate −0.79 [−1.43; −0.16]
EBM:Sucrose
Direct estimate 1 0.14 −0.27 [−2.00; 1.45]
Indirect estimate 0.02 [−0.69; 0.73]
Network estimate −0.02 [−0.68; 0.63]
FacilitatedTucking:Glucose
Direct estimate 2 0.22 0% 0.32 [−0.91; 1.56]
Indirect estimate 0.65 [0.00; 1.31]
Network estimate 0.58 [0.00; 1.16]
FacilitatedTucking:MotherHolding
Direct estimate 1 0.16 0.68 [−1.05; 2.42]
Indirect estimate 0.05 [−0.71; 0.82]
Network estimate 0.16 [−0.54; 0.86]
FacilitatedTucking:NNS
Direct estimate 2 0.22 85% 0.56 [−0.66; 1.77]
Indirect estimate 0.30 [−0.34; 0.94]
Network estimate 0.36 [−0.21; 0.92]
−6 −4 −2 0 2 4 6


Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
FacilitatedTucking:NNS_Sucrose
Direct estimate 1 0.15 1.27 [−0.45; 3.00]
Indirect estimate 2.43 [1.71; 3.15]
Network estimate 2.26 [1.60; 2.92]
FacilitatedTucking:Opioid
Direct estimate 2 0.49 96% 0.15 [−1.09; 1.39]
Indirect estimate −0.04 [−1.24; 1.17]
Network estimate 0.05 [−0.81; 0.92]
FacilitatedTucking:SensorialSaturation
Direct estimate 1 0.56 1.12 [−0.61; 2.85]
Indirect estimate −0.00 [−1.95; 1.95]
Network estimate 0.63 [−0.67; 1.92]
FacilitatedTucking:SterileWater
Direct estimate 1 0.12 −0.95 [−2.74; 0.83]
Indirect estimate −0.27 [−0.94; 0.39]
Network estimate −0.36 [−0.98; 0.27]
FacilitatedTucking:Sucrose
Direct estimate 1 0.11 0.54 [−1.23; 2.31]
Indirect estimate 0.40 [−0.21; 1.01]
Network estimate 0.41 [−0.16; 0.99]
FacilitatedTucking:Sucrose_FacilitatedTucking
Direct estimate 1 0.53 0.52 [−1.25; 2.29]
Indirect estimate 0.39 [−1.47; 2.26]
Network estimate 0.46 [−0.83; 1.74]
FacilitatedTucking:WhiteNoise
Direct estimate 1 0.19 −0.27 [−2.00; 1.46]
Indirect estimate 1.70 [0.85; 2.54]
Network estimate 1.32 [0.55; 2.08]
Fructose:Glucose
Direct estimate 1 0.52 −0.06 [−1.80; 1.68]
Indirect estimate −0.42 [−2.25; 1.40]
Network estimate −0.23 [−1.49; 1.03]
−6 −4 −2 0 2 4 6


Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
Fructose:SterileWater
Direct estimate 1 0.52 −1.35 [−3.10; 0.41]
Indirect estimate −0.99 [−2.80; 0.83]
Network estimate −1.17 [−2.43; 0.09]
Glucose:Glucose_MotherHolding
Direct estimate 1 0.36 0.78 [−1.02; 2.57]
Indirect estimate 0.44 [−0.91; 1.79]
Network estimate 0.56 [−0.52; 1.64]
Glucose:NNS
Direct estimate 1 0.10 0.00 [−1.75; 1.75]
Indirect estimate −0.25 [−0.84; 0.34]
Network estimate −0.22 [−0.78; 0.33]
Glucose:Opioid
Direct estimate 1 0.26 −0.96 [−2.74; 0.83]
Indirect estimate −0.38 [−1.44; 0.68]
Network estimate −0.53 [−1.44; 0.38]
Glucose:SterileWater
Direct estimate 6 0.47 88% −1.22 [−1.95; −0.49]
Indirect estimate −0.69 [−1.38; −0.01]
Network estimate −0.94 [−1.44; −0.44]
Glucose:Sucrose
Direct estimate 1 0.09 0.15 [−1.59; 1.90]
Indirect estimate −0.20 [−0.75; 0.35]
Network estimate −0.17 [−0.69; 0.35]
KMC:KMC_Sucrose
Direct estimate 1 0.38 0.55 [−1.19; 2.30]
Indirect estimate 0.51 [−0.85; 1.87]
Network estimate 0.52 [−0.55; 1.60]
KMC:NNS
Direct estimate 1 0.14 0.49 [−1.24; 2.22]
Indirect estimate 0.21 [−0.49; 0.90]
Network estimate 0.24 [−0.40; 0.89]
−6 −4 −2 0 2 4 6

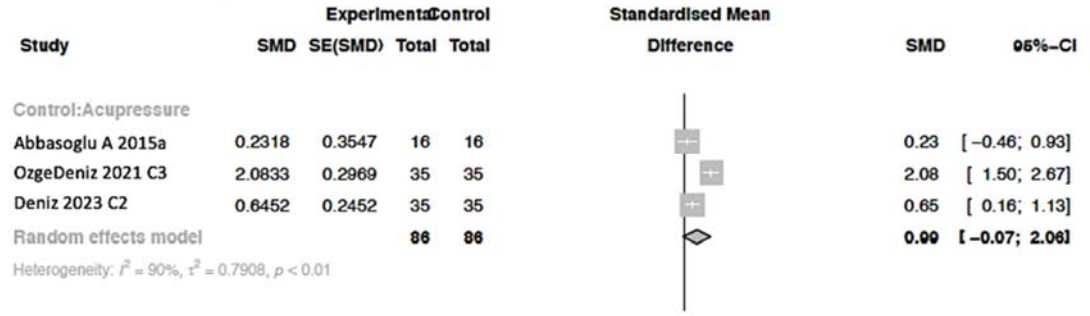

Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
KMC:Sucrose
Direct estimate 3 0.36 84% 0.26 [−0.74; 1.27]
Indirect estimate 0.32 [−0.43; 1.08]
Network estimate 0.30 [−0.30; 0.90]
KMC_Sucrose:Sucrose
Direct estimate 1 0.37 −0.51 [−2.25; 1.23]
Indirect estimate −0.06 [−1.38; 1.26]
Network estimate −0.22 [−1.28; 0.83]
MotherHeartbeatSounds:Odour
Direct estimate 1 0.55 −0.33 [−2.08; 1.42]
Indirect estimate −1.05 [−3.00; 0.90]
Network estimate −0.65 [−1.95; 0.65]
MotherHolding:MotherVoice
Direct estimate 1 0.20 0.44 [−1.31; 2.19]
Indirect estimate 0.05 [−0.83; 0.93]
Network estimate 0.13 [−0.66; 0.92]
MotherHolding:MotherVoice_Holding
Direct estimate 1 0.26 1.89 [0.10; 3.67]
Indirect estimate 1.58 [0.51; 2.66]
Network estimate 1.66 [0.75; 2.58]
MotherHolding:Swaddling
Direct estimate 1 0.27 −0.26 [−1.99; 1.47]
Indirect estimate −0.27 [−1.32; 0.79]
Network estimate −0.27 [−1.17; 0.63]
MotherHolding:WhiteNoise
Direct estimate 2 0.32 99% 0.72 [−0.54; 1.97]
Indirect estimate 1.37 [0.51; 2.23]
Network estimate 1.16 [0.45; 1.87]
MotherHolding:WhiteNoise_Holding
Direct estimate 1 0.25 3.56 [1.70; 5.43]
Indirect estimate 2.76 [1.67; 3.85]
Network estimate 2.96 [2.02; 3.90]
−6 −4 −2 0 2 4 6


Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
MotherVoice:MotherVoice_Holding
Direct estimate 1 0.29 1.36 [−0.41; 3.13]
Indirect estimate 1.60 [0.48; 2.73]
Network estimate 1.53 [0.58; 2.48]
MotherVoice:WhiteNoise
Direct estimate 2 0.37 66% 1.50 [0.22; 2.77]
Indirect estimate 0.76 [−0.21; 1.73]
Network estimate 1.03 [0.26; 1.80]
MotherVoice:WhiteNoise_Holding
Direct estimate 1 0.29 2.70 [0.89; 4.51]
Indirect estimate 2.88 [1.74; 4.03]
Network estimate 2.83 [1.86; 3.80]
MotherVoice_Holding:WhiteNoise
Direct estimate 1 0.28 0.30 [−1.45; 2.05]
Indirect estimate −0.81 [−1.90; 0.27]
Network estimate −0.50 [−1.43; 0.42]
MotherVoice_Holding:WhiteNoise_Holding
Direct estimate 1 0.35 0.99 [−0.77; 2.76]
Indirect estimate 1.46 [0.17; 2.75]
Network estimate 1.30 [0.26; 2.34]
NNS:NNS_Sucrose
Direct estimate 6 0.51 97% 1.68 [0.94; 2.43]
Indirect estimate 2.13 [1.37; 2.88]
Network estimate 1.90 [1.37; 2.43]
NNS:PronePositioning
Direct estimate 1 0.36 −0.51 [−2.21; 1.18]
Indirect estimate −0.08 [−1.34; 1.19]
Network estimate −0.23 [−1.24; 0.78]
NNS:Sucrose
Direct estimate 3 0.25 97% 0.88 [−0.13; 1.90]
Indirect estimate −0.22 [−0.80; 0.37]
Network estimate 0.06 [−0.45; 0.56]
−6 −4 −2 0 2 4 6

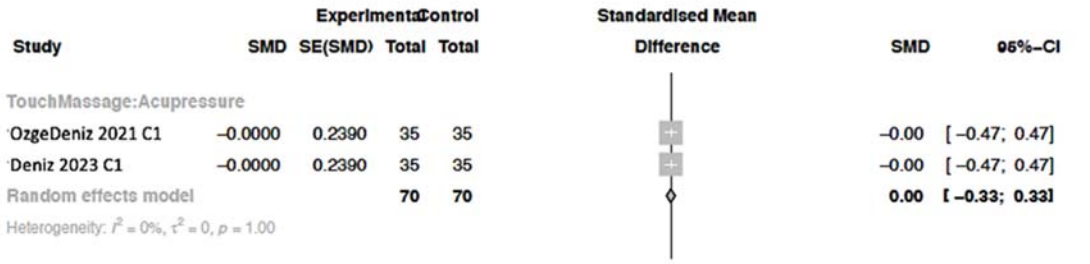

Comparison
Number of Studies
Direct Evidence
I2
Random Effects Model
SMD
95%–CI
NNS:TouchMassage
Direct estimate 1 0.13 −0.03 [−1.77; 1.71]
Indirect estimate −0.14 [−0.81; 0.54]
Network estimate −0.12 [−0.75; 0.50]
NNS_Sucrose:PronePositioning
Direct estimate 1 0.37 −0.69 [−2.38; 1.00]
Indirect estimate −2.98 [−4.28; −1.68]
Network estimate −2.13 [−3.17; −1.10]
NNS_Sucrose:Sucrose
Direct estimate 2 0.18 98% −6.14 [−7.61; −4.68]
Indirect estimate −0.92 [−1.60; −0.24]
Network estimate −1.85 [−2.46; −1.23]
Opioid:SensorialSaturation
Direct estimate 1 0.56 0.09 [−1.63; 1.81]
Indirect estimate 1.21 [−0.75; 3.17]
Network estimate 0.57 [−0.72; 1.87]
Opioid:SterileWater
Direct estimate 1 0.27 −0.11 [−1.89; 1.66]
Indirect estimate −0.52 [−1.61; 0.57]
Network estimate −0.41 [−1.34; 0.52]
Paracetamol:SterileWater
Direct estimate 1 0.52 0.00 [−1.82; 1.82]
Indirect estimate −0.80 [−2.70; 1.09]
Network estimate −0.39 [−1.70; 0.93]
Paracetamol:Sucrose
Direct estimate 1 0.52 0.00 [−1.82; 1.82]
Indirect estimate 0.80 [−1.09; 2.70]
Network estimate 0.39 [−0.93; 1.70]
SterileWater:Sucrose
Direct estimate 5 0.45 0% 0.33 [−0.46; 1.11]
Indirect estimate 1.13 [0.43; 1.83]
Network estimate 0.77 [0.25; 1.29]
Sucrose:Sucrose_FacilitatedTucking
Direct estimate 1 0.53 −0.01 [−1.78; 1.76]
Indirect estimate 0.11 [−1.76; 1.98]
Network estimate 0.05 [−1.24; 1.33]
WhiteNoise:WhiteNoise_Holding
Direct estimate 1 0.29 0.80 [−0.95; 2.55]
Indirect estimate 2.21 [1.09; 3.32]
Network estimate 1.80 [0.86; 2.74]
−6 −4 −2 0 2 4 6

Web Fig. 4. Direct evidence from the pair wise comparisons for the primary outcome 'pain score during heel prick' in neonates

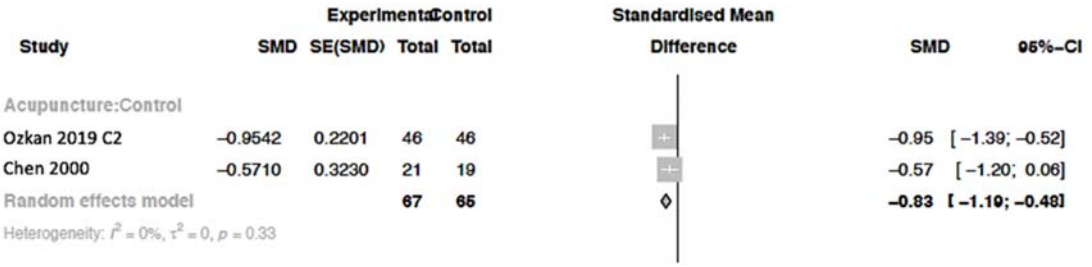
A. Control vs. Acupressure



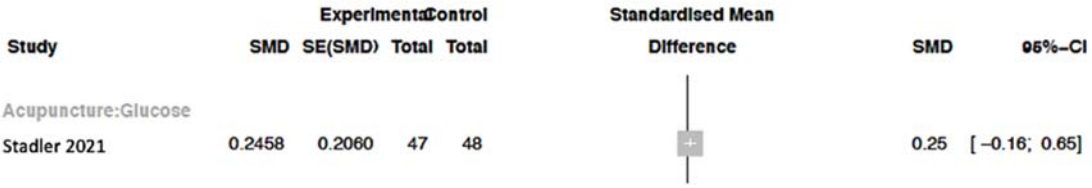
B. Touch massage vs. Acupressure



C. Acupuncture vs. Control

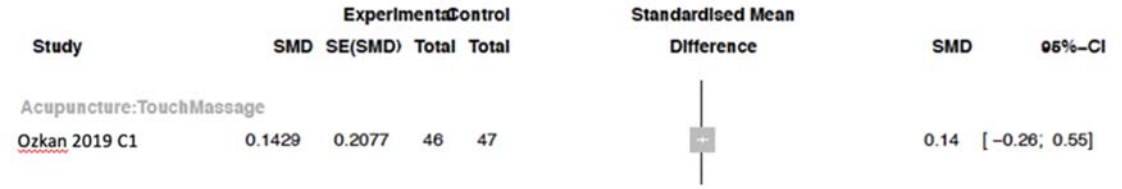


D. Acupuncture vs. Glucose

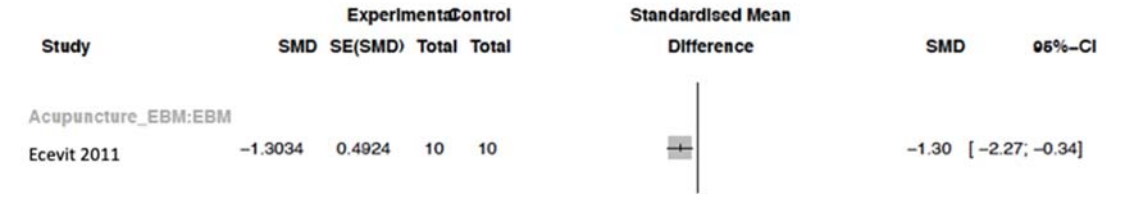


E. Acupuncture vs. Sucrose

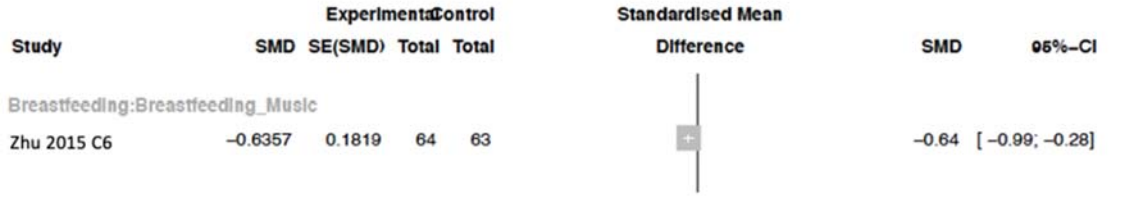
F. Acupuncture vs. Touch massage



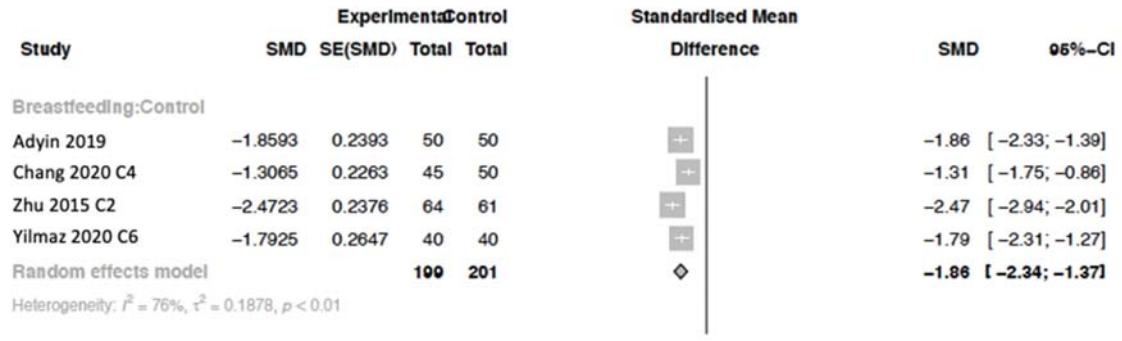
G. Acupuncture-EBM vs. EBM



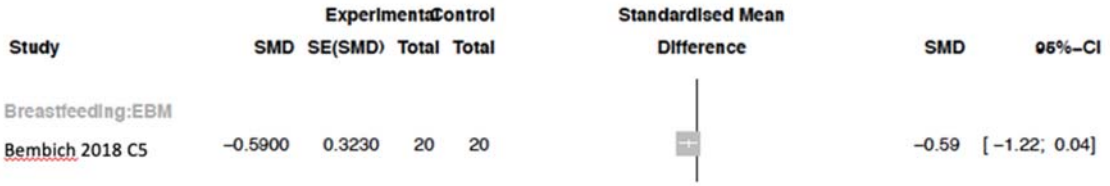
H. Breastfeeding vs. Breastfeeding-Music



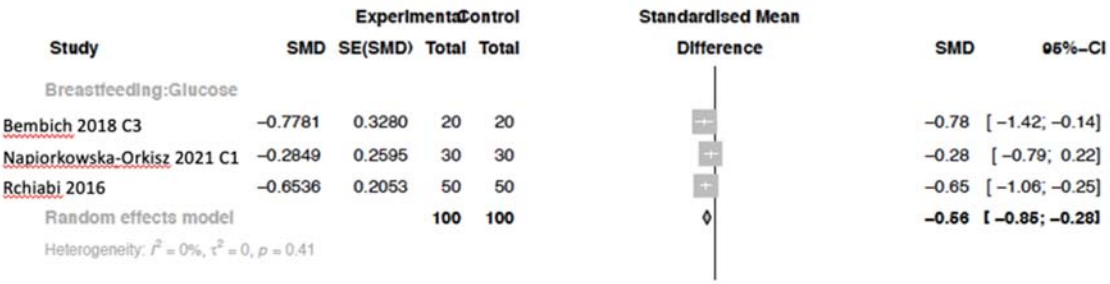
I. Breastfeeding vs. Control



J. Breastfeeding vs. EBM

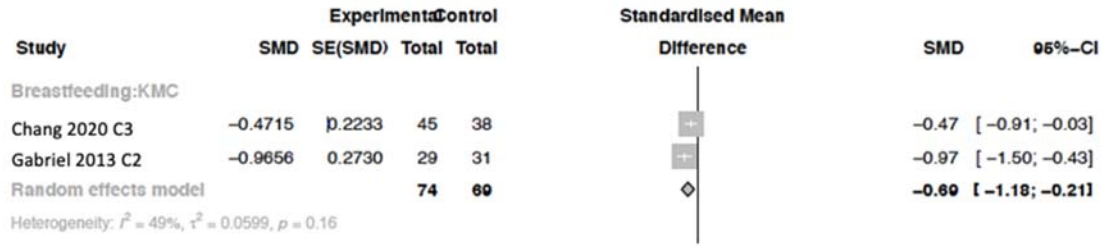


K. Breastfeeding vs. Glucose



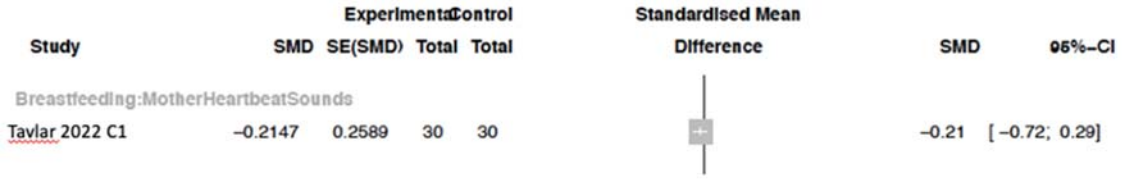
L. Breastfeeding vs. Glucose-Mother holding

M. Breastfeeding vs. KMC

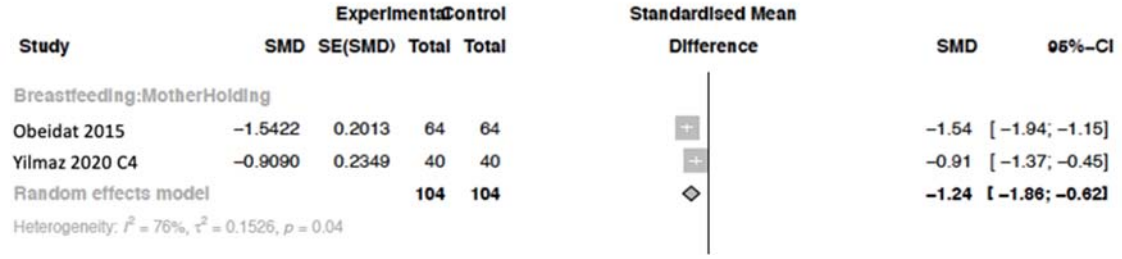


N. Breastfeeding vs. KMC-Sucrose

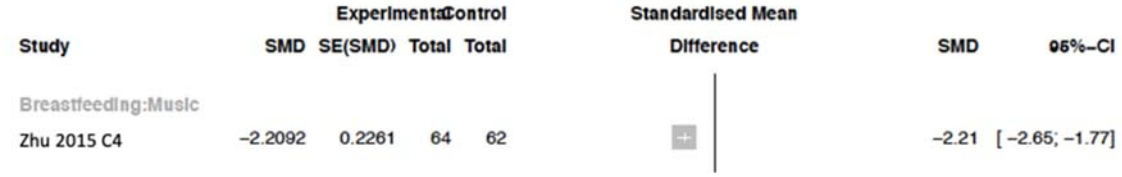
O. Breastfeeding vs. Mother's heartbeat sounds



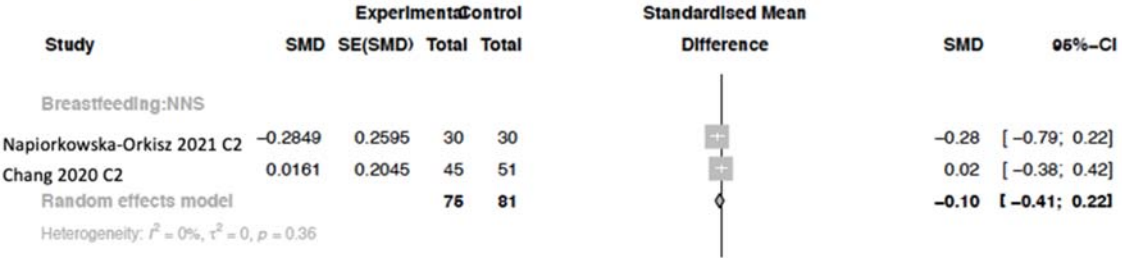
P. Breastfeeding vs. Mother holding



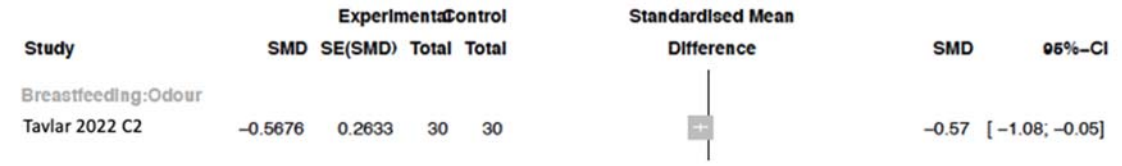
Q. Breastfeeding vs. Music



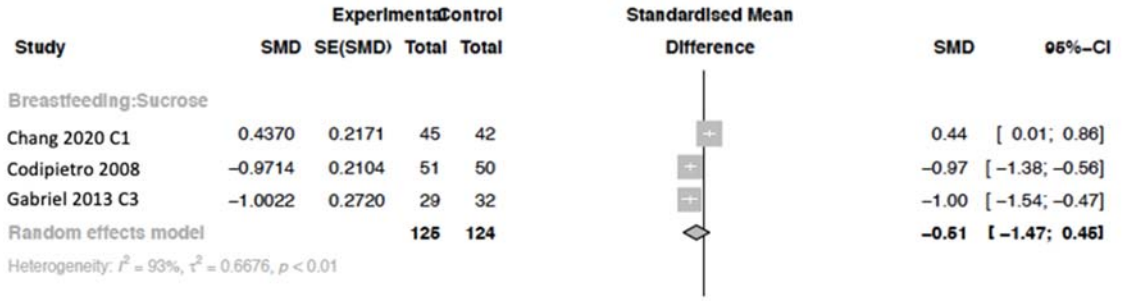
R. Breastfeeding vs. NNS



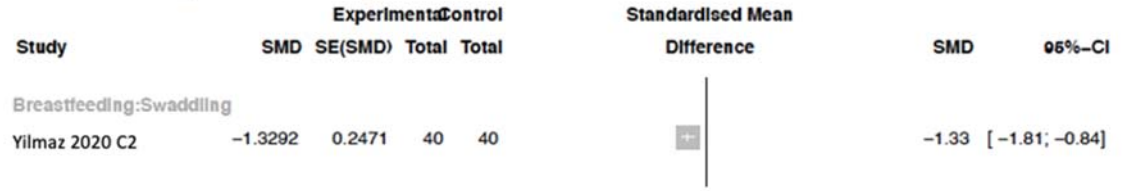
S. Breastfeeding vs. Odour



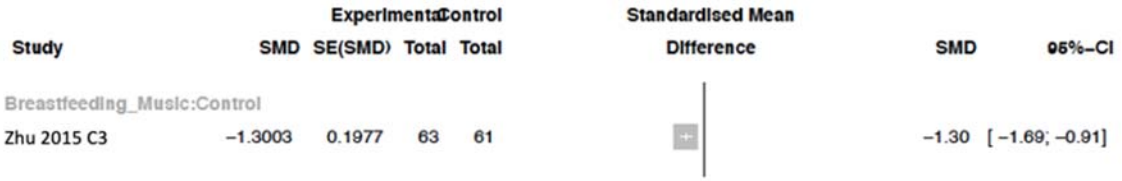
T. Breastfeeding vs. Sucrose



U. Breastfeeding vs. Swaddling

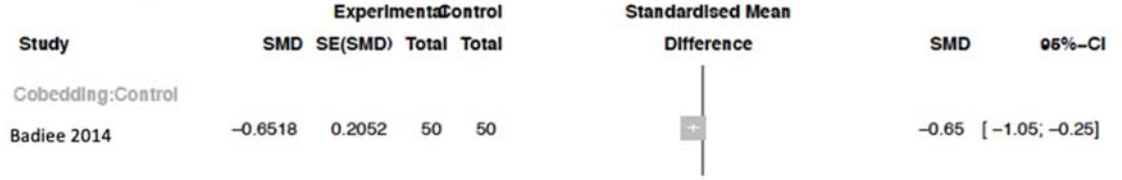


V. Breastfeeding-Music vs Control

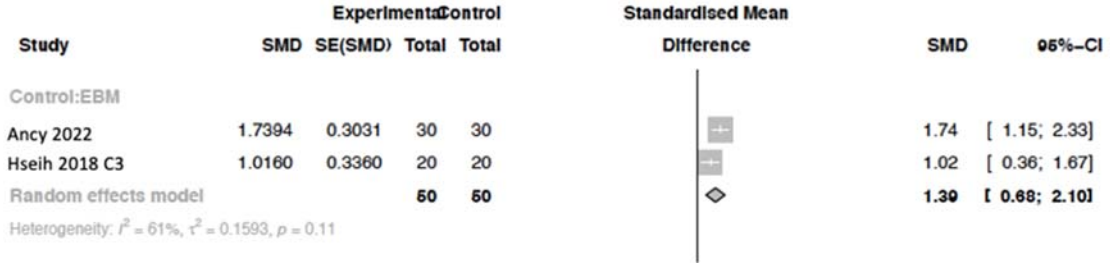


W. Breastfeeding-Music vs. Music

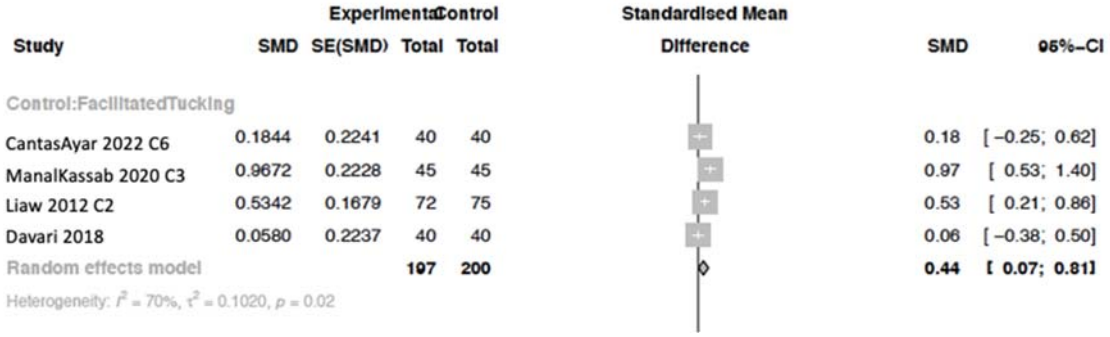
X. Cobedding vs. Control



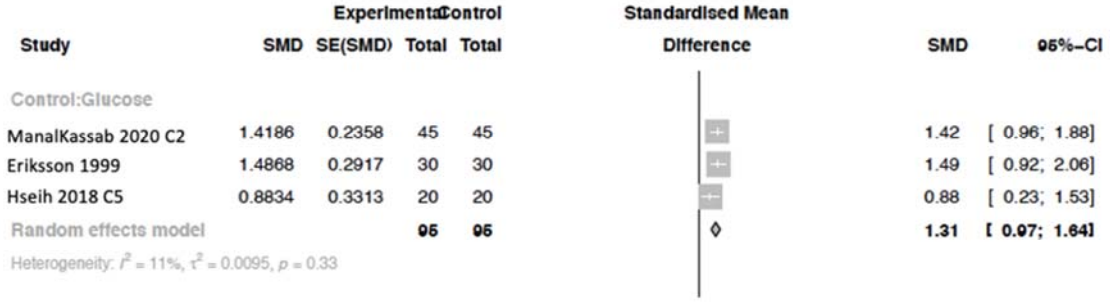
Y. Control vs. EBM



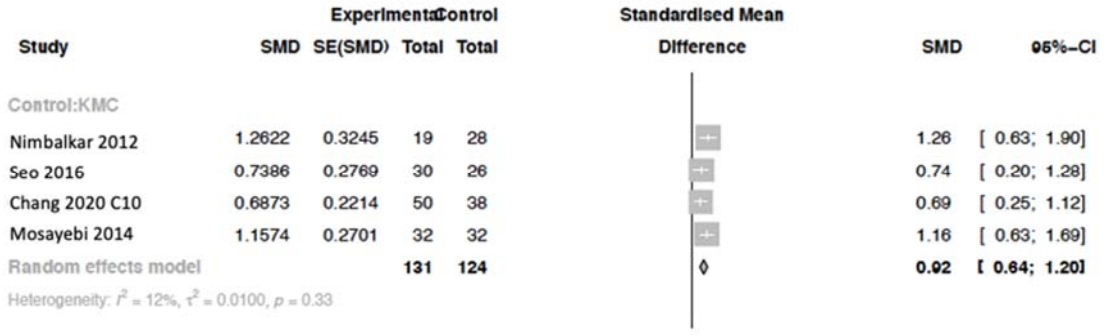
Z. Control vs. Facilitated tucking



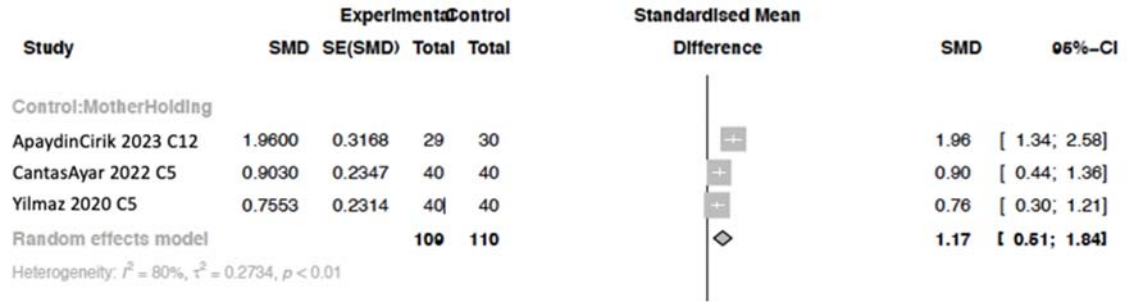
AA. Control vs. Glucose



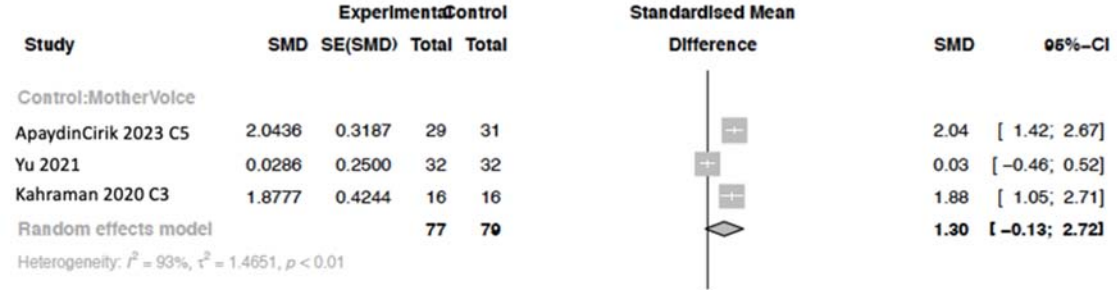
AB. Control vs. KMC



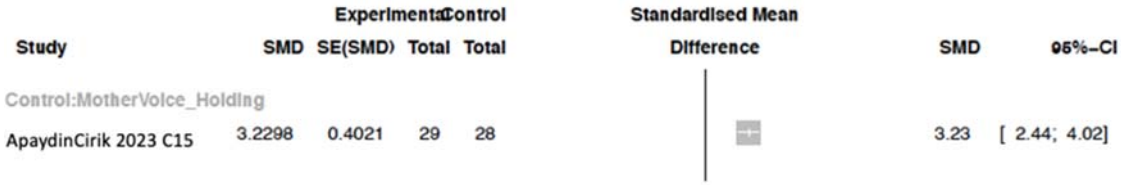
AC. Control vs. Mother holding



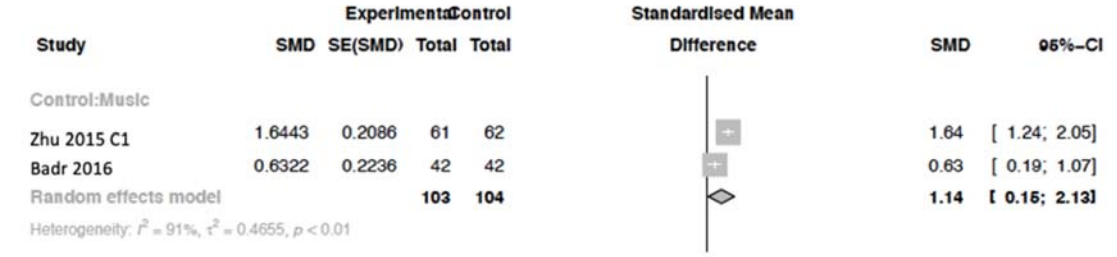
AD. Control vs. Mother's Voice



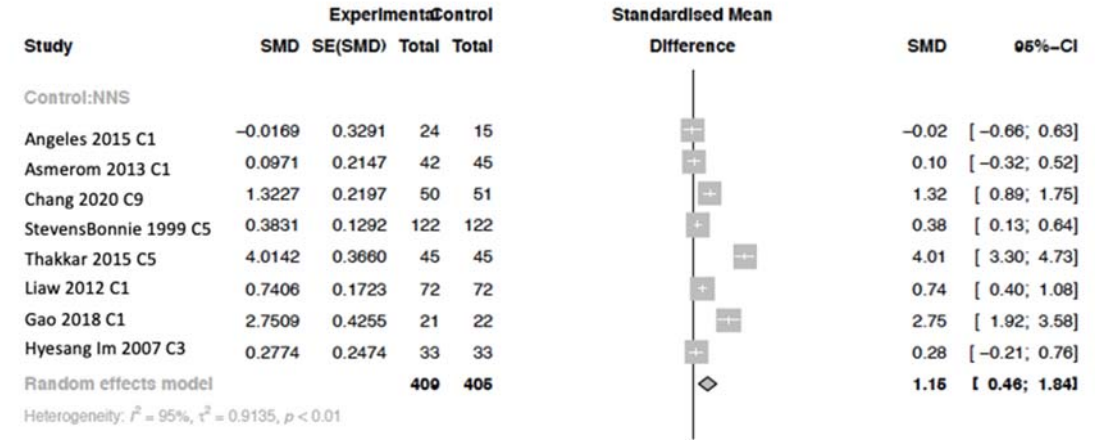
AE. Control vs. Mother's Voice-Mother holding



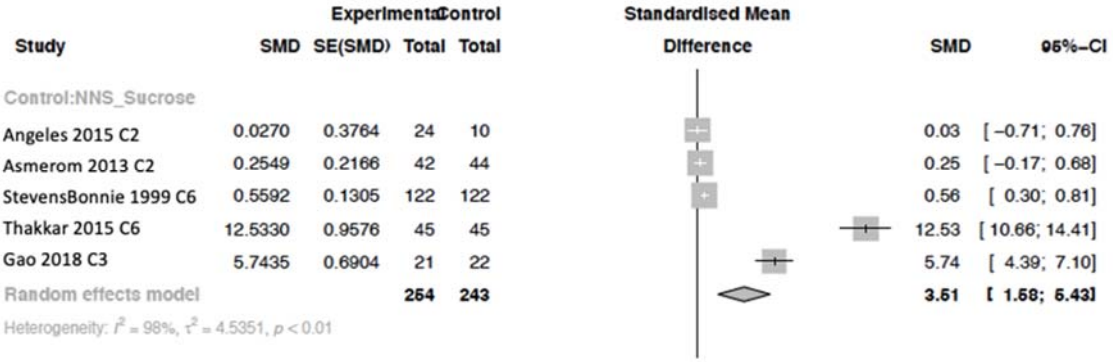
AF. Control vs. Music



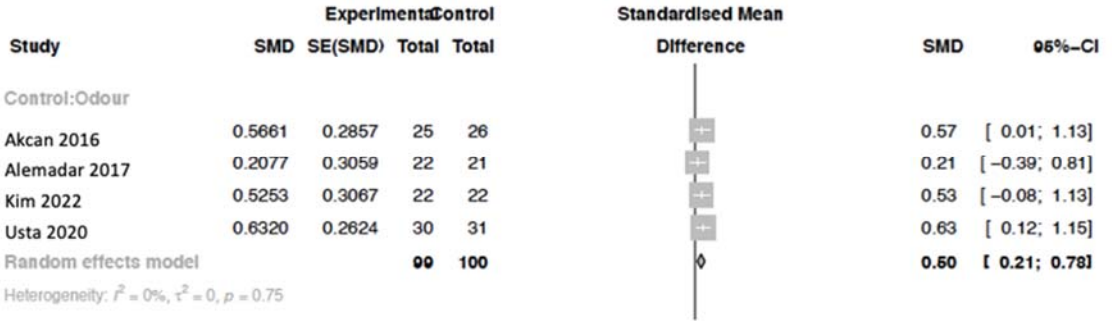
AG. Control vs. NNS



AH. Control vs. NNS-Sucrose

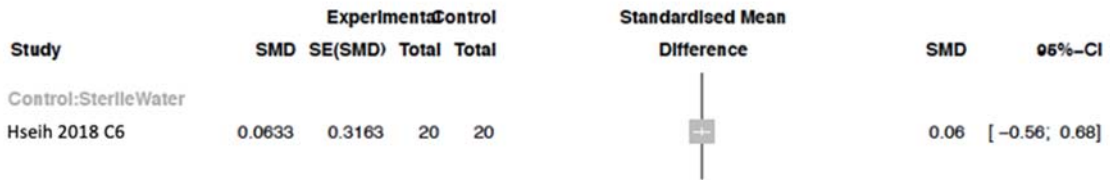


AI. Control vs. Odour

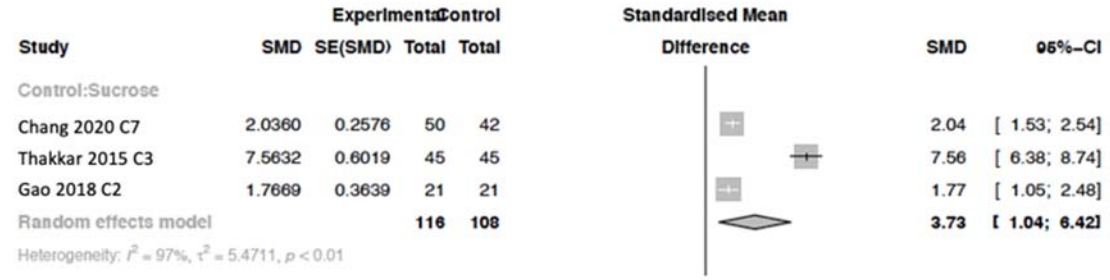


AJ. Control vs. Prone Positioning

AK. Control vs. Sterile water

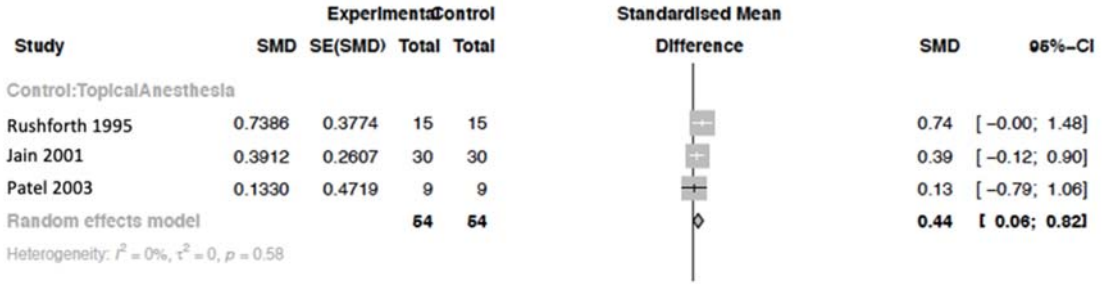


AL. Control vs. Sucrose

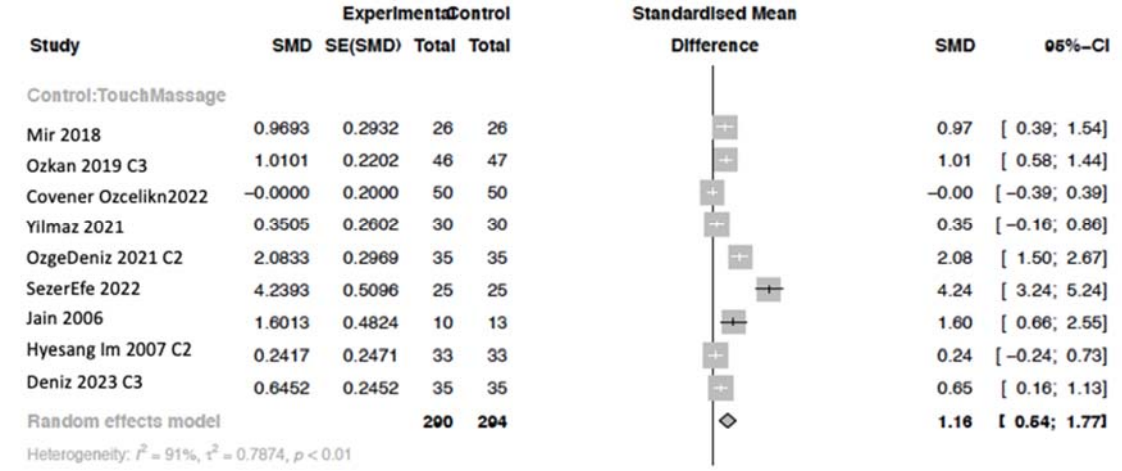


AM. Control vs. Swaddling

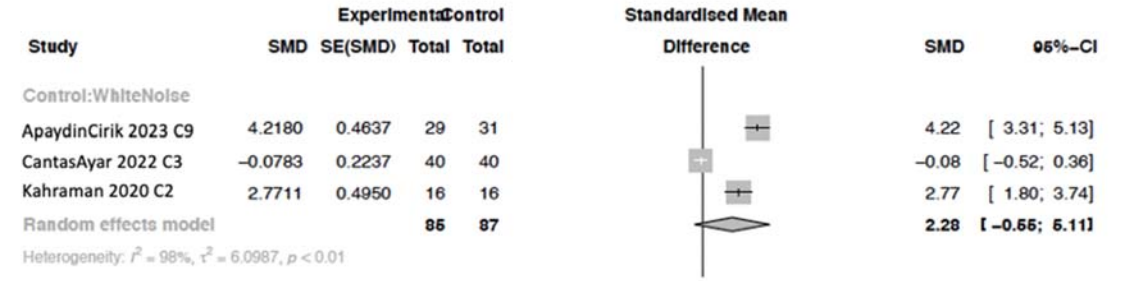
AN. Control vs. Topical Anesthesia



AO. Control vs. Touch Massage

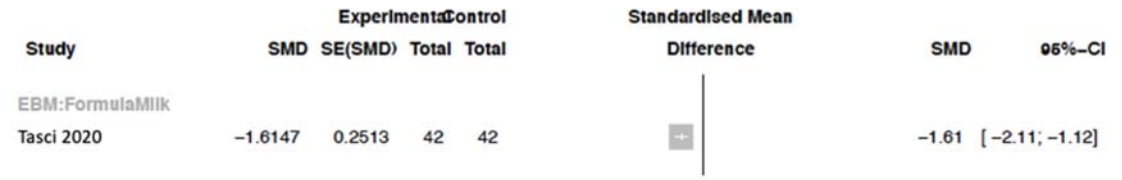


AP. Control vs. White noise

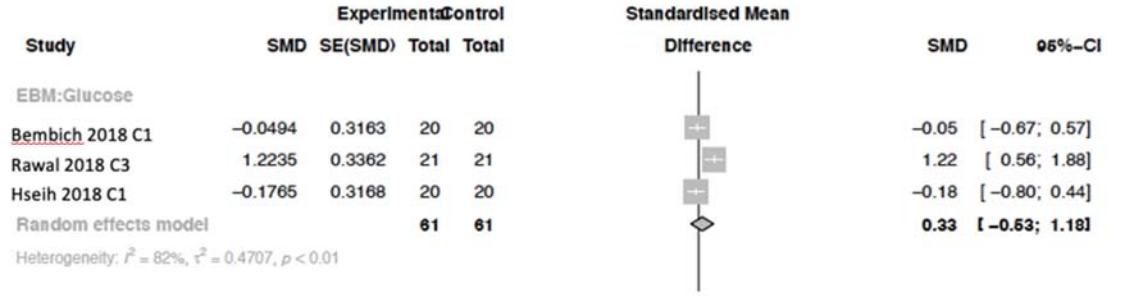


AQ. Control vs. White noise-Mother holding

AR. EBM vs. Formula milk

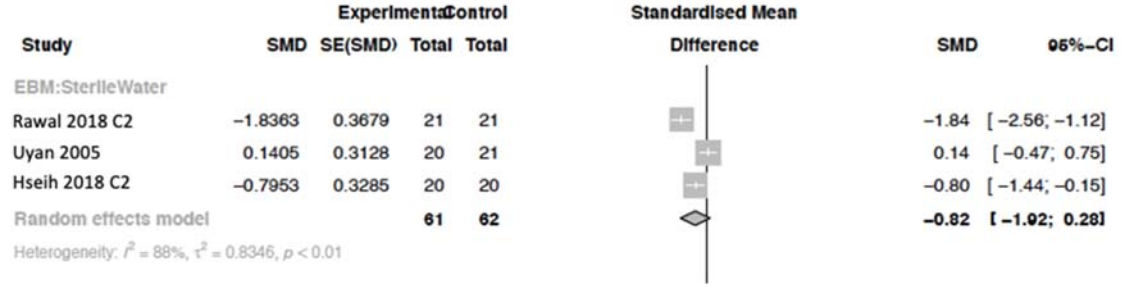


AS. EBM vs. Glucose

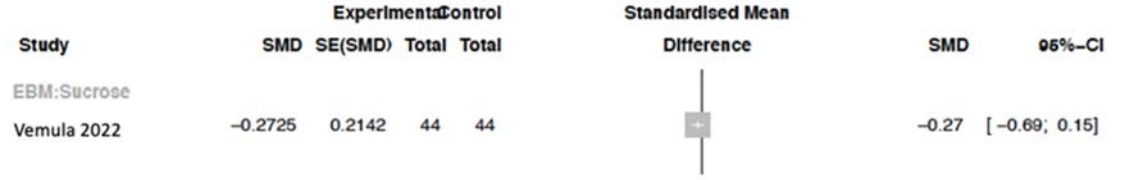


AT. EBM vs. Glucose-Mother holding

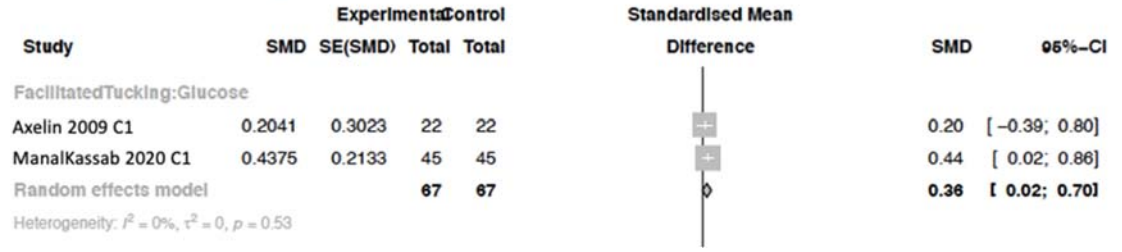
AU. EBM vs. Sterile water



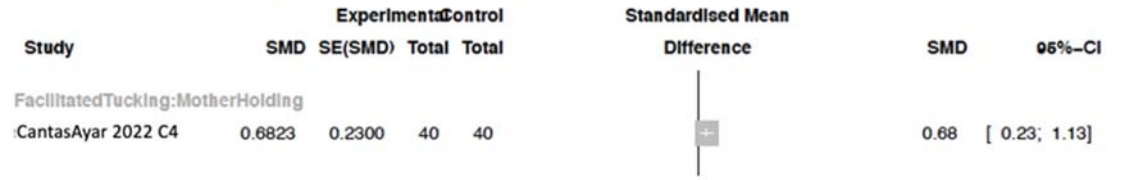
AV. EBM vs. Sucrose



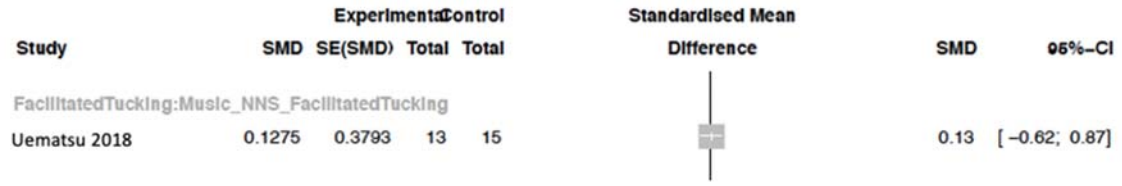
AW. Facilitated tucking vs. Glucose



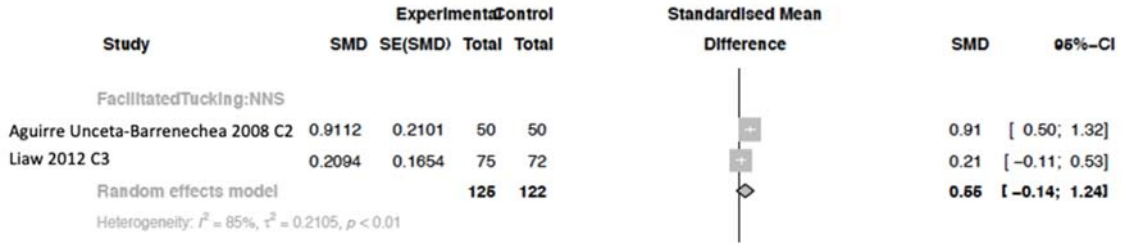
AX. Facilitated tucking vs. Mother holding



AY. Facilitated tucking vs. Music-NNS-Facilitated tucking

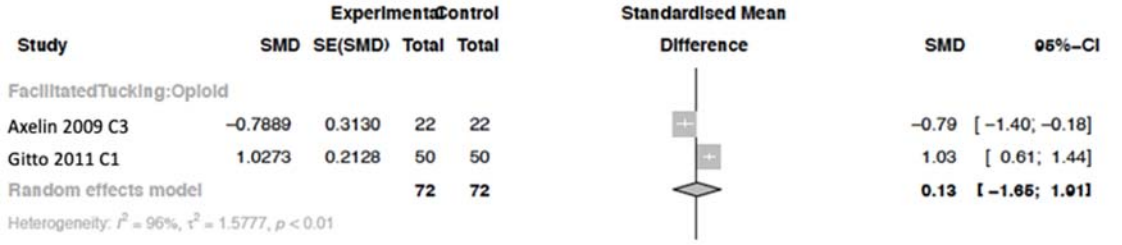


AZ. Facilitated tucking vs. NNS

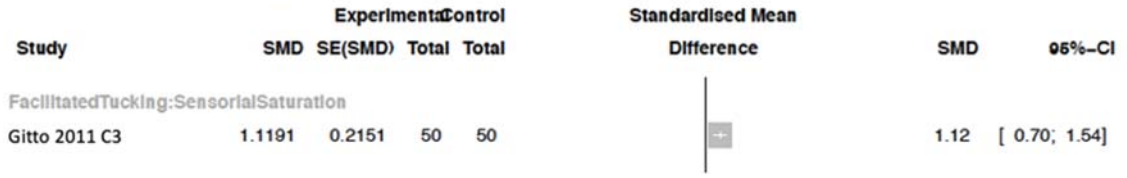


BA. Facilitated tucking vs. NNS-Sucrose

BB. Facilitated tucking vs. Opioid

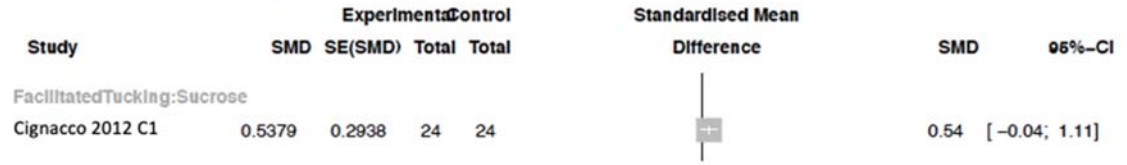


BC. Facilitated tucking vs. Sensorial saturation



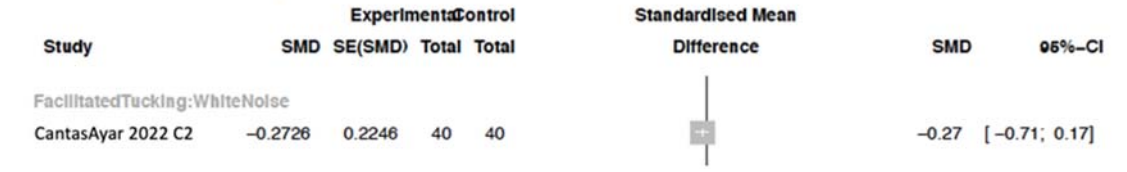
BD. Facilitated tucking vs. Sterile water

BE. Facilitated tucking vs. Sucrose



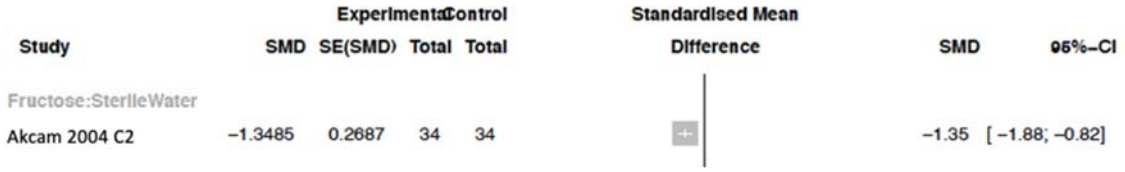
BJ. Facilitated tucking vs. Sucrose-Facilitated tucking

BK. Facilitated tucking vs. White noise



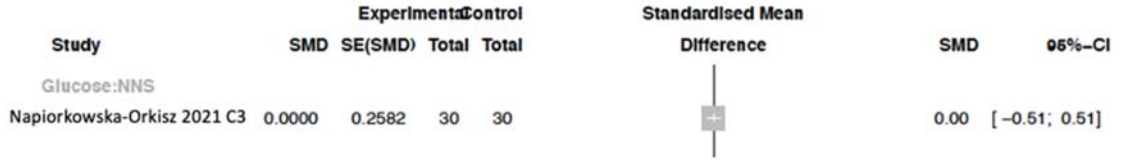
BL. Fructose vs. Glucose

BM. Fructose vs. Sterile water



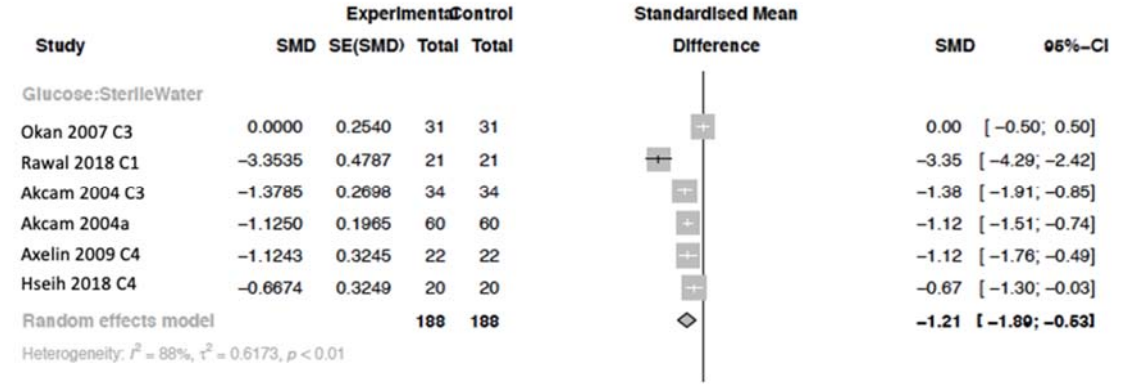
BN. Glucose vs. Glucose-Mother holding

BO. Glucose vs. NNS

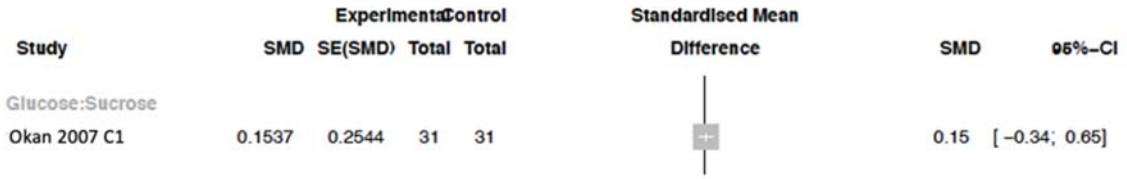


BP. Glucose vs. Opioid

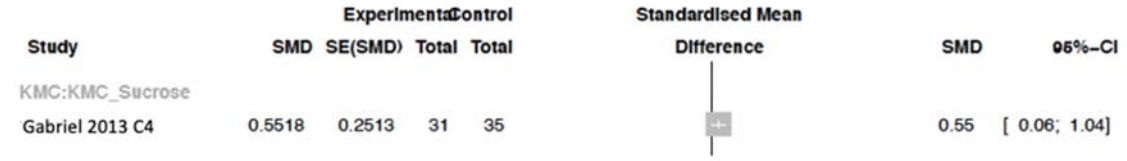
BQ. Glucose vs. Sterile water



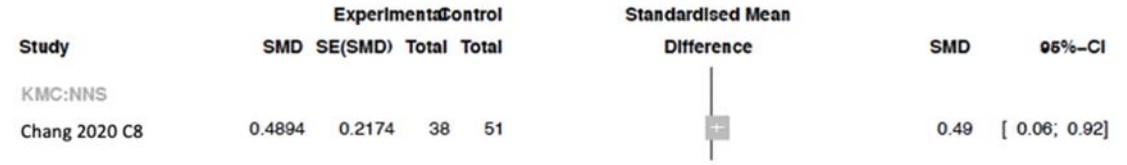
BR. Glucose vs. Sucrose



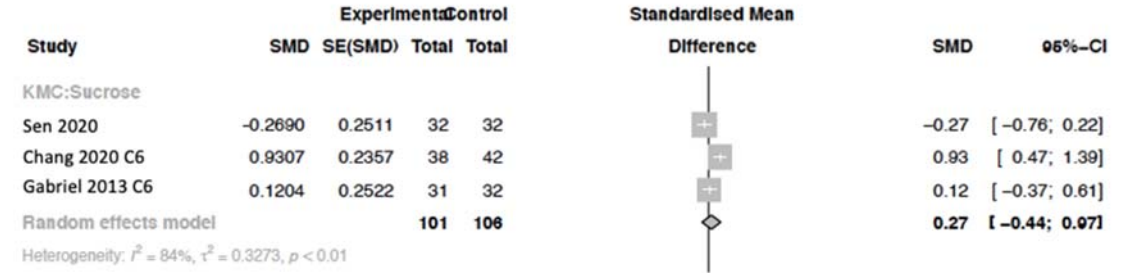
BS. KMC vs. KMC-Sucrose



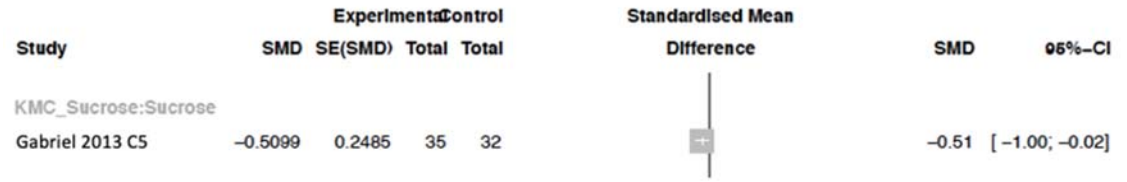
BT. KMC vs. NNS



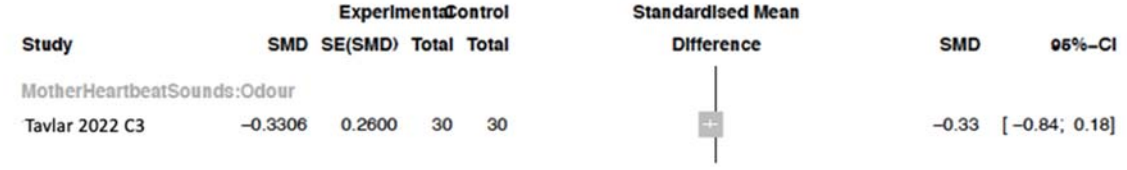
BU. KMC vs. Sucrose



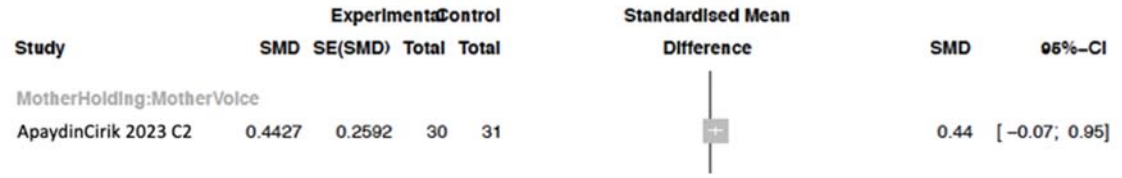
BV. KMC-Sucrose vs. Sucrose



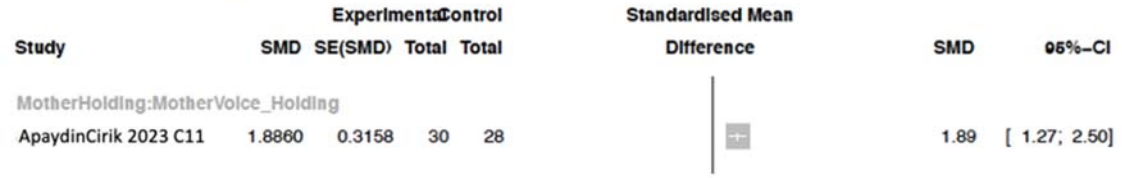
BW. Mother's Heart Beat Sounds vs. Odour



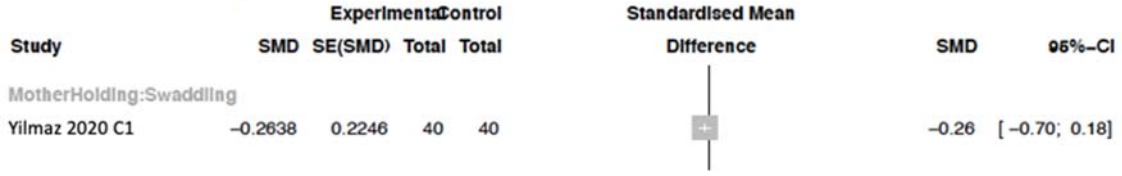
BX. Mother holding vs. Mother's Voice



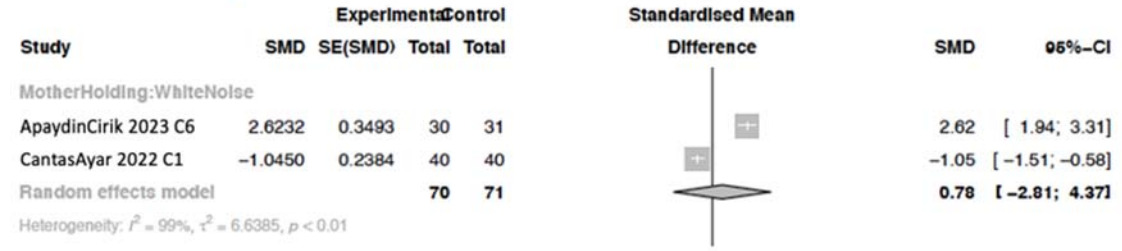
BY. Mother holding vs. Mother's Voice-Mother holding



BZ. Mother holding vs. Swaddling

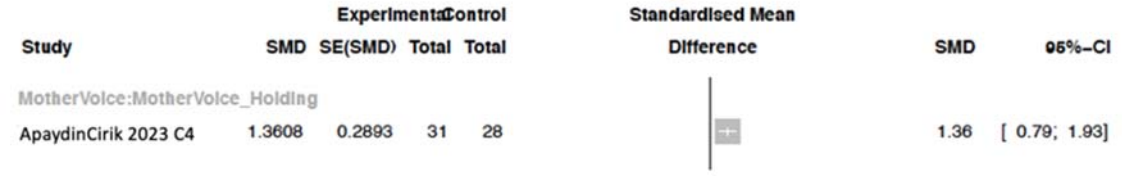


CA. Mother holding vs. White noise

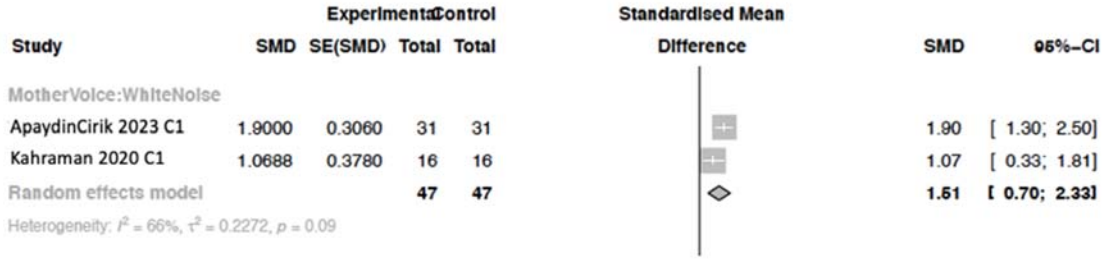


CB. Mother holding vs. White noise-Mother holding

CC. Mother's Voice vs. Mother's Voice-Mother holding



CD. Mother's Voice vs. White noise



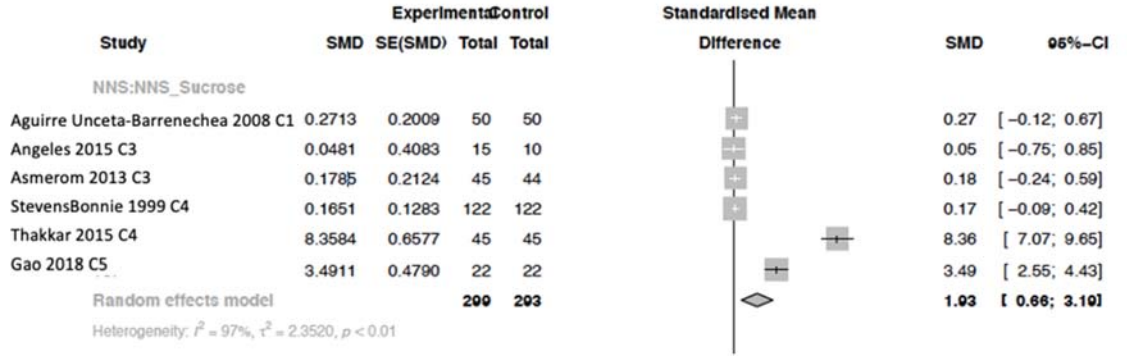
CE. Mother's Voice vs. White noise- Mother holding

CF. Mother's Voice-Mother holding vs. White noise

CG. Mother's Voice- Mother holding vs. White noise- Mother holding

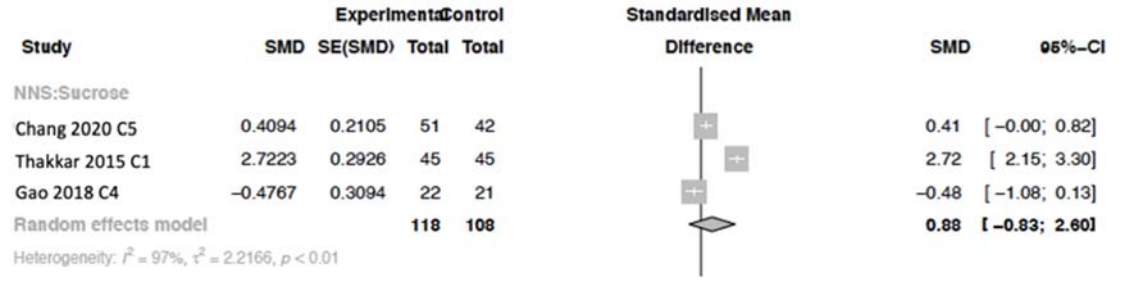
CH. NNS vs. NNS-Facilitated tucking

CI. NNS vs. NNS-Sucrose

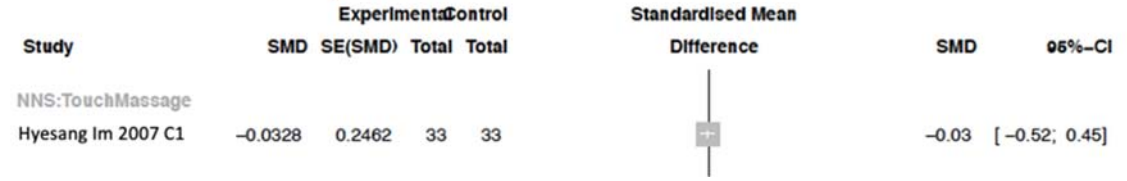


CJ. NNS vs. Prone positioning

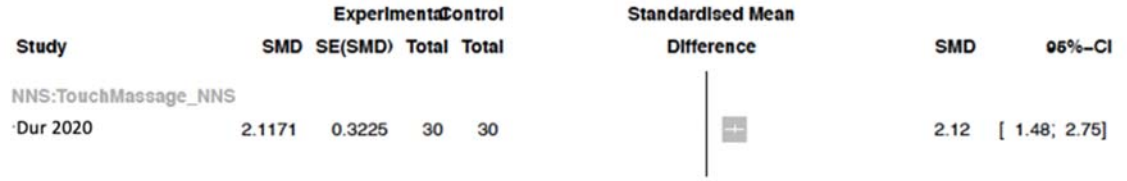
CK. NNS vs. Sucrose



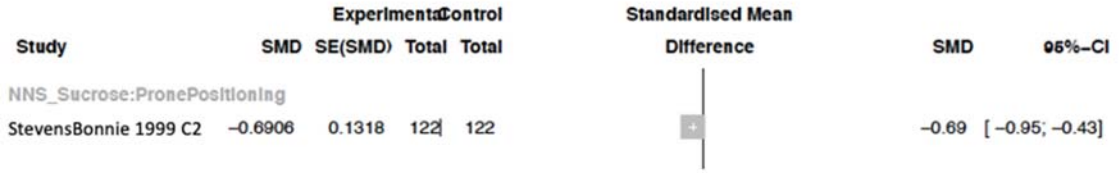
CL. NNS vs. Touch Massage



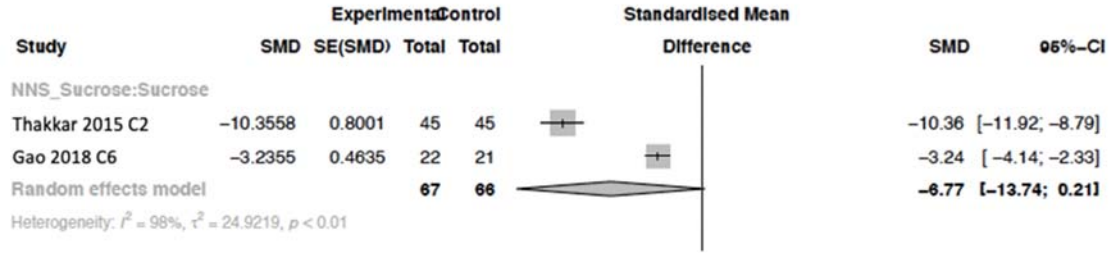
CM. NNS vs. Touch Massage-NNS



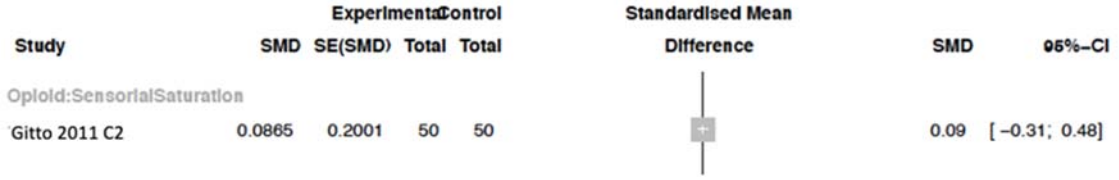
CN. NNS-Sucrose vs. Prone Positioning



CO. NNS-Sucrose vs. Sucrose

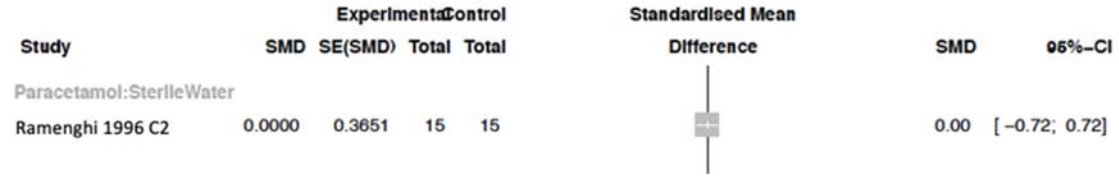


CP. Opioid vs. Sensorial Saturation



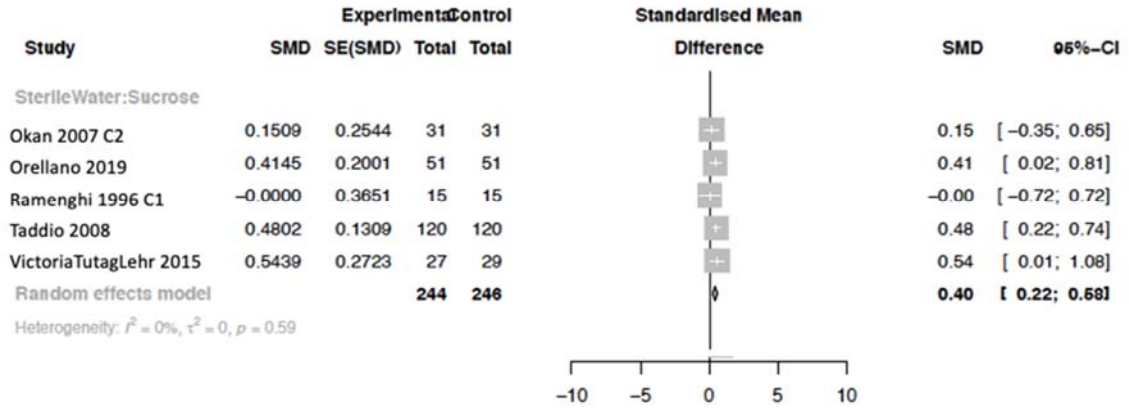
CQ. Opioid vs. Sterile water

CR. Paracetamol vs. Sterile water



CS. Paracetamol vs. Sucrose

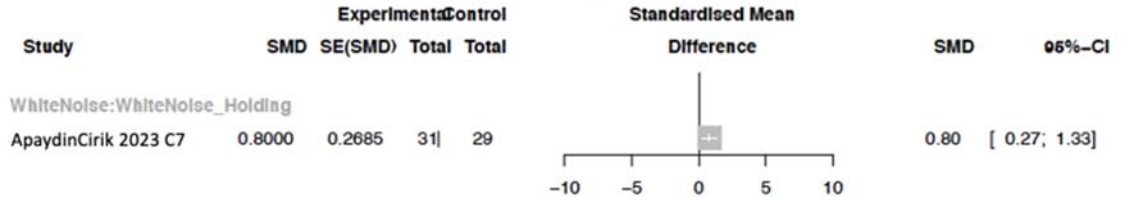
CT. Sterile water vs. Sucrose



CU. Sucrose vs. Sucrose-Facilitated tucking

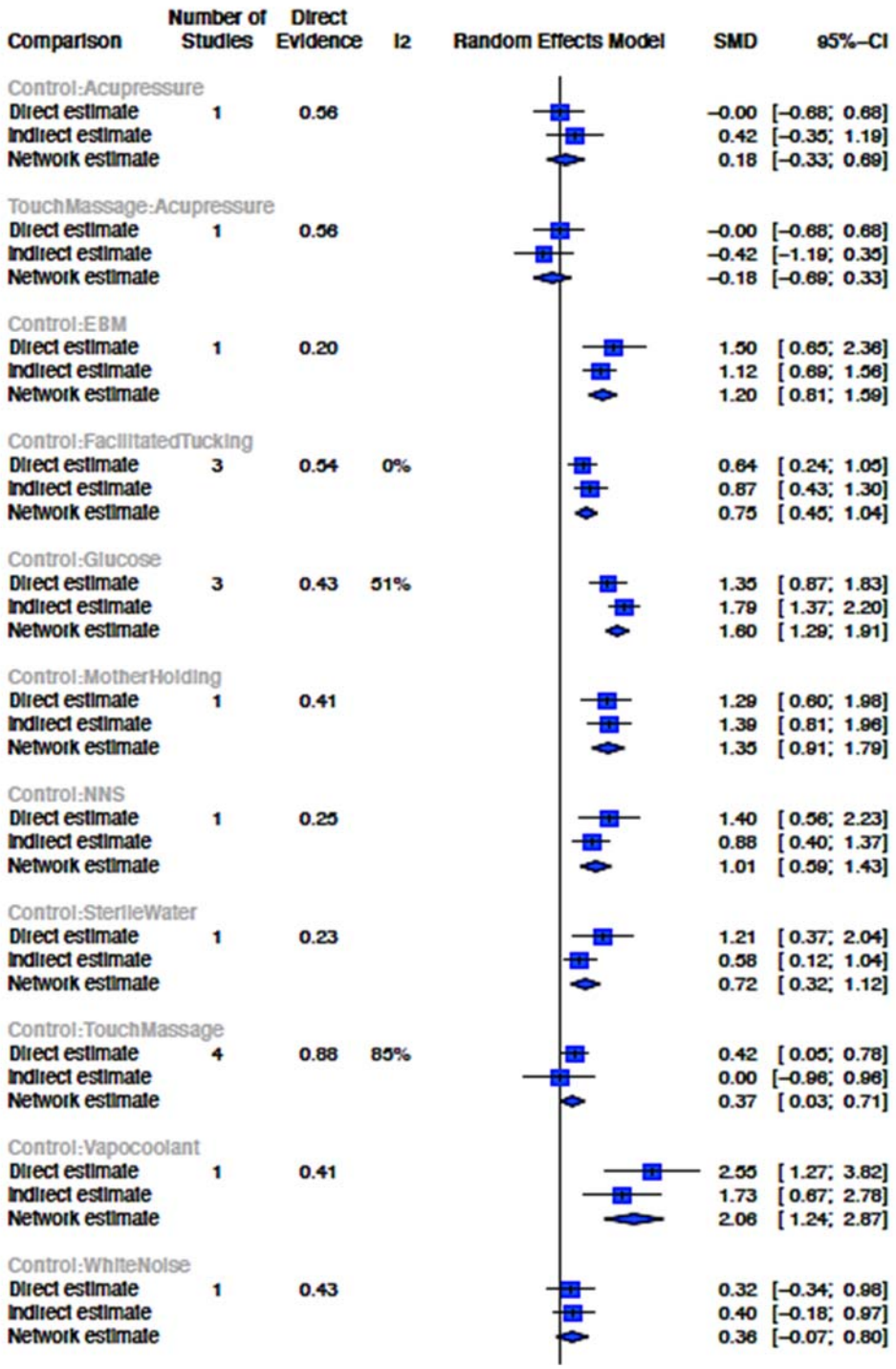
CV. Sucrose vs. Sucrose-Vibration

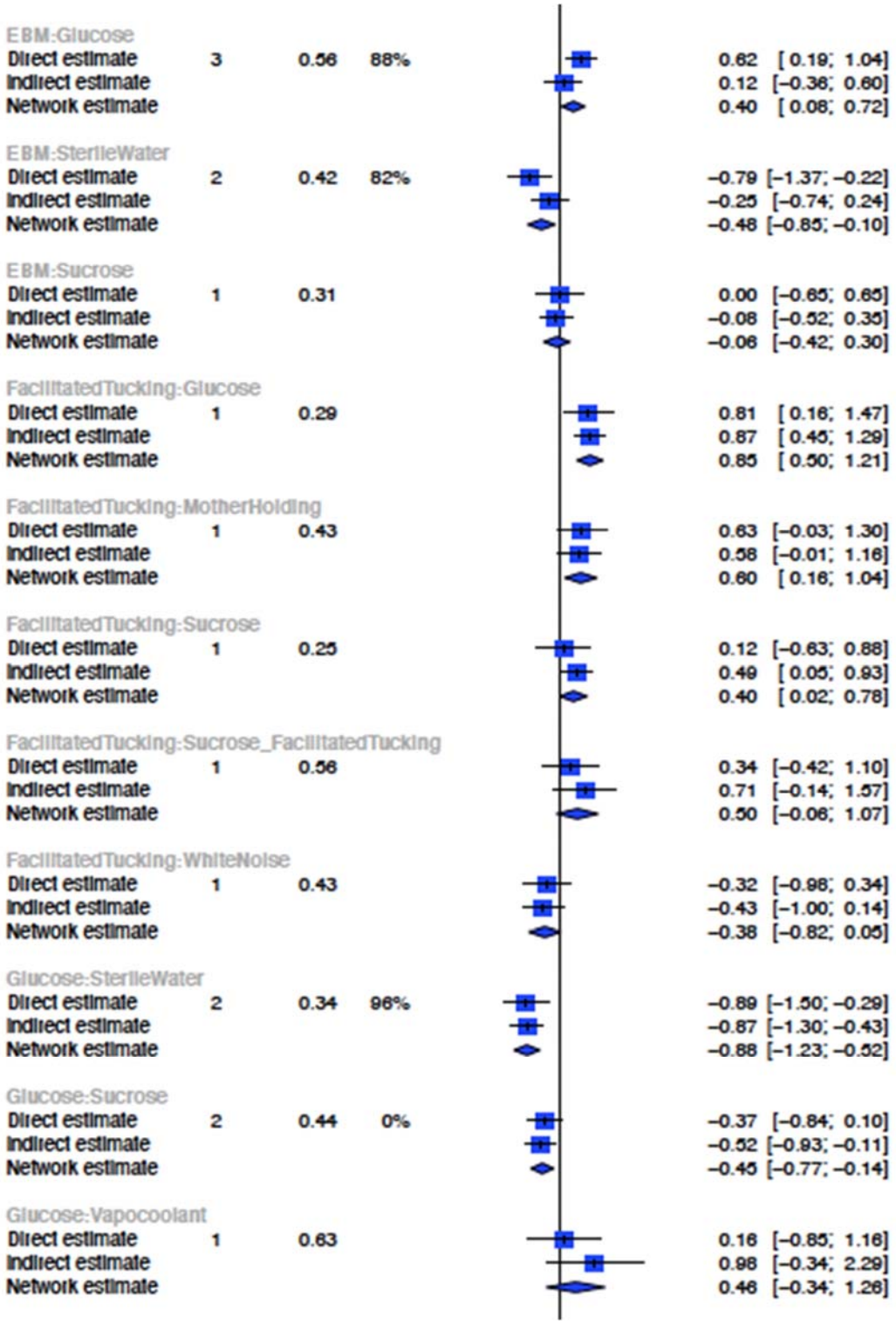
CW. White noise vs. White noise-Mother holding

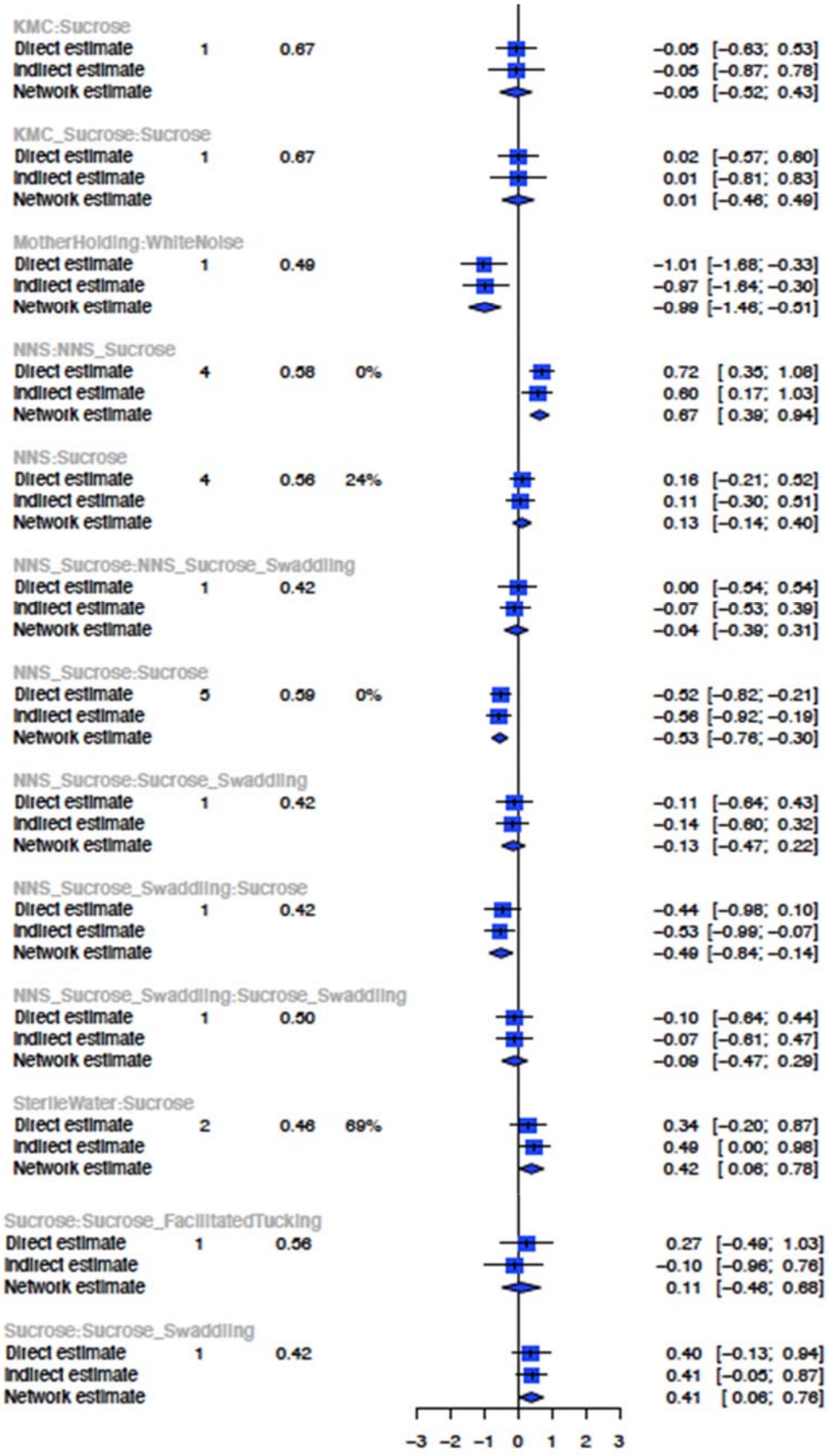


Web Fig. 5 League plot depicting the network estimate [SMD (95% CrI)] for the primary outcome pain score at 30 sec after heel prick' in neonates

Web Fig. 6. Split between direct and indirect evidence for the primary outcome 'pain score at 30 sec after heel prick' in neonates

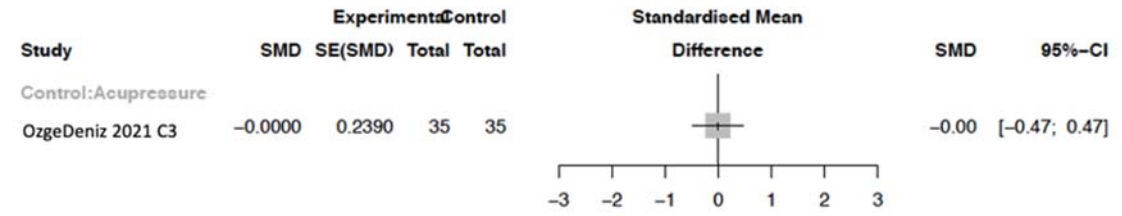



EBM:Glucose
Direct estimate 3 0.56 88% 0.62 [0.19; 1.04]
Indirect estimate 0.12 [−0.36; 0.60]
Network estimate 0.40 [0.08; 0.72]
EBM:SterileWater
Direct estimate 2 0.42 82% −0.79 [−1.37; −0.22]
Indirect estimate −0.25 [−0.74; 0.24]
Network estimate −0.48 [−0.85; −0.10]
EBM:Sucrose
Direct estimate 1 0.31 0.00 [−0.65; 0.65]
Indirect estimate −0.06 [−0.52; 0.35]
Network estimate −0.06 [−0.42; 0.30]
FacilitatedTucking:Glucose
Direct estimate 1 0.29 0.81 [0.16; 1.47]
Indirect estimate 0.87 [0.45; 1.29]
Network estimate 0.85 [0.50; 1.21]
FacilitatedTucking:MotherHolding
Direct estimate 1 0.43 0.63 [−0.03; 1.30]
Indirect estimate 0.58 [−0.01; 1.16]
Network estimate 0.60 [0.16; 1.04]
FacilitatedTucking:Sucrose
Direct estimate 1 0.25 0.12 [−0.63; 0.88]
Indirect estimate 0.49 [0.05; 0.93]
Network estimate 0.40 [0.02; 0.78]
FacilitatedTucking:Sucrose_FacilitatedTucking
Direct estimate 1 0.56 0.34 [−0.42; 1.10]
Indirect estimate 0.71 [−0.14; 1.57]
Network estimate 0.50 [−0.06; 1.07]
FacilitatedTucking:WhiteNoise
Direct estimate 1 0.43 −0.32 [−0.98; 0.34]
Indirect estimate −0.43 [−1.00; 0.14]
Network estimate −0.38 [−0.82; 0.05]
Glucose:SterileWater
Direct estimate 2 0.34 96% −0.89 [−1.50; −0.29]
Indirect estimate −0.87 [−1.30; −0.43]
Network estimate −0.88 [−1.23; −0.52]
Glucose:Sucrose
Direct estimate 2 0.44 0% −0.37 [−0.84; 0.10]
Indirect estimate −0.52 [−0.93; −0.11]
Network estimate −0.45 [−0.77; −0.14]
Glucose:Vapocoolant
Direct estimate 1 0.63 0.16 [−0.85; 1.16]
Indirect estimate 0.98 [−0.34; 2.29]
Network estimate 0.46 [−0.34; 1.26]

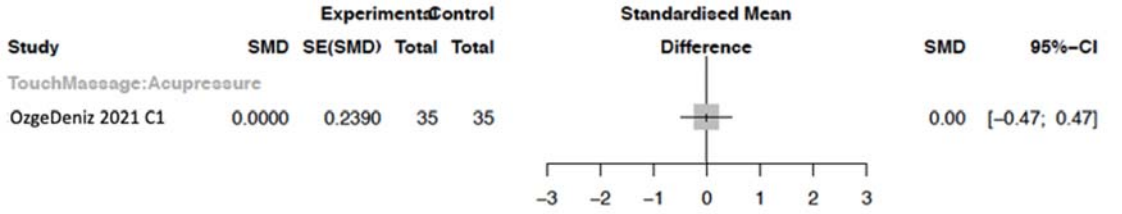

KMC:Sucrose
Direct estimate 1 0.67 −0.05 [−0.63; 0.53]
Indirect estimate −0.05 [−0.87; 0.78]
Network estimate −0.05 [−0.52; 0.43]
KMC_Sucrose:Sucrose
Direct estimate 1 0.67 0.02 [−0.57; 0.60]
Indirect estimate 0.01 [−0.81; 0.83]
Network estimate 0.01 [−0.46; 0.49]
MotherHolding:WhiteNoise
Direct estimate 1 0.49 −1.01 [−1.68; −0.33]
Indirect estimate −0.97 [−1.64; −0.30]
Network estimate −0.99 [−1.46; −0.51]
NNS:NNS_Sucrose
Direct estimate 4 0.58 0% 0.72 [0.35; 1.08]
Indirect estimate 0.60 [0.17; 1.03]
Network estimate 0.67 [0.39; 0.94]
NNS:Sucrose
Direct estimate 4 0.56 24% 0.16 [−0.21; 0.52]
Indirect estimate 0.11 [−0.30; 0.51]
Network estimate 0.13 [−0.14; 0.40]
NNS_Sucrose:NNS_Sucrose_Swaddling
Direct estimate 1 0.42 0.00 [−0.54; 0.54]
Indirect estimate −0.07 [−0.53; 0.39]
Network estimate −0.04 [−0.39; 0.31]
NNS_Sucrose:Sucrose
Direct estimate 5 0.59 0% −0.52 [−0.82; −0.21]
Indirect estimate −0.56 [−0.92; −0.19]
Network estimate −0.53 [−0.76; −0.30]
NNS_Sucrose:Sucrose_Swaddling
Direct estimate 1 0.42 −0.11 [−0.64; 0.43]
Indirect estimate −0.14 [−0.60; 0.32]
Network estimate −0.13 [−0.47; 0.22]
NNS_Sucrose_Swaddling:Sucrose
Direct estimate 1 0.42 −0.44 [−0.98; 0.10]
Indirect estimate −0.53 [−0.99; −0.07]
Network estimate −0.49 [−0.84; −0.14]
NNS_Sucrose_Swaddling:Sucrose_Swaddling
Direct estimate 1 0.50 −0.10 [−0.64; 0.44]
Indirect estimate −0.07 [−0.61; 0.47]
Network estimate −0.09 [−0.47; 0.29]
SterileWater:Sucrose
Direct estimate 2 0.46 69% 0.34 [−0.20; 0.87]
Indirect estimate 0.49 [0.00; 0.98]
Network estimate 0.42 [0.06; 0.78]
Sucrose:Sucrose_FacilitatedTucking
Direct estimate 1 0.56 0.27 [−0.49; 1.03]
Indirect estimate −0.10 [−0.96; 0.76]
Network estimate 0.11 [−0.46; 0.68]
Sucrose:Sucrose_Swaddling
Direct estimate 1 0.42 0.40 [−0.13; 0.94]
Indirect estimate 0.41 [−0.05; 0.87]
Network estimate 0.41 [0.06; 0.76]
−3 −2 −1 0 1 2 3

Web Fig. 7. Direct Evidence from the pair wise comparisons for the primary outcome 'pain score at 30 sec after heel prick' in neonates

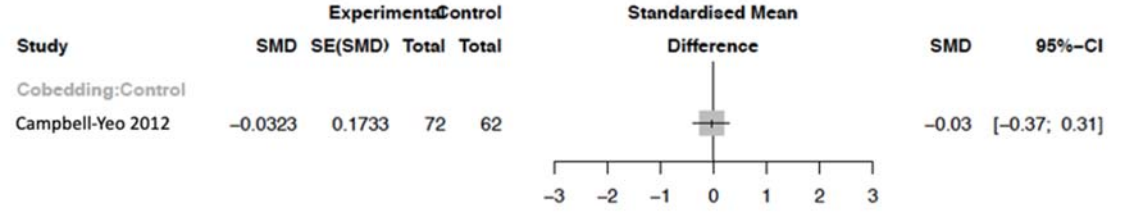
A. Control vs. Acupressure



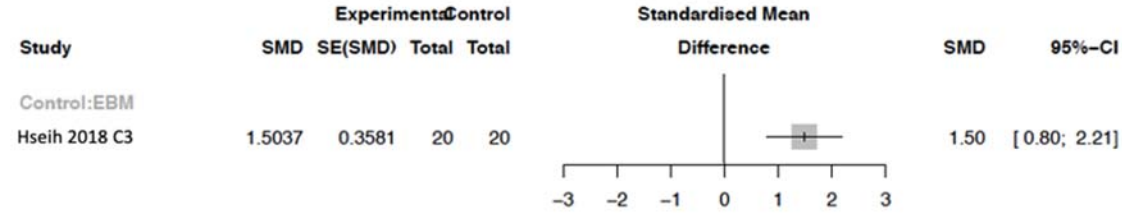
B. Touch Massage vs. Acupressure



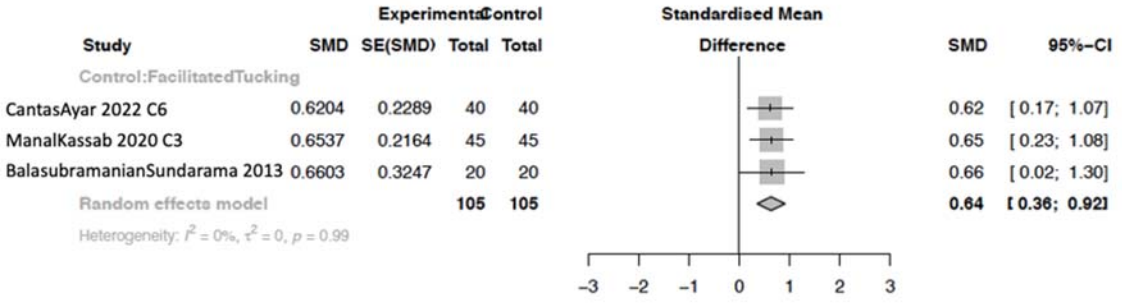
C. Cobedding vs. Control



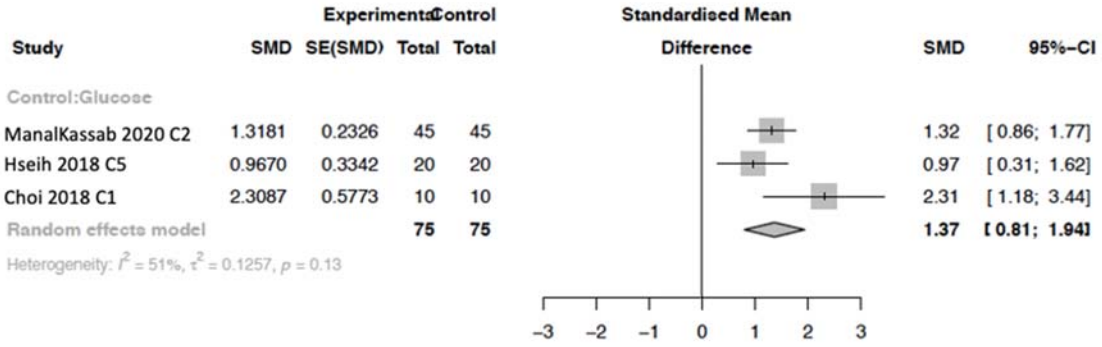
D. Control vs. EBM



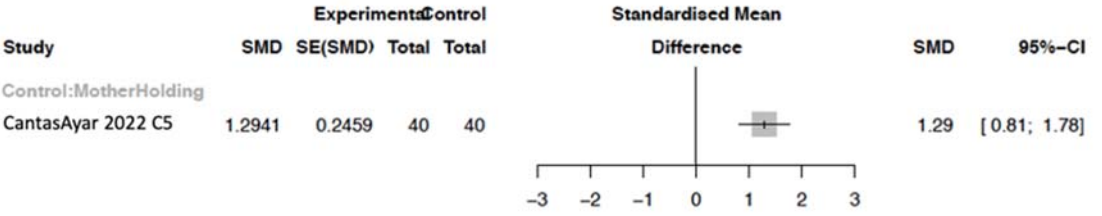
E. Control vs. Facilitated tucking



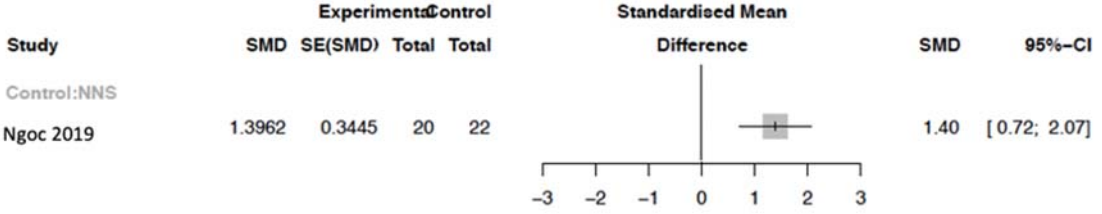
F. Control vs. Glucose



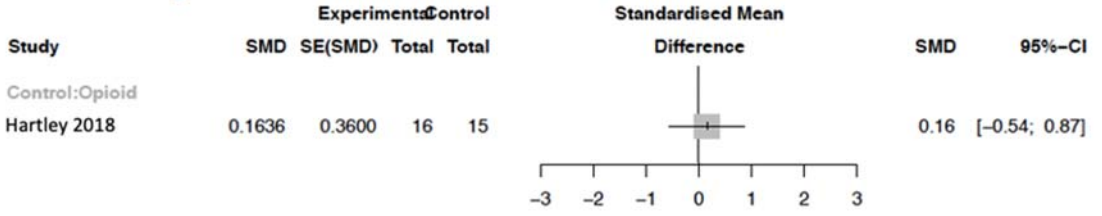
G. Control vs. Mother holding



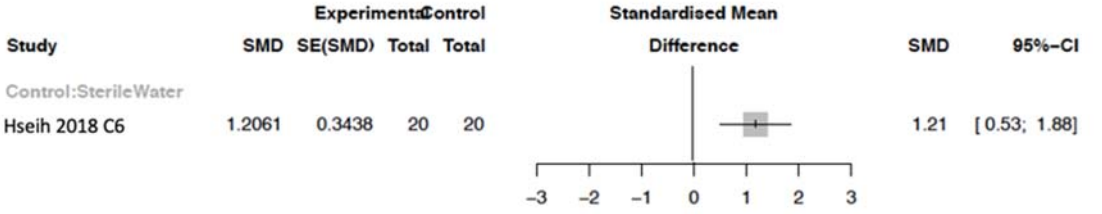
H. Control vs. NNS



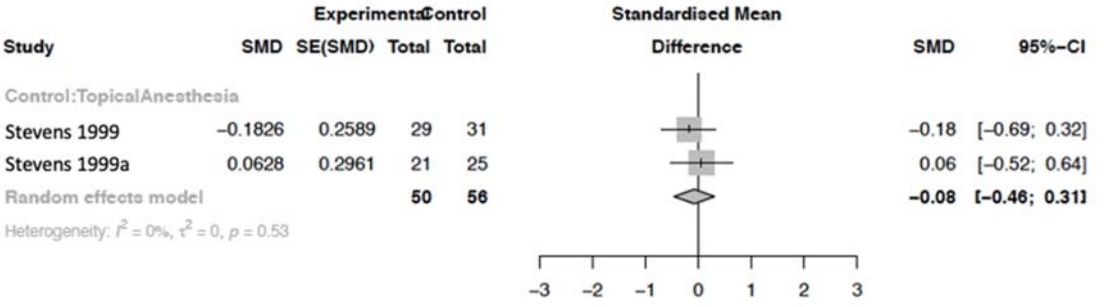
I. Control vs. Opioid



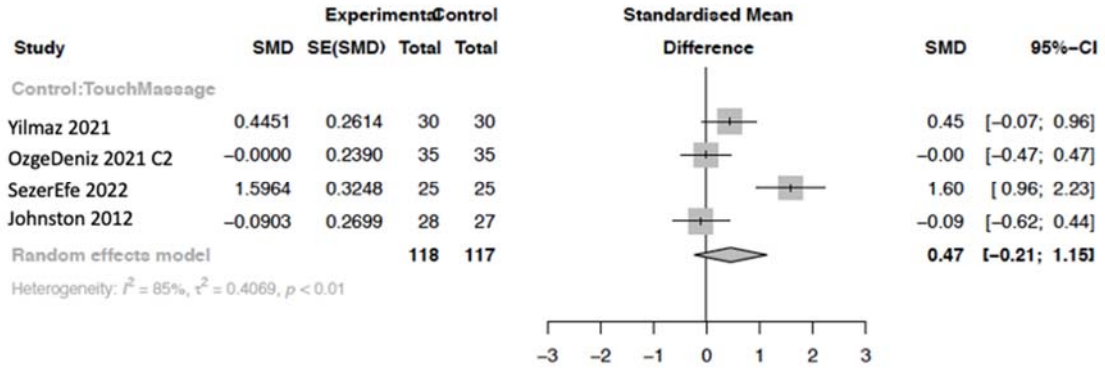
J. Control vs. Sterile water



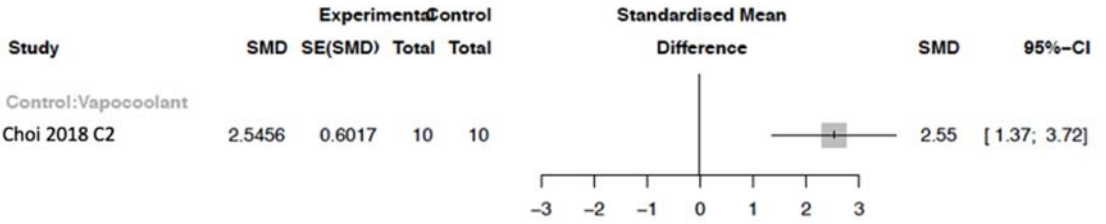
K. Control vs. Topical Anesthesia



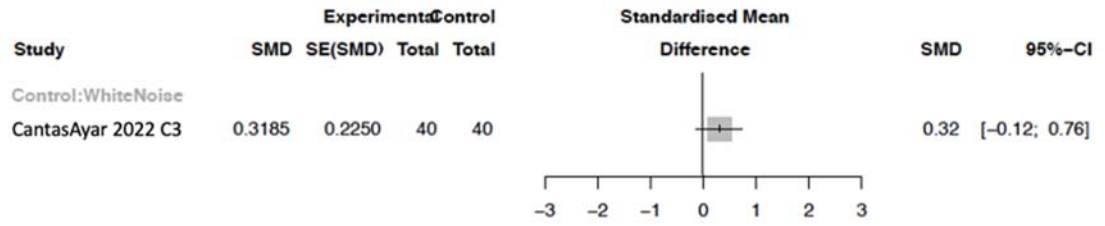
L. Control vs. Touch Massage



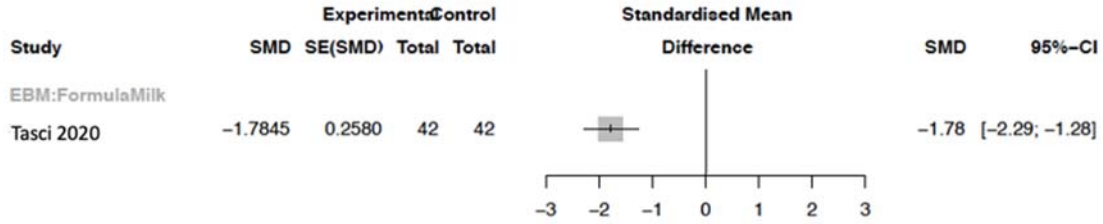
M. Control vs. Vapo coolant



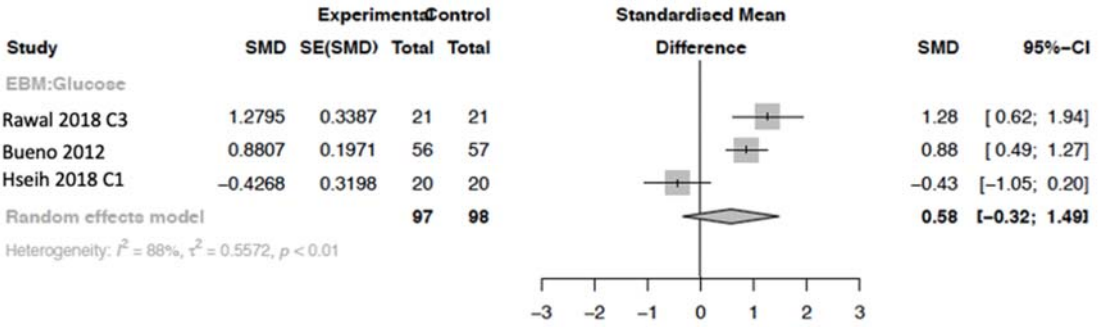
N. Control vs. White noise



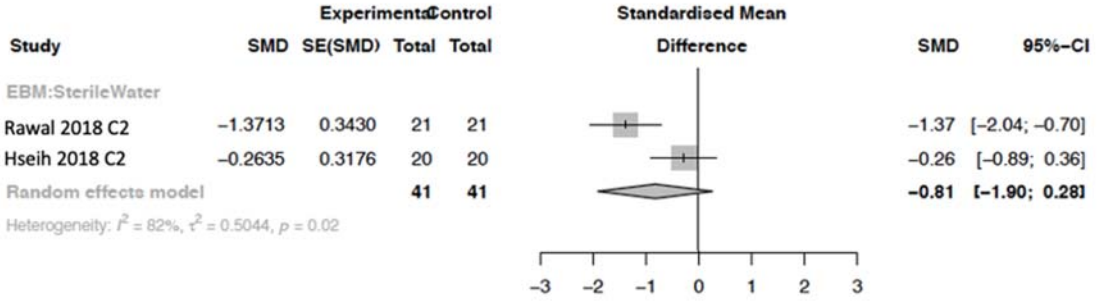
O. EBM vs. Formula Milk



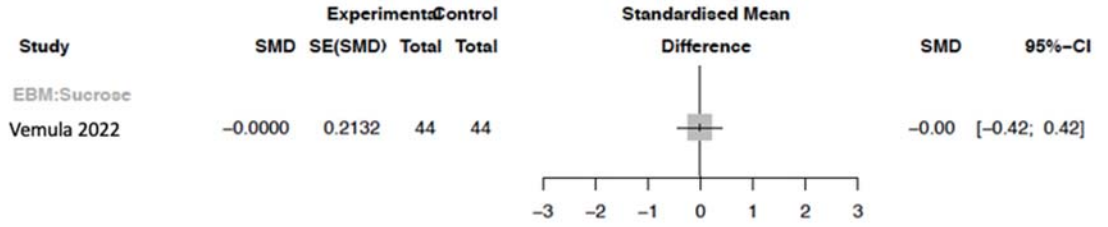
P. EBM vs. Glucose



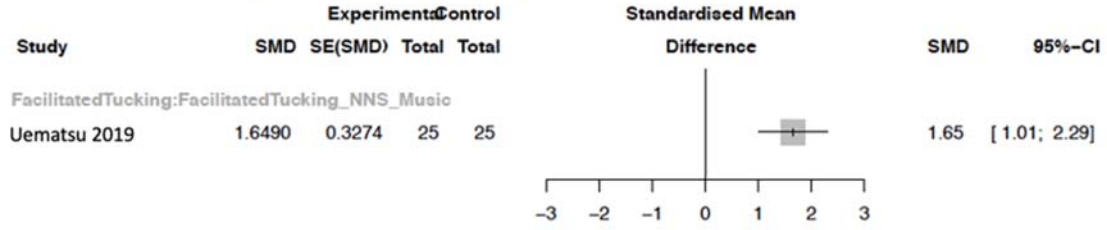
Q. EBM vs. Sterile water



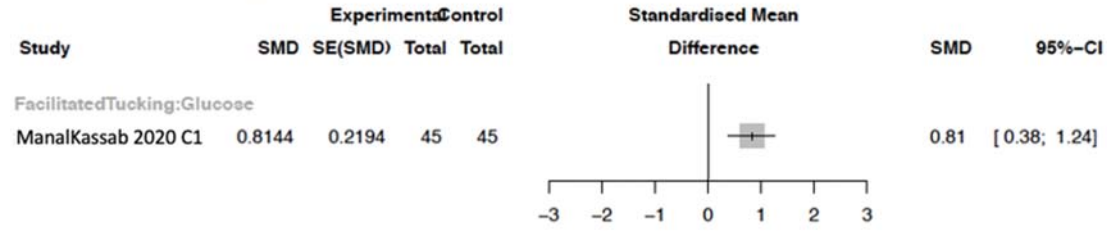
R. EBM vs. Sucrose



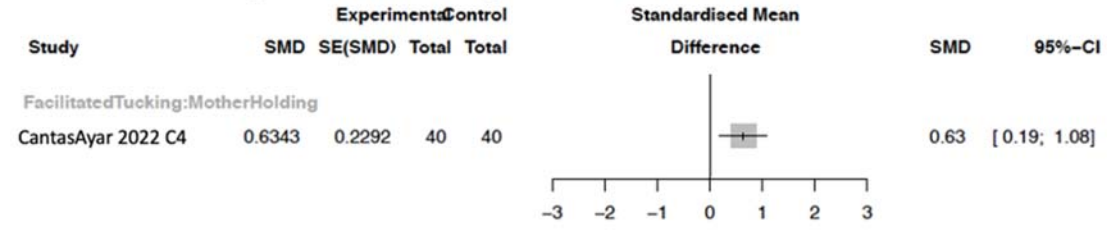
S. Facilitated tucking vs. Facilitated tucking-NNS-Music



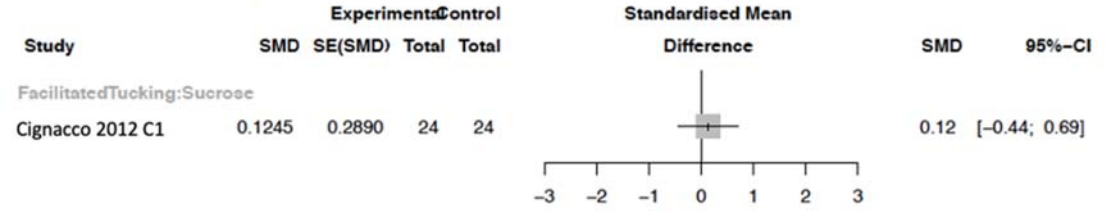
T. Facilitated tucking vs. Glucose



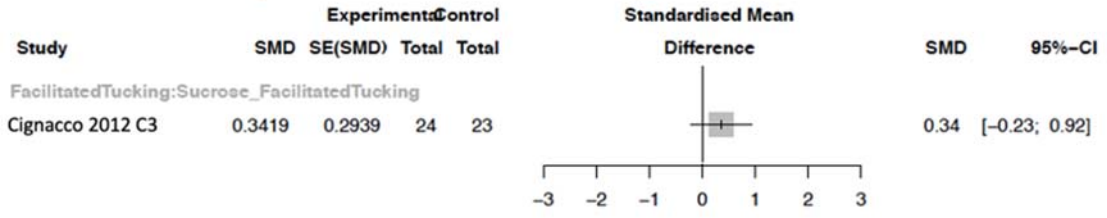
U. Facilitated tucking vs. Mother holding



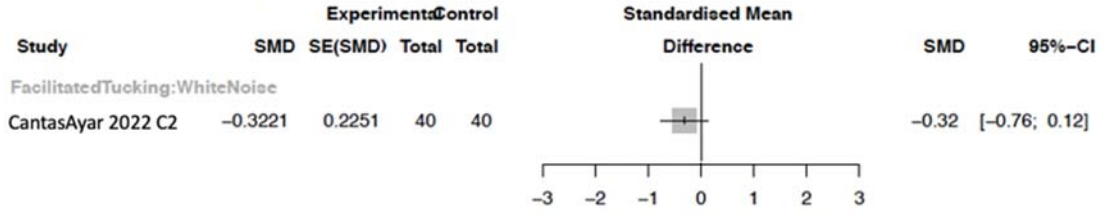
V. Facilitated tucking vs. Sucrose



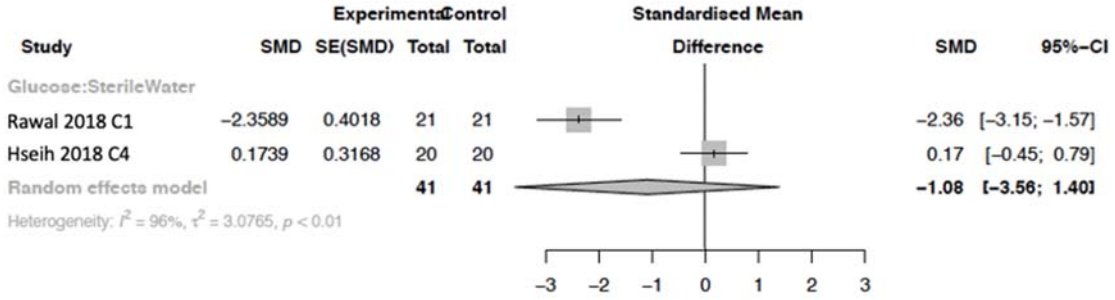
W. Facilitated tucking vs. Sucrose-Facilitated tucking



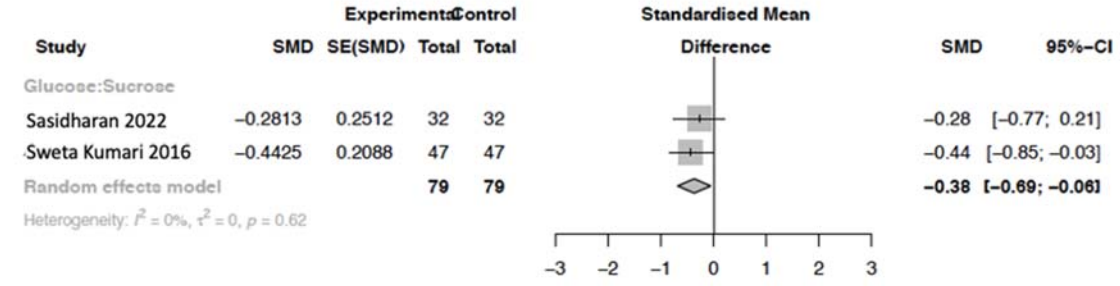
X. Facilitated tucking vs. White noise



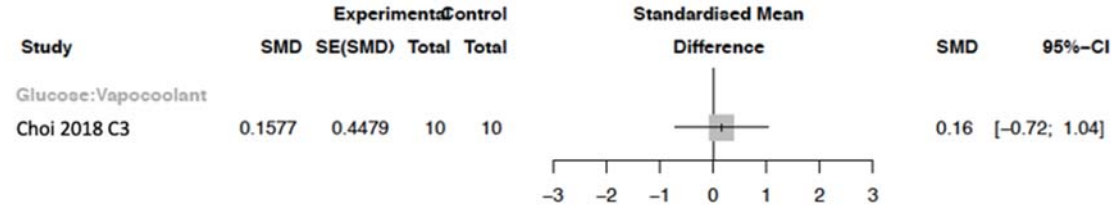
Y. Glucose vs. Sterile water



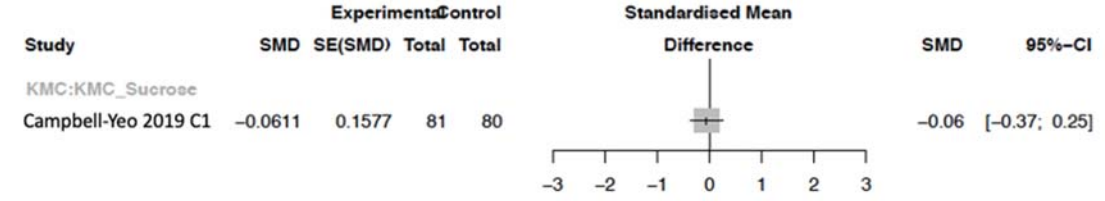
Z. Glucose vs. Sucrose



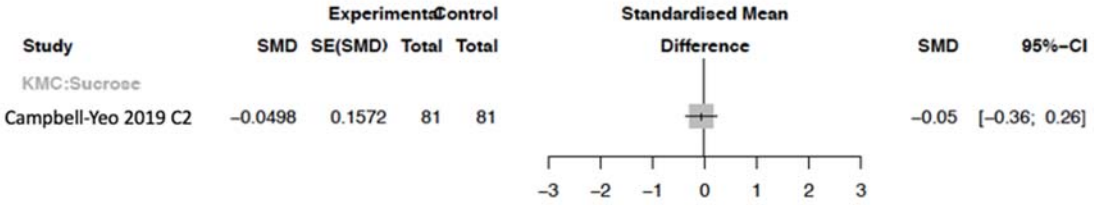
AA. Glucose vs. Vapo coolant



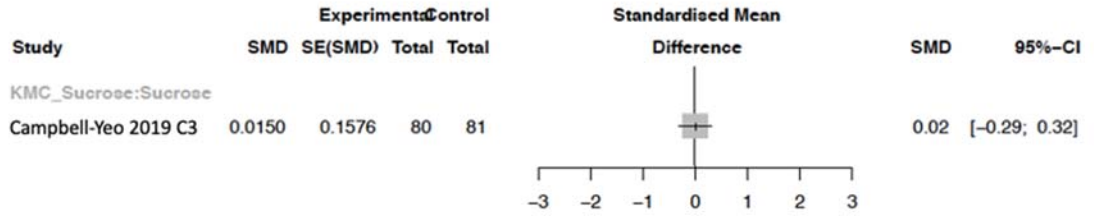
AB. KMC vs. KMC-Sucrose



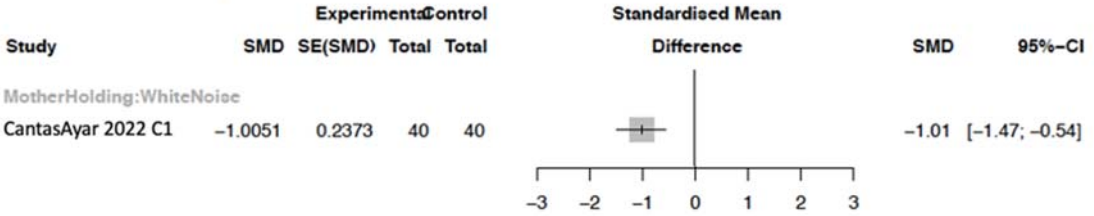
AC. KMC vs. Sucrose



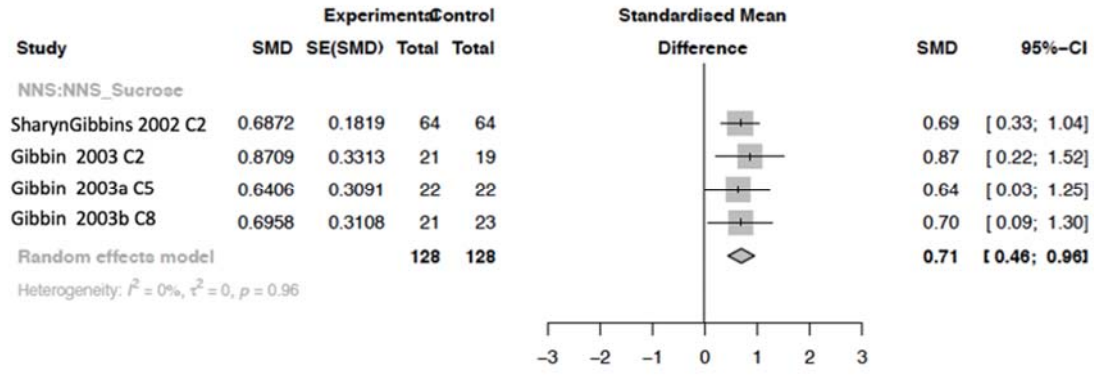
AD. KMC-Sucrose vs. Sucrose



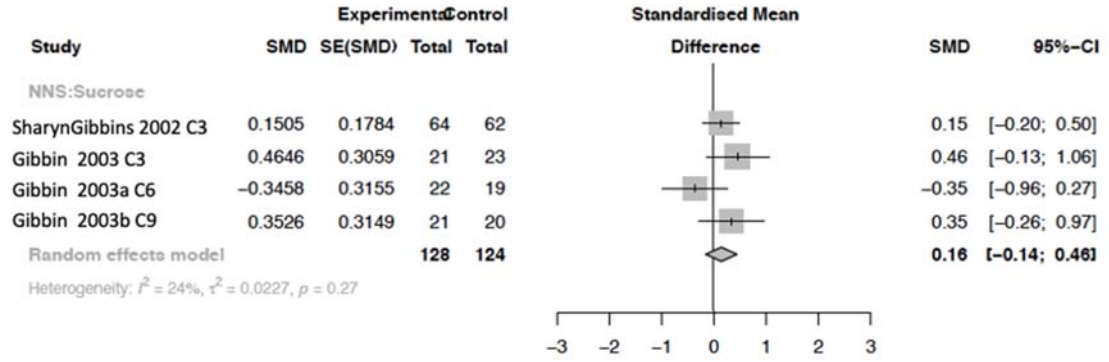
AE. Mother holding vs. White noise



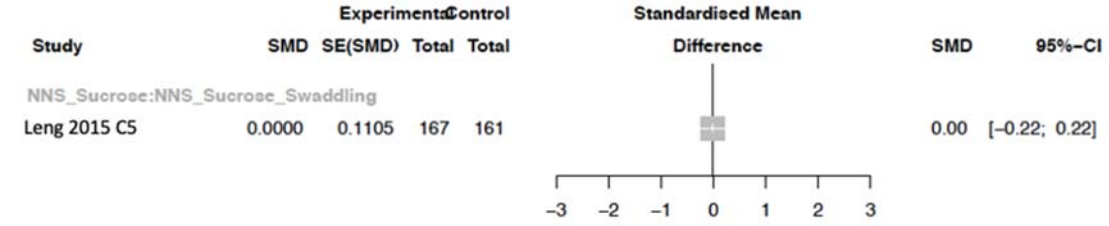
AF. NNS vs. NNS-Sucrose



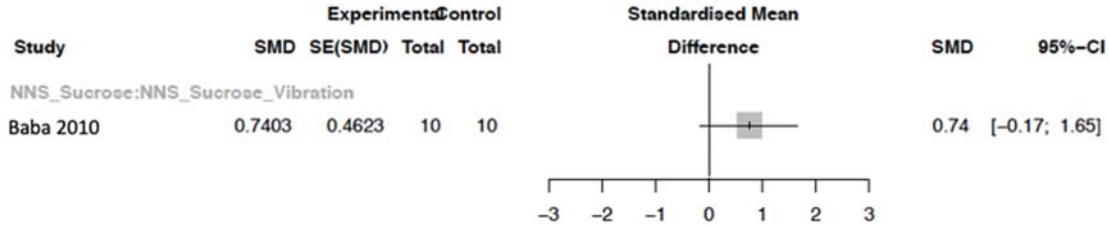
AG. NNS vs. Sucrose



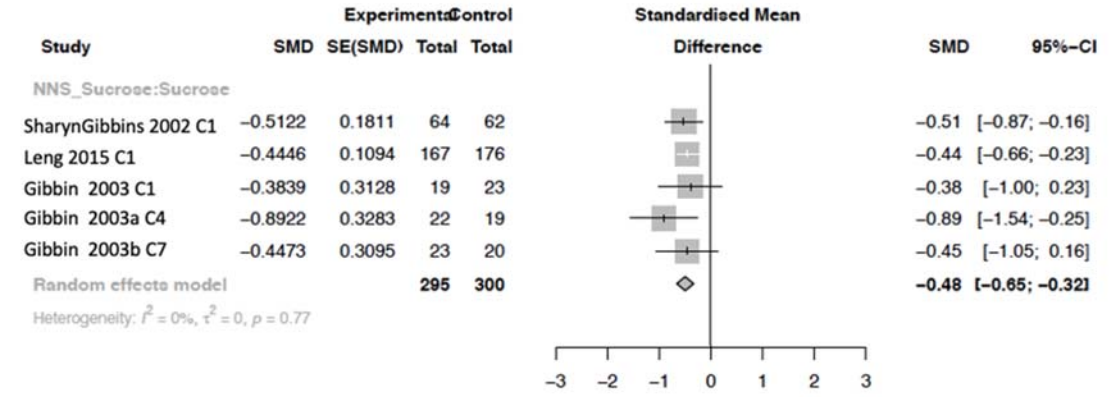
AH. NNS-Sucrose vs. NNS-Sucrose-Swaddling



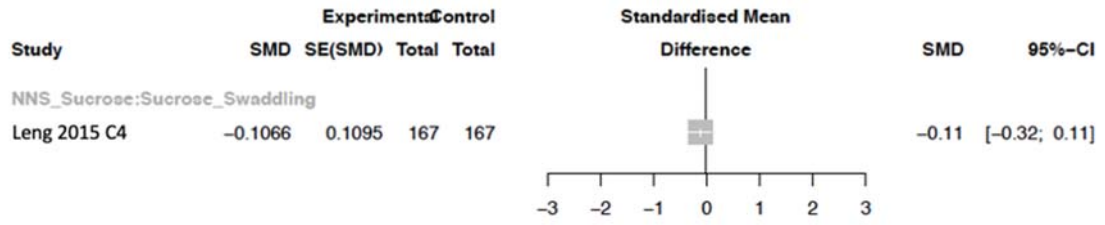
AI. NNS-Sucrose vs. NNS-Sucrose-Vibration



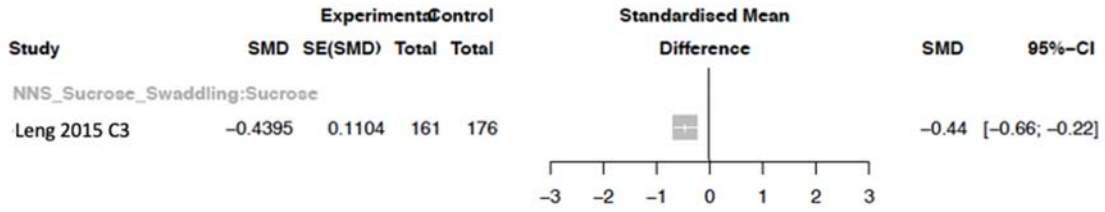
AJ. NNS-Sucrose vs. Sucrose



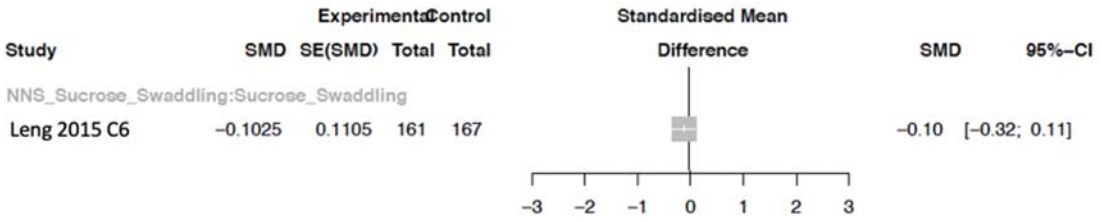
AK. NNS-Sucrose vs. Sucrose-Swaddling



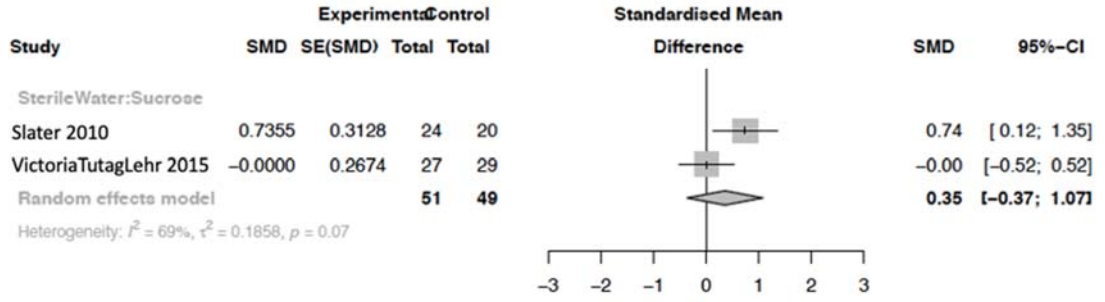
AL. NNS-Sucrose-Swaddling vs. Sucrose



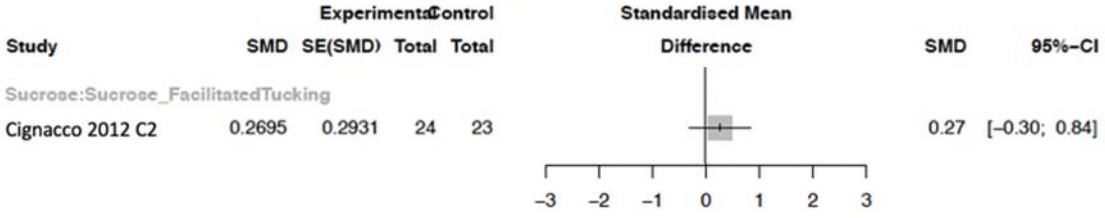
AL. NNS-Sucrose-Swaddling vs. Sucrose-Swaddling



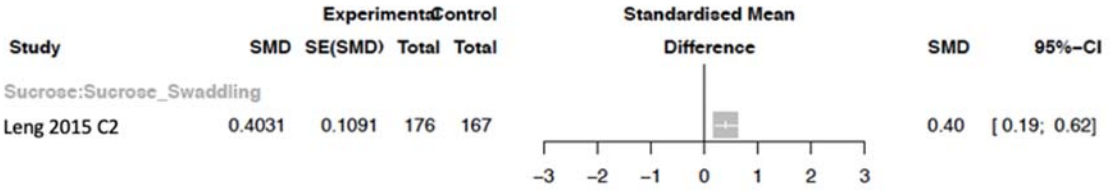
AM. Sterile water vs. Sucrose

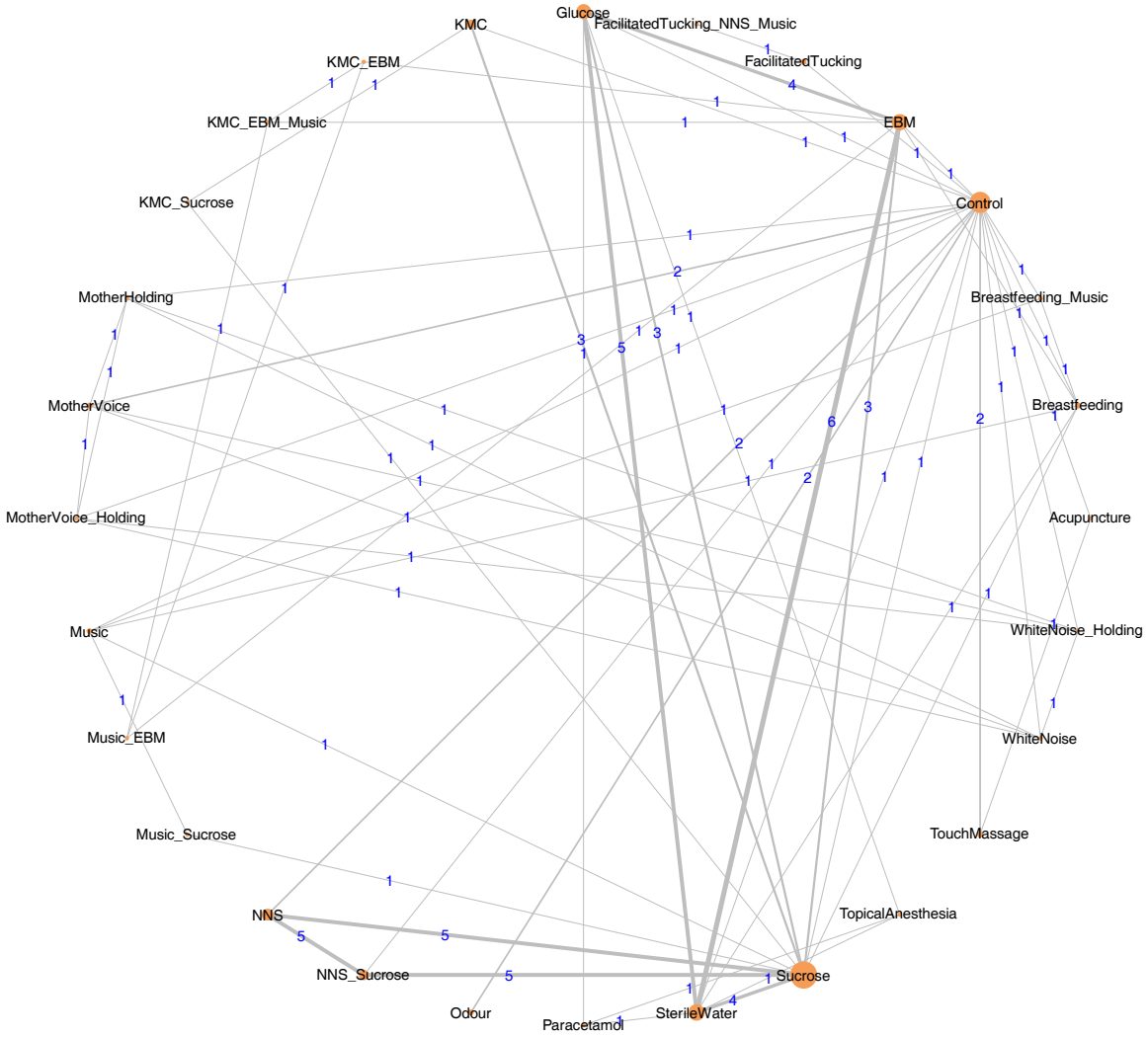


AN. Sucrose vs. Sucrose-Facilitated tucking



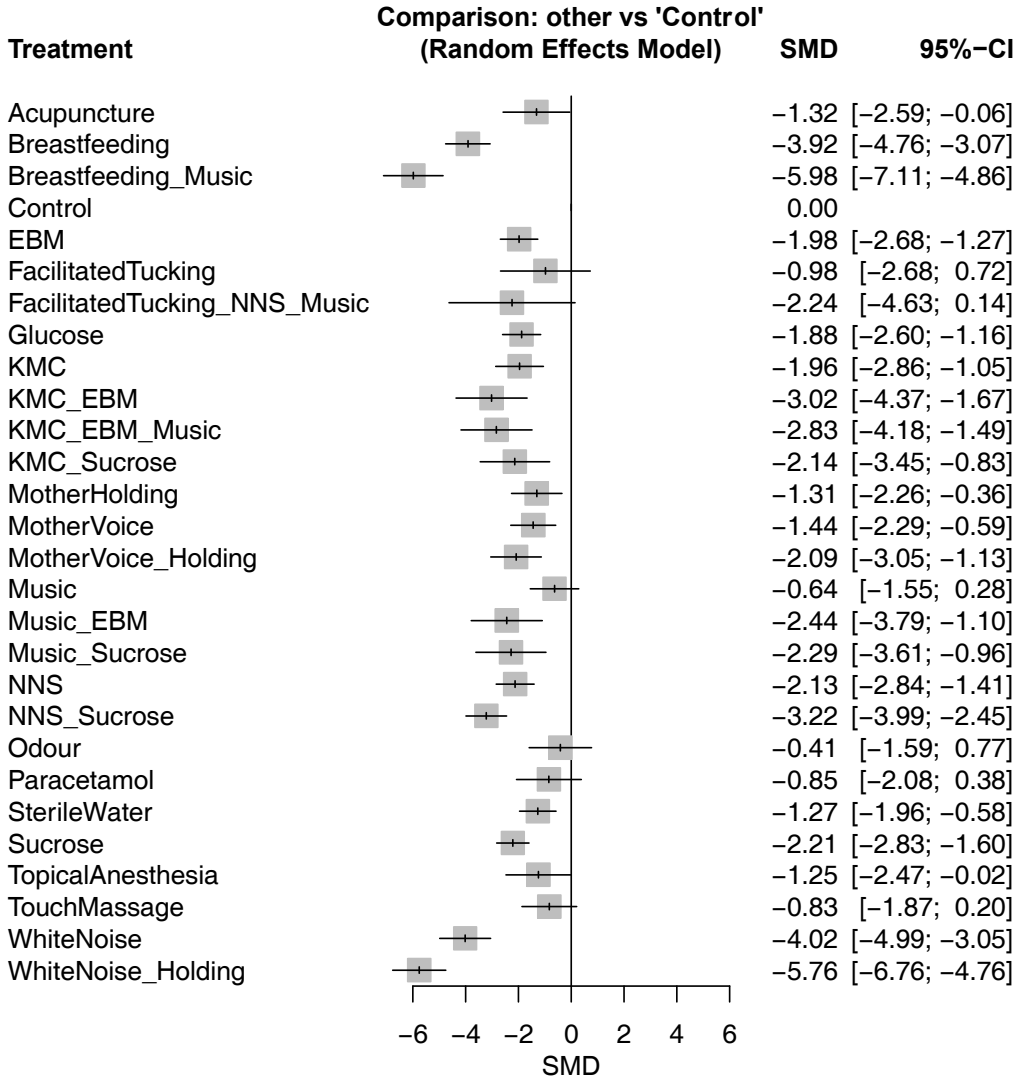
AO. Sucrose vs. Sucrose-Swaddling



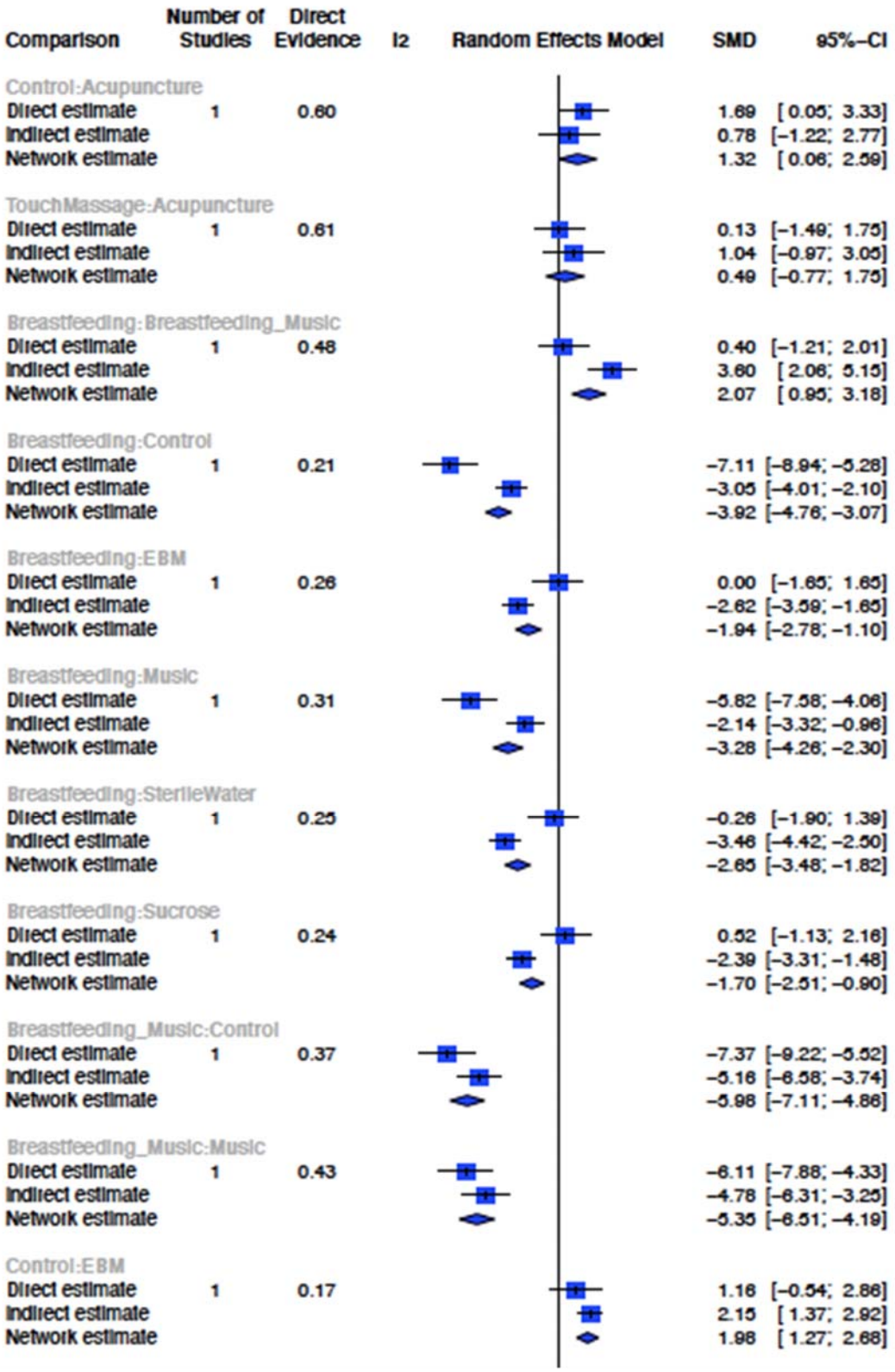


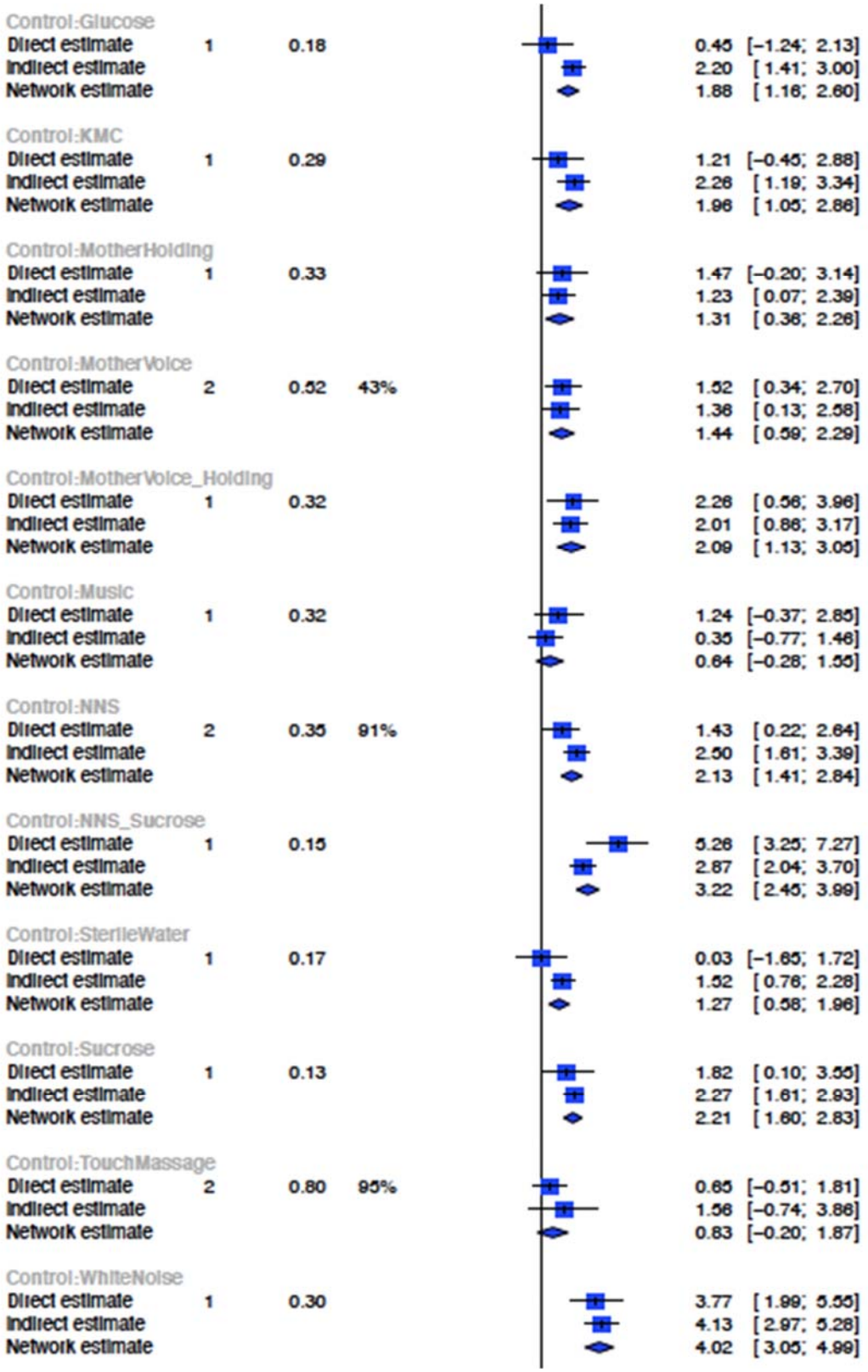
Web Fig. 8A. Network plot for pain score at one minute after heel prick in neonates

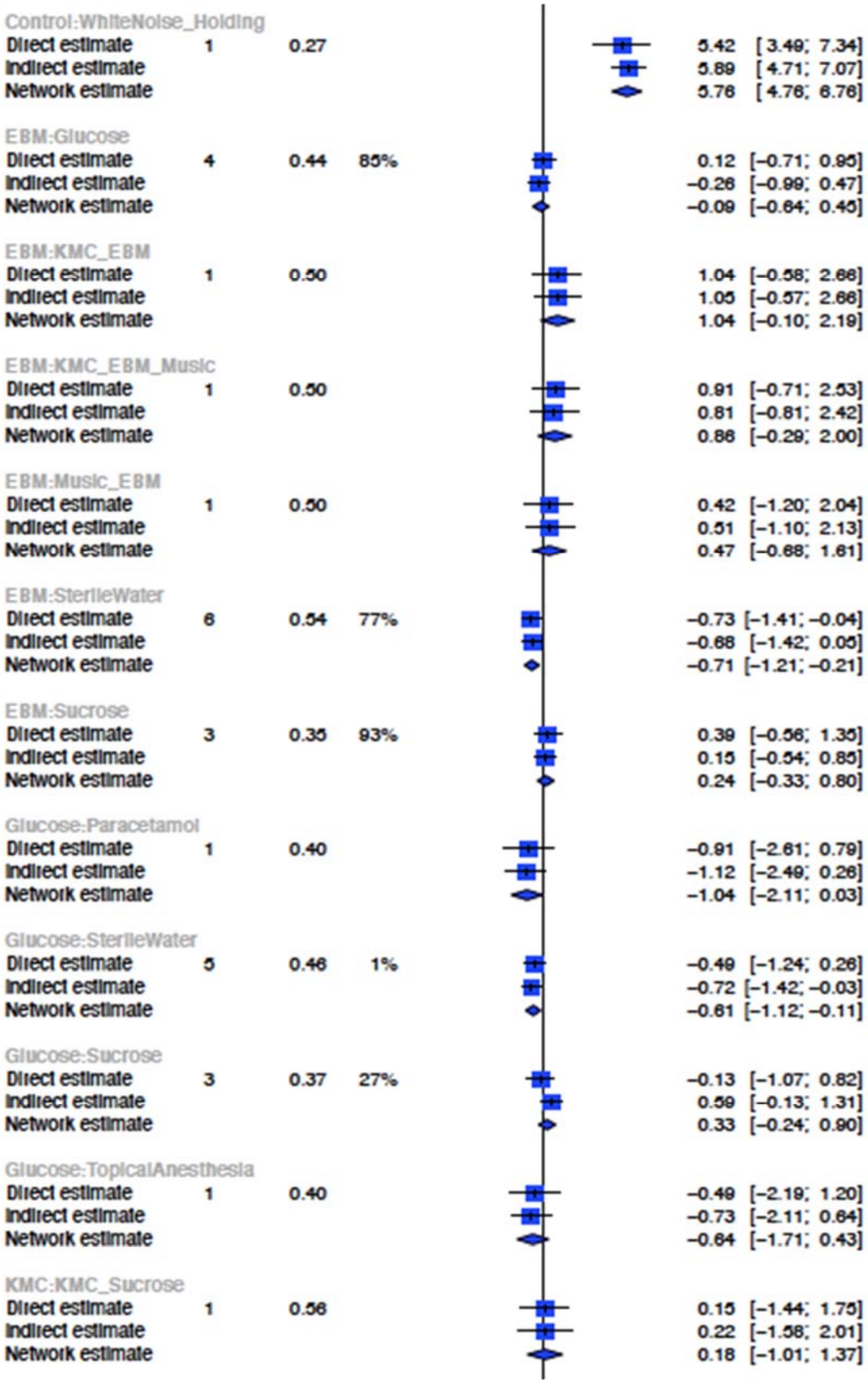
Web Fig. 8B. Forest plot depicting the network estimates [SMD (95% CrI)] of the various interventions with 'Control' as the common comparator for pain score at one minute after heel prick in neonates

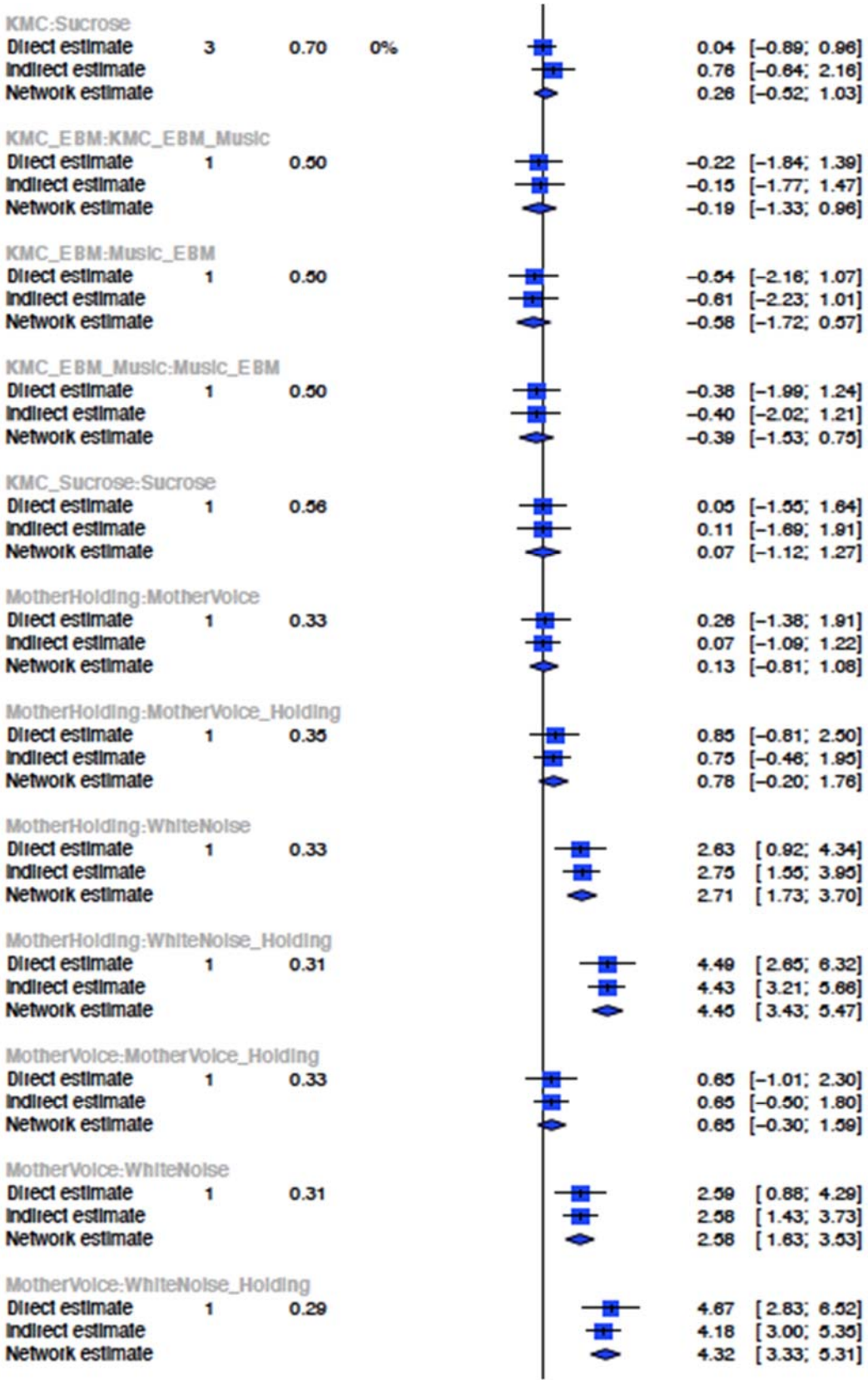


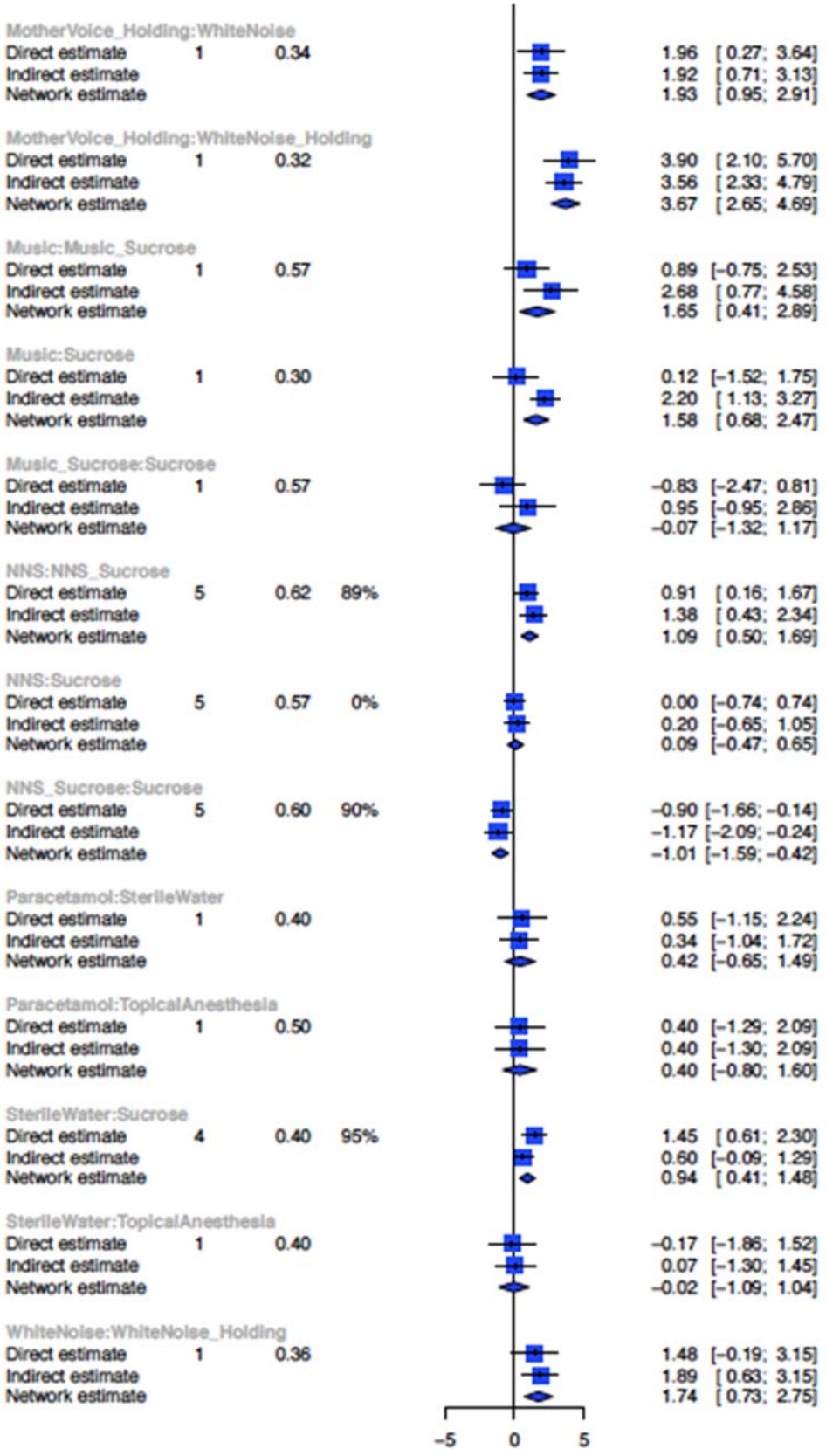
Web Fig. 9. Split between direct and indirect evidence for the secondary outcome 'pain score at one minute after heel prick' in neonates



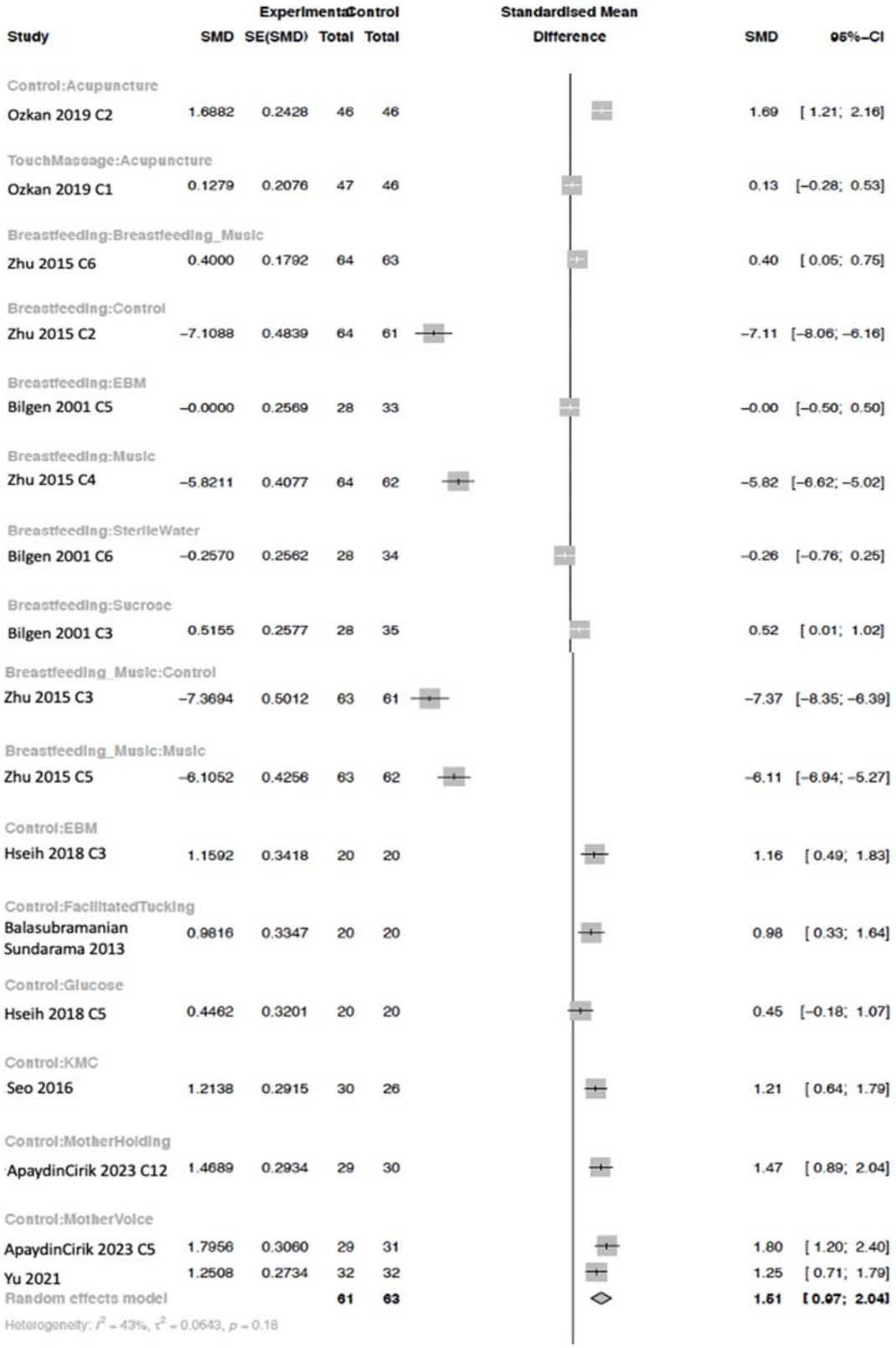

Control:Glucose
Direct estimate 1 0.18 0.45 [−1.24; 2.13]
Indirect estimate 2.20 [1.41; 3.00]
Network estimate 1.88 [1.16; 2.60]
Control:KMC
Direct estimate 1 0.29 1.21 [−0.45; 2.88]
Indirect estimate 2.28 [1.19; 3.34]
Network estimate 1.96 [1.05; 2.86]
Control:MotherHolding
Direct estimate 1 0.33 1.47 [−0.20; 3.14]
Indirect estimate 1.23 [0.07; 2.39]
Network estimate 1.31 [0.36; 2.26]
Control:MotherVoice
Direct estimate 2 0.52 43% 1.52 [0.34; 2.70]
Indirect estimate 1.36 [0.13; 2.58]
Network estimate 1.44 [0.59; 2.29]
Control:MotherVoice_Holding
Direct estimate 1 0.32 2.26 [0.56; 3.96]
Indirect estimate 2.01 [0.86; 3.17]
Network estimate 2.09 [1.13; 3.05]
Control:Music
Direct estimate 1 0.32 1.24 [−0.37; 2.85]
Indirect estimate 0.35 [−0.77; 1.46]
Network estimate 0.64 [−0.28; 1.55]
Control:NNS
Direct estimate 2 0.35 91% 1.43 [0.22; 2.64]
Indirect estimate 2.50 [1.61; 3.39]
Network estimate 2.13 [1.41; 2.84]
Control:NNS_Sucrose
Direct estimate 1 0.15 5.26 [3.25; 7.27]
Indirect estimate 2.87 [2.04; 3.70]
Network estimate 3.22 [2.45; 3.99]
Control:SterileWater
Direct estimate 1 0.17 0.03 [−1.65; 1.72]
Indirect estimate 1.52 [0.76; 2.28]
Network estimate 1.27 [0.58; 1.96]
Control:Sucrose
Direct estimate 1 0.13 1.82 [0.10; 3.55]
Indirect estimate 2.27 [1.61; 2.93]
Network estimate 2.21 [1.60; 2.83]
Control:TouchMassage
Direct estimate 2 0.80 95% 0.65 [−0.51; 1.81]
Indirect estimate 1.56 [−0.74; 3.86]
Network estimate 0.83 [−0.20; 1.87]
Control:WhiteNoise
Direct estimate 1 0.30 3.77 [1.99; 5.55]
Indirect estimate 4.13 [2.97; 5.28]
Network estimate 4.02 [3.05; 4.99]

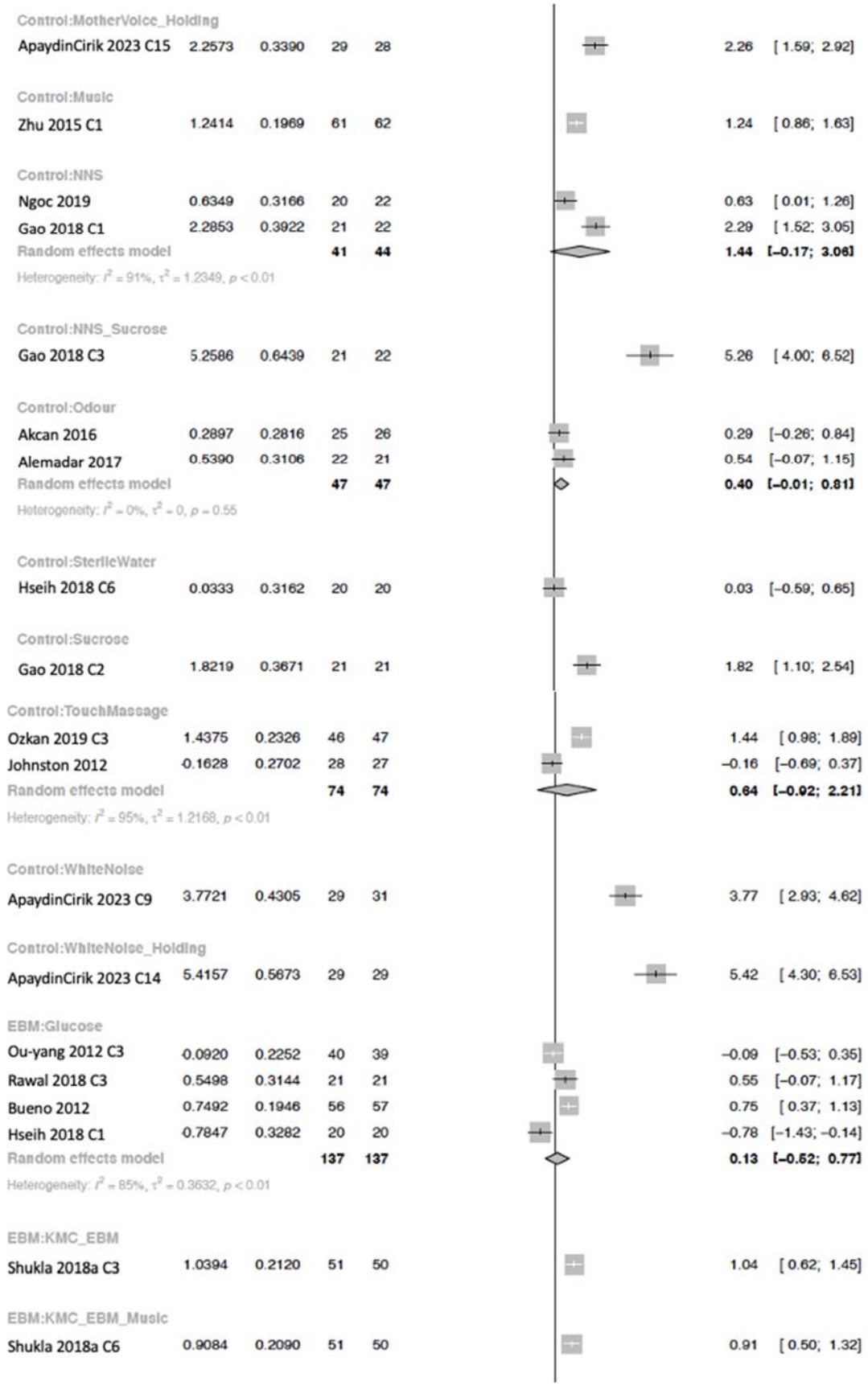

Control:WhiteNoise_Holding
Direct estimate 1 0.27 5.42 [3.49; 7.34]
Indirect estimate 5.89 [4.71; 7.07]
Network estimate 5.76 [4.76; 6.76]
EBM:Glucose
Direct estimate 4 0.44 85% 0.12 [−0.71; 0.95]
Indirect estimate −0.26 [−0.99; 0.47]
Network estimate −0.09 [−0.64; 0.45]
EBM:KMC_EBM
Direct estimate 1 0.50 1.04 [−0.58; 2.66]
Indirect estimate 1.05 [−0.57; 2.66]
Network estimate 1.04 [−0.10; 2.19]
EBM:KMC_EBM_Music
Direct estimate 1 0.50 0.91 [−0.71; 2.53]
Indirect estimate 0.81 [−0.81; 2.42]
Network estimate 0.86 [−0.29; 2.00]
EBM:Music_EBM
Direct estimate 1 0.50 0.42 [−1.20; 2.04]
Indirect estimate 0.51 [−1.10; 2.13]
Network estimate 0.47 [−0.68; 1.61]
EBM:SterileWater
Direct estimate 6 0.54 77% −0.73 [−1.41; −0.04]
Indirect estimate −0.68 [−1.42; 0.05]
Network estimate −0.71 [−1.21; −0.21]
EBM:Sucrose
Direct estimate 3 0.35 93% 0.39 [−0.56; 1.35]
Indirect estimate 0.15 [−0.54; 0.85]
Network estimate 0.24 [−0.33; 0.80]
Glucose:Paracetamol
Direct estimate 1 0.40 −0.91 [−2.61; 0.79]
Indirect estimate −1.12 [−2.49; 0.26]
Network estimate −1.04 [−2.11; 0.03]
Glucose:SterileWater
Direct estimate 5 0.46 1% −0.49 [−1.24; 0.26]
Indirect estimate −0.72 [−1.42; −0.03]
Network estimate −0.61 [−1.12; −0.11]
Glucose:Sucrose
Direct estimate 3 0.37 27% −0.13 [−1.07; 0.82]
Indirect estimate 0.59 [−0.13; 1.31]
Network estimate 0.33 [−0.24; 0.90]
Glucose:TopicalAnesthesia
Direct estimate 1 0.40 −0.49 [−2.19; 1.20]
Indirect estimate −0.73 [−2.11; 0.64]
Network estimate −0.64 [−1.71; 0.43]
KMC:KMC_Sucrose
Direct estimate 1 0.56 0.15 [−1.44; 1.75]
Indirect estimate 0.22 [−1.58; 2.01]
Network estimate 0.18 [−1.01; 1.37]

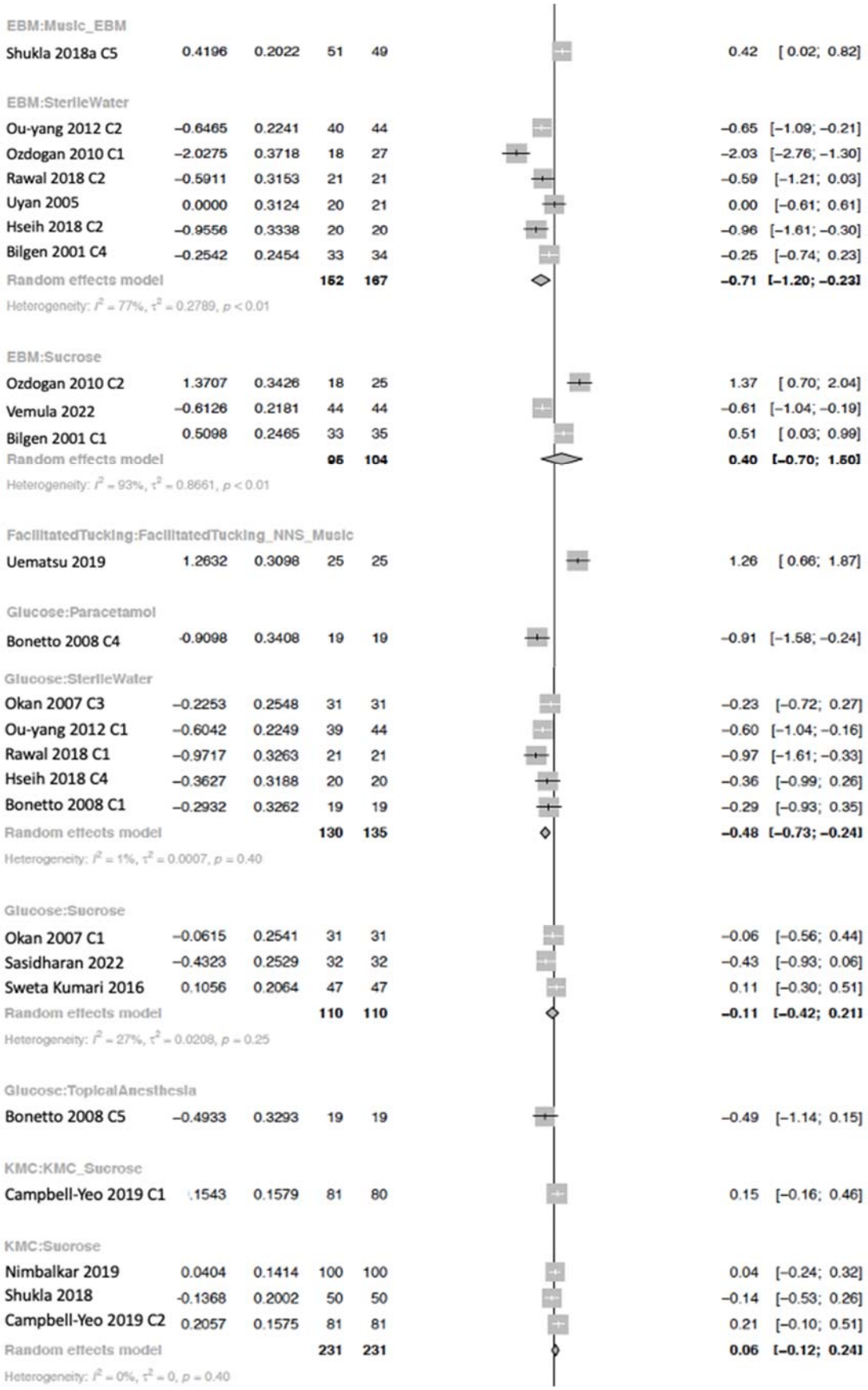

KMC:Sucrose
Direct estimate 3 0.70 0% 0.04 [−0.89; 0.96]
Indirect estimate 0.76 [−0.64; 2.16]
Network estimate 0.26 [−0.52; 1.03]
KMC_EBM:KMC_EBM_Music
Direct estimate 1 0.50 −0.22 [−1.84; 1.39]
Indirect estimate −0.15 [−1.77; 1.47]
Network estimate −0.19 [−1.33; 0.96]
KMC_EBM:Music_EBM
Direct estimate 1 0.50 −0.54 [−2.16; 1.07]
Indirect estimate −0.61 [−2.23; 1.01]
Network estimate −0.58 [−1.72; 0.57]
KMC_EBM_Music:Music_EBM
Direct estimate 1 0.50 −0.38 [−1.99; 1.24]
Indirect estimate −0.40 [−2.02; 1.21]
Network estimate −0.39 [−1.53; 0.75]
KMC_Sucrose:Sucrose
Direct estimate 1 0.56 0.05 [−1.55; 1.64]
Indirect estimate 0.11 [−1.69; 1.91]
Network estimate 0.07 [−1.12; 1.27]
MotherHolding:MotherVoice
Direct estimate 1 0.33 0.26 [−1.38; 1.91]
Indirect estimate 0.07 [−1.09; 1.22]
Network estimate 0.13 [−0.81; 1.08]
MotherHolding:MotherVoice_Holding
Direct estimate 1 0.35 0.85 [−0.81; 2.50]
Indirect estimate 0.75 [−0.46; 1.95]
Network estimate 0.78 [−0.20; 1.76]
MotherHolding:WhiteNoise
Direct estimate 1 0.33 2.63 [0.92; 4.34]
Indirect estimate 2.75 [1.55; 3.95]
Network estimate 2.71 [1.73; 3.70]
MotherHolding:WhiteNoise_Holding
Direct estimate 1 0.31 4.49 [2.65; 6.32]
Indirect estimate 4.43 [3.21; 5.66]
Network estimate 4.45 [3.43; 5.47]
MotherVoice:MotherVoice_Holding
Direct estimate 1 0.33 0.65 [−1.01; 2.30]
Indirect estimate 0.65 [−0.50; 1.80]
Network estimate 0.65 [−0.30; 1.59]
MotherVoice:WhiteNoise
Direct estimate 1 0.31 2.59 [0.88; 4.29]
Indirect estimate 2.58 [1.43; 3.73]
Network estimate 2.58 [1.63; 3.53]
MotherVoice:WhiteNoise_Holding
Direct estimate 1 0.29 4.67 [2.83; 6.52]
Indirect estimate 4.18 [3.00; 5.35]
Network estimate 4.32 [3.33; 5.31]

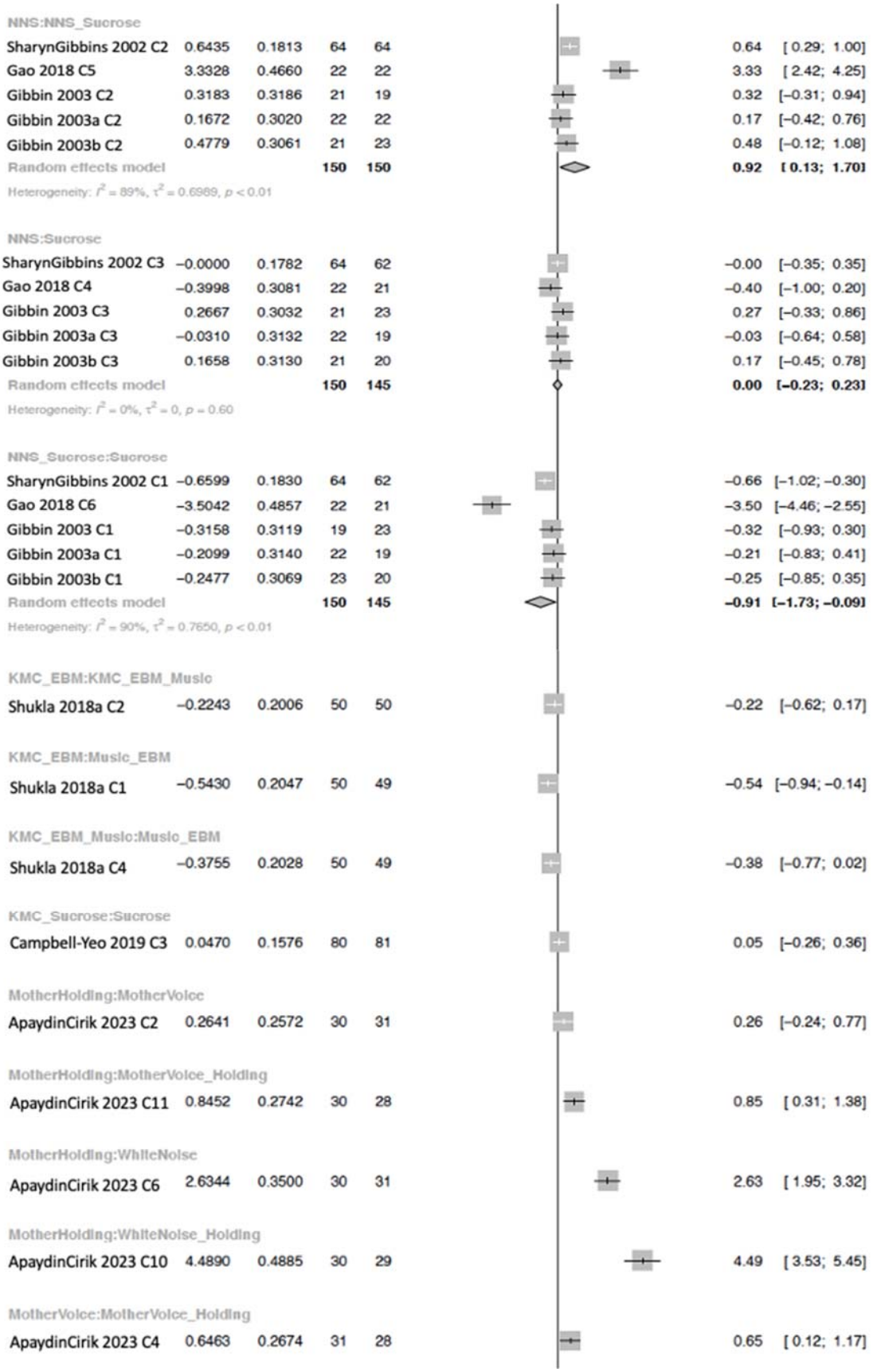

MotherVoice_Holding:WhiteNoise
Direct estimate 1 0.34 1.96 [0.27; 3.64]
Indirect estimate 1.92 [0.71; 3.13]
Network estimate 1.93 [0.95; 2.91]
MotherVoice_Holding:WhiteNoise_Holding
Direct estimate 1 0.32 3.90 [2.10; 5.70]
Indirect estimate 3.56 [2.33; 4.79]
Network estimate 3.67 [2.65; 4.69]
Music:Music_Sucrose
Direct estimate 1 0.57 0.89 [−0.75; 2.53]
Indirect estimate 2.68 [0.77; 4.58]
Network estimate 1.65 [0.41; 2.89]
Music:Sucrose
Direct estimate 1 0.30 0.12 [−1.52; 1.75]
Indirect estimate 2.20 [1.13; 3.27]
Network estimate 1.58 [0.68; 2.47]
Music_Sucrose:Sucrose
Direct estimate 1 0.57 −0.83 [−2.47; 0.81]
Indirect estimate 0.95 [−0.95; 2.86]
Network estimate −0.07 [−1.32; 1.17]
NNS:NNS_Sucrose
Direct estimate 5 0.62 89% 0.91 [0.16; 1.67]
Indirect estimate 1.38 [0.43; 2.34]
Network estimate 1.09 [0.50; 1.69]
NNS:Sucrose
Direct estimate 5 0.57 0% 0.00 [−0.74; 0.74]
Indirect estimate 0.20 [−0.65; 1.05]
Network estimate 0.09 [−0.47; 0.65]
NNS_Sucrose:Sucrose
Direct estimate 5 0.60 90% −0.90 [−1.66; −0.14]
Indirect estimate −1.17 [−2.09; −0.24]
Network estimate −1.01 [−1.59; −0.42]
Paracetamol:SterileWater
Direct estimate 1 0.40 0.55 [−1.15; 2.24]
Indirect estimate 0.34 [−1.04; 1.72]
Network estimate 0.42 [−0.65; 1.49]
Paracetamol:TopicalAnesthesia
Direct estimate 1 0.50 0.40 [−1.29; 2.09]
Indirect estimate 0.40 [−1.30; 2.09]
Network estimate 0.40 [−0.80; 1.60]
SterileWater:Sucrose
Direct estimate 4 0.40 95% 1.45 [0.61; 2.30]
Indirect estimate 0.60 [−0.09; 1.29]
Network estimate 0.94 [0.41; 1.48]
SterileWater:TopicalAnesthesia
Direct estimate 1 0.40 −0.17 [−1.86; 1.52]
Indirect estimate 0.07 [−1.30; 1.45]
Network estimate −0.02 [−1.09; 1.04]
WhiteNoise:WhiteNoise_Holding
Direct estimate 1 0.36 1.48 [−0.19; 3.15]
Indirect estimate 1.89 [0.63; 3.15]
Network estimate 1.74 [0.73; 2.75]
−5
0
5

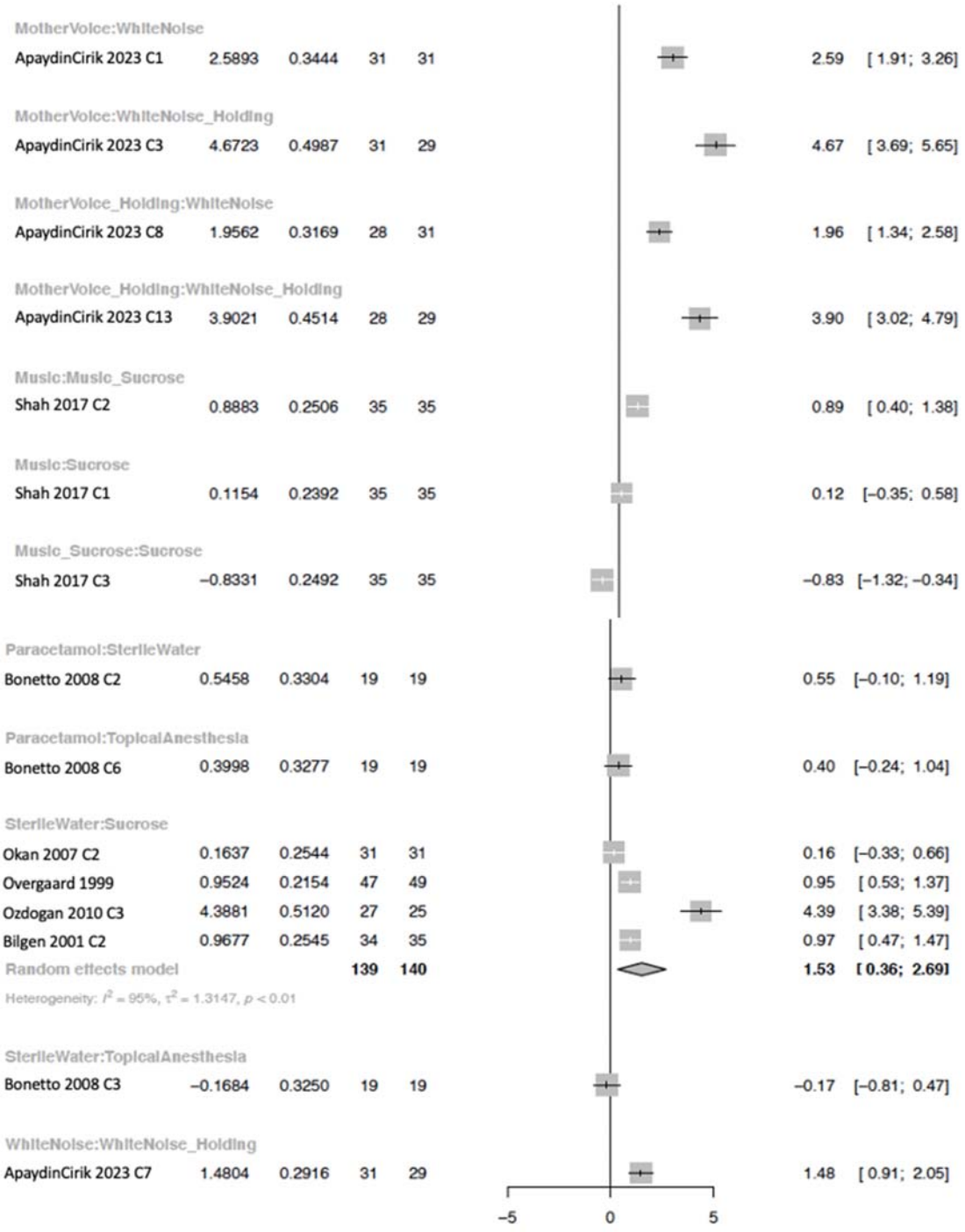
Web Fig. 10. Direct Evidence from the pair wise comparisons for the secondary outcome 'pain score at one minute after heel prick' in neonates

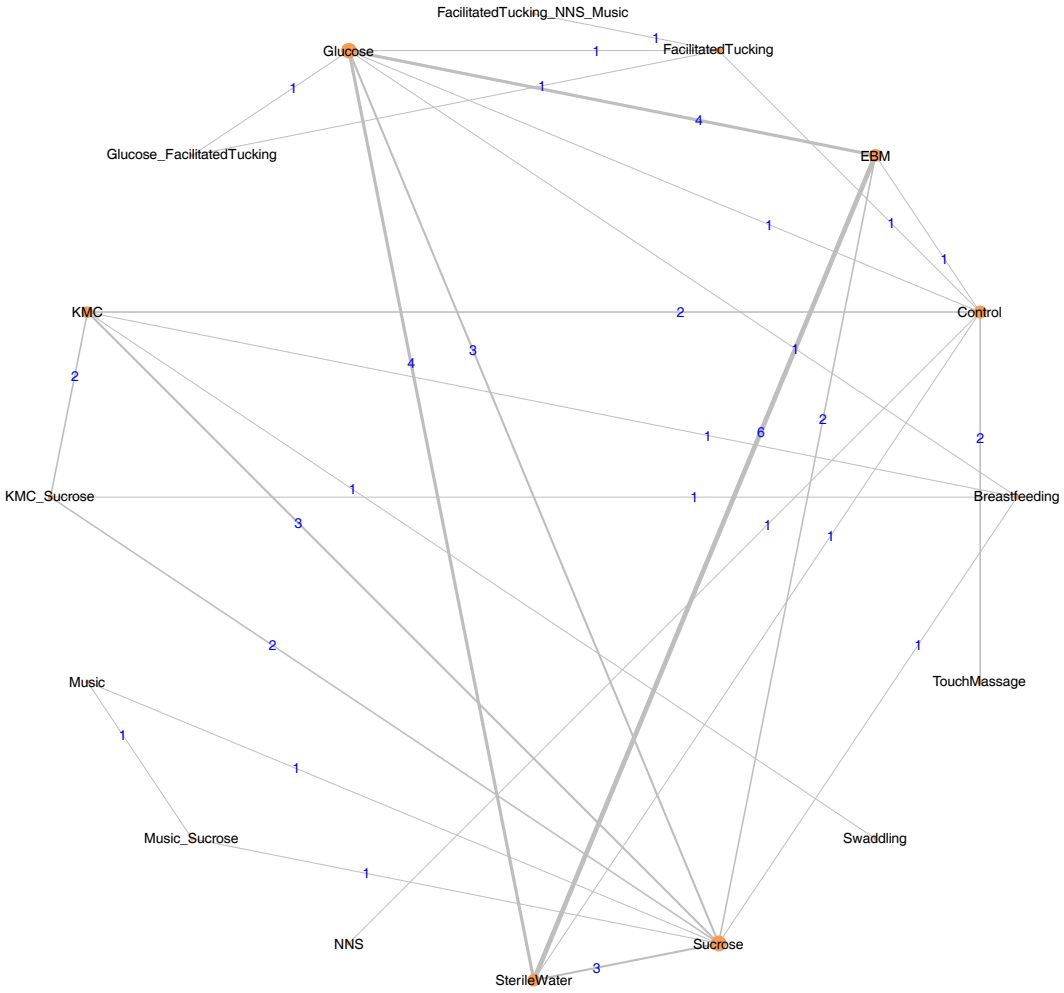



Control:MotherVoice_Holding
ApaydinCirik 2023 C15 2.2573 0.3390 29 28 2.26 [1.59; 2.92]
Control:Music
Zhu 2015 C1 1.2414 0.1969 61 62 1.24 [0.86; 1.63]
Control:NNS
Ngoc 2019 0.6349 0.3166 20 22 0.63 [0.01; 1.26]
Gao 2018 C1 2.2853 0.3922 21 22 2.29 [1.52; 3.05]
Random effects model 41 44 1.44 [-0.17; 3.06]
Heterogeneity: I^2 = 91%, τ^2 = 1.2349, p < 0.01
Control:NNS_Sucrose
Gao 2018 C3 5.2586 0.6439 21 22 5.26 [4.00; 6.52]
Control:Odour
Akcan 2016 0.2897 0.2816 25 26 0.29 [-0.26; 0.84]
Alemadar 2017 0.5390 0.3106 22 21 0.54 [-0.07; 1.15]
Random effects model 47 47 0.40 [-0.01; 0.81]
Heterogeneity: I^2 = 0%, τ^2 = 0, p = 0.55
Control:SterileWater
Hseih 2018 C6 0.0333 0.3162 20 20 0.03 [-0.59; 0.65]
Control:Sucrose
Gao 2018 C2 1.8219 0.3671 21 21 1.82 [1.10; 2.54]
Control:TouchMassage
Ozkan 2019 C3 1.4375 0.2326 46 47 1.44 [0.98; 1.89]
Johnston 2012 -0.1628 0.2702 28 27 -0.16 [-0.69; 0.37]
Random effects model 74 74 0.64 [-0.92; 2.21]
Heterogeneity: I^2 = 95%, τ^2 = 1.2168, p < 0.01
Control:WhiteNoise
ApaydinCirik 2023 C9 3.7721 0.4305 29 31 3.77 [2.93; 4.62]
Control:WhiteNoise_Holding
ApaydinCirik 2023 C14 5.4157 0.5673 29 29 5.42 [4.30; 6.53]
EBM:Glucose
Ou-yang 2012 C3 -0.0920 0.2252 40 39 -0.09 [-0.53; 0.35]
Rawal 2018 C3 0.5498 0.3144 21 21 0.55 [-0.07; 1.17]
Bueno 2012 0.7492 0.1946 56 57 0.75 [0.37; 1.13]
Hseih 2018 C1 -0.7847 0.3282 20 20 -0.78 [-1.43; -0.14]
Random effects model 137 137 0.13 [-0.52; 0.77]
Heterogeneity: I^2 = 85%, τ^2 = 0.3632, p < 0.01
EBM:KMC_EBM
Shukla 2018a C3 1.0394 0.2120 51 50 1.04 [0.62; 1.45]
EBM:KMC_EBM_Music
Shukla 2018a C6 0.9084 0.2090 51 50 0.91 [0.50; 1.32]

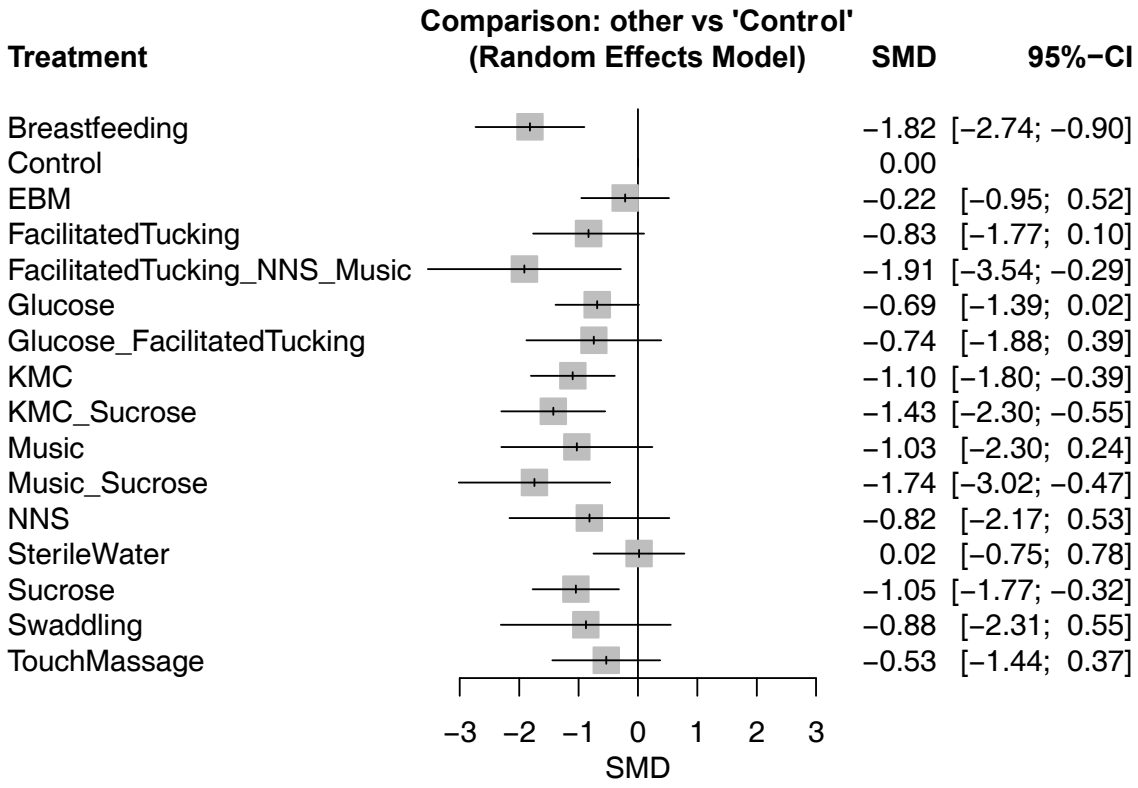

EBM:Music_EBM
Shukla 2018a C5 0.4196 0.2022 51 49 0.42 [0.02; 0.82]
EBM:SterileWater
Ou-yang 2012 C2 −0.6465 0.2241 40 44 −0.65 [−1.09; −0.21]
Ozdogan 2010 C1 −2.0275 0.3718 18 27 −2.03 [−2.76; −1.30]
Rawal 2018 C2 −0.5911 0.3153 21 21 −0.59 [−1.21; 0.03]
Uyan 2005 0.0000 0.3124 20 21 0.00 [−0.61; 0.61]
Hseih 2018 C2 −0.9556 0.3338 20 20 −0.96 [−1.61; −0.30]
Bilgen 2001 C4 −0.2542 0.2454 33 34 −0.25 [−0.74; 0.23]
Random effects model 152 167 −0.71 [−1.20; −0.23]
Heterogeneity: I^2 = 77%, τ^2 = 0.2789, p < 0.01
EBM:Sucrose
Ozdogan 2010 C2 1.3707 0.3426 18 25 1.37 [0.70; 2.04]
Vemula 2022 −0.6126 0.2181 44 44 −0.61 [−1.04; −0.19]
Bilgen 2001 C1 0.5098 0.2465 33 35 0.51 [0.03; 0.99]
Random effects model 95 104 0.40 [−0.70; 1.50]
Heterogeneity: I^2 = 93%, τ^2 = 0.8661, p < 0.01
FacilitatedTucking:FacilitatedTucking_NNS_Music
Uematsu 2019 1.2632 0.3098 25 25 1.26 [0.66; 1.87]
Glucose:Paracetamol
Bonetto 2008 C4 -0.9098 0.3408 19 19 −0.91 [−1.58; −0.24]
Glucose:SterileWater
Okan 2007 C3 −0.2253 0.2548 31 31 −0.23 [−0.72; 0.27]
Ou-yang 2012 C1 −0.6042 0.2249 39 44 −0.60 [−1.04; −0.16]
Rawal 2018 C1 −0.9717 0.3263 21 21 −0.97 [−1.61; −0.33]
Hseih 2018 C4 −0.3627 0.3188 20 20 −0.36 [−0.99; 0.26]
Bonetto 2008 C1 −0.2932 0.3262 19 19 −0.29 [−0.93; 0.35]
Random effects model 130 135 −0.48 [−0.73; −0.24]
Heterogeneity: I^2 = 1%, τ^2 = 0.0007, p = 0.40
Glucose:Sucrose
Okan 2007 C1 −0.0615 0.2541 31 31 −0.06 [−0.56; 0.44]
Sasidharan 2022 −0.4323 0.2529 32 32 −0.43 [−0.93; 0.06]
Sweta Kumari 2016 0.1056 0.2064 47 47 0.11 [−0.30; 0.51]
Random effects model 110 110 −0.11 [−0.42; 0.21]
Heterogeneity: I^2 = 27%, τ^2 = 0.0208, p = 0.25
Glucose:TopicalAnesthesia
Bonetto 2008 C5 −0.4933 0.3293 19 19 −0.49 [−1.14; 0.15]
KMC:KMC_Sucrose
Campbell-Yeo 2019 C1 .1543 0.1579 81 80 0.15 [−0.16; 0.46]
KMC:Sucrose
Nimbalkar 2019 0.0404 0.1414 100 100 0.04 [−0.24; 0.32]
Shukla 2018 -0.1368 0.2002 50 50 −0.14 [−0.53; 0.26]
Campbell-Yeo 2019 C2 0.2057 0.1575 81 81 0.21 [−0.10; 0.51]
Random effects model 231 231 0.06 [−0.12; 0.24]
Heterogeneity: I^2 = 0%, τ^2 = 0, p = 0.40


NNS:NNS_Sucrose
SharynGibbins 2002 C2 0.6435 0.1813 64 64 0.64 [0.29; 1.00]
Gao 2018 C5 3.3328 0.4660 22 22 3.33 [2.42; 4.25]
Gibbin 2003 C2 0.3183 0.3186 21 19 0.32 [−0.31; 0.94]
Gibbin 2003a C2 0.1672 0.3020 22 22 0.17 [−0.42; 0.76]
Gibbin 2003b C2 0.4779 0.3061 21 23 0.48 [−0.12; 1.08]
Random effects model 150 150 0.92 [0.13; 1.70]
Heterogeneity: I^2 = 89%, τ^2 = 0.6989, p < 0.01
NNS:Sucrose
SharynGibbins 2002 C3 −0.0000 0.1782 64 62 −0.00 [−0.35; 0.35]
Gao 2018 C4 −0.3998 0.3081 22 21 −0.40 [−1.00; 0.20]
Gibbin 2003 C3 0.2667 0.3032 21 23 0.27 [−0.33; 0.86]
Gibbin 2003a C3 −0.0310 0.3132 22 19 −0.03 [−0.64; 0.58]
Gibbin 2003b C3 0.1658 0.3130 21 20 0.17 [−0.45; 0.78]
Random effects model 150 145 0.00 [−0.23; 0.23]
Heterogeneity: I^2 = 0%, τ^2 = 0, p = 0.60
NNS_Sucrose:Sucrose
SharynGibbins 2002 C1 −0.6599 0.1830 64 62 −0.66 [−1.02; −0.30]
Gao 2018 C6 −3.5042 0.4857 22 21 −3.50 [−4.46; −2.55]
Gibbin 2003 C1 −0.3158 0.3119 19 23 −0.32 [−0.93; 0.30]
Gibbin 2003a C1 −0.2099 0.3140 22 19 −0.21 [−0.83; 0.41]
Gibbin 2003b C1 −0.2477 0.3069 23 20 −0.25 [−0.85; 0.35]
Random effects model 150 145 −0.91 [−1.73; −0.09]
Heterogeneity: I^2 = 90%, τ^2 = 0.7650, p < 0.01
KMC_EBM:KMC_EBM_Music
Shukla 2018a C2 −0.2243 0.2006 50 50 −0.22 [−0.62; 0.17]
KMC_EBM:Music_EBM
Shukla 2018a C1 −0.5430 0.2047 50 49 −0.54 [−0.94; −0.14]
KMC_EBM_Music:Music_EBM
Shukla 2018a C4 −0.3755 0.2028 50 49 −0.38 [−0.77; 0.02]
KMC_Sucrose:Sucrose
Campbell-Yeo 2019 C3 0.0470 0.1576 80 81 0.05 [−0.26; 0.36]
MotherHolding:MotherVoice
ApaydinCirik 2023 C2 0.2641 0.2572 30 31 0.26 [−0.24; 0.77]
MotherHolding:MotherVoice_Holding
ApaydinCirik 2023 C11 0.8452 0.2742 30 28 0.85 [0.31; 1.38]
MotherHolding:WhiteNoise
ApaydinCirik 2023 C6 2.6344 0.3500 30 31 2.63 [1.95; 3.32]
MotherHolding:WhiteNoise_Holding
ApaydinCirik 2023 C10 4.4890 0.4885 30 29 4.49 [3.53; 5.45]
MotherVoice:MotherVoice_Holding
ApaydinCirik 2023 C4 0.6463 0.2674 31 28 0.65 [0.12; 1.17]


MotherVoice:WhiteNoise
ApaydinCirik 2023 C1 2.5893 0.3444 31 31 2.59 [1.91; 3.26]
MotherVoice:WhiteNoise_Holding
ApaydinCirik 2023 C3 4.6723 0.4987 31 29 4.67 [3.69; 5.65]
MotherVoice_Holding:WhiteNoise
ApaydinCirik 2023 C8 1.9562 0.3169 28 31 1.96 [1.34; 2.58]
MotherVoice_Holding:WhiteNoise_Holding
ApaydinCirik 2023 C13 3.9021 0.4514 28 29 3.90 [3.02; 4.79]
Music:Music_Sucrose
Shah 2017 C2 0.8883 0.2506 35 35 0.89 [0.40; 1.38]
Music:Sucrose
Shah 2017 C1 0.1154 0.2392 35 35 0.12 [−0.35; 0.58]
Music_Sucrose:Sucrose
Shah 2017 C3 −0.8331 0.2492 35 35 −0.83 [−1.32; −0.34]
Paracetamol:SterileWater
Bonetto 2008 C2 0.5458 0.3304 19 19 0.55 [−0.10; 1.19]
Paracetamol:TopicalAnesthesia
Bonetto 2008 C6 0.3998 0.3277 19 19 0.40 [−0.24; 1.04]
SterileWater:Sucrose
Okan 2007 C2 0.1637 0.2544 31 31 0.16 [−0.33; 0.66]
Overgaard 1999 0.9524 0.2154 47 49 0.95 [0.53; 1.37]
Ozdogan 2010 C3 4.3881 0.5120 27 25 4.39 [3.38; 5.39]
Bilgen 2001 C2 0.9677 0.2545 34 35 0.97 [0.47; 1.47]
Random effects model 139 140 1.53 [0.36; 2.69]
Heterogeneity: I^2 = 95%, τ^2 = 1.3147, p < 0.01
SterileWater:TopicalAnesthesia
Bonetto 2008 C3 −0.1684 0.3250 19 19 −0.17 [−0.81; 0.47]
WhiteNoise:WhiteNoise_Holding
ApaydinCirik 2023 C7 1.4804 0.2916 31 29 1.48 [0.91; 2.05]
−5
0
5

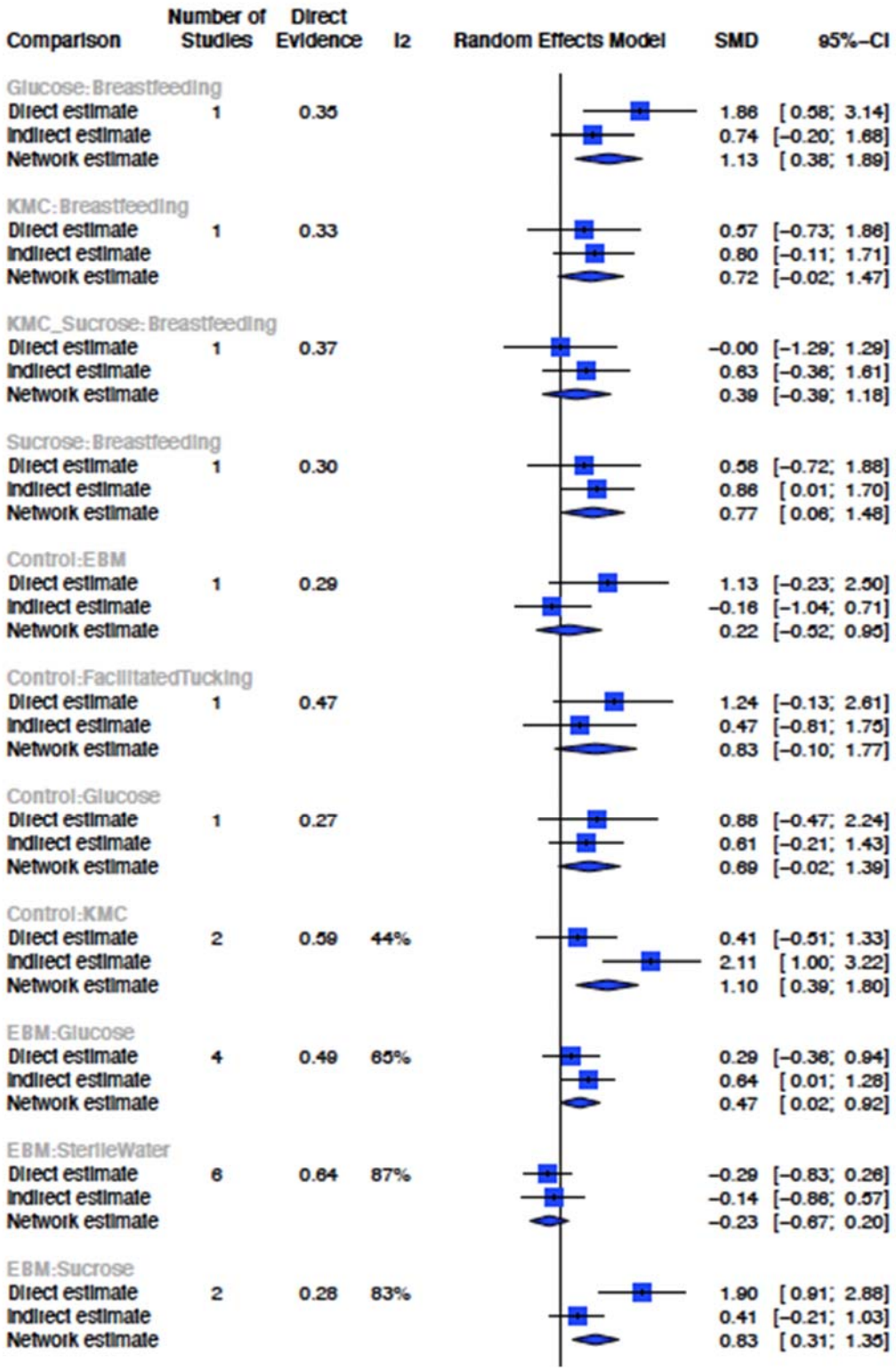


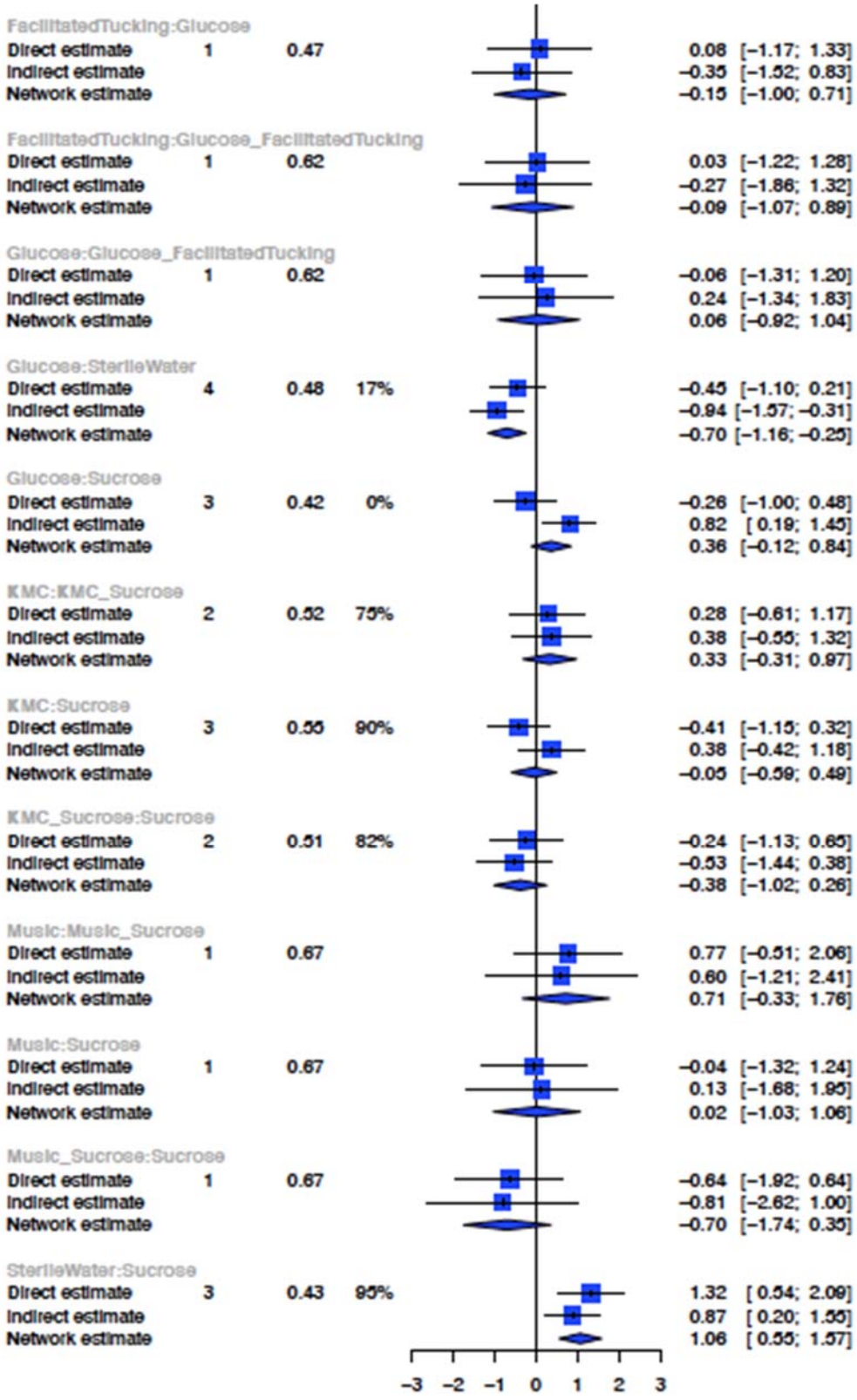
Web Fig. 11A. Network plot for pain score at two minutes after heel prick in neonates.



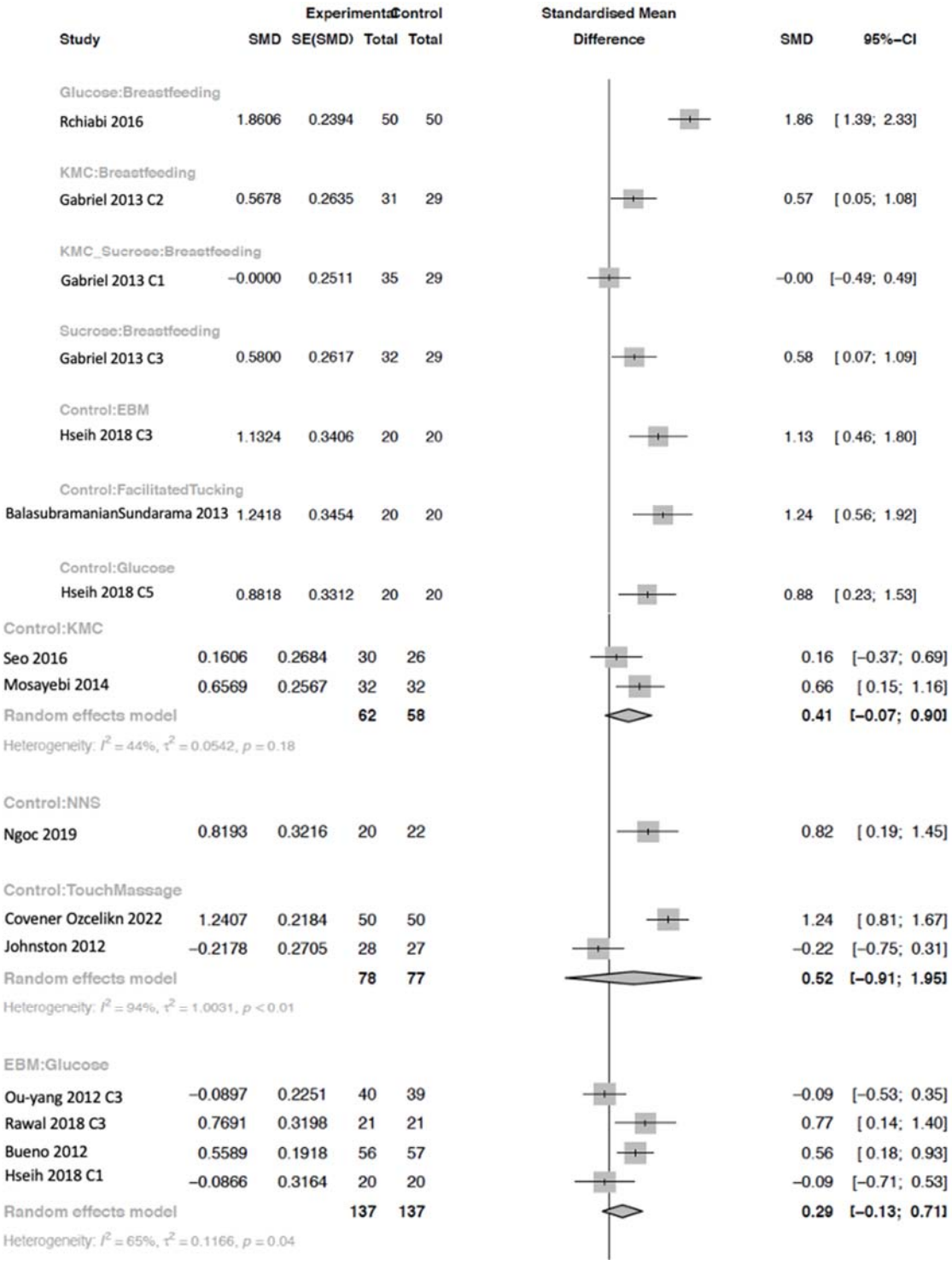
Web Fig. 11B. Forest plot depicting the network estimates [SMD (95% CrI)] of the various interventions with 'Control' as the common comparator for pain score at two minutes after heel prick in neonates.

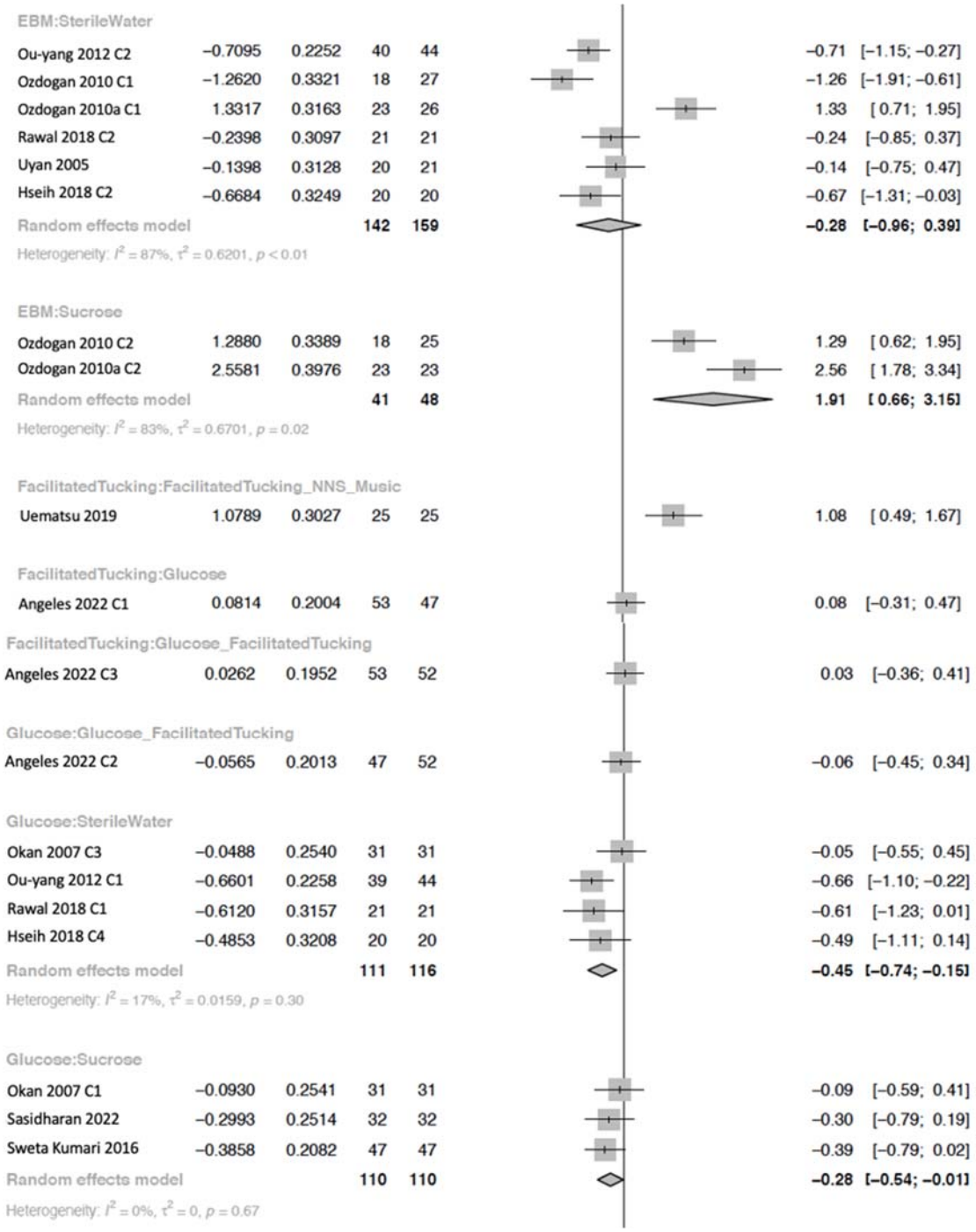
Web Fig. 12. Split between direct and indirect evidence for the secondary outcome 'pain score at two minutes after heel prick' in neonates

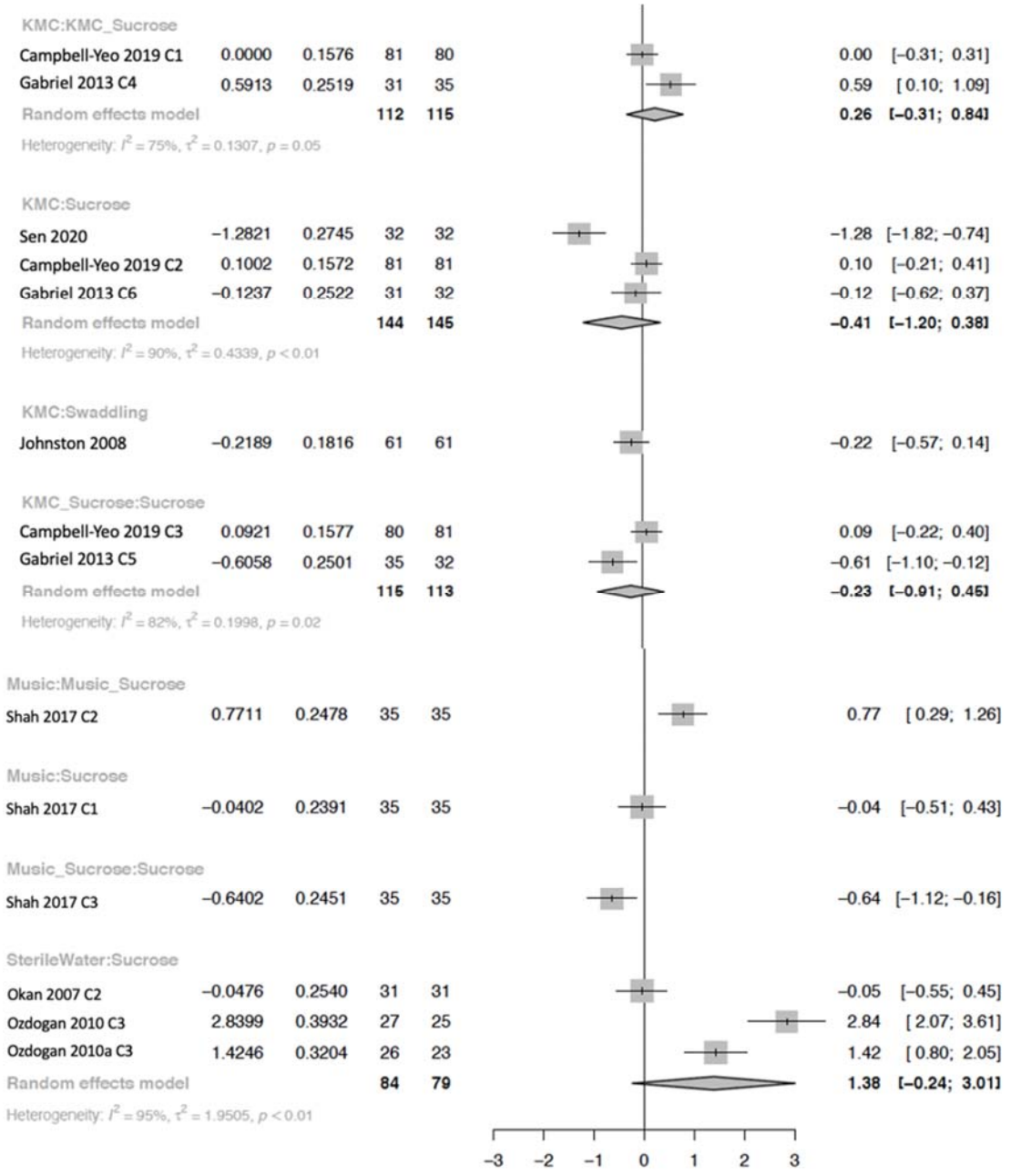


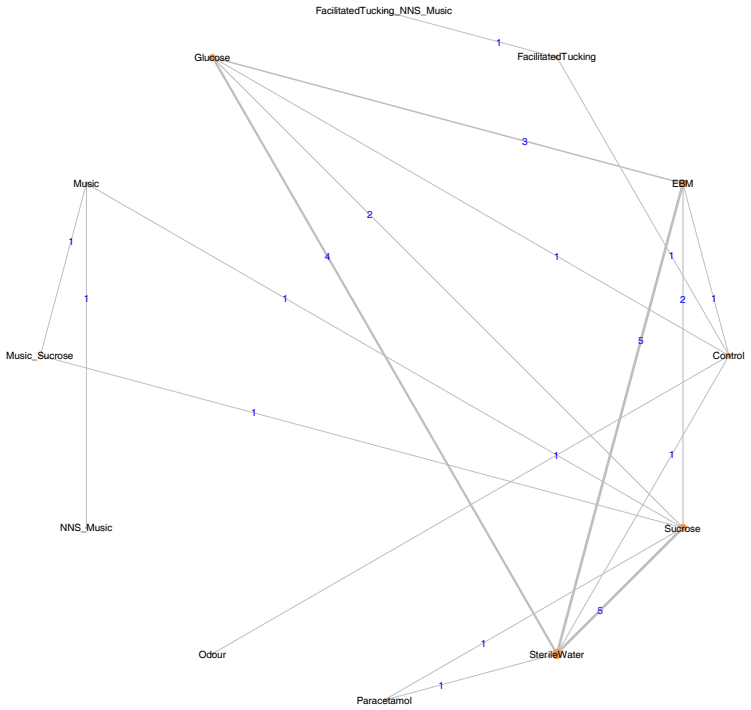

FacilitatedTucking:Glucose
Direct estimate 1 0.47 0.08 [−1.17; 1.33]
Indirect estimate −0.35 [−1.52; 0.83]
Network estimate −0.15 [−1.00; 0.71]
FacilitatedTucking:Glucose_FacilitatedTucking
Direct estimate 1 0.62 0.03 [−1.22; 1.28]
Indirect estimate −0.27 [−1.86; 1.32]
Network estimate −0.09 [−1.07; 0.89]
Glucose:Glucose_FacilitatedTucking
Direct estimate 1 0.62 −0.06 [−1.31; 1.20]
Indirect estimate 0.24 [−1.34; 1.83]
Network estimate 0.06 [−0.92; 1.04]
Glucose:SterileWater
Direct estimate 4 0.48 17% −0.45 [−1.10; 0.21]
Indirect estimate −0.94 [−1.57; −0.31]
Network estimate −0.70 [−1.16; −0.25]
Glucose:Sucrose
Direct estimate 3 0.42 0% −0.26 [−1.00; 0.48]
Indirect estimate 0.82 [0.19; 1.45]
Network estimate 0.36 [−0.12; 0.84]
KMC:KMC_Sucrose
Direct estimate 2 0.52 75% 0.28 [−0.61; 1.17]
Indirect estimate 0.38 [−0.55; 1.32]
Network estimate 0.33 [−0.31; 0.97]
KMC:Sucrose
Direct estimate 3 0.55 90% −0.41 [−1.15; 0.32]
Indirect estimate 0.38 [−0.42; 1.18]
Network estimate −0.05 [−0.59; 0.49]
KMC_Sucrose:Sucrose
Direct estimate 2 0.51 82% −0.24 [−1.13; 0.65]
Indirect estimate −0.53 [−1.44; 0.38]
Network estimate −0.38 [−1.02; 0.26]
Music:Music_Sucrose
Direct estimate 1 0.67 0.77 [−0.51; 2.06]
Indirect estimate 0.60 [−1.21; 2.41]
Network estimate 0.71 [−0.33; 1.76]
Music:Sucrose
Direct estimate 1 0.67 −0.04 [−1.32; 1.24]
Indirect estimate 0.13 [−1.68; 1.95]
Network estimate 0.02 [−1.03; 1.06]
Music_Sucrose:Sucrose
Direct estimate 1 0.67 −0.64 [−1.92; 0.64]
Indirect estimate −0.81 [−2.62; 1.00]
Network estimate −0.70 [−1.74; 0.35]
SterileWater:Sucrose
Direct estimate 3 0.43 95% 1.32 [0.54; 2.09]
Indirect estimate 0.87 [0.20; 1.55]
Network estimate 1.06 [0.55; 1.57]
−3 −2 −1 0 1 2 3

Web Fig. 13. Direct evidence from the pair wise comparisons for the secondary outcome 'pain score at two minutes after heel prick' in neonates

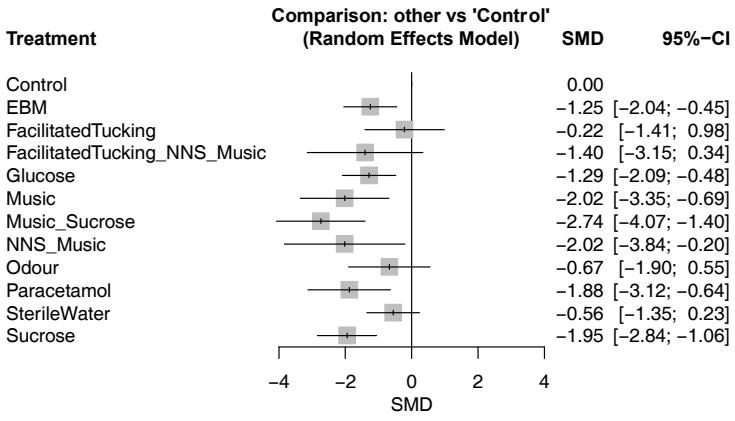



EBM:SterileWater
Ou-yang 2012 C2 −0.7095 0.2252 40 44 −0.71 [−1.15; −0.27]
Ozdogan 2010 C1 −1.2620 0.3321 18 27 −1.26 [−1.91; −0.61]
Ozdogan 2010a C1 1.3317 0.3163 23 26 1.33 [0.71; 1.95]
Rawal 2018 C2 −0.2398 0.3097 21 21 −0.24 [−0.85; 0.37]
Uyan 2005 −0.1398 0.3128 20 21 −0.14 [−0.75; 0.47]
Hseih 2018 C2 −0.6684 0.3249 20 20 −0.67 [−1.31; −0.03]
Random effects model 142 159 −0.28 [−0.96; 0.39]
Heterogeneity: $I^2 = 87\%$, $\tau^2 = 0.6201$, $p < 0.01$
EBM:Sucrose
Ozdogan 2010 C2 1.2880 0.3389 18 25 1.29 [0.62; 1.95]
Ozdogan 2010a C2 2.5581 0.3976 23 23 2.56 [1.78; 3.34]
Random effects model 41 48 1.91 [0.66; 3.15]
Heterogeneity: $I^2 = 83\%$, $\tau^2 = 0.6701$, $p = 0.02$
FacilitatedTucking:FacilitatedTucking_NNS_Music
Uematsu 2019 1.0789 0.3027 25 25 1.08 [0.49; 1.67]
FacilitatedTucking:Glucose
Angeles 2022 C1 0.0814 0.2004 53 47 0.08 [−0.31; 0.47]
FacilitatedTucking:Glucose_FacilitatedTucking
Angeles 2022 C3 0.0262 0.1952 53 52 0.03 [−0.36; 0.41]
Glucose:Glucose_FacilitatedTucking
Angeles 2022 C2 −0.0565 0.2013 47 52 −0.06 [−0.45; 0.34]
Glucose:SterileWater
Okan 2007 C3 −0.0488 0.2540 31 31 −0.05 [−0.55; 0.45]
Ou-yang 2012 C1 −0.6601 0.2258 39 44 −0.66 [−1.10; −0.22]
Rawal 2018 C1 −0.6120 0.3157 21 21 −0.61 [−1.23; 0.01]
Hseih 2018 C4 −0.4853 0.3208 20 20 −0.49 [−1.11; 0.14]
Random effects model 111 116 −0.45 [−0.74; −0.15]
Heterogeneity: $I^2 = 17\%$, $\tau^2 = 0.0159$, $p = 0.30$
Glucose:Sucrose
Okan 2007 C1 −0.0930 0.2541 31 31 −0.09 [−0.59; 0.41]
Sasidharan 2022 −0.2993 0.2514 32 32 −0.30 [−0.79; 0.19]
Sweta Kumari 2016 −0.3858 0.2082 47 47 −0.39 [−0.79; 0.02]
Random effects model 110 110 −0.28 [−0.54; −0.01]
Heterogeneity: $I^2 = 0\%$, $\tau^2 = 0$, $p = 0.67$


KMC:KMC_Sucrose
Campbell-Yeo 2019 C1 0.0000 0.1576 81 80 0.00 [−0.31; 0.31]
Gabriel 2013 C4 0.5913 0.2519 31 35 0.59 [0.10; 1.09]
Random effects model 112 115 0.26 [−0.31; 0.84]
Heterogeneity: I^2 = 75%, τ^2 = 0.1307, p = 0.05
KMC:Sucrose
Sen 2020 −1.2821 0.2745 32 32 −1.28 [−1.82; −0.74]
Campbell-Yeo 2019 C2 0.1002 0.1572 81 81 0.10 [−0.21; 0.41]
Gabriel 2013 C6 −0.1237 0.2522 31 32 −0.12 [−0.62; 0.37]
Random effects model 144 145 −0.41 [−1.20; 0.38]
Heterogeneity: I^2 = 90%, τ^2 = 0.4339, p < 0.01
KMC:Swaddling
Johnston 2008 −0.2189 0.1816 61 61 −0.22 [−0.57; 0.14]
KMC_Sucrose:Sucrose
Campbell-Yeo 2019 C3 0.0921 0.1577 80 81 0.09 [−0.22; 0.40]
Gabriel 2013 C5 −0.6058 0.2501 35 32 −0.61 [−1.10; −0.12]
Random effects model 115 113 −0.23 [−0.91; 0.45]
Heterogeneity: I^2 = 82%, τ^2 = 0.1998, p = 0.02
Music:Music_Sucrose
Shah 2017 C2 0.7711 0.2478 35 35 0.77 [0.29; 1.26]
Music:Sucrose
Shah 2017 C1 −0.0402 0.2391 35 35 −0.04 [−0.51; 0.43]
Music_Sucrose:Sucrose
Shah 2017 C3 −0.6402 0.2451 35 35 −0.64 [−1.12; −0.16]
SterileWater:Sucrose
Okan 2007 C2 −0.0476 0.2540 31 31 −0.05 [−0.55; 0.45]
Ozdogan 2010 C3 2.8399 0.3932 27 25 2.84 [2.07; 3.61]
Ozdogan 2010a C3 1.4246 0.3204 26 23 1.42 [0.80; 2.05]
Random effects model 84 79 1.38 [−0.24; 3.01]
Heterogeneity: I^2 = 95%, τ^2 = 1.9505, p < 0.01
−3
−2
−1
0
1
2
3

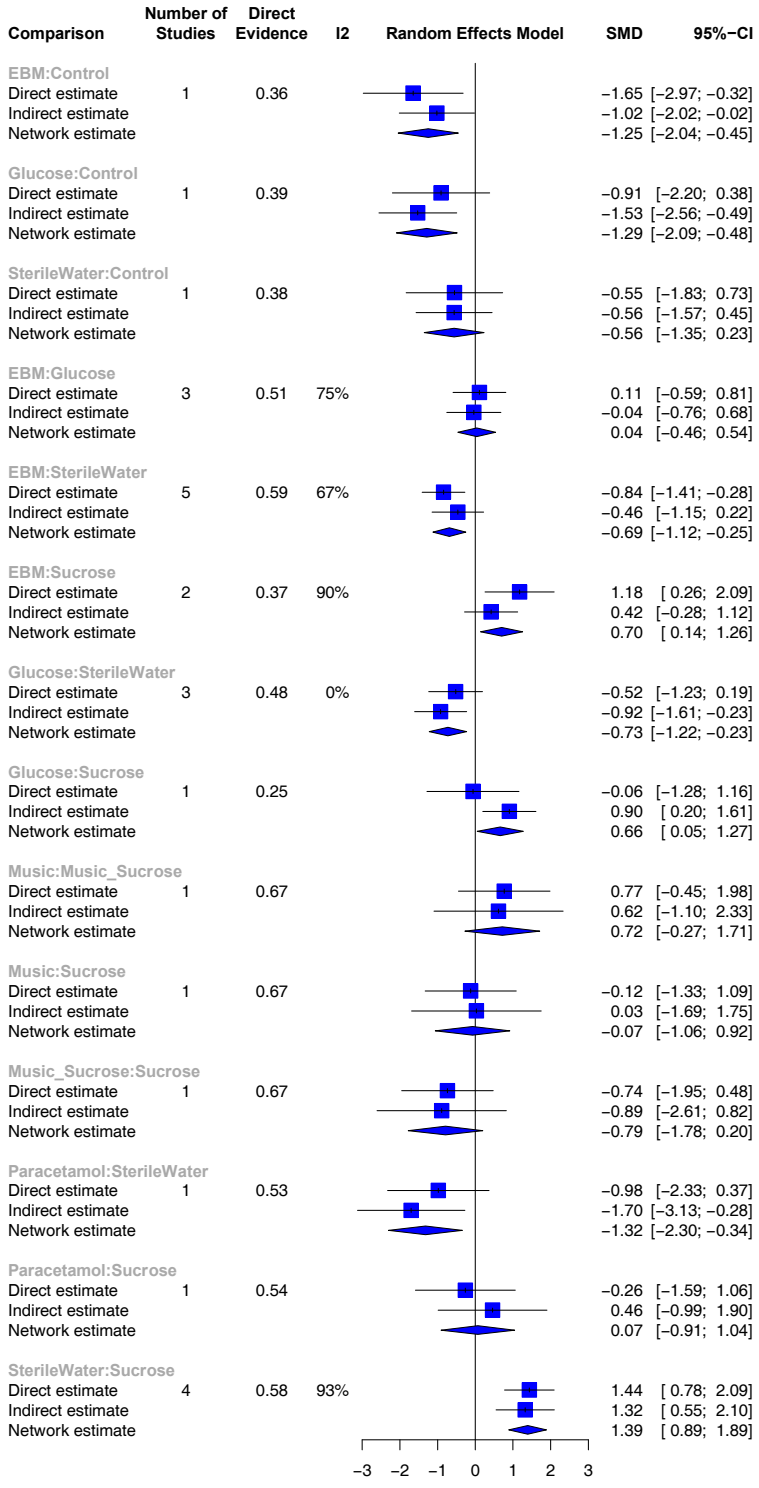


Web Fig. 14A. Network plot for pain score at three minutes after heel prick in neonates

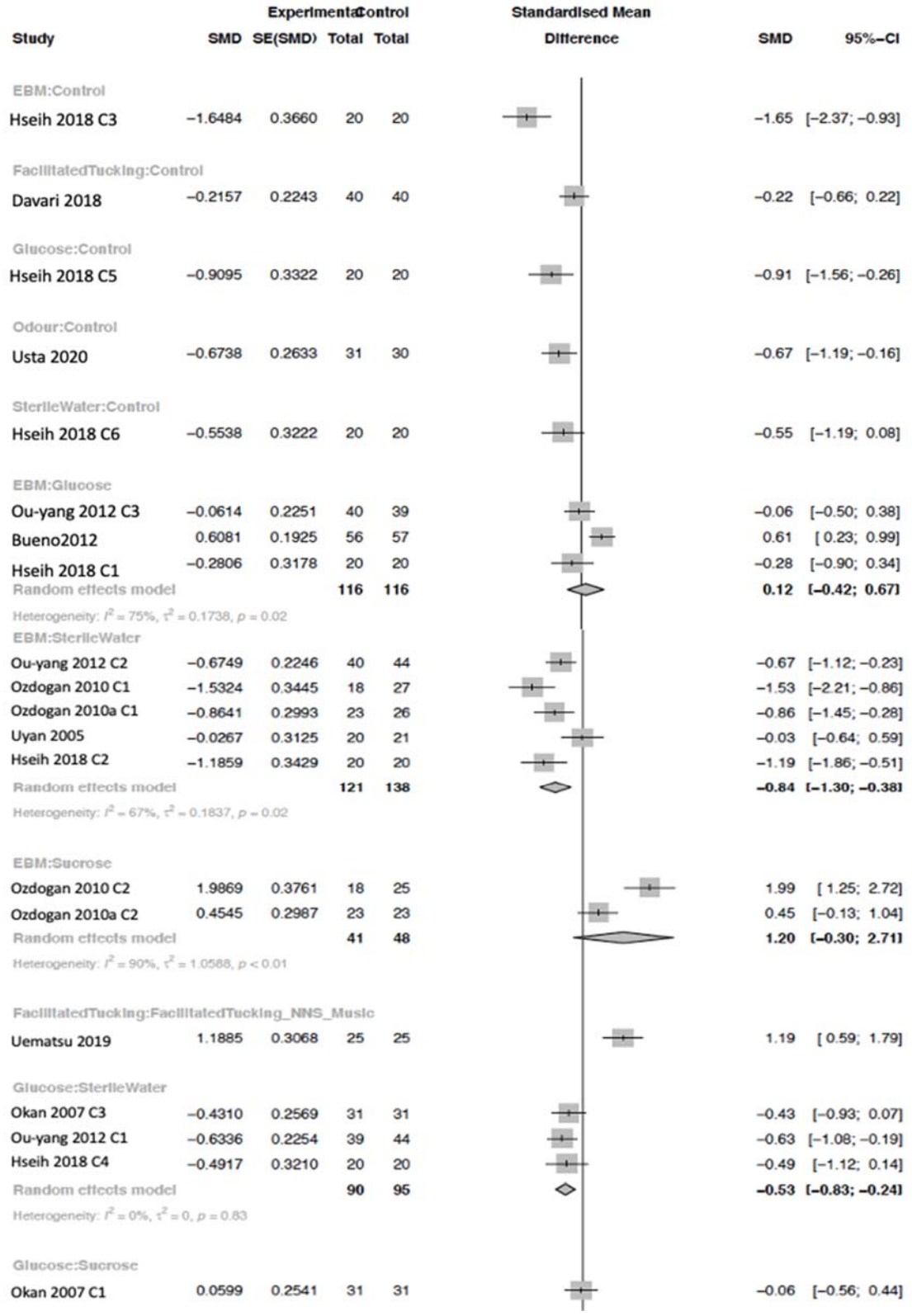


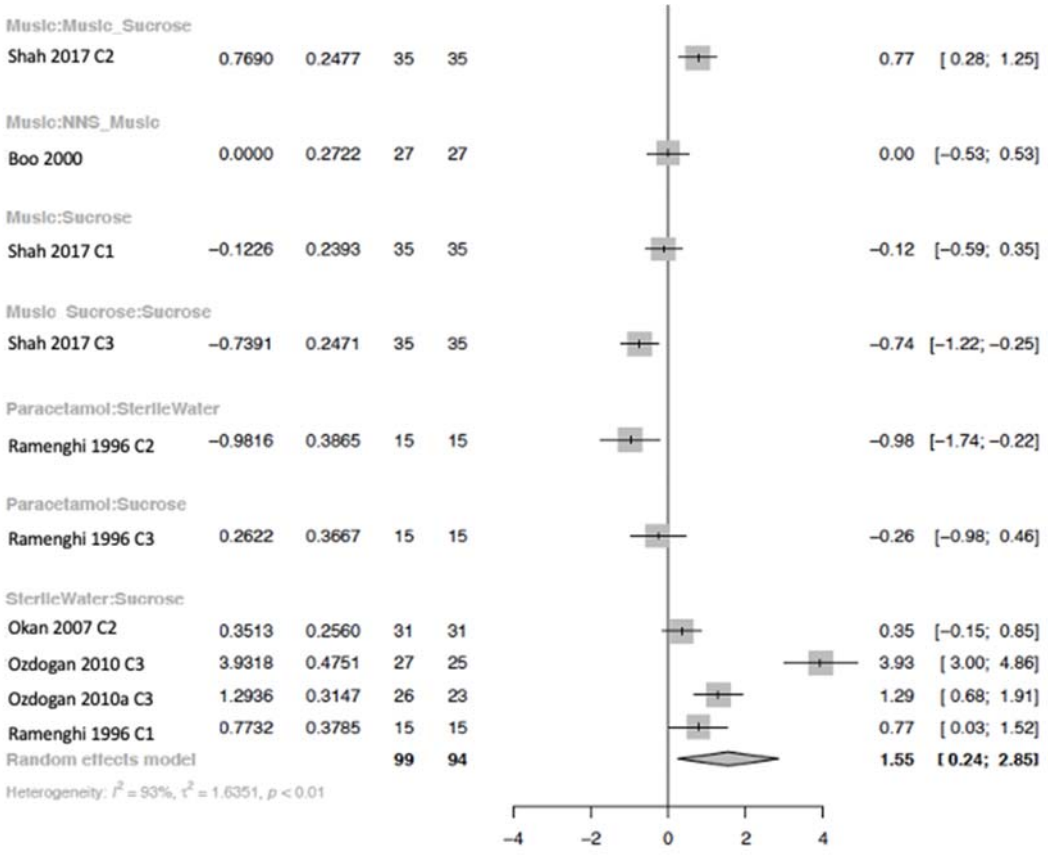
Web Fig. 14B. Forest plot depicting the network estimates [SMD (95% CrI)] of the various interventions with 'Control' as the common comparator for pain score at three minutes after heel prick in neonates.

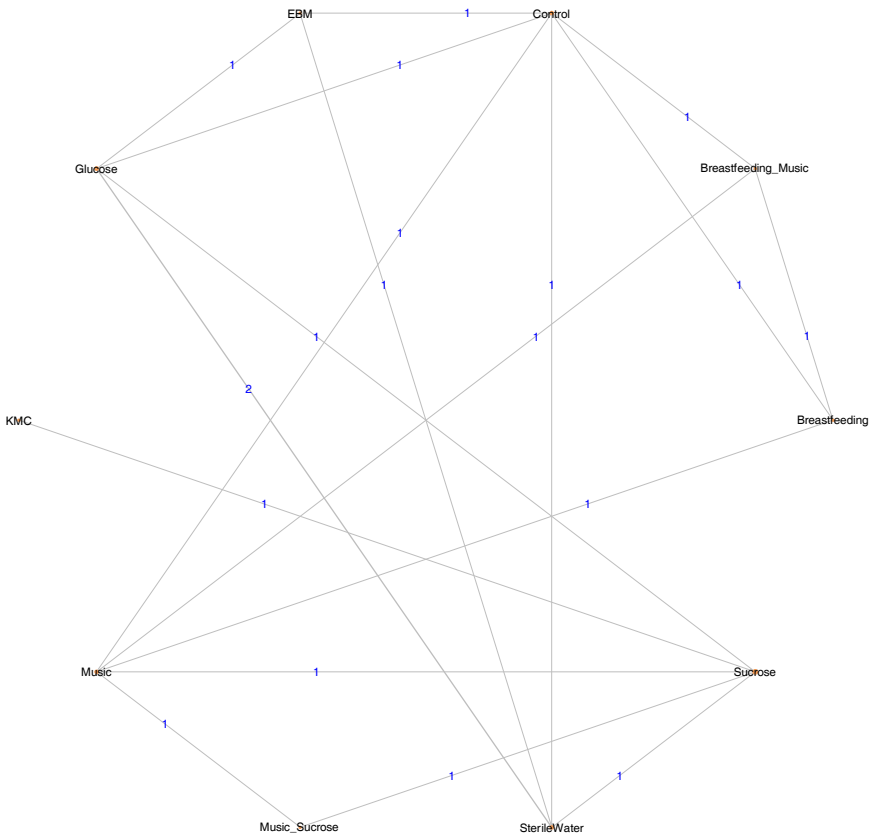
Web Fig. 15. Split between direct and indirect evidence for the secondary outcome 'pain score at three minutes after heel prick' in neonates



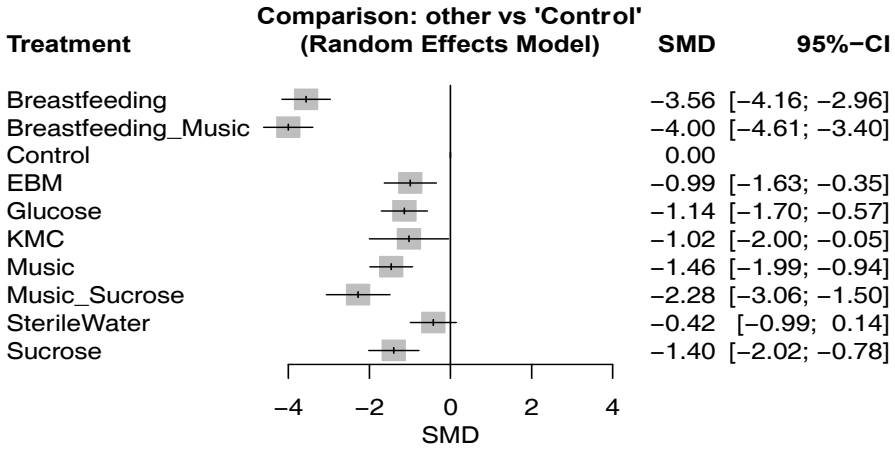
Web Fig. 16. Direct evidence from the pair wise comparisons for the secondary outcome 'pain score at three minutes after heel prick' in neonates




Music:Music_Sucrose
Shah 2017 C2 0.7690 0.2477 35 35 0.77 [0.28; 1.25]
Music:NNS_Music
Boo 2000 0.0000 0.2722 27 27 0.00 [−0.53; 0.53]
Music:Sucrose
Shah 2017 C1 −0.1226 0.2393 35 35 −0.12 [−0.59; 0.35]
Music_Sucrose:Sucrose
Shah 2017 C3 −0.7391 0.2471 35 35 −0.74 [−1.22; −0.25]
Paracetamol:SterileWater
Ramenghi 1996 C2 −0.9816 0.3865 15 15 −0.98 [−1.74; −0.22]
Paracetamol:Sucrose
Ramenghi 1996 C3 0.2622 0.3667 15 15 −0.26 [−0.98; 0.46]
SterileWater:Sucrose
Okan 2007 C2 0.3513 0.2560 31 31 0.35 [−0.15; 0.85]
Ozdogan 2010 C3 3.9318 0.4751 27 25 3.93 [3.00; 4.86]
Ozdogan 2010a C3 1.2936 0.3147 26 23 1.29 [0.68; 1.91]
Ramenghi 1996 C1 0.7732 0.3785 15 15 0.77 [0.03; 1.52]
Random effects model 99 94 1.55 [0.24; 2.85]
Heterogeneity: I^2 = 93%, τ^2 = 1.6351, p < 0.01
−4
−2
0
2
4

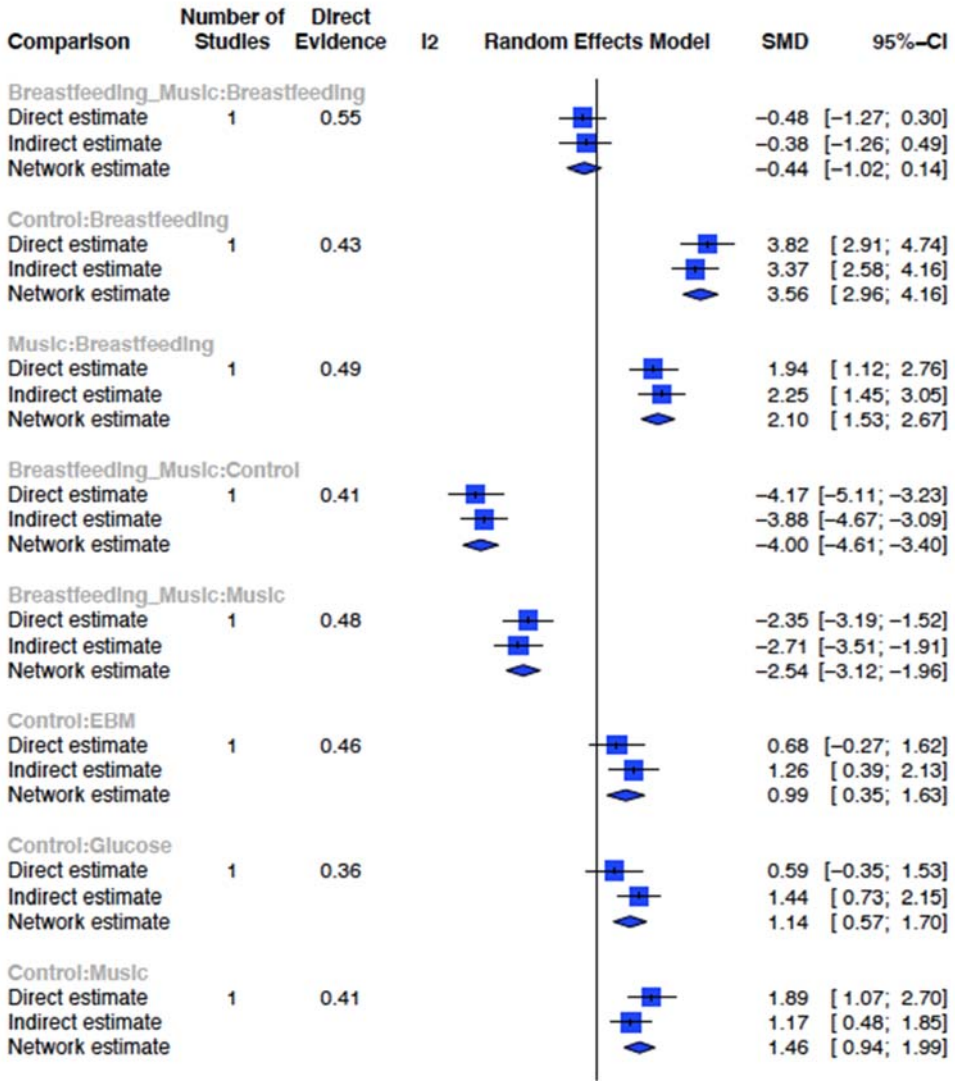


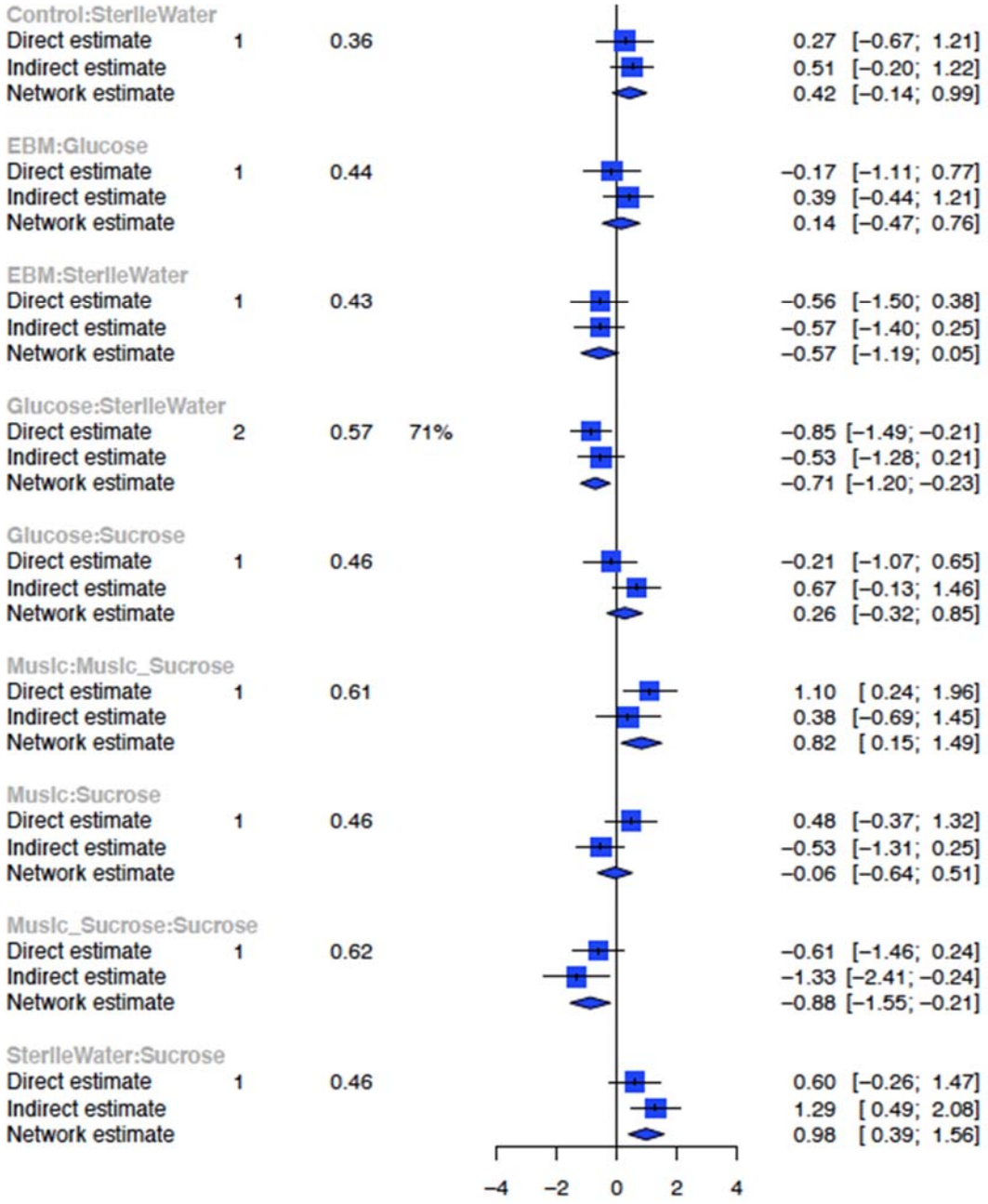
Web Fig. 17A. Network plot for pain score at five minutes after heel prick in neonates



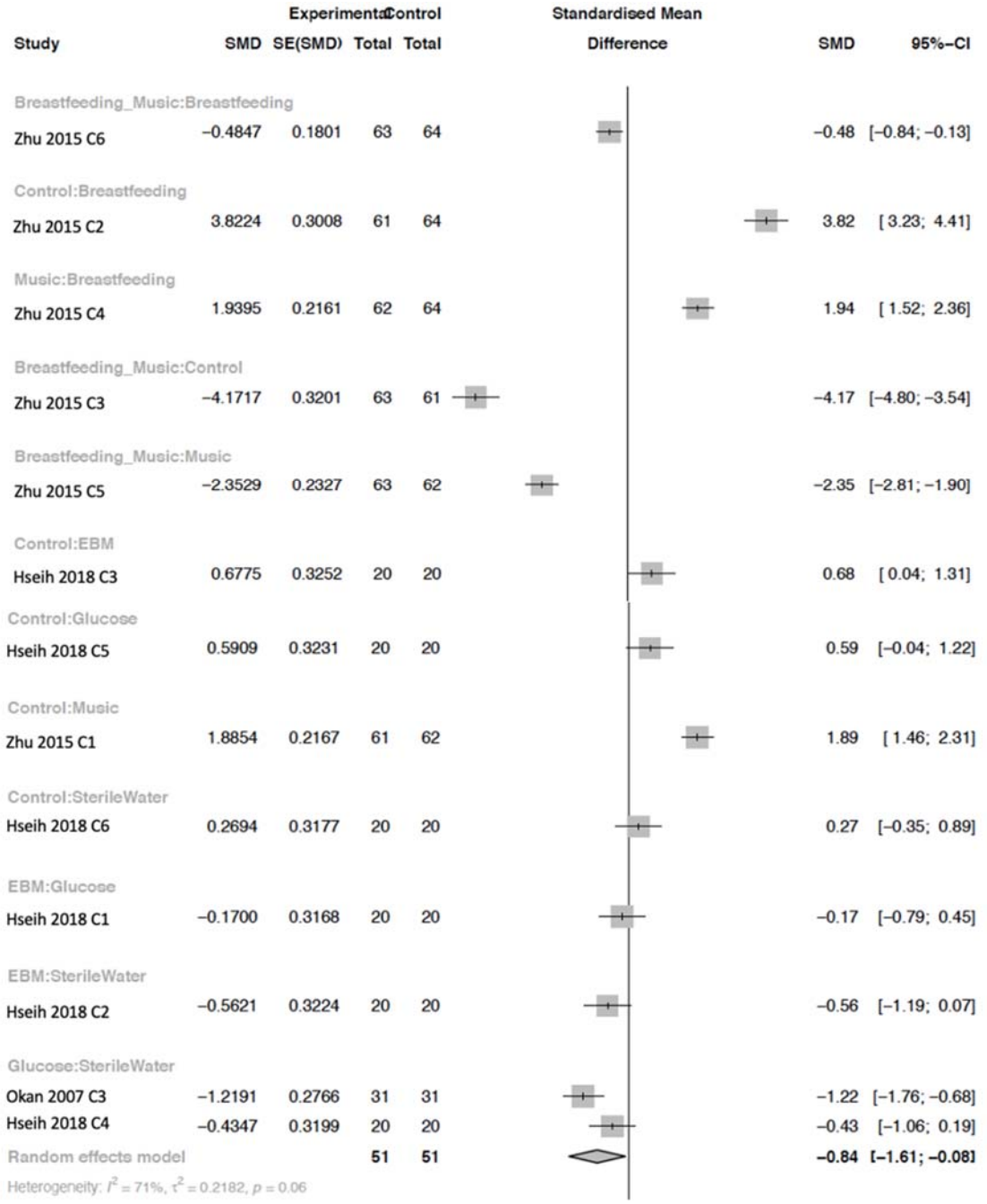
Web Fig. 17B. Forest plot depicting the network estimates [SMD (95% CrI)] of the various interventions with 'Control' as the common comparator

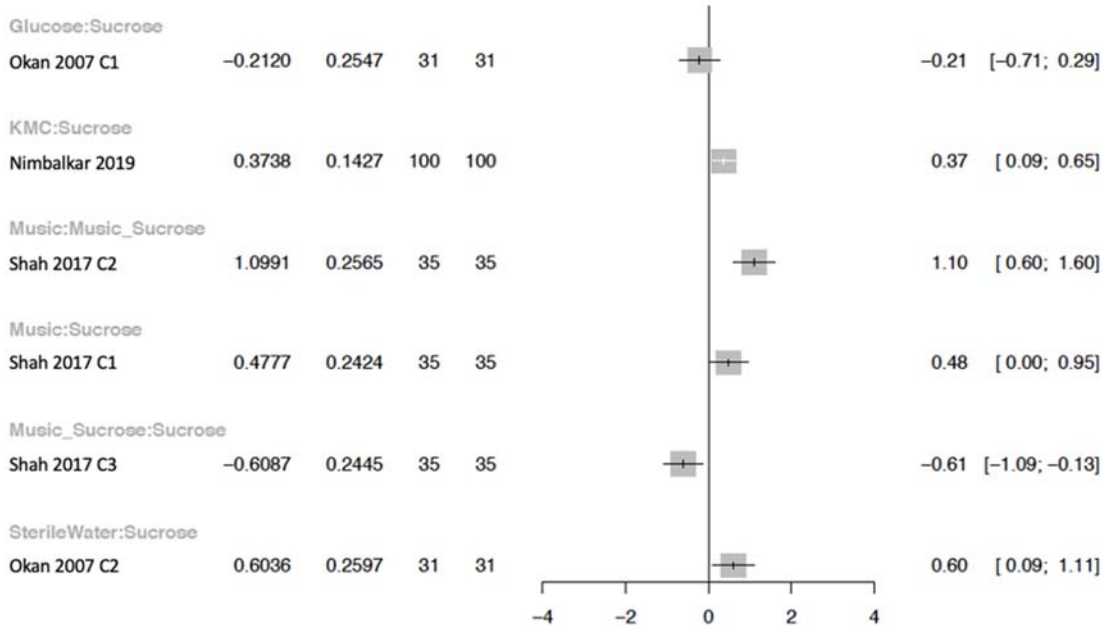
Web Fig. 18. Split between direct and indirect evidence for the secondary outcome 'pain score at five minutes after heel prick' in neonates

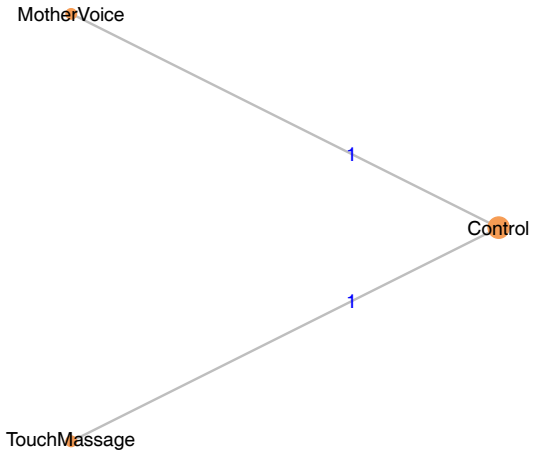



Control:SterileWater
Direct estimate 1 0.36 0.27 [−0.67; 1.21]
Indirect estimate 0.51 [−0.20; 1.22]
Network estimate 0.42 [−0.14; 0.99]
EBM:Glucose
Direct estimate 1 0.44 −0.17 [−1.11; 0.77]
Indirect estimate 0.39 [−0.44; 1.21]
Network estimate 0.14 [−0.47; 0.76]
EBM:SterileWater
Direct estimate 1 0.43 −0.56 [−1.50; 0.38]
Indirect estimate −0.57 [−1.40; 0.25]
Network estimate −0.57 [−1.19; 0.05]
Glucose:SterileWater
Direct estimate 2 0.57 71% −0.85 [−1.49; −0.21]
Indirect estimate −0.53 [−1.28; 0.21]
Network estimate −0.71 [−1.20; −0.23]
Glucose:Sucrose
Direct estimate 1 0.46 −0.21 [−1.07; 0.65]
Indirect estimate 0.67 [−0.13; 1.46]
Network estimate 0.26 [−0.32; 0.85]
Music:Music_Sucrose
Direct estimate 1 0.61 1.10 [0.24; 1.96]
Indirect estimate 0.38 [−0.69; 1.45]
Network estimate 0.82 [0.15; 1.49]
Music:Sucrose
Direct estimate 1 0.46 0.48 [−0.37; 1.32]
Indirect estimate −0.53 [−1.31; 0.25]
Network estimate −0.06 [−0.64; 0.51]
Music_Sucrose:Sucrose
Direct estimate 1 0.62 −0.61 [−1.46; 0.24]
Indirect estimate −1.33 [−2.41; −0.24]
Network estimate −0.88 [−1.55; −0.21]
SterileWater:Sucrose
Direct estimate 1 0.46 0.60 [−0.26; 1.47]
Indirect estimate 1.29 [0.49; 2.08]
Network estimate 0.98 [0.39; 1.56]
−4
−2
0
2
4

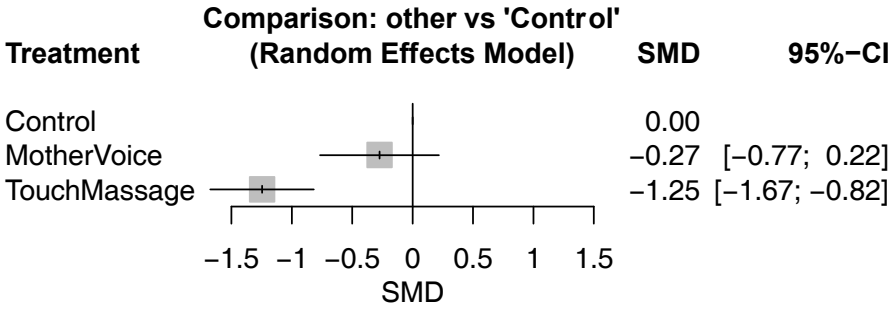
Web Fig. 19. Direct evidence from the pair wise comparisons for the secondary outcome 'pain score at five minutes after heel prick' in neonates



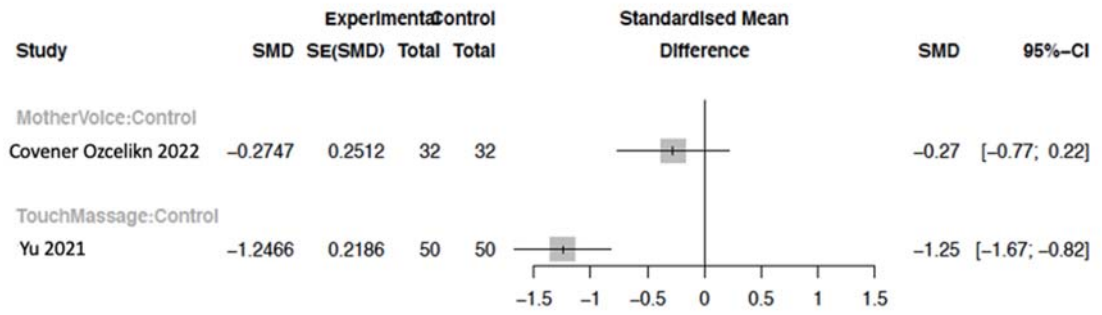

Glucose:Sucrose
Okan 2007 C1 −0.2120 0.2547 31 31 −0.21 [−0.71; 0.29]
KMC:Sucrose
Nimbalkar 2019 0.3738 0.1427 100 100 0.37 [0.09; 0.65]
Music:Music_Sucrose
Shah 2017 C2 1.0991 0.2565 35 35 1.10 [0.60; 1.60]
Music:Sucrose
Shah 2017 C1 0.4777 0.2424 35 35 0.48 [0.00; 0.95]
Music_Sucrose:Sucrose
Shah 2017 C3 −0.6087 0.2445 35 35 −0.61 [−1.09; −0.13]
SterileWater:Sucrose
Okan 2007 C2 0.6036 0.2597 31 31 0.60 [0.09; 1.11]
−4
−2
0
2
4



Web Fig. 20A. Network plot for pain score at 10 minutes after heel prick in neonates



Web Fig. 20B. Forest plot depicting the network estimates [SMD (95% CrI)] of the various interventions with 'Control' as the common comparator for pain score at 10 minutes after heel prick in neonates



Web Fig. 21. Direct evidence from the pair wise comparisons for the secondary outcome 'pain score at 10 minutes after heel prick' in neonates

Web Table I Search Strategy used In Medline, Embase, CENTRAL and CINAHL

Comparative efficacy and safety of interventions for pain management during heel prick in newborn infants - A systematic review and network meta-analysis

PubMed 28/2/2023

#	Query	Results
5	AND randomizedcontrolledtrial[Filter]	162
4	#1 AND #2 AND #3	447
3	(((((((morphine OR diamorphine OR fentanyl OR alfentanil OR sufentanil OR pethidine OR meperidine OR codeine OR methadone OR acetaminophen OR paracetamol)))) OR (("Pain/prevention and control"[Mesh] OR Sucrose[MeSH] OR sucrose[TIAB] OR Glucose[MeSH] OR glucose[TIAB] OR "Sweetening Agents"[MeSH] OR "Kangaroo-Mother Care Method"[MeSH] OR "skin to skin"[TIAB] OR (kangaroo[TIAB] AND care[TIAB]) OR "Facilitated tucking"[MeSH] OR (facilitated[TIAB] AND tucking[TIAB]) OR swaddl*[TIAB] OR cuddl*[TIAB] OR ((non-nutritive[TIAB] OR nonnutritive[TIAB] OR finger*[TIAB]) AND suck*[TIAB]) OR "Pain Management"[MeSH] OR "Infant Care"[MeSH] OR "Sucking Behavior"[MeSH] OR Fingersucking[MeSH] OR fingersucking[TIAB] OR Pacifiers[MeSH] OR pacifier*[TIAB] OR "Breast feeding"[MeSH] OR (breast*[TIAB] AND (milk[TIAB] OR feed*[TIAB])) OR breastfeed*[TIAB] OR rocking[TIAB] OR holding[TIAB] OR "Therapeutic Touch"[MeSH] or Touch[MeSH] OR ((maternal[TIAB] OR mother*[TIAB] OR therapeutic[TIAB]) AND touch*[TIAB]) OR massag*[TIAB] OR Massage[MeSH] OR "Physical Therapy Modalities"[MeSH] OR "physical therapy"[TIAB] OR physiotherapy[TIAB] OR ((verbal[TIAB] OR toy[TIAB] OR toys[TIAB] OR audiovisual[TIAB] OR audio-video[TIAB]) AND distract*[TIAB]) OR "Videodisc Recording"[MeSH] OR music[MeSH] OR "Music Therapy"[MeSH] OR music[TIAB] OR Attention[MeSH] OR (development*[TIAB] AND care[TIAB]) OR (environment*[TIAB] AND stimul*[TIAB]) OR "Patient Positioning"[MeSH] OR positioning[TIAB] OR "supportive bedding"[TIAB] OR "Bedding and Linens"[MeSH] OR Restraint, Physical[MeSH] OR (attention[TIAB] AND (behavior*[TIAB] OR behaviour*[TIAB])) OR (modif*[TIAB] AND environment*[TIAB]) OR ((low[TIAB] OR lower*[TIAB]) AND (noise*[TIAB] OR light*[TIAB])) OR "White	1,128,611

	noise"[TIAB] OR (cluster*[TIAB] AND (care[TIAB] OR procedure*[TIAB])) OR (sooth*[TIAB] AND smell*[TIAB]) OR (familiar[TIAB] AND (odor*[TIAB] OR odour*[TIAB])) OR "Acoustic Stimulation"[MeSH] OR "acoustic stimulation"[TIAB] OR "Tape Recording"[MeSH] OR Speech[MeSH] OR (record*[TIAB] AND voice[TIAB] AND (maternal[TIAB] OR mother*[TIAB])) OR "Parent-Child Relations"[MeSH] OR "Photic Stimulation"[MeSH] OR "photic stimulation"[TIAB] OR "Acupuncture Therapy"[MeSH] OR Acupuncture[MeSH] OR acupuncture[TIAB] OR Acupressure[MeSH] OR acupressure[TIAB] OR electroacupuncture[TIAB] OR "electro acupuncture"[TIAB] OR acupoint*[TIAB] OR "Transcutaneous Electric Nerve Stimulation"[MeSH] OR "transcutaneous electrical nerve stimulation"[TIAB] OR "noninvasive electrical stimulation of acupuncture points"[TIAB] OR NESAP[TIAB] OR ((tactile[TIAB] OR vestibular[TIAB] OR gustative[TIAB] OR olfactory[TIAB] OR auditory[TIAB] OR visual[TIAB]) AND stimul*[TIAB]) OR "Multisensorial stimulation"[TIAB] OR "Sensorial saturation"[TIAB] OR Sensation[MeSH]))))) OR (("pain"[MeSH Terms] OR pain[Text Word]) OR (((("Pain Management"[Mesh]) OR ("Analgesia"[Mesh])) OR (pain control[Text Word])) OR (pain relief[Text Word]))))	
2	(heel lance) OR (heel prick) OR (heel-prick) OR (heel stick)	938
1	Search: (((((((((("infant, newborn"[MeSH Terms] OR neonate[Text Word]) OR ("Infant, Premature"[Mesh])) OR ("Infant, Extremely Premature"[Mesh])) OR ("Infant, Extremely Low Birth Weight"[Mesh])) OR ("Infant, Very Low Birth Weight"[Mesh])) OR ("infant, low birth weight"[MeSH Terms] OR low birth weight[Text Word])) OR ("Infant, Small for Gestational Age"[Mesh])) OR (term[Text Word] OR preterm[Text Word] OR premature[Text Word])) OR (newborn[Text Word])) OR (infan*[Text Word])) OR (neonat*[Text Word])	401,296

Database(s): **Embase Classic+Embase** 1947 to 2023 February 27
Search Strategy:

#	Searches	Results
1	infant, newborn/ or Infant, Premature/ or Infant, Extremely Premature/ or Infant, Extremely Low Birth Weight/ or Infant, Very Low Birth Weight/ or Infant, Small for Gestational Age/ or infant, low birth weight/	744101
2	(low birth weight* or term or preterm* or premature or newborn* or infan* or neonat*).ab,kf,ti.	3042948
3	1 or 2	3300286
4	(heel lance or heel prick or heel-prick).mp. or heel stick.ab,kf,ti. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]	1066
5	exp pain/pc [Prevention]	31238
6	exp sucrose/	56630
7	exp glucose/	530890
8	exp sweetening agent/	111954
9	exp kangaroo care/	1838
10	exp Facilitated tucking/	73
11	exp infant care/	1669
12	exp sucking/	4788
13	exp finger sucking/	17
14	exp pacifier/	1066
15	exp breast feeding/	67086
16	exp therapeutic touch/	96
17	exp touch/	34318
18	exp massage/	20009
19	physiotherapy/	112886
20	exp videorecording/	116704
21	exp music/	22550
22	exp music therapy/	8777
23	exp attention/	346632
24	exp patient positioning/	22964
25	(Bedding and Linens).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]	32
26	exp bed linen/	182

27	exp physical restraint/	722
28	exp recording/	176772
29	exp speech/	126658
30	exp child parent relation/	104706
31	exp photostimulation/	29880
32	exp acupuncture/	56759
33	exp transcutaneous electrical nerve stimulation/	3474
34	exp sensation/	41485
35	exp analgesia/	208590
36	(morphine or diamorphine or fentanyl or alfentanil or sufentanil or pethidine or meperidine or codeine or methadone or acetaminophen or paracetamol or Sucrose or glucose or skin to skin or kangaroo care or Facilitated tucking or swaddl* or cuddl* or non nutritive suck* or nonnutritive suck* or finger* suck* or pacifier* or fingersucking or breast* milk or breast feed* or breastfeed* or rocking or holding or maternal touch or mother* touch or therapeutic touch* or massag* or physical therapy or physiotherapy or verbal distract* or toy distract* or toys distract* or audiovisual distract* or audio video distract* or music or development* or "supportive bedding" or attention behavior* or attention behaviour* or modif* environment* or low noise* or lower* noise* or low light* or lower* light* or "White noise" or cluster* care or cluster* procedure* or sooth* smell* or familiar odor* or familiar odour* or "acoustic stimulation" or maternal record* voice or mother* record* voice or "photice stimulation" or acupuncture or acupressure or electroacupuncture or "ectro acupuncture" or acupoint* or "transcutaneous electrical nerve stimulation" or "noninvasive electrical stimulation of acupuncture points" or NESAP or tactile stimul* or vestibular stimul* or gustative stimul* or olfactory stimul* or auditory stimul* or visual stimul* or "Multisensorial stimulation" or "Sensorial saturation" or pain control* or pain relief* or pain management*).af.	7872478
37	or/5-36	8617112
38	3 and 4 and 37	613
39	limit 38 to (clinical trial or randomized controlled trial or controlled clinical trial)	213

Database(s): **EBM Reviews - Cochrane Central Register of Controlled Trials** January 2023
Search Strategy:

#	Searches	Results
1	infant, newborn/ or Infant, Premature/ or Infant, Extremely Premature/ or Infant, Extremely Low Birth Weight/ or Infant, Very Low Birth Weight/ or Infant, Small for Gestational Age/ or infant, low birth weight/	19476
2	(low birth weight* or term or preterm* or premature or newborn* or infan* or neonat*).ab,kf,ti.	234624
3	1 or 2	238269
4	(heel lance or heel prick or heel-prick).mp. or heel stick.ab,kf,ti. [mp=title, original title, abstract, floating sub-heading word, mesh headings, heading words, keyword]	433
5	exp pain/pc [Prevention]	8
6	exp sucrose/	1528
7	exp glucose/	21777
8	exp sweetening agent/	7465
9	exp kangaroo care/	0
10	exp Facilitated tucking/	16
11	exp infant care/	926
12	exp sucking/	0
13	exp finger sucking/	9
14	exp pacifier/	68
15	exp breast feeding/	2380
16	exp therapeutic touch/	153
17	exp touch/	750
18	exp massage/	1373
19	physiotherapy/	0
20	exp videorecording/	2969
21	exp music/	937
22	exp music therapy/	1062
23	exp attention/	6145
24	exp patient positioning/	746
25	(Bedding and Linens).mp. [mp=title, original title, abstract, floating sub-heading word, mesh headings, heading words, keyword]	409
26	exp bed linen/	0
27	exp physical restraint/	283
28	exp recording/	0

29	exp speech/	1064
30	exp child parent relation/	0
31	exp photostimulation/	0
32	exp acupuncture/	199
33	exp transcutaneous electrical nerve stimulation/	2366
34	exp sensation/	27313
35	exp analgesia/	9192
36	(morphine or diamorphine or fentanyl or alfentanil or sufentanil or pethidine or meperidine or codeine or methadone or acetaminophen or paracetamol or Sucrose or glucose or skin to skin or kangaroo care or Facilitated tucking or swaddl* or cuddl* or non nutritive suck* or nonnutritive suck* or finger* suck* or pacifier* or fingersucking or breast* milk or breast feed* or breastfeed* or rocking or holding or maternal touch or mother* touch or therapeutic touch* or massag* or physical therapy or physiotherapy or verbal distract* or toy distract* or toys distract* or audiovisual distract* or audio video distract* or music or development* or "supportive bedding" or attention behavior* or attention behaviour* or modif* environment* or low noise* or lower* noise* or low light* or lower* light* or "White noise" or cluster* care or cluster* procedure* or sooth* smell* or familiar odor* or familiar odour* or "acoustic stimulation" or maternal record* voice or mother* record* voice or "photice stimulation" or acupuncture or acupressure or electroacupuncture or "ectro acupuncture" or acupoint* or "transcutaneous electrical nerve stimulation" or "noninvasive electrical stimulation of acupuncture points" or NESAP or tactile stimul* or vestibular stimul* or gustative stimul* or olfactory stimul* or auditory stimul* or visual stimul* or "Multisensorial stimulation" or "Sensorial saturation" or pain control* or pain relief* or pain management*).af.	318739
37	or/5-36	348832
38	3 and 4 and 37	370

CINAHL Wednesday, March 01, 2023 4:09:37 AM

#	Query	Results
S42	S40 AND S41	186
S41	(randomized controlled trials OR MH double-blind studies OR MH single-blind studies OR MH random assignment OR MH pretest-posttest design OR MH cluster sample OR TI (randomised OR randomized) OR AB (random*) OR TI (trial) OR (MH (sample size) AND AB (assigned OR allocated OR control)) OR MH (placebos) OR PT (randomized controlled trial) OR AB (control W5 group) OR MH (crossover design) OR MH (comparative studies) OR AB (cluster W3 RCT)) NOT ((MH animals+ OR MH animal studies OR TI animal model*) NOT MH human)	951,268

S40	S3 AND S4 AND S39	271
S39	S37 OR S38	1,023,198
S38	TI (morphine or diamorphine or fentanyl or alfentanil or sufentanil or pethidine or meperidine or codeine or methadone or acetaminophen or paracetamol or Sucrose or glucose or skin to skin or kangaroo care or Facilitated tucking or swaddl* or cuddl* or non nutritive suck* or nonnutritive suck* or finger* suck* or pacifier* or fingersucking or breast* milk or breast feed* or breastfeed* or rocking or holding or maternal touch or mother* touch or therapeutic touch* or massag* or physical therapy or physiotherapy or verbal distract* or toy distract* or toys distract* or audiovisual distract* or audio video distract* or music or development* or "supportive bedding" or attention behavior* or attention behaviour* or modif* environment* or low noise* or lower* noise* or low light* or lower* light* or "White noise" or cluster* care or cluster* procedure* or sooth* smell* or familiar odor* or familiar odour* or "acoustic stimulation" or maternal record* voice or mother* record* voice or "photice stimulation" or acupuncture or acupressure or electroacupuncture or "ectro acupuncture" or acupoint* or "transcutaneous electrical nerve stimulation" or "noninvasive electrical stimulation of acupuncture points" or NESAP or tactile stimul* or vestibular stimul* or gustative stimul* or olfactory stimul* or auditory stimul* or visual stimul* or "Multisensorial stimulation" or "Sensorial saturation" or pain control* or pain relief* or pain management*) OR AB ((morphine or diamorphine or fentanyl or alfentanil or sufentanil or pethidine or meperidine or codeine or methadone or acetaminophen or paracetamol or Sucrose or glucose or skin to skin or kangaroo care or Facilitated tucking or swaddl* or cuddl* or non nutritive suck* or nonnutritive suck* or finger* suck* or pacifier* or fingersucking or breast* milk or breast feed* or breastfeed* or rocking or holding or maternal touch or mother* touch or therapeutic touch* or massag* or physical therapy or physiotherapy or verbal distract* or toy distract* or toys distract* or audiovisual distract* or audio video distract* or music or development* or "supportive bedding" or attention behavior* or attention behaviour* or modif* environment* or low noise* or lower* noise* or low light* or lower* light* or "White noise" or cluster* care or cluster* procedure* or sooth* smell* or familiar odor* or familiar odour* or "acoustic stimulation" or maternal record* voice or mother* record* voice or "photice stimulation" or acupuncture or acupressure or electroacupuncture or "ectro acupuncture" or acupoint* or "transcutaneous electrical nerve stimulation" or "noninvasive electrical stimulation of acupuncture points" or NESAP or tactile stimul* or vestibular stimul* or gustative stimul* or olfactory stimul* or auditory stimul* or visual stimul* or "Multisensorial stimulation" or "Sensorial saturation" or pain control* or pain relief* or pain management*))	806,816
S37	S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36	328,812
S36	(MH "Analgesia+")	16,584
S35	(MH "Sensation")	4,611
S34	(MH "Transcutaneous Electric Nerve Stimulation")	2,620
S33	(MH "Acupuncture")	16,241
S32	"photostimulation"	19
S31	(MH "Phototherapy")	3,826

S30	photostimulation	19
S29	(MH "Parent-Child Relations")	23,228
S28	(MH "Speech+")	33,053
S27	(MH "Audiorecording") OR (MH "Videorecording")	76,623
S26	(MH "Restraint, Physical")	4,654
S25	(MH "Bedding and Linens")	1,463
S24	(MH "Patient Positioning")	9,947
S23	(MH "Attention")	18,325
S22	(MH "Music") OR (MH "Music Therapy")	17,302
S21	(MH "Videorecording")	31,172
S20	(MH "Physical Therapy")	38,364
S19	(MH "Massage")	16,816
S18	(MH "Touch")	4,379
S17	(MH "Therapeutic Touch")	1,572
S16	(MH "Breast Feeding")	26,732
S15	(MH "Pacifiers")	555
S14	"finger sucking"	31
S13	"sucking"	1,546
S12	(MH "Infant Care")	5,152
S11	"Facilitated tucking"	64
S10	Facilitated tucking	65
S9	(MH "Kangaroo Care")	1,641
S8	(MH "Sweetening Agents+")	4,515
S7	(MH "Glucose")	12,380
S6	(MH "Sucrose")	1,547
S5	(MH "Pain/PC")	7,153
S4	TI (heel lance or heel prick* or heel-prick* or heel stick*) OR AB (heel lance or heel prick* or heel-prick* or heel stick*)	413
S3	S1 OR S2	696,492
S2	TI ((low birth weight* or term or preterm* or premature or newborn* or infan* or neonat*)) OR AB ((low birth weight* or term or preterm* or premature or newborn* or infan* or neonat*))	637,457
S1	(MH "Infant, Newborn") OR (MH "Infant, Premature") OR (MH "Infant, Very Low Birth Weight") OR (MH "Infant, Postmature") OR (MH "Infant, Low Birth	156,200

	Weight") OR (MH "Infant, Small for Gestational Age") OR (MH "Infant, Large for Gestational Age")	

Web Table II. Risk of bias in included trials using ROB 2.0

Study ID	Randomisation Process	Deviation from intended interventions	Missing Outcome	Measurement of outcome	Selection of reported results	Overall Risk
Abbasoglu A 2015	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Abbasoglu A 2015a	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Aguirre Unceta-Barrenechea 2008	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Akcam 2004	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Akcam 2004a	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Akcan 2016	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Alemadar 2017	Some Concerns	High Risk	Low Risk	Low Risk	Some Concerns	High Risk
Ancy 2022	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Angeles 2015	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Angeles 2020	Low Risk	Some Concerns	Low Risk	Some Concerns	Some Concerns	High Risk
ApaydinCirik 2023	Low Risk	Low Risk	Some Concerns	Some Concerns	Low Risk	High Risk
Asmerom 2013	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Axelin 2009	Low Risk	Some Concerns	Low Risk	Low Risk	Some Concerns	High Risk
Aydin 2019	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Baba 2010	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Badiee 2014	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns	High Risk
Badr 2016	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
BalasubramanianSundarama 2013	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Bembich 2018	Low Risk	Low Risk	Low Risk	Some Concerns	Low Risk	Low Risk
Benoit 2021	Low Risk	Low Risk	Some Concerns	Low Risk	Low Risk	Low Risk
Bilgen 2001	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Bonetto 2008	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Boo 2000	High Risk	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Bueno 2012	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Campbell-Yeo 2012	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Campbell-Yeo 2019	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
CantasAyar 2022	Low Risk	Low Risk	Low Risk	Some Concerns	Low Risk	Low Risk
Chang 2020	Some Concerns	Some Concerns	Low Risk	Some Concerns	Some Concerns	High Risk
chen 2017	Some Concerns	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns
Choi 2018	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Cignacco 2012	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Codipietro 2008	Low Risk	Low Risk	Low Risk	Some Concerns	Low Risk	Low Risk
Covener Ozcelikn 2022	Low Risk	Some Concerns	Low Risk	Low Risk	Low Risk	Low Risk
Davari 2018	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns
Dur 2020	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk

Study ID	Randomisation Process	Deviation from intended interventions	Missing Outcome	Measurement of outcome	Selection of reported results	Overall Risk
Ecevit 2011	Some Concerns	Low Risk	Some Concerns	Some Concerns	Low Risk	High Risk
Eriksson 1999	Low Risk	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns
Erkut 2017	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Gabriel 2013	Low Risk	Low Risk	Some Concerns	Low Risk	Low Risk	Some Concerns
Gao 2015	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Gibbin 2003	Some Concerns	Some Concerns	Low Risk	Low Risk	Some Concerns	High Risk
Gitto 2011	Some Concerns	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns
Hartley 2018	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Hseih 2018	High Risk	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Hyesang Im 2007	High Risk	Low Risk	Low Risk	Low Risk	Low Risk	High Risk
Jain 2001	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Jain 2006	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Johnston 2008	Low Risk	Low Risk	Some Concerns	Low Risk	Low Risk	Some Concerns
Johnston 2012	Some Concerns	Low Risk	Some Concerns	Some Concerns	Low Risk	High Risk
Kahraman 2020	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Kaya 2014	Some Concerns	High Risk	Low Risk	Low Risk	Some Concerns	High Risk
Kim 2022	Some Concerns	Some Concerns	Low Risk	Some Concerns	Some Concerns	High Risk
Leng 2015	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Liaw 2012	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
ManalKassab 2020	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Mir 2018	High Risk	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Mosayebi 2014	Some Concerns	Low Risk	Some Concerns	Low Risk	Some Concerns	High Risk
Napiorkowska-Orkisz 2021	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Ngoc 2019	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Nimbalkar 2012	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Nimbalkar 2019	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Low Risk
Obeidat 2015	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Okan 2007	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Orellano 2019	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Ou-yang 2012	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Overgaard 1999	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Ozdogan 2010	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	
OzgeDeniz 2021	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Ozkan 2019	Some Concerns	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns
Patel 2003	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Perroteau 2018	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns

Study ID	Randomisation Process	Deviation from intended interventions	Missing Outcome	Measurement of outcome	Selection of reported results	Overall Risk
Ramenghi 1996	Some Concerns	Low Risk	Low Risk	High Risk	Some Concerns	High Risk
Rawal 2018	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Rchiabi 2016	Some Concerns	Some Concerns	Some Concerns	Some Concerns	High Risk	High Risk
Rushforth 1995	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Sasidharan 2022	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Sen 2020	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Seo 2016	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
SezerEfe 2022	Low Risk	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns
Shah 2017	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
SharynGibbins 2002	Low Risk	Some Concerns	Low Risk	Low Risk	Low Risk	Low Risk
Shu 2014	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Shukla 2018	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Shukla 2018a	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Simonse 2012	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Slater 2010	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Stadler 2021	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Stevens 1999	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
StevensBonnie 1999	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Low Risk
Sweta Kumari 2016	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Low Risk
Taddio 2008	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Tasci 2020	Some Concerns	Some Concerns	Low Risk	Low Risk	Some Concerns	High Risk
Tavlar 2022	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns	Some Concerns
Thakkar 2015	Low Risk	Some Concerns	Low Risk	Low Risk	Low Risk	Low Risk
Uematsu 2018	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Usta 2020	Low Risk	Low Risk	Some Concerns	Low Risk	Some Concerns	High Risk
Uyan 2005	Some Concerns	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Vemula 2022	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
VictoriaTutagLehr 2015	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Yilmaz 2020	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns	Some Concerns
Yilmaz 2021	High Risk	Low Risk	Low Risk	Low Risk	Some Concerns	High Risk
Yu 2021	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk
Zhu 2015	Low Risk	Low Risk	Low Risk	Low Risk	Low Risk	Some Concerns

Web Table III. GRADE assessment of primary outcome: Pain score during heel prick

son	Direct evidence - Certainty of Evidence	Indirect evidence - Certainty of Evidence	Network meta-analysis RR (CrI)	Certainty of Evidence
Acupressure vs. Control	MODERATE[a]	LOW[b]	-1.05 (-1.86 to -0.23)	MODERATE[a]
Acupressure vs. Touch Massage	LOW[b]	MODERATE[a]	0.08 (-0.76 to 0.92)	MODERATE[a]
Acupuncture vs. Control	HIGH	MODERATE[a]	-0.84 (-1.64 to -0.03)	MODERATE[a]
Acupuncture vs. Glucose	MODERATE[a]	HIGH	0.64 (-0.23 to 1.51)	HIGH
Acupuncture vs. Sucrose	MODERATE[c]	HIGH	0.47 (-0.39 to 1.33)	HIGH
Acupuncture vs. Touch Massage	LOW[b]	HIGH	0.29 (-0.60 to 1.18)	HIGH
Acupuncture-EBM_NNS vs. EBM	VERY LOW[c,d]	-	-1.30 (-3.24 to 0.63)	VERY LOW[c,d]
Breastfeeding vs. Breastfeeding-Music	HIGH	HIGH	-0.50 (-1.56 to 0.56)	HIGH
Breastfeeding vs. Control	HIGH	HIGH	-1.91 (-2.33 to -1.48)	HIGH
Breastfeeding vs. EBM	MODERATE[a]	HIGH	-0.58 (-1.24 to 0.09)	HIGH
Breastfeeding vs. Glucose	MODERATE[e]	HIGH	-0.43 (-0.96 to 0.10)	HIGH
Breastfeeding vs. Glucose-Mother holding	LOW[b]	MODERATE[a]	0.13 (-0.96 to 1.22)	MODERATE[a]
Breastfeeding vs. KMC	MODERATE[a]	MODERATE[a]	-0.90 (-1.52 to -0.28)	MODERATE[a]
Breastfeeding vs. KMC-Sucrose	LOW[b]	MODERATE[a]	-0.37 (-1.43 to 0.68)	MODERATE[a]
Breastfeeding vs. Mother's heartbeat sounds	LOW[b]	MODERATE[a]	-0.53 (-1.84 to 0.77)	MODERATE[a]
Breastfeeding vs. Mother holding	HIGH	HIGH	-0.86 (-1.50 to -0.21)	HIGH
Breastfeeding vs. Music	HIGH	HIGH	-1.33 (-2.27 to -0.39)	HIGH
Breastfeeding vs. NNS	VERY LOW[b,e]	HIGH	-0.65 (-1.17 to -0.14)	HIGH
Breastfeeding vs. Odour	MODERATE[a]	LOW[b]	-1.18 (-2.00 to -0.37)	MODERATE[a]
Breastfeeding vs. Sucrose	VERY LOW[b,f]	HIGH	-0.60 (-1.10 to -0.10)	HIGH
Breastfeeding vs. Swaddling	MODERATE[c]	HIGH	-1.12 (-1.98 to -0.27)	HIGH
Breastfeeding-Music vs. Control	HIGH	HIGH	-1.41 (-2.46 to -0.35)	HIGH
Breastfeeding-Music vs. Music	HIGH	HIGH	-0.83 (-1.99 to 0.33)	HIGH
Cobedding vs. Control	LOW[d]	-	-0.65 (-2.37 to 1.07)	
Control vs. EBM	HIGH	MODERATE[a]	1.33 (0.70 to 1.96)	HIGH
Control vs. Facilitated tucking	MODERATE[a]	MODERATE[a]	0.90 (0.40 to 1.40)	MODERATE[a]
Control vs. Glucose	HIGH	MODERATE[a]	1.48 (1.00 to 1.96)	HIGH
Control vs. KMC	MODERATE[e]	MODERATE[a]	1.01 (0.43 to 1.58)	MODERATE[a]
Control vs. Mother holding	HIGH	HIGH	1.05 (0.48 to 1.62)	HIGH
Control vs. Mother's Voice	MODERATE[a]	VERY LOW[a,d]	1.18 (0.47 to 1.89)	MODERATE[a]
Control vs. Mother's Voice-Mother holding	LOW[c,e]	VERY LOW[c,d]	2.72 (1.82 to 3.61)	LOW[c,e]
Control vs. Music	MODERATE[a]	HIGH	0.58 (-0.33 to 1.49)	HIGH

Control vs. NNS	HIGH	HIGH	1.25 (0.85 to 1.66)	HIGH
Control vs. NNS-Sucrose	HIGH	HIGH	3.15 (2.62 to 3.69)	HIGH
Control vs. Odour	LOW[a,e]	MODERATE[a]	0.72 (-0.04 to 1.48)	MODERATE[a]
Control vs. Prone Positioning	MODERATE[a]	HIGH	1.02 (0.01 to 2.03)	HIGH
Control vs. Sterile water	VERY LOW[b,d]	HIGH	0.54 (0.00 to 1.08)	HIGH
Control vs. Sucrose	HIGH	MODERATE[c]	1.31 (0.87 to 1.75)	HIGH
Control vs. Swaddling	HIGH	MODERATE[c]	0.78 (-0.01 to 1.58)	HIGH
Control vs. Topical Anesthesia	MODERATE[a]	-	0.43 (-0.63 to 1.48)	MODERATE[a]
Control vs. Touch Massage	HIGH	LOW[b]	1.13 (0.62 to 1.64)	HIGH
Control vs. White noise	VERY LOW[b,f]	MODERATE[a]	2.21 (1.56 to 2.86)	MODERATE[a]
Control vs. White noise-Mother holding	VERY LOW[c,d]	VERY LOW[c,d]	4.01 (3.10 to 4.93)	VERY LOW[c,d]
EBM vs. Formula Milk	VERY LOW[c,d]	–	-1.61 (-3.36 to 0.13)	VERY LOW[c,d]
EBM vs. Glucose	VERY LOW[b,g]	HIGH	0.15 (-0.46 to 0.76)	HIGH
EBM vs. Glucose-Mother holding	MODERATE[a]	LOW[b]	0.71 (-0.40 to 1.81)	MODERATE[a]
EBM vs. Sterile water	VERY LOW[b,e,g]	MODERATE[a]	-0.79 (-1.43 to -0.16)	MODERATE[a]
EBM vs. Sucrose	MODERATE[a]	HIGH	-0.02 (-0.68 to 0.63)	HIGH HIGH
Facilitated tucking vs. Glucose	MODERATE[a]	MODERATE[a]	0.58 (0.00 to 1.16)	MODERATE[a]
Facilitated tucking vs. Mother holding	MODERATE[c]	MODERATE[a]	0.16 (-0.54 to 0.86)	MODERATE[a]
Facilitated tucking vs. Music-NNS-Facilitated tucking	LOW[b]	-	0.13 (-1.70 to 1.96)	LOW[b]
Facilitated tucking vs. NNS	MODERATE[a]	MODERATE[a]	0.36 (-0.21 to 0.92)	MODERATE[a]
Facilitated tucking vs. NNS-Sucrose	LOW[d]	MODERATE[a]	2.26 (1.60 to 2.92)	MODERATE[a]
Facilitated tucking vs. Opioid	VERY LOW[b,d]	VERY LOW[c,d]	0.05 (-0.81 to 0.92)	VERY LOW[c,d]
Facilitated tucking vs. Sensorial Saturation	HIGH	VERY LOW[b,d]	0.63 (-0.67 to 1.92)	HIGH
Facilitated tucking vs. Sterile water	VERY LOW[c,d]	MODERATE[a]	-0.36 (-0.98 to 0.27)	MODERATE[a]
Facilitated tucking vs. Sucrose	MODERATE[a]	MODERATE[a]	0.41 (-0.16 to 0.99)	MODERATE[a]
Facilitated tucking vs. Sucrose-Facilitated tucking	MODERATE[a]	LOW[b]	0.46 (-0.83 to 1.74)	MODERATE[a]
Facilitated tucking vs. White noise	MODERATE[a]	VERY LOW[b,f]	1.32 (0.55 to 2.08)	MODERATE[a]
Fructose vs. Glucose	LOW[b]	MODERATE[c]	-0.23 (-1.49 to 1.03)	MODERATE[c]
Fructose vs. Sterile water	MODERATE[c]	LOW[b]	-1.17 (-2.43 to 0.09)	MODERATE[c]
Glucose vs. Glucose-Mother holding	MODERATE[a]	LOW[b]	0.56 (-0.52 to 1.64)	MODERATE[a]
Glucose vs. NNS	LOW[b]	HIGH	-0.22 (-0.78 to 0.33)	HIGH
Glucose vs. Opioid	VERY LOW[b,d]	VERY LOW[b,d]	-0.53 (-1.44 to 0.38)	VERY LOW[b,d]
Glucose vs. Sterile water	HIGH	LOW[b]	-0.94 (-1.44 to -0.44)	HIGH
Glucose vs. Sucrose	LOW[b]	HIGH	-0.17 (-0.69 to 0.35)	HIGH

KMC vs. KMC-Sucrose	MODERATE[a]	LOW[b]	0.52 (-0.55 to 1.60)	MODERATE[a]
KMC vs. NNS	VERY LOW[a,d]	MODERATE[e]	0.24 (-0.40 to 0.89)	MODERATE[e]
KMC vs. Sucrose	VERY LOW[b,g]	MODERATE[e]	0.30 (-0.30 to 0.90)	MODERATE[e]
KMC-Sucrose vs. Sucrose	MODERATE[a]	VERY LOW[b,f]	-0.22 (-1.28 to 0.83)	MODERATE[a]
Mother's heartbeat sounds vs. Odour	MODERATE[a]	LOW[b]	-0.65 (-1.95 to 0.65)	MODERATE[a]
Mother holding vs. Mother's Voice	VERY LOW[a,d]	MODERATE[a]	0.13 (-0.66 to 0.92)	MODERATE[a]
Mother holding vs. Mother's Voice-Mother holding	VERY LOW[c,d]	LOW[c,e]	1.66 (0.75 to 2.58)	LOW[c,e]
Mother holding vs. Swaddling	MODERATE[a]	HIGH	-0.27 (-1.17 to 0.63)	HIGH
Mother holding vs. White noise	VERY LOW[b,f]	MODERATE[c]	1.16 (0.45 to 1.87)	MODERATE[c]
Mother holding vs. White noise-Mother holding	VERY LOW[c,d]	VERY LOW[c,d]	2.96 (2.02 to 3.90)	VERY LOW[c,d]
Mother's Voice vs. Mother's Voice-Mother holding	VERY LOW[c,d]	LOW[c,e]	1.53 (0.58 to 2.48)	LOW[c,e]
Mother's Voice vs. White noise	LOW[c,e]	LOW[c,e]	1.03 (0.26 to 1.80)	LOW[c,e]
Mother's Voice vs. White noise-Mother holding	VERY LOW[c,d]	VERY LOW[c,d]	2.83 (1.86 to 3.80)	VERY LOW[c,d]
Mother's Voice-Mother holding vs. White noise	VERY LOW[b,f]	LOW[c,e]	-0.50 (-1.43 to 0.42)	LOW[c,e]
Mother's Voice-Mother holding vs. White noise-Mother holding	VERY LOW[c,d]	VERY LOW[c,d]	1.30 (0.26 to 2.34)	VERY LOW[c,d]
NNS vs. NNS-Facilitated tucking	MODERATE[a]	-	0.48 (-1.28 to 2.23)	MODERATE[a]
NNS vs. NNS-Sucrose	HIGH	HIGH	1.90 (1.37 to 2.43)	HIGH
NNS vs. Prone Positioning	HIGH	HIGH	-0.23 (-1.24 to 0.78)	HIGH
NNS vs. Sucrose	VERY LOW[b,f]	HIGH	0.06 (-0.45 to 0.56)	HIGH
NNS vs. Touch Massage	VERY LOW[b,d]	HIGH	-0.12 (-0.75 to 0.50)	HIGH
NNS vs. Touch Massage-NNS	MODERATE[c]	-	2.12 (0.33 to 3.91)	MODERATE[c]
NNS-Sucrose vs. Prone Positioning	HIGH	HIGH	-2.13 (-3.17 to -1.10)	HIGH
NNS-Sucrose vs. Sucrose	LOW[b]	HIGH	-1.85 (-2.46 to -1.23)	HIGH
Opioid vs. Sensorial Saturation	LOW[b]	VERY LOW[b,d]	0.57 (-0.72 to 1.87)	LOW[b]
Opioid vs. Sterile water	VERY LOW[b,d]	VERY LOW[b,d]	-0.41 (-1.34 to 0.52)	VERY LOW[b,d]
Paracetamol vs. Sterile water	VERY LOW[b,d]	VERY LOW[b,d]	-0.39 (-1.70 to 0.93)	VERY LOW[b,d]
Paracetamol vs. Sucrose	VERY LOW[b,d]	VERY LOW[b,d]	0.39 (-0.93 to 1.70)	VERY LOW[b,d]
Sterile water vs. Sucrose	HIGH	LOW[b]	0.77 (0.25 to 1.29)	HIGH
Sucrose vs. Sucrose-Facilitated tucking	LOW[b]	MODERATE[a]	0.05 (-1.24 to 1.33)	MODERATE[a]
Sucrose vs. Sucrose-Vibration	VERY LOW[c,d]	–	1.46 (-0.30 to 3.23)	VERY LOW[c,d]
White noise vs. White noise-Mother holding	VERY LOW[c,d]	VERY LOW[c,d]	1.80 (0.86 to 2.74)	VERY LOW[c,d]
Acupressure vs. Acupuncture	–	MODERATE[a]	-0.21 (-1.34 to 0.91)	MODERATE[a]
Acupressure vs. Acupuncture-EBM	–	VERY LOW[c,d]	1.59 (-0.60 to 3.77)	VERY LOW[c,d]
Acupressure vs. Breastfeeding	–	MODERATE[a]	0.86 (-0.06 to 1.78)	MODERATE[a]

Acupressure vs. Breastfeeding-Music	–	MODERATE[a]	0.36 (-0.97 to 1.69)	MODERATE[a]
Acupressure vs. Cobedding	–	LOW[d]	-0.40 (-2.30 to 1.51)	LOW[d]
Acupressure vs. EBM	–	MODERATE[a]	0.28 (-0.74 to 1.31)	MODERATE[a]
Acupressure vs. Facilitated tucking	–	MODERATE[a]	-0.15 (-1.11 to 0.80)	MODERATE[a]
Acupressure vs. Formula Milk	–	VERY LOW[c,d]	-1.33 (-3.36 to 0.69)	VERY LOW[c,d]
Acupressure vs. Fructose	–	LOW[b]	0.66 (-0.88 to 2.21)	LOW[b]
Acupressure vs. Glucose	–	MODERATE[a]	0.43 (-0.51 to 1.37)	MODERATE[a]
Acupressure vs. Glucose-Mother holding	–	MODERATE[a]	0.99 (-0.38 to 2.36)	MODERATE[a]
Acupressure vs. KMC	–	MODERATE[a]	-0.04 (-1.03 to 0.95)	MODERATE[a]
Acupressure vs. KMC-Sucrose	–	MODERATE[a]	0.48 (-0.86 to 1.83)	MODERATE[a]
Acupressure vs. Mother's heartbeat sounds	–	LOW[b]	0.32 (-1.23 to 1.88)	LOW[b]
Acupressure vs. Mother holding	–	MODERATE[a]	0.00 (-0.99 to 1.00)	MODERATE[a]
Acupressure vs. Mother's Voice	–	MODERATE[a]	0.13 (-0.95 to 1.21)	MODERATE[a]
Acupressure vs. Mother's Voice-Mother holding	–	LOW[c,e]	1.67 (0.46 to 2.88)	LOW[c,e]
Acupressure vs. Music	–	MODERATE[a]	-0.47 (-1.69 to 0.75)	MODERATE[a]
Acupressure vs. Music-NNS-Facilitated tucking	–	LOW[b]	-0.03 (-2.09 to 2.04)	LOW[b]
Acupressure vs. NNS	–	MODERATE[a]	0.20 (-0.70 to 1.11)	MODERATE[a]
Acupressure vs. NNS-Facilitated tucking	–	MODERATE[a]	0.68 (-1.29 to 2.65)	MODERATE[a]
Acupressure vs. NNS-Sucrose	–	MODERATE[a]	2.11 (1.13 to 3.08)	MODERATE[a]
Acupressure vs. Odour	–	LOW[a,e]	-0.33 (-1.44 to 0.79)	LOW[a,e]
Acupressure vs. Opioid	–	VERY LOW[b,d]	-0.10 (-1.33 to 1.12)	VERY LOW[b,d]
Acupressure vs. Paracetamol	–	VERY LOW[b,d]	-0.12 (-1.70 to 1.45)	VERY LOW[b,d]
Acupressure vs. Prone Positioning	–	MODERATE[a]	-0.03 (-1.32 to 1.27)	MODERATE[a]
Acupressure vs. Sensorial Saturation	–	MODERATE[a]	0.47 (-1.11 to 2.06)	MODERATE[a]
Acupressure vs. Sterile water	–	VERY LOW[b,d]	-0.51 (-1.49 to 0.46)	VERY LOW[b,d]
Acupressure vs. Sucrose	–	MODERATE[a]	0.26 (-0.66 to 1.18)	MODERATE[a]
Acupressure vs. Sucrose-Facilitated tucking	–	MODERATE[a]	0.31 (-1.23 to 1.84)	MODERATE[a]
Acupressure vs. Sucrose-Vibration	–	VERY LOW[c,d]	1.73 (-0.27 to 3.72)	VERY LOW[c,d]
Acupressure vs. Swaddling	–	MODERATE[a]	-0.27 (-1.40 to 0.87)	MODERATE[a]
Acupressure vs. Topical Anesthesia	–	MODERATE[a]	-0.62 (-1.95 to 0.71)	MODERATE[a]
Acupressure vs. Touch Massage-NNS	–	MODERATE[a]	2.32 (0.32 to 4.33)	MODERATE[a]
Acupressure vs. White noise	–	VERY LOW[b,f]	1.16 (0.12 to 2.20)	VERY LOW[b,f]
Acupressure a vs. White noise-Mother holding	–	VERY LOW[c,d]	2.96 (1.74 to 4.19)	VERY LOW[c,d]
Acupuncture vs. Acupuncture-EBM	–	VERY LOW[c,d]	1.80 (-0.37 to 3.96)	VERY LOW[c,d]

Acupuncture vs. Breastfeeding	_	HIGH	1.07 (0.19 to 1.95)	HIGH
Acupuncture vs. Breastfeeding-Music	_	HIGH	0.57 (-0.75 to 1.88)	HIGH
Acupuncture vs. Cobedding	_	LOW[d]	-0.19 (-2.09 to 1.71)	LOW[d]
Acupuncture vs. EBM	_	HIGH	0.49 (-0.49 to 1.47)	HIGH
Acupuncture vs. Facilitated tucking	_	MODERATE[a]	0.06 (-0.86 to 0.98)	MODERATE[a]
Acupuncture vs. Formula Milk	_	VERY LOW[c,d]	-1.12 (-3.12 to 0.88)	VERY LOW[c,d]
Acupuncture vs. Fructose	_	LOW[b]	0.87 (-0.63 to 2.38)	LOW[b]
Acupuncture vs. Glucose-Mother holding	_	MODERATE[a]	1.20 (-0.13 to 2.53)	MODERATE[a]
Acupuncture vs. KMC	_	MODERATE[a]	0.17 (-0.79 to 1.13)	MODERATE[a]
Acupuncture vs. KMC-Sucrose	_	MODERATE[a]	0.70 (-0.61 to 2.01)	MODERATE[a]
Acupuncture vs. Mother's heartbeat sounds	_	LOW[b]	0.54 (-1.00 to 2.07)	LOW[b]
Acupuncture vs. Mother holding	_	HIGH	0.21 (-0.76 to 1.19)	HIGH
Acupuncture vs. Mother's Voice	_	MODERATE[a]	0.34 (-0.73 to 1.41)	MODERATE[a]
Acupuncture vs. Mother's Voice-Mother holding	_	LOW[c,e]	1.88 (0.68 to 3.08)	LOW[c,e]
Acupuncture vs. Music	_	MODERATE[a]	-0.26 (-1.47 to 0.95)	MODERATE[a]
Acupuncture vs. Music-NNS-Facilitated tucking	_	LOW[b]	0.18 (-1.86 to 2.23)	LOW[b]
Acupuncture vs. NNS	_	HIGH	0.41 (-0.46 to 1.29)	HIGH
Acupuncture vs. NNS-Facilitated tucking	_	MODERATE[a]	0.89 (-1.07 to 2.85)	MODERATE[a]
Acupuncture vs. NNS-Sucrose	_	HIGH	2.32 (1.37 to 3.26)	HIGH
Acupuncture vs. Odour	_	LOW[a,e]	-0.12 (-1.22 to 0.99)	LOW[a,e]
Acupuncture vs. Opioid	_	VERY LOW[d]	0.11 (-1.08 to 1.30)	VERY LOW[d]
Acupuncture vs. Paracetamol	_	VERY LOW[b,d]	0.09 (-1.46 to 1.63)	VERY LOW[b,d]
Acupuncture vs. Prone Positioning	_	MODERATE[a]	0.18 (-1.10 to 1.47)	MODERATE[a]
Acupuncture vs. Sensorial Saturation	_	MODERATE[a]	0.68 (-0.87 to 2.24)	MODERATE[a]
Acupuncture vs. Sterile water	_	MODERATE[a]	-0.30 (-1.22 to 0.62)	MODERATE[a]
Acupuncture vs. Sucrose-Facilitated tucking	_	LOW[b]	0.52 (-0.99 to 2.02)	LOW[b]
Acupuncture vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.94 (-0.03 to 3.90)	VERY LOW[c,d]
Acupuncture vs. Swaddling	_	HIGH	-0.05 (-1.18 to 1.07)	HIGH
Acupuncture vs. Topical Anesthesia	_	MODERATE[a]	-0.41 (-1.74 to 0.92)	MODERATE[a]
Acupuncture vs. Touch Massage-NNS	_	MODERATE[c]	2.53 (0.54 to 4.52)	MODERATE[c]
Acupuncture vs. White noise	_	VERY LOW[b,f]	1.37 (0.34 to 2.40)	VERY LOW[b,f]
Acupuncture vs. White noise-Mother holding	_	VERY LOW[c,d]	3.18 (1.96 to 4.39)	VERY LOW[c,d]
Acupuncture-EBM vs. Breastfeeding	_	VERY LOW[c,d]	-0.73 (-2.77 to 1.32)	VERY LOW[c,d]
Acupuncture-EBM vs. Breastfeeding-Music	_	VERY LOW[c,d]	-1.23 (-3.50 to 1.05)	VERY LOW[c,d]

Acupuncture-EBM vs. Cobedding	–	VERY LOW[c,d]	-1.98 (-4.65 to 0.68)	VERY LOW[c,d]
Acupuncture-EBM vs. Control	–	VERY LOW[c,d]	-2.63 (-4.67 to -0.60)	VERY LOW[c,d]
Acupuncture-EBM vs. Facilitated tucking	–	VERY LOW[c,d]	-1.74 (-3.80 to 0.33)	VERY LOW[c,d]
Acupuncture-EBM vs. Formula Milk	–	VERY LOW[c,d]	-2.92 (-5.52 to -0.31)	VERY LOW[c,d]
Acupuncture-EBM vs. Fructose	–	VERY LOW[c,d]	-0.92 (-3.28 to 1.44)	VERY LOW[c,d]
Acupuncture-EBM vs. Glucose	–	VERY LOW[c,d]	-1.16 (-3.18 to 0.87)	VERY LOW[c,d]
Acupuncture-EBM vs. Glucose-Mother holding	–	VERY LOW[c,d]	-0.60 (-2.82 to 1.63)	VERY LOW[c,d]
Acupuncture-EBM vs. KMC	–	VERY LOW[c,d]	-1.63 (-3.72 to 0.47)	VERY LOW[c,d]
Acupuncture-EBM vs. KMC-Sucrose	–	VERY LOW[c,d]	-1.10 (-3.37 to 1.17)	VERY LOW[c,d]
Acupuncture-EBM vs. Mother's heartbeat sounds	–	VERY LOW[c,d]	-1.26 (-3.67 to 1.15)	VERY LOW[c,d]
Acupuncture-EBM vs. Mother holding	–	VERY LOW[c,d]	-1.58 (-3.68 to 0.52)	VERY LOW[c,d]
Acupuncture-EBM vs. Mother's Voice	–	VERY LOW[c,d]	-1.45 (-3.60 to 0.70)	VERY LOW[c,d]
Acupuncture-EBM vs. Mother's Voice-Mother holding	–	VERY LOW[c,d]	0.08 (-2.13 to 2.30)	VERY LOW[c,d]
Acupuncture-EBM vs. Music	–	VERY LOW[c,d]	-2.05 (-4.27 to 0.16)	VERY LOW[c,d]
Acupuncture-EBM vs. Music-NNS-Facilitated tucking	–	VERY LOW[c,d]	-1.61 (-4.37 to 1.15)	VERY LOW[c,d]
Acupuncture-EBM vs. NNS	–	VERY LOW[c,d]	-1.38 (-3.44 to 0.67)	VERY LOW[c,d]
Acupuncture-EBM vs. NNS-Facilitated tucking	–	VERY LOW[c,d]	-0.90 (-3.60 to 1.80)	VERY LOW[c,d]
Acupuncture-EBM vs. NNS-Sucrose	–	VERY LOW[c,d]	0.52 (-1.57 to 2.61)	VERY LOW[c,d]
Acupuncture-EBM vs. Odour	–	VERY LOW[c,d]	-1.91 (-4.07 to 0.25)	VERY LOW[c,d]
Acupuncture-EBM vs. Opioid	–	VERY LOW[c,d]	-1.69 (-3.88 to 0.50)	VERY LOW[c,d]
Acupuncture-EBM vs. Paracetamol	–	VERY LOW[c,d]	-1.71 (-4.11 to 0.69)	VERY LOW[c,d]
Acupuncture-EBM vs. Prone Positioning	–	VERY LOW[c,d]	-1.61 (-3.87 to 0.65)	VERY LOW[c,d]
Acupuncture-EBM vs. Sensorial Saturation	–	VERY LOW[c,d]	-1.11 (-3.53 to 1.30)	VERY LOW[c,d]
Acupuncture-EBM vs. Sterile water	–	VERY LOW[c,d]	-2.10 (-4.13 to -0.06)	VERY LOW[c,d]
Acupuncture-EBM vs. Sucrose	–	VERY LOW[c,d]	-1.32 (-3.36 to 0.72)	VERY LOW[c,d]
Acupuncture-EBM vs. Sucrose-Facilitated tucking	–	VERY LOW[c,d]	-1.28 (-3.67 to 1.11)	VERY LOW[c,d]
Acupuncture-EBM vs. Sucrose-Vibration	–	VERY LOW[c,d]	0.14 (-2.56 to 2.84)	VERY LOW[c,d]
Acupuncture-EBM vs. Swaddling	–	VERY LOW[c,d]	-1.85 (-4.02 to 0.32)	VERY LOW[c,d]
Acupuncture-EBM vs. Topical Anesthesia	–	VERY LOW[c,d]	-2.21 (-4.50 to 0.08)	VERY LOW[c,d]
Acupuncture-EBM vs. Touch Massage	–	VERY LOW[c,d]	-1.51 (-3.60 to 0.59)	VERY LOW[c,d]
Acupuncture-EBM vs. Touch Massage-NNS	–	VERY LOW[c,d]	0.74 (-1.99 to 3.46)	VERY LOW[c,d]
Acupuncture-EBM vs. White noise	–	VERY LOW[c,d]	-0.42 (-2.55 to 1.70)	VERY LOW[c,d]
Acupuncture-EBM vs. White noise-Mother holding	–	VERY LOW[c,d]	1.38 (-0.84 to 3.60)	VERY LOW[c,d]
Breastfeeding vs. Cobedding	–	LOW[d]	-1.26 (-3.03 to 0.52)	LOW[d]

Breastfeeding vs. Facilitated tucking	_	MODERATE[a]	-1.01 (-1.61 to -0.41)	MODERATE[a]
Breastfeeding vs. Formula Milk	_	VERY LOW[c,d]	-2.19 (-4.06 to -0.32)	VERY LOW[c,d]
Breastfeeding vs. Fructose	_	LOW[b]	-0.20 (-1.53 to 1.14)	LOW[b]
Breastfeeding vs. Mother's Voice	_	MODERATE[a]	-0.73 (-1.54 to 0.08)	MODERATE[a]
Breastfeeding vs. Mother's Voice-Mother holding	_	LOW[c,e]	0.81 (-0.16 to 1.78)	LOW[c,e]
Breastfeeding vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.88 (-2.81 to 1.04)	LOW[b]
Breastfeeding vs. NNS-Facilitated tucking	_	VERY LOW[b,e]	-0.18 (-2.01 to 1.65)	VERY LOW[b,e]
Breastfeeding vs. NNS-Sucrose	_	HIGH	1.25 (0.60 to 1.89)	HIGH
Breastfeeding vs. Opioid	_	VERY LOW[d]	-0.96 (-1.92 to 0.01)	VERY LOW[d]
Breastfeeding vs. Paracetamol	_	VERY LOW[b,d]	-0.98 (-2.36 to 0.39)	VERY LOW[b,d]
Breastfeeding vs. Prone Positioning	_	MODERATE[a]	-0.89 (-1.96 to 0.19)	MODERATE[a]
Breastfeeding vs. Sensorial Saturation	_	MODERATE[a]	-0.39 (-1.78 to 1.01)	MODERATE[a]
Breastfeeding vs. Sterile water	_	MODERATE[a]	-1.37 (-1.97 to -0.77)	MODERATE[a]
Breastfeeding vs. Sucrose-Facilitated tucking	_	VERY LOW[b,f]	-0.55 (-1.89 to 0.78)	VERY LOW[b,f]
Breastfeeding vs. Sucrose-Vibration	_	VERY LOW[c,d]	0.87 (-0.97 to 2.70)	VERY LOW[c,d]
Breastfeeding vs. Topical Anesthesia	_	MODERATE[a]	-1.48 (-2.62 to -0.34)	MODERATE[a]
Breastfeeding vs. Touch Massage	_	HIGH	-0.78 (-1.44 to -0.12)	HIGH
Breastfeeding vs. Touch Massage-NNS	_	VERY LOW[b,e]	1.46 (-0.40 to 3.33)	VERY LOW[b,e]
Breastfeeding vs. White noise	_	VERY LOW[b,f]	0.30 (-0.45 to 1.05)	VERY LOW[b,f]
Breastfeeding vs. White noise-Mother holding	_	VERY LOW[c,d]	2.11 (1.12 to 3.10)	VERY LOW[c,d]
Breastfeeding-Music vs. Cobedding	_	LOW[d]	-0.76 (-2.77 to 1.26)	LOW[d]
Breastfeeding-Music vs. EBM	_	HIGH	-0.08 (-1.28 to 1.12)	HIGH
Breastfeeding-Music vs. Facilitated tucking	_	MODERATE[a]	-0.51 (-1.66 to 0.64)	MODERATE[a]
Breastfeeding-Music vs. Formula Milk	_	VERY LOW[c,d]	-1.69 (-3.81 to 0.43)	VERY LOW[c,d]
Breastfeeding-Music vs. Fructose	_	LOW[b]	0.31 (-1.36 to 1.97)	LOW[b]
Breastfeeding-Music vs. Glucose	_	HIGH	0.07 (-1.06 to 1.20)	HIGH
Breastfeeding-Music vs. Glucose-Mother holding	_	MODERATE[a]	0.63 (-0.86 to 2.12)	MODERATE[a]
Breastfeeding-Music vs. KMC	_	MODERATE[a]	-0.40 (-1.57 to 0.78)	MODERATE[a]
Breastfeeding-Music vs. KMC-Sucrose	_	LOW[b]	0.13 (-1.34 to 1.59)	LOW[b]
Breastfeeding-Music vs. Mother's heartbeat sounds	_	LOW[b]	-0.03 (-1.69 to 1.62)	LOW[b]
Breastfeeding-Music vs. Mother holding	_	HIGH	-0.36 (-1.54 to 0.82)	HIGH
Breastfeeding-Music vs. Mother's Voice	_	MODERATE[a]	-0.23 (-1.49 to 1.04)	MODERATE[a]
Breastfeeding-Music vs. Mother's Voice-Mother holding	_	LOW[c,e]	1.31 (-0.07 to 2.68)	LOW[c,e]
Breastfeeding-Music vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.38 (-2.55 to 1.78)	LOW[b]

Breastfeeding-Music vs. NNS	_	HIGH	-0.15 (-1.27 to 0.96)	HIGH
Breastfeeding-Music vs. NNS-Facilitated tucking	_	MODERATE[a]	0.32 (-1.75 to 2.40)	MODERATE[a]
Breastfeeding-Music vs. NNS-Sucrose	_	HIGH	1.75 (0.58 to 2.92)	HIGH
Breastfeeding-Music vs. Odour	_	MODERATE[a]	-0.68 (-1.97 to 0.60)	MODERATE[a]
Breastfeeding-Music vs. Opioid	_	VERY LOW[b,d]	-0.46 (-1.84 to 0.92)	VERY LOW[b,d]
Breastfeeding-Music vs. Paracetamol	_	VERY LOW[b,d]	-0.48 (-2.18 to 1.22)	VERY LOW[b,d]
Breastfeeding-Music vs. Prone Positioning	_	MODERATE[a]	-0.39 (-1.84 to 1.07)	MODERATE[a]
Breastfeeding-Music vs. Sensorial Saturation	_	MODERATE	0.12 (-1.59 to 1.82)	MODERATE
Breastfeeding-Music vs. Sterile water	_	VERY LOW	-0.87 (-2.03 to 0.29)	VERY LOW
Breastfeeding-Music vs. Sucrose	_	HIGH	-0.10 (-1.21 to 1.02)	HIGH
Breastfeeding-Music vs. Sucrose-Facilitated tucking	_	MODERATE[a]	-0.05 (-1.72 to 1.61)	MODERATE[a]
Breastfeeding-Music vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.37 (-0.72 to 3.46)	VERY LOW[c,d]
Breastfeeding-Music vs. Swaddling	_	HIGH	-0.62 (-1.93 to 0.68)	HIGH
Breastfeeding-Music vs. Topical Anesthesia	_	MODERATE[a]	-0.98 (-2.47 to 0.51)	MODERATE[a]
Breastfeeding-Music vs. Touch Massage	_	HIGH	-0.28 (-1.45 to 0.89)	HIGH
Breastfeeding-Music vs. Touch Massage-NNS	_	MODERATE[a]	1.96 (-0.14 to 4.07)	MODERATE[a]
Breastfeeding-Music vs. White noise	_	VERY LOW[b,f]	0.80 (-0.43 to 2.03)	VERY LOW[b,f]
Breastfeeding-Music vs. White noise-Mother holding	_	VERY LOW[c,d]	2.61 (1.22 to 4.00)	VERY LOW[c,d]
Cobedding vs. EBM	_	LOW[d]	0.68 (-1.15 to 2.51)	LOW[d]
Cobedding vs. Facilitated tucking	_	LOW[d]	0.24 (-1.55 to 2.04)	LOW[d]
Cobedding vs. Formula Milk	_	VERY LOW[c,d]	-0.94 (-3.47 to 1.59)	VERY LOW[c,d]
Cobedding vs. Fructose	_	LOW[d]	1.06 (-1.10 to 3.23)	LOW[d]
Cobedding vs. Glucose	_	LOW[d]	0.83 (-0.96 to 2.61)	LOW[d]
Cobedding vs. Glucose-Mother holding	_	LOW[d]	1.39 (-0.66 to 3.43)	LOW[d]
Cobedding vs. KMC	_	LOW[d]	0.36 (-1.46 to 2.17)	LOW[d]
Cobedding vs. KMC-Sucrose	_	LOW[d]	0.88 (-1.14 to 2.91)	LOW[d]
Cobedding vs. Mother's heartbeat sounds	_	LOW[d]	0.72 (-1.45 to 2.89)	LOW[d]
Cobedding vs. Mother holding	_	LOW[d]	0.40 (-1.41 to 2.21)	LOW[d]
Cobedding vs. Mother's Voice	_	LOW[d]	0.53 (-1.33 to 2.39)	LOW[d]
Cobedding vs. Mother's Voice-Mother holding	_	LOW[d]	2.06 (0.12 to 4.00)	LOW[d]
Cobedding vs. Music	_	LOW[d]	-0.07 (-2.02 to 1.88)	LOW[d]
Cobedding vs. Music-NNS-Facilitated tucking	_	LOW[d]	0.37 (-2.19 to 2.93)	LOW[d]
Cobedding vs. NNS	_	LOW[d]	0.60 (-1.17 to 2.37)	LOW[d]
Cobedding vs. NNS-Facilitated tucking	_	LOW[d]	1.08 (-1.41 to 3.57)	LOW[d]

Cobedding vs. NNS-Sucrose	_	LOW[d]	2.50 (0.70 to 4.31)	LOW[d]
Cobedding vs. Odour	_	LOW[a,e]	0.07 (-1.81 to 1.95)	LOW[a,e]
Cobedding vs. Opioid	_	VERY LOW[b,d]	0.30 (-1.65 to 2.25)	VERY LOW[b,d]
Cobedding vs. Paracetamol	_	VERY LOW[b,d]	0.27 (-1.92 to 2.46)	VERY LOW[b,d]
Cobedding vs. Prone Positioning	_	LOW[d]	0.37 (-1.63 to 2.37)	LOW[d]
Cobedding vs. Sensorial Saturation	_	LOW[d]	0.87 (-1.32 to 3.06)	LOW[d]
Cobedding vs. Sterile water	_	VERY LOW[b,d]	-0.11 (-1.92 to 1.69)	VERY LOW[b,d]
Cobedding vs. Sucrose	_	LOW[d]	0.66 (-1.12 to 2.44)	LOW[d]
Cobedding vs. Sucrose-Facilitated tucking	_	LOW[d]	0.70 (-1.46 to 2.86)	LOW[d]
Cobedding vs. Sucrose-Vibration	_	VERY LOW[c,d]	2.12 (-0.39 to 4.63)	VERY LOW[c,d]
Cobedding vs. Swaddling	_	LOW[d]	0.13 (-1.76 to 2.03)	LOW[d]
Cobedding vs. Topical Anesthesia	_	LOW[d]	-0.22 (-2.24 to 1.80)	LOW[d]
Cobedding vs. Touch Massage	_	LOW[d]	0.48 (-1.32 to 2.27)	LOW[d]
Cobedding vs. Touch Massage-NNS	_	LOW[d]	2.72 (0.20 to 5.23)	LOW[d]
Cobedding vs. White noise	_	VERY LOW[b,f]	1.56 (-0.28 to 3.40)	VERY LOW[b,f]
Cobedding vs. White noise-Mother holding	_	VERY LOW[c,d]	3.36 (1.41 to 5.31)	VERY LOW[c,d]
Control vs. Formula Milk	_	VERY LOW[c,d]	-0.28 (-2.14 to 1.57)	VERY LOW[c,d]
Control vs. Fructose	_	LOW[b]	1.71 (0.40 to 3.03)	LOW[b]
Control vs. Glucose-Mother holding	_	MODERATE[a]	2.04 (0.94 to 3.14)	MODERATE[a]
Control vs. KMC-Sucrose	_	MODERATE[a]	1.53 (0.47 to 2.60)	MODERATE[a]
Control vs. Mother's heartbeat sounds	_	LOW[b]	1.37 (0.05 to 2.69)	LOW[b]
Control vs. Music-NNS-Facilitated tucking	_	LOW[b]	1.02 (-0.87 to 2.92)	LOW[b]
Control vs. NNS-Facilitated tucking	_	MODERATE[a]	1.73 (-0.07 to 3.53)	MODERATE[a]
Control vs. Opioid	_	VERY LOW[b,d]	0.95 (0.03 to 1.87)	VERY LOW[b,d]
Control vs. Paracetamol	_	VERY LOW[b,d]	0.92 (-0.43 to 2.28)	VERY LOW[b,d]
Control vs. Sensorial Saturation	_	MODERATE[a]	1.52 (0.16 to 2.88)	MODERATE[a]
Control vs. Sucrose-Facilitated tucking	_	MODERATE[a]	1.36 (0.05 to 2.66)	MODERATE[a]
Control vs. Sucrose-Vibration	_	VERY LOW[c,d]	2.77 (0.95 to 4.60)	VERY LOW[c,d]
Control vs. Touch Massage-NNS	_	MODERATE[c]	3.37 (1.54 to 5.21)	MODERATE[c]
EBM vs. Facilitated tucking	_	MODERATE[a]	-0.43 (-1.17 to 0.30)	MODERATE[a]
EBM vs. Fructose	_	VERY LOW[b,g]	0.38 (-0.98 to 1.74)	VERY LOW[b,g]
EBM vs. KMC	_	MODERATE[a]	-0.32 (-1.12 to 0.48)	MODERATE[a]
EBM vs. KMC-Sucrose	_	MODERATE[a]	0.20 (-0.98 to 1.39)	MODERATE[a]
EBM vs. Mother's heartbeat sounds	_	LOW[b]	0.04 (-1.39 to 1.48)	LOW[b]

EBM vs. Mother holding	_	HIGH	-0.28 (-1.10 to 0.54)	HIGH
EBM vs. Mother's Voice	_	MODERATE[a]	-0.15 (-1.09 to 0.79)	MODERATE[a]
EBM vs. Mother's Voice-Mother holding	_	LOW[c,e]	1.38 (0.30 to 2.47)	LOW[c,e]
EBM vs. Music	_	MODERATE[a]	-0.75 (-1.84 to 0.34)	MODERATE[a]
EBM vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.31 (-2.28 to 1.66)	LOW[b]
EBM vs. NNS	_	HIGH	-0.08 (-0.78 to 0.62)	HIGH
EBM vs. NNS-Facilitated tucking	_	MODERATE[a]	0.40 (-1.49 to 2.29)	MODERATE[a]
EBM vs. NNS-Sucrose	_	HIGH	1.82 (1.04 to 2.61)	HIGH
EBM vs. Odour	_	MODERATE[a]	-0.61 (-1.58 to 0.36)	MODERATE[a]
EBM vs. Opioid	_	VERY LOW	-0.38 (-1.41 to 0.65)	VERY LOW
EBM vs. Paracetamol	_	VERY LOW[b,d]	-0.41 (-1.82 to 1.01)	VERY LOW[b,d]
EBM vs. Prone Positioning	_	MODERATE[a]	-0.31 (-1.48 to 0.86)	MODERATE[a]
EBM vs. Sensorial Saturation	_	MODERATE[a]	0.19 (-1.26 to 1.64)	MODERATE[a]
EBM vs. Sucrose-Facilitated tucking	_	LOW[b]	0.02 (-1.38 to 1.43)	LOW[b]
EBM vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.44 (-0.44 to 3.33)	VERY LOW[c,d]
EBM vs. Swaddling	_	HIGH	-0.55 (-1.54 to 0.45)	HIGH
EBM vs. Topical Anesthesia	_	MODERATE[a]	-0.90 (-2.13 to 0.32)	MODERATE[a]
EBM vs. Touch Massage	_	HIGH	-0.20 (-1.00 to 0.60)	HIGH
EBM vs. Touch Massage-NNS	_	MODERATE[a]	2.04 (0.12 to 3.96)	MODERATE[a]
EBM vs. White noise	_	VERY LOW[b,f]	0.88 (-0.01 to 1.77)	VERY LOW[b,f]
EBM vs. White noise-Mother holding	_	VERY LOW[c,d]	2.68 (1.58 to 3.78)	VERY LOW[c,d]
Facilitated tucking vs. Formula Milk	_	VERY LOW[c,d]	-1.18 (-3.07 to 0.71)	VERY LOW[c,d]
Facilitated tucking vs. Fructose	_	LOW[b]	0.82 (-0.54 to 2.17)	LOW[b]
Facilitated tucking vs. Glucose-Mother holding	_	MODERATE[a]	1.14 (-0.02 to 2.31)	MODERATE[a]
Facilitated tucking vs. KMC	_	MODERATE[a]	0.11 (-0.61 to 0.83)	MODERATE[a]
Facilitated tucking vs. KMC-Sucrose	_	MODERATE[a]	0.64 (-0.51 to 1.78)	MODERATE[a]
Facilitated tucking vs. Mother's heartbeat sounds	_	LOW[b]	0.48 (-0.92 to 1.87)	LOW[b]
Facilitated tucking vs. Mother's Voice	_	LOW[a,e]	0.29 (-0.55 to 1.13)	LOW[a,e]
Facilitated tucking vs. Mother's Voice-Mother holding	_	LOW[a,e]	1.82 (0.82 to 2.82)	LOW[a,e]
Facilitated tucking vs. Music	_	MODERATE[a]	-0.32 (-1.35 to 0.71)	MODERATE[a]
Facilitated tucking vs. NNS-Facilitated tucking	_	MODERATE[a]	0.83 (-1.01 to 2.68)	MODERATE[a]
Facilitated tucking vs. Odour	_	LOW[a,e]	-0.17 (-1.07 to 0.73)	LOW[a,e]
Facilitated tucking vs. Paracetamol	_	VERY LOW[b,d]	0.03 (-1.37 to 1.42)	VERY LOW[b,d]
Facilitated tucking vs. Prone Positioning	_	MODERATE[a]	0.13 (-0.97 to 1.23)	MODERATE[a]

Facilitated tucking vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.88 (0.02 to 3.74)	VERY LOW[c,d]
Facilitated tucking vs. Swaddling	_	MODERATE[a]	-0.11 (-1.04 to 0.81)	MODERATE[a]
Facilitated tucking vs. Topical Anesthesia	_	LOW[a,e]	-0.47 (-1.63 to 0.70)	LOW[a,e]
Facilitated tucking vs. Touch Massage	_	LOW[a,e]	0.23 (-0.47 to 0.94)	LOW[a,e]
Facilitated tucking vs. Touch Massage-NNS	_	MODERATE[a]	2.47 (0.60 to 4.35)	MODERATE[a]
Facilitated tucking vs. White noise-Mother holding	_	VERY LOW[c,d]	3.12 (2.10 to 4.13)	VERY LOW[c,d]
Formula Milk vs. Fructose	_	VERY LOW[c,d]	2.00 (-0.22 to 4.21)	VERY LOW[c,d]
Formula Milk vs. Glucose	_	VERY LOW[c,d]	1.76 (-0.09 to 3.61)	VERY LOW[c,d]
Formula Milk vs. Glucose-Mother holding	_	VERY LOW[c,d]	2.32 (0.26 to 4.39)	VERY LOW[c,d]
Formula Milk vs. KMC	_	VERY LOW[c,d]	1.29 (-0.63 to 3.21)	VERY LOW[c,d]
Formula Milk vs. KMC-Sucrose	_	VERY LOW[c,d]	1.82 (-0.29 to 3.93)	VERY LOW[c,d]
Formula Milk vs. Mother's heartbeat sounds	_	VERY LOW[c,d]	1.66 (-0.60 to 3.92)	VERY LOW[c,d]
Formula Milk vs. Mother holding	_	VERY LOW[c,d]	1.34 (-0.59 to 3.26)	VERY LOW[c,d]
Formula Milk vs. Mother's Voice	_	VERY LOW[c,d]	1.47 (-0.52 to 3.45)	VERY LOW[c,d]
Formula Milk vs. Mother's Voice-Mother holding	_	VERY LOW[c,d]	3.00 (0.95 to 5.05)	VERY LOW[c,d]
Formula Milk vs. Music	_	VERY LOW[c,d]	0.86 (-1.19 to 2.92)	VERY LOW[c,d]
Formula Milk vs. Music-NNS-Facilitated tucking	_	VERY LOW[c,d]	1.31 (-1.33 to 3.94)	VERY LOW[c,d]
Formula Milk vs. NNS	_	VERY LOW[c,d]	1.54 (-0.34 to 3.42)	VERY LOW[c,d]
Formula Milk vs. NNS-Facilitated tucking	_	VERY LOW[c,d]	2.01 (-0.56 to 4.58)	VERY LOW[c,d]
Formula Milk vs. NNS-Sucrose	_	VERY LOW[c,d]	3.44 (1.52 to 5.35)	VERY LOW[c,d]
Formula Milk vs. Odour	_	VERY LOW[c,d]	1.01 (-0.99 to 3.00)	VERY LOW[c,d]
Formula Milk vs. Opioid	_	VERY LOW[c,d]	1.23 (-0.79 to 3.26)	VERY LOW[c,d]
Formula Milk vs. Paracetamol	_	VERY LOW[c,d]	1.21 (-1.04 to 3.46)	VERY LOW[c,d]
Formula Milk vs. Prone Positioning	_	VERY LOW[c,d]	1.31 (-0.80 to 3.41)	VERY LOW[c,d]
Formula Milk vs. Sensorial Saturation	_	VERY LOW[c,d]	1.81 (-0.46 to 4.07)	VERY LOW[c,d]
Formula Milk vs. Sterile water	_	VERY LOW[c,d]	0.82 (-1.03 to 2.68)	VERY LOW[c,d]
Formula Milk vs. Sucrose	_	VERY LOW[c,d]	1.59 (-0.27 to 3.46)	VERY LOW[c,d]
Formula Milk vs. Sucrose-Facilitated tucking	_	VERY LOW[c,d]	1.64 (-0.60 to 3.88)	VERY LOW[c,d]
Formula Milk vs. Sucrose-Vibration	_	VERY LOW[c,d]	3.06 (0.49 to 5.63)	VERY LOW[c,d]
Formula Milk vs. Swaddling	_	VERY LOW[c,d]	1.07 (-0.94 to 3.08)	VERY LOW[c,d]
Formula Milk vs. Topical Anesthesia	_	VERY LOW[c,d]	0.71 (-1.42 to 2.85)	VERY LOW[c,d]
Formula Milk vs. Touch Massage	_	VERY LOW[c,d]	1.41 (-0.51 to 3.33)	VERY LOW[c,d]
Formula Milk vs. Touch Massage-NNS	_	VERY LOW[c,d]	3.65 (1.06 to 6.25)	VERY LOW[c,d]
Formula Milk vs. White noise	_	VERY LOW[c,d]	2.50 (0.54 to 4.45)	VERY LOW[c,d]

Formula Milk vs. White noise-Mother holding	_	VERY LOW[c,d]	4.30 (2.23 to 6.36)	VERY LOW[c,d]
Fructose vs. Glucose-Mother holding	_	LOW[b]	0.33 (-1.31 to 1.97)	LOW[b]
Fructose vs. KMC	_	LOW[b]	-0.70 (-2.10 to 0.70)	LOW[b]
Fructose vs. KMC-Sucrose	_	MODERATE[a]	-0.18 (-1.83 to 1.47)	MODERATE[a]
Fructose vs. Mother's heartbeat sounds	_	LOW[b]	-0.34 (-2.18 to 1.50)	LOW[b]
Fructose vs. Mother holding	_	LOW[b]	-0.66 (-2.08 to 0.75)	LOW[b]
Fructose vs. Mother's Voice	_	LOW[b]	-0.53 (-2.02 to 0.96)	LOW[b]
Fructose vs. Mother's Voice-Mother holding	_	LOW[b]	1.00 (-0.58 to 2.58)	LOW[b]
Fructose vs. Music	_	LOW[b]	-1.13 (-2.72 to 0.45)	LOW[b]
Fructose vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.69 (-2.97 to 1.59)	LOW[b]
Fructose vs. NNS	_	LOW[b]	-0.46 (-1.80 to 0.89)	LOW[b]
Fructose vs. NNS-Facilitated tucking	_	LOW[b]	0.02 (-2.19 to 2.23)	LOW[b]
Fructose vs. NNS-Sucrose	_	LOW[b]	1.44 (0.05 to 2.84)	LOW[b]
Fructose vs. Odour	_	LOW[b]	-0.99 (-2.50 to 0.52)	LOW[b]
Fructose vs. Opioid	_	VERY LOW[d]	-0.76 (-2.28 to 0.76)	VERY LOW[d]
Fructose vs. Paracetamol	_	VERY LOW[b,d]	-0.79 (-2.59 to 1.02)	VERY LOW[b,d]
Fructose vs. Prone Positioning	_	LOW[b]	-0.69 (-2.33 to 0.95)	LOW[b]
Fructose vs. Sensorial Saturation	_	LOW[b]	-0.19 (-2.02 to 1.65)	LOW[b]
Fructose vs. Sucrose	_	MODERATE[c]	-0.40 (-1.72 to 0.91)	MODERATE[c]
Fructose vs. Sucrose-Facilitated tucking	_	LOW[b]	-0.36 (-2.16 to 1.45)	LOW[b]
Fructose vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.06 (-1.14 to 3.27)	VERY LOW[c,d]
Fructose vs. Swaddling	_	LOW[b]	-0.93 (-2.45 to 0.60)	LOW[b]
Fructose vs. Topical Anesthesia	_	LOW[b]	-1.28 (-2.97 to 0.40)	LOW[b]
Fructose vs. Touch Massage	_	LOW[b]	-0.58 (-1.99 to 0.82)	LOW[b]
Fructose vs. Touch Massage-NNS	_	LOW[b]	1.66 (-0.58 to 3.90)	LOW[b]
Fructose vs. White noise	_	LOW[b]	0.50 (-0.95 to 1.95)	LOW[b]
Fructose vs. White noise-Mother holding	_	VERY LOW[c,d]	2.30 (0.71 to 3.89)	VERY LOW[c,d]
Glucose vs. KMC	_	MODERATE[a]	-0.47 (-1.16 to 0.22)	MODERATE[a]
Glucose vs. KMC-Sucrose	_	MODERATE[a]	0.06 (-1.06 to 1.17)	MODERATE[a]
Glucose vs. Mother's heartbeat sounds	_	LOW[b]	-0.10 (-1.48 to 1.27)	LOW[b]
Glucose vs. Mother holding	_	HIGH	-0.43 (-1.14 to 0.29)	HIGH
Glucose vs. Mother's Voice	_	MODERATE[a]	-0.30 (-1.14 to 0.55)	MODERATE[a]
Glucose vs. Mother's Voice-Mother holding	_	LOW[c,e]	1.24 (0.24 to 2.24)	LOW[c,e]
Glucose vs. Music	_	MODERATE[a]	-0.90 (-1.91 to 0.11)	MODERATE[a]

Glucose vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.45 (-2.38 to 1.47)	LOW[b]
Glucose vs. NNS-Facilitated tucking	_	LOW[b]	0.25 (-1.59 to 2.09)	LOW[b]
Glucose vs. NNS-Sucrose	_	HIGH	1.68 (1.01 to 2.35)	HIGH
Glucose vs. Odour	_	MODERATE[a]	-0.76 (-1.63 to 0.12)	MODERATE[a]
Glucose vs. Paracetamol	_	VERY LOW[b,d]	-0.55 (-1.91 to 0.81)	VERY LOW[b,d]
Glucose vs. Prone Positioning	_	MODERATE[a]	-0.46 (-1.55 to 0.64)	MODERATE[a]
Glucose vs. Sensorial Saturation	_	MODERATE[a]	0.04 (-1.33 to 1.42)	MODERATE[a]
Glucose vs. Sucrose-Facilitated tucking	_	MODERATE[a]	-0.12 (-1.46 to 1.21)	MODERATE[a]
Glucose vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.30 (-0.55 to 3.14)	VERY LOW[c,d]
Glucose vs. Swaddling	_	HIGH	-0.69 (-1.60 to 0.22)	HIGH
Glucose vs. Topical Anesthesia	_	MODERATE[a]	-1.05 (-2.21 to 0.11)	MODERATE[a]
Glucose vs. Touch Massage	_	HIGH	-0.35 (-1.04 to 0.34)	HIGH
Glucose vs. Touch Massage-NNS	_	LOW[b]	1.89 (0.02 to 3.77)	LOW[b]
Glucose vs. White noise	_	MODERATE[a]	0.73 (-0.05 to 1.52)	MODERATE[a]
Glucose vs. White noise-Mother holding	_	VERY LOW[c,d]	2.54 (1.51 to 3.56)	VERY LOW[c,d]
Glucose-Mother holding vs. KMC	_	LOW[b]	-1.03 (-2.23 to 0.17)	LOW[b]
Glucose-Mother holding vs. KMC-Sucrose	_	LOW[b]	-0.51 (-1.99 to 0.98)	LOW[b]
Glucose-Mother holding vs. Mother's heartbeat sounds	_	LOW[b]	-0.67 (-2.35 to 1.02)	LOW[b]
Glucose-Mother holding vs. Mother holding	_	LOW[b]	-0.99 (-2.20 to 0.23)	LOW[b]
Glucose-Mother holding vs. Mother's Voice	_	MODERATE[a]	-0.86 (-2.16 to 0.45)	MODERATE[a]
Glucose-Mother holding vs. Mother's Voice-Mother holding	_	LOW[c,e]	0.68 (-0.73 to 2.08)	LOW[c,e]
Glucose-Mother holding vs. Music	_	LOW[b]	-1.46 (-2.86 to -0.05)	LOW[b]
Glucose-Mother holding vs. Music-NNS-Facilitated tucking	_	LOW[b]	-1.02 (-3.19 to 1.15)	LOW[b]
Glucose-Mother holding vs. NNS	_	LOW[b]	-0.79 (-1.93 to 0.36)	LOW[b]
Glucose-Mother holding vs. NNS-Facilitated tucking	_	LOW[b]	-0.31 (-2.40 to 1.78)	LOW[b]
Glucose-Mother holding vs. NNS-Sucrose	_	MODERATE[a]	1.12 (-0.08 to 2.32)	MODERATE[a]
Glucose-Mother holding vs. Odour	_	LOW[b]	-1.32 (-2.63 to 0.00)	LOW[b]
Glucose-Mother holding vs. Opioid	_	VERY LOWb,d	-1.09 (-2.46 to 0.28)	VERY LOWb,d
Glucose-Mother holding vs. Paracetamol	_	VERY LOW[b,d]	-1.11 (-2.81 to 0.58)	VERY LOW[b,d]
Glucose-Mother holding vs. Prone Positioning	_	MODERATE[a]	-1.02 (-2.50 to 0.46)	MODERATE[a]
Glucose-Mother holding vs. Sensorial Saturation	_	MODERATE[a]	-0.52 (-2.22 to 1.19)	MODERATE[a]
Glucose-Mother holding vs. Sterile water	_	MODERATE[a]	-1.50 (-2.63 to -0.37)	MODERATE[a]
Glucose-Mother holding vs. Sucrose	_	MODERATE[a]	-0.73 (-1.85 to 0.39)	MODERATE[a]
Glucose-Mother holding vs. Sucrose-Facilitated tucking	_	MODERATE[a]	-0.68 (-2.36 to 0.99)	MODERATE[a]

Glucose-Mother holding vs. Sucrose-Vibration	_	VERY LOW[c,d]	0.74 (-1.36 to 2.83)	VERY LOW[c,d]
Glucose-Mother holding vs. Swaddling	_	LOW[b]	-1.25 (-2.59 to 0.08)	LOW[b]
Glucose-Mother holding vs. Topical Anesthesia	_	MODERATE[a]	-1.61 (-3.14 to -0.09)	MODERATE[a]
Glucose-Mother holding vs. Touch Massage	_	MODERATE[a]	-0.91 (-2.12 to 0.30)	MODERATE[a]
Glucose-Mother holding vs. Touch Massage-NNS	_	LOW[b]	1.33 (-0.79 to 3.45)	LOW[b]
Glucose-Mother holding vs. White noise	_	MODERATE[a]	0.17 (-1.09 to 1.44)	MODERATE[a]
Glucose-Mother holding vs. White noise-Mother holding	_	VERY LOW[c,d]	1.97 (0.55 to 3.40)	VERY LOW[c,d]
KMC vs. Mother's heartbeat sounds	_	LOW[b]	0.36 (-1.05 to 1.78)	LOW[b]
KMC vs. Mother holding	_	MODERATE[a]	0.04 (-0.74 to 0.83)	MODERATE[a]
KMC vs. Mother's Voice	_	MODERATE[a]	0.17 (-0.73 to 1.08)	MODERATE[a]
KMC vs. Mother's Voice-Mother holding	_	LOW[c,e]	1.71 (0.65 to 2.76)	LOW[c,e]
KMC vs. Music	_	MODERATE[a]	-0.43 (-1.49 to 0.63)	MODERATE[a]
KMC vs. Music-NNS-Facilitated tucking	_	LOW[b]	0.01 (-1.95 to 1.98)	LOW[b]
KMC vs. NNS-Facilitated tucking	_	VERY LOW[a,d]	0.72 (-1.14 to 2.59)	VERY LOW[a,d]
KMC vs. NNS-Sucrose	_	MODERATE[a]	2.15 (1.40 to 2.89)	MODERATE[a]
KMC vs. Odour	_	MODERATE[a]	-0.29 (-1.22 to 0.65)	MODERATE[a]
KMC vs. Opioid	_	VERY LOW[b,d]	-0.06 (-1.11 to 0.99)	VERY LOW[b,d]
KMC vs. Paracetamol	_	VERY LOW[b,d]	-0.08 (-1.51 to 1.34)	VERY LOW[b,d]
KMC vs. Prone Positioning	_	MODERATE[a]	0.01 (-1.13 to 1.16)	MODERATE[a]
KMC vs. Sensorial Saturation	_	MODERATE[a]	0.51 (-0.94 to 1.97)	MODERATE[a]
KMC vs. Sterile water	_	VERY LOW[b,d]	-0.47 (-1.19 to 0.25)	VERY LOW[b,d]
KMC vs. Sucrose-Facilitated tucking	_	VERY LOW[b,g]	0.35 (-1.04 to 1.73)	VERY LOW[b,g]
KMC vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.77 (-0.10 to 3.63)	VERY LOW[c,d]
KMC vs. Swaddling	_	MODERATE[a]	-0.22 (-1.19 to 0.74)	MODERATE[a]
KMC vs. Topical Anesthesia	_	MODERATE[a]	-0.58 (-1.78 to 0.62)	MODERATE[a]
KMC vs. Touch Massage	_	MODERATE[a]	0.12 (-0.64 to 0.88)	MODERATE[a]
KMC vs. Touch Massage-NNS	_	VERY LOW[a,d]	2.36 (0.46 to 4.26)	VERY LOW[a,d]
KMC vs. White noise	_	VERY LOW[b,f]	1.20 (0.35 to 2.06)	VERY LOW[b,f]
KMC vs. White noise-Mother holding	_	VERY LOW[c,d]	3.00 (1.93 to 4.08)	VERY LOW[c,d]
KMC-Sucrose vs. Mother's heartbeat sounds	_	LOW[b]	-0.16 (-1.82 to 1.50)	LOW[b]
KMC-Sucrose vs. Mother holding	_	MODERATE[a]	-0.48 (-1.67 to 0.71)	MODERATE[a]
KMC-Sucrose vs. Mother's Voice	_	MODERATE[a]	-0.35 (-1.63 to 0.92)	MODERATE[a]
KMC-Sucrose vs. Mother's Voice-Mother holding	_	LOW[c,e]	1.18 (-0.20 to 2.56)	LOW[c,e]
KMC-Sucrose vs. Music	_	MODERATE[a]	-0.95 (-2.33 to 0.43)	MODERATE[a]

KMC-Sucrose vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.51 (-2.67 to 1.65)	LOW[b]
KMC-Sucrose vs. NNS	_	VERY LOW[b,e]	-0.28 (-1.38 to 0.82)	VERY LOW[b,e]
KMC-Sucrose vs. NNS-Facilitated tucking	_	MODERATE[a]	0.20 (-1.87 to 2.27)	MODERATE[a]
KMC-Sucrose vs. NNS-Sucrose	_	LOW[b]	1.62 (0.46 to 2.79)	LOW[b]
KMC-Sucrose vs. Odour	_	MODERATE[a]	-0.81 (-2.10 to 0.48)	MODERATE[a]
KMC-Sucrose vs. Opioid	_	VERY LOW[b,d]	-0.59 (-1.96 to 0.79)	VERY LOW[b,d]
KMC-Sucrose vs. Paracetamol	_	VERY LOW[b,d]	-0.61 (-2.28 to 1.06)	VERY LOW[b,d]
KMC-Sucrose vs. Prone Positioning	_	MODERATE[a]	-0.51 (-1.97 to 0.94)	MODERATE[a]
KMC-Sucrose vs. Sensorial Saturation	_	MODERATE[a]	-0.01 (-1.71 to 1.69)	MODERATE[a]
KMC-Sucrose vs. Sterile water	_	MODERATE[a]	-0.99 (-2.13 to 0.14)	MODERATE[a]
KMC-Sucrose vs. Sucrose-Facilitated tucking	_	LOW[b]	-0.18 (-1.82 to 1.46)	LOW[b]
KMC-Sucrose vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.24 (-0.82 to 3.30)	VERY LOW[c,d]
KMC-Sucrose vs. Swaddling	_	MODERATE[a]	-0.75 (-2.06 to 0.56)	MODERATE[a]
KMC-Sucrose vs. Topical Anesthesia	_	MODERATE[a]	-1.11 (-2.61 to 0.40)	MODERATE[a]
KMC-Sucrose vs. Touch Massage	_	MODERATE[a]	-0.41 (-1.58 to 0.77)	MODERATE[a]
KMC-Sucrose vs. Touch Massage-NNS	_	MODERATE[a]	1.84 (-0.27 to 3.94)	MODERATE[a]
KMC-Sucrose vs. White noise	_	MODERATE[a]	0.68 (-0.56 to 1.92)	MODERATE[a]
KMC-Sucrose vs. White noise-Mother holding	_	VERY LOW[c,d]	2.48 (1.08 to 3.88)	VERY LOW[c,d]
Mother's heartbeat sounds vs. Mother holding	_	LOW[b]	-0.32 (-1.74 to 1.10)	LOW[b]
Mother's heartbeat sounds vs. Mother's Voice	_	MODERATE[a]	-0.19 (-1.69 to 1.30)	MODERATE[a]
Mother's heartbeat sounds vs. Mother's Voice-Mother holding	_	LOW[b]	1.34 (-0.24 to 2.93)	LOW[b]
Mother's heartbeat sounds vs. Music	_	LOW[b]	-0.79 (-2.37 to 0.79)	LOW[b]
Mother's heartbeat sounds vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.35 (-2.65 to 1.95)	LOW[b]
Mother's heartbeat sounds vs. NNS	_	VERY LOW[b,e]	-0.12 (-1.48 to 1.24)	VERY LOW[b,e]
Mother's heartbeat sounds vs. NNS-Facilitated tucking	_	VERY LOW[b,e]	0.36 (-1.86 to 2.58)	VERY LOW[b,e]
Mother's heartbeat sounds vs. NNS-Sucrose	_	LOW[b]	1.78 (0.37 to 3.19)	LOW[b]
Mother's heartbeat sounds vs. Opioid	_	VERY LOW[b,d]	-0.43 (-2.02 to 1.16)	VERY LOW[b,d]
Mother's heartbeat sounds vs. Paracetamol	_	VERY LOW[b,d]	-0.45 (-2.32 to 1.42)	VERY LOW[b,d]
Mother's heartbeat sounds vs. Prone Positioning	_	LOW[b]	-0.35 (-2.01 to 1.30)	LOW[b]
Mother's heartbeat sounds vs. Sensorial Saturation	_	LOW[b]	0.15 (-1.73 to 2.03)	LOW[b]
Mother's heartbeat sounds vs. Sterile water	_	LOW[b]	-0.83 (-2.24 to 0.57)	LOW[b]
Mother's heartbeat sounds vs. Sucrose	_	VERY LOW[b,f]	-0.06 (-1.43 to 1.30)	VERY LOW[b,f]
Mother's heartbeat sounds vs. Sucrose-Facilitated tucking	_	VERY LOW[b,f]	-0.02 (-1.86 to 1.82)	VERY LOW[b,f]
Mother's heartbeat sounds vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.40 (-0.83 to 3.63)	VERY LOW[c,d]

Mother's heartbeat sounds vs. Swaddling	_	LOW[b]	-0.59 (-2.11 to 0.93)	LOW[b]
Mother's heartbeat sounds vs. Topical Anesthesia	_	MODERATE[a]	-0.95 (-2.64 to 0.75)	MODERATE[a]
Mother's heartbeat sounds vs. Touch Massage	_	LOW[b]	-0.24 (-1.66 to 1.17)	LOW[b]
Mother's heartbeat sounds vs. Touch Massage-NNS	_	VERY LOW[b,e]	2.00 (-0.25 to 4.25)	VERY LOW[b,e]
Mother's heartbeat sounds vs. White noise	_	VERY LOW[b,f]	0.84 (-0.63 to 2.30)	VERY LOW[b,f]
Mother's heartbeat sounds vs. White noise-Mother holding	_	VERY LOW[c,d]	2.64 (1.04 to 4.24	VERY LOW[c,d]
Mother holding vs. Music	_	HIGH	-0.47 (-1.54 to 0.59)	HIGH
Mother holding vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.03 (-1.99 to 1.93)	LOW[b]
Mother holding vs. NNS	_	HIGH	0.20 (-0.48 to 0.88)	HIGH
Mother holding vs. NNS-Facilitated tucking	_	MODERATE[a]	0.68 (-1.20 to 2.56)	MODERATE[a]
Mother holding vs. NNS-Sucrose	_	HIGH	2.10 (1.34 to 2.87)	HIGH
Mother holding vs. Odour	_	MODERATE[a]	-0.33 (-1.27 to 0.61)	MODERATE[a]
Mother holding vs. Opioid	_	VERY LOW[b,d]	-0.10 (-1.15 to 0.95)	VERY LOW[b,d]
Mother holding vs. Paracetamol	_	VERY LOW[b,d]	-0.13 (-1.58 to 1.33)	VERY LOW[b,d]
Mother holding vs. Prone Positioning	_	MODERATE[a]	-0.03 (-1.19 to 1.12)	MODERATE[a]
Mother holding vs. Sensorial Saturation	_	MODERATE[c]	0.47 (-0.98 to 1.92)	MODERATE[c]
Mother holding vs. Sterile water	_	VERY LOW[b,d]	-0.51 (-1.27 to 0.24)	VERY LOW[b,d]
Mother holding vs. Sucrose	_	HIGH	0.26 (-0.43 to 0.95)	HIGH
Mother holding vs. Sucrose-Facilitated tucking	_	MODERATE[a]	0.30 (-1.10 to 1.71)	MODERATE[a]
Mother holding vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.72 (-0.18 to 3.62)	VERY LOW[c,d]
Mother holding vs. Topical Anesthesia	_	MODERATE[a]	-0.62 (-1.82 to 0.58)	MODERATE[a]
Mother holding vs. Touch Massage	_	HIGH	0.08 (-0.69 to 0.84)	HIGH
Mother holding vs. Touch Massage-NNS	_	MODERATE[c]	2.32 (0.41 to 4.23)	MODERATE[c]
Mother's Voice vs. Music	_	MODERATE[a]	-0.60 (-1.76 to 0.55)	MODERATE[a]
Mother's Voice vs. Music-NNS-Facilitated tucking	_	LOW[b]	-0.16 (-2.17 to 1.86)	LOW[b]
Mother's Voice vs. NNS	_	MODERATE[a]	0.07 (-0.74 to 0.88)	MODERATE[a]
Mother's Voice vs. NNS-Facilitated tucking	_	MODERATE[a]	0.55 (-1.38 to 2.48)	MODERATE[a]
Mother's Voice vs. NNS-Sucrose	_	MODERATE[a]	1.97 (1.09 to 2.86)	MODERATE[a]
Mother's Voice vs. Odour	_	LOW[a,e]	-0.46 (-1.50 to 0.58)	LOW[a,e]
Mother's Voice vs. Opioid	_	VERY LOW[b,d]	-0.23 (-1.38 to 0.91)	VERY LOW[b,d]
Mother's Voice vs. Paracetamol	_	VERY LOW[b,d]	-0.26 (-1.78 to 1.27)	VERY LOW[b,d]
Mother's Voice vs. Prone Positioning	_	MODERATE[a]	-0.16 (-1.40 to 1.07)	MODERATE[a]
Mother's Voice vs. Sensorial Saturation	_	MODERATE[a]	0.34 (-1.18 to 1.86)	MODERATE[a]
Mother's Voice vs. Sterile water	_	VERY LOW[b,d]	-0.64 (-1.53 to 0.24)	VERY LOW[b,d]

Mother's Voice vs. Sucrose	_	MODERATE[a]	0.13 (-0.70 to 0.95)	MODERATE[a]
Mother's Voice vs. Sucrose-Facilitated tucking	_	MODERATE[a]	0.17 (-1.30 to 1.65)	MODERATE[a]
Mother's Voice vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.59 (-0.36 to 3.54)	VERY LOW[c,d]
Mother's Voice vs. Swaddling	_	MODERATE[a]	-0.40 (-1.44 to 0.65)	MODERATE[a]
Mother's Voice vs. Topical Anesthesia	_	MODERATE[a]	-0.75 (-2.03 to 0.52)	MODERATE[a]
Mother's Voice vs. Touch Massage	_	MODERATE[a]	-0.05 (-0.93 to 0.82)	MODERATE[a]
Mother's Voice vs. Touch Massage-NNS	_	MODERATE[c]	2.19 (0.22 to 4.15)	MODERATE[c]
Mother's Voice-Mother holding vs. Music	_	LOW[c,e]	-2.14 (-3.41 to -0.86)	LOW[c,e]
Mother's Voice-Mother holding vs. Music-NNS-Facilitated tucking	_	LOW[c,e]	-1.69 (-3.78 to 0.39)	LOW[c,e]
Mother's Voice-Mother holding vs. NNS	_	LOW[c,e]	-1.46 (-2.44 to -0.49)	LOW[c,e]
Mother's Voice-Mother holding vs. NNS-Facilitated tucking	_	LOW[c,e]	-0.99 (-2.99 to 1.02)	LOW[c,e]
Mother's Voice-Mother holding vs. NNS-Sucrose	_	LOW[c,e]	0.44 (-0.60 to 1.47)	LOW[c,e]
Mother's Voice-Mother holding vs. Odour	_	LOW[c,e]	-1.99 (-3.16 to -0.82)	LOW[c,e]
Mother's Voice-Mother holding vs. Opioid	_	VERY LOW[b,d]	-1.77 (-3.03 to -0.50)	VERY LOW[b,d]
Mother's Voice-Mother holding vs. Paracetamol	_	VERY LOW[b,d]	-1.79 (-3.41 to -0.18)	VERY LOW[b,d]
Mother's Voice-Mother holding vs. Prone Positioning	_	LOW[c,e]	-1.69 (-3.04 to -0.35)	LOW[c,e]
Mother's Voice-Mother holding vs. Sensorial Saturation	_	LOW[c,e]	-1.19 (-2.80 to 0.42)	LOW[c,e]
Mother's Voice-Mother holding vs. Sterile water	_	VERY LOW[b,d]	-2.18 (-3.21 to -1.14)	VERY LOW[b,d]
Mother's Voice-Mother holding vs. Sucrose	_	LOW[c,e]	-1.41 (-2.39 to -0.42)	LOW[c,e]
Mother's Voice-Mother holding vs. Sucrose-Facilitated tucking	_	LOW[c,e]	-1.36 (-2.93 to 0.21)	LOW[c,e]
Mother's Voice-Mother holding vs. Sucrose-Vibration	_	VERY LOW[c,d]	0.06 (-1.97 to 2.08)	VERY LOW[c,d]
Mother's Voice-Mother holding vs. Swaddling	_	LOW[c,e]	-1.93 (-3.10 to -0.76)	LOW[c,e]
Mother's Voice-Mother holding vs. Topical Anesthesia	_	LOW[c,e]	-2.29 (-3.67 to -0.90)	LOW[c,e]
Mother's Voice-Mother holding vs. Touch Massage	_	LOW[c,e]	-1.59 (-2.62 to -0.56)	LOW[c,e]
Mother's Voice-Mother holding vs. Touch Massage-NNS	_	LOW[c,e]	0.65 (-1.38 to 2.69)	LOW[c,e]
Music vs. Music-NNS-Facilitated tucking	_	LOW[b]	0.44 (-1.66 to 2.54)	LOW[b]
Music vs. NNS	_	HIGH	0.67 (-0.31 to 1.66)	HIGH
Music vs. NNS-Facilitated tucking	_	MODERATE[a]	1.15 (-0.86 to 3.16)	MODERATE[a]
Music vs. NNS-Sucrose	_	MODERATE[a]	2.58 (1.53 to 3.63)	MODERATE[a]
Music vs. Odour	_	MODERATE[a]	0.14 (-1.03 to 1.32)	MODERATE[a]
Music vs. Opioid	_	VERY LOW[b,d]	0.37 (-0.91 to 1.65)	VERY LOW[b,d]
Music vs. Paracetamol	_	VERY LOW[b,d]	0.34 (-1.28 to 1.97)	VERY LOW[b,d]
Music vs. Prone Positioning	_	MODERATE[a]	0.44 (-0.92 to 1.80)	MODERATE[a]
Music vs. Sensorial Saturation	_	MODERATE[a]	0.94 (-0.68 to 2.57)	MODERATE[a]

Music vs. Sterile water	_	VERY LOW[b,d]	-0.04 (-1.08 to 1.00)	VERY LOW[b,d]
Music vs. Sucrose	_	MODERATE[a]	0.73 (-0.26 to 1.72)	MODERATE[a]
Music vs. Sucrose-Facilitated tucking	_	MODERATE[a]	0.78 (-0.81 to 2.36)	MODERATE[a]
Music vs. Sucrose-Vibration	_	VERY LOW[c,d]	2.19 (0.17 to 4.22)	VERY LOW[c,d]
Music vs. Swaddling	_	MODERATE[a]	0.20 (-0.99 to 1.40)	MODERATE[a]
Music vs. Topical Anesthesia	_	MODERATE[a]	-0.15 (-1.55 to 1.24)	MODERATE[a]
Music vs. Touch Massage	_	MODERATE[a]	0.55 (-0.50 to 1.60)	MODERATE[a]
Music vs. Touch Massage-NNS	_	MODERATE[a]	2.79 (0.75 to 4.83)	MODERATE[a]
Music vs. White noise	_	VERY LOW[b,f]	1.63 (0.52 to 2.75)	VERY LOW[b,f]
Music vs. White noise-Mother holding	_	VERY LOW[c,d]	3.43 (2.14 to 4.72)	VERY LOW[c,d]
Music-NNS-Facilitated tucking vs. NNS	_	LOW[b]	0.23 (-1.69 to 2.15)	LOW[b]
Music-NNS-Facilitated tucking vs. NNS-Facilitated tucking	_	LOW[b]	0.71 (-1.89 to 3.30)	LOW[b]
Music-NNS-Facilitated tucking vs. NNS-Sucrose	_	LOW[b]	2.13 (0.18 to 4.08)	LOW[b]
Music-NNS-Facilitated tucking vs. Odour	_	LOW[b]	-0.30 (-2.34 to 1.74)	LOW[b]
Music-NNS-Facilitated tucking vs. Opioid	_	VERY LOW[b,d]	-0.07 (-2.10 to 1.95)	VERY LOW[b,d]
Music-NNS-Facilitated tucking vs. Paracetamol	_	VERY LOW[b,d]	-0.10 (-2.40 to 2.20)	VERY LOW[b,d]
Music-NNS-Facilitated tucking vs. Prone Positioning	_	LOW[b]	-0.00 (-2.14 to 2.13)	LOW[b]
Music-NNS-Facilitated tucking vs. Sensorial Saturation	_	LOW[b]	0.50 (-1.74 to 2.74)	LOW[b]
Music-NNS-Facilitated tucking vs. Sterile water	_	VERY LOW[c,d]	-0.48 (-2.42 to 1.45)	VERY LOW[c,d]
Music-NNS-Facilitated tucking vs. Sucrose	_	LOW[b]	0.29 (-1.63 to 2.21)	LOW[b]
Music-NNS-Facilitated tucking vs. Sucrose-Facilitated tucking	_	LOW[b]	0.33 (-1.91 to 2.57)	LOW[b]
Music-NNS-Facilitated tucking vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.75 (-0.86 to 4.36)	VERY LOW[c,d]
Music-NNS-Facilitated tucking vs. Swaddling	_	LOW[b]	-0.24 (-2.29 to 1.81)	LOW[b]
Music-NNS-Facilitated tucking vs. Topical Anesthesia	_	LOW[b]	-0.60 (-2.77 to 1.58)	LOW[b]
Music-NNS-Facilitated tucking vs. Touch Massage	_	LOW[b]	0.11 (-1.86 to 2.07)	LOW[b]
Music-NNS-Facilitated tucking vs. Touch Massage-NNS	_	LOW[b]	2.35 (-0.27 to 4.97)	LOW[b]
Music-NNS-Facilitated tucking vs. White noise	_	LOW[b]	1.19 (-0.80 to 3.17)	LOW[b]
Music-NNS-Facilitated tucking vs. White noise-Mother holding	_	VERY LOW[c,d]	2.99 (0.90 to 5.08)	VERY LOW[c,d]
NNS vs. Odour	_	LOW[a,e]	-0.53 (-1.38 to 0.32)	LOW[a,e]
NNS vs. Opioid	_	VERY LOW[b,d]	-0.31 (-1.26 to 0.65)	VERY LOW[b,d]
NNS vs. Paracetamol	_	VERY LOW[b,d]	-0.33 (-1.71 to 1.05)	VERY LOW[b,d]
NNS vs. Sensorial Saturation	_	MODERATE[a]	0.27 (-1.11 to 1.65)	MODERATE[a]
NNS vs. Sterile water	_	LOW[b]	-0.71 (-1.33 to -0.10)	LOW[b]
NNS vs. Sucrose-Facilitated tucking	_	MODERATE[a]	0.10 (-1.23 to 1.43)	MODERATE[a]

NNS vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.52 (-0.32 to 3.36)	VERY LOW[c,d]
NNS vs. Swaddling	_	HIGH	-0.47 (-1.35 to 0.41)	HIGH
NNS vs. Topical Anesthesia	_	MODERATE[a]	-0.83 (-1.96 to 0.30)	MODERATE[a]
NNS vs. White noise	_	VERY LOW[b,f]	0.96 (0.21 to 1.71)	VERY LOW[b,f]
NNS vs. White noise-Mother holding	_	VERY LOW[c,d]	2.76 (1.77 to 3.75)	VERY LOW[c,d]
NNS-Facilitated tucking vs. NNS-Sucrose	_	LOW[a,e]	1.42 (-0.41 to 3.26)	LOW[a,e]
NNS-Facilitated tucking vs. Odour	_	VERY LOW[b,d]	-1.01 (-2.95 to 0.94)	VERY LOW[b,d]
NNS-Facilitated tucking vs. Opioid	_	VERY LOW[b,d]	-0.78 (-2.78 to 1.22)	VERY LOW[b,d]
NNS-Facilitated tucking vs. Paracetamol	_	VERY LOW[b,d]	-0.81 (-3.04 to 1.42)	VERY LOW[b,d]
NNS-Facilitated tucking vs. Prone Positioning	_	MODERATE[a]	-0.71 (-2.73 to 1.31)	MODERATE[a]
NNS-Facilitated tucking vs. Sensorial Saturation	_	MODERATE[a]	-0.21 (-2.44 to 2.03)	MODERATE[a]
NNS-Facilitated tucking vs. Sterile water	_	LOW[b]	-1.19 (-3.05 to 0.66)	LOW[b]
NNS-Facilitated tucking vs. Sucrose	_	VERY LOW[b,f]	-0.42 (-2.24 to 1.40)	VERY LOW[b,f]
NNS-Facilitated tucking vs. Sucrose-Facilitated tucking	_	MODERATE[a]	-0.38 (-2.58 to 1.82)	MODERATE[a]
NNS-Facilitated tucking vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.04 (-1.50 to 3.58)	VERY LOW[c,d]
NNS-Facilitated tucking vs. Swaddling	_	MODERATE[a]	-0.95 (-2.91 to 1.02)	MODERATE[a]
NNS-Facilitated tucking vs. Topical Anesthesia	_	MODERATE[a]	-1.30 (-3.39 to 0.78)	MODERATE[a]
NNS-Facilitated tucking vs. Touch Massage	_	MODERATE[a]	-0.60 (-2.46 to 1.26)	MODERATE[a]
NNS-Facilitated tucking vs. Touch Massage-NNS	_	MODERATE[a]	1.64 (-0.86 to 4.14)	MODERATE[a]
NNS-Facilitated tucking vs. White noise	_	MODERATE[a]	0.48 (-1.43 to 2.39)	MODERATE[a]
NNS-Facilitated tucking vs. White noise-Mother holding	_	VERY LOW[c,d]	2.28 (0.27 to 4.30)	VERY LOW[c,d]
NNS-Sucrose vs. Odour	_	LOW[a,e]	-2.43 (-3.35 to -1.51)	LOW[a,e]
NNS-Sucrose vs. Opioid	_	LOW[a,e]	-2.21 (-3.23 to -1.18)	LOW[a,e]
NNS-Sucrose vs. Paracetamol	_	VERY LOW[b,d]	-2.23 (-3.66 to -0.81)	VERY LOW[b,d]
NNS-Sucrose vs. Sensorial Saturation	_	LOW[d]	-1.63 (-3.06 to -0.20)	LOW[d]
NNS-Sucrose vs. Sterile water	_	LOW[b]	-2.62 (-3.33 to -1.91)	LOW[b]
NNS-Sucrose vs. Sucrose-Facilitated tucking	_	LOW[d]	-1.80 (-3.18 to -0.42)	LOW[d]
NNS-Sucrose vs. Sucrose-Vibration	_	VERY LOW[c,d]	-0.38 (-2.25 to 1.49)	VERY LOW[c,d]
NNS-Sucrose vs. Swaddling	_	HIGH	-2.37 (-3.32 to -1.42)	HIGH
NNS-Sucrose vs. Topical Anesthesia	_	MODERATE[a]	-2.73 (-3.91 to -1.54)	MODERATE[a]
NNS-Sucrose vs. Touch Massage	_	HIGH	-2.03 (-2.76 to -1.30)	HIGH
NNS-Sucrose vs. Touch Massage-NNS	_	MODERATE[a]	0.22 (-1.65 to 2.08)	MODERATE[a]
NNS-Sucrose vs. White noise	_	LOW[d]	-0.94 (-1.77 to -0.11)	LOW[d]
NNS-Sucrose vs. White noise-Mother holding	_	VERY LOW[c,d]	0.86 (-0.20 to 1.91)	VERY LOW[c,d]

Odour vs. Opioid	_	VERY LOW[b,d]	0.23 (-0.96 to 1.41)	VERY LOW[b,d]
Odour vs. Paracetamol	_	VERY LOW[b,d]	0.20 (-1.34 to 1.74)	VERY LOW[b,d]
Odour vs. Prone Positioning	_	LOW[a,e]	0.30 (-0.96 to 1.56)	LOW[a,e]
Odour vs. Sensorial Saturation	_	VERY LOW[b,d]	0.80 (-0.75 to 2.35)	VERY LOW[b,d]
Odour vs. Sterile water	_	VERY LOW[b,d]	-0.18 (-1.10 to 0.73)	VERY LOW[b,d]
Odour vs. Sucrose	_	LOW[a,e]	0.59 (-0.27 to 1.45)	LOW[a,e]
Odour vs. Sucrose-Facilitated tucking	_	LOW[a,e]	0.63 (-0.87 to 2.14)	LOW[a,e]
Odour vs. Sucrose-Vibration	_	VERY LOW[c,d]	2.05 (0.08 to 4.02)	VERY LOW[c,d]
Odour vs. Swaddling	_	MODERATE[c]	0.06 (-1.03 to 1.15)	MODERATE[c]
Odour vs. Topical Anesthesia	_	LOW[a,e]	-0.30 (-1.60 to 1.01)	LOW[a,e]
Odour vs. Touch Massage	_	LOW[a,e]	0.41 (-0.51 to 1.32)	LOW[a,e]
Odour vs. Touch Massage-NNS	_	LOW[a,e]	2.65 (0.67 to 4.63)	LOW[a,e]
Odour vs. White noise	_	VERY LOW[b,f]	1.49 (0.49 to 2.48)	VERY LOW[b,f]
Odour vs. White noise-Mother holding	_	VERY LOW[c,d]	3.29 (2.10 to 4.48)	VERY LOW[c,d]
Opioid vs. Paracetamol	_	VERY LOW[b,d]	-0.02 (-1.60 to 1.55)	VERY LOW[b,d]
Opioid vs. Prone Positioning	_	VERY LOW[b,d]	0.07 (-1.27 to 1.42)	VERY LOW[b,d]
Opioid vs. Sucrose	_	VERY LOW[b,d]	0.36 (-0.58 to 1.31)	VERY LOW[b,d]
Opioid vs. Sucrose-Facilitated tucking	_	VERY LOW[b,d]	0.41 (-1.11 to 1.93)	VERY LOW[b,d]
Opioid vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.83 (-0.18 to 3.83)	VERY LOW[c,d]
Opioid vs. Swaddling	_	VERY LOW[b,d]	-0.16 (-1.37 to 1.04)	VERY LOW[b,d]
Opioid vs. Topical Anesthesia	_	VERY LOW[b,d]	-0.52 (-1.92 to 0.88)	VERY LOW[b,d]
Opioid vs. Touch Massage	_	VERY LOW[b,d]	0.18 (-0.86 to 1.23)	VERY LOW[b,d]
Opioid vs. Touch Massage-NNS	_	VERY LOW[b,d]	2.42 (0.39 to 4.45)	VERY LOW[b,d]
Opioid vs. White noise	_	VERY LOW[b,d]	1.26 (0.17 to 2.36)	VERY LOW[b,d]
Opioid vs. White noise-Mother holding	_	VERY LOW[c,d]	3.07 (1.78 to 4.35)	VERY LOW[c,d]
Paracetamol vs. Prone Positioning	_	VERY LOW[b,d]	0.10 (-1.58 to 1.77)	VERY LOW[b,d]
Paracetamol vs. Sensorial Saturation	_	VERY LOW[b,d]	0.60 (-1.27 to 2.47)	VERY LOW[b,d]
Paracetamol vs. Sucrose-Facilitated tucking	_	VERY LOW[b,d]	0.43 (-1.39 to 2.25)	VERY LOW[b,d]
Paracetamol vs. Sucrose-Vibration	_	VERY LOW[b,d]	1.85 (-0.35 to 4.05)	VERY LOW[b,d]
Paracetamol vs. Swaddling	_	VERY LOW[b,d]	-0.14 (-1.70 to 1.42)	VERY LOW[b,d]
Paracetamol vs. Topical Anesthesia	_	VERY LOW[b,d]	-0.50 (-2.21 to 1.22)	VERY LOW[b,d]
Paracetamol vs. Touch Massage	_	VERY LOW[b,d]	0.20 (-1.24 to 1.65)	VERY LOW[b,d]
Paracetamol vs. Touch Massage-NNS	_	VERY LOW[b,d]	2.45 (0.19 to 4.71)	VERY LOW[b,d]
Paracetamol vs. White noise	_	VERY LOW[b,d]	1.29 (-0.20 to 2.78)	VERY LOW[b,d]

Paracetamol vs. White noise-Mother holding	_	VERY LOW[b,d]	3.09 (1.46 to 4.72)	VERY LOW[b,d]
Prone Positioning vs. Sensorial Saturation	_	MODERATE[a]	0.50 (-1.17 to 2.18)	MODERATE[a]
Prone Positioning vs. Sterile water	_	VERY LOW[b,d]	-0.48 (-1.61 to 0.64)	VERY LOW[b,d]
Prone Positioning vs. Sucrose	_	MODERATE[a]	0.29 (-0.79 to 1.36)	MODERATE[a]
Prone Positioning vs. Sucrose-Facilitated tucking	_	MODERATE[a]	0.33 (-1.30 to 1.97)	MODERATE[a]
Prone Positioning vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.75 (-0.32 to 3.82)	VERY LOW[c,d]
Prone Positioning vs. Swaddling	_	MODERATE[a]	-0.24 (-1.52 to 1.05)	MODERATE[a]
Prone Positioning vs. Topical Anesthesia	_	MODERATE[a]	-0.59 (-2.06 to 0.87)	MODERATE[a]
Prone Positioning vs. Touch Massage	_	MODERATE[a]	0.11 (-1.02 to 1.24)	MODERATE[a]
Prone Positioning vs. Touch Massage-NNS	_	MODERATE[c]	2.35 (0.29 to 4.40)	MODERATE[c]
Prone Positioning vs. White noise	_	VERY LOW[b,f]	1.19 (-0.01 to 2.39)	VERY LOW[b,f]
Prone Positioning vs. White noise-Mother holding	_	VERY LOW[c,d]	2.99 (1.63 to 4.35)	VERY LOW[c,d]
Sensorial Saturation vs. Sterile water	_	VERY LOW[b,d]	-0.98 (-2.37 to 0.40)	VERY LOW[b,d]
Sensorial Saturation vs. Sucrose	_	MODERATE[a]	-0.21 (-1.60 to 1.17)	MODERATE[a]
Sensorial Saturation vs. Sucrose-Facilitated tucking	_	MODERATE[a]	-0.17 (-1.98 to 1.64)	MODERATE[a]
Sensorial Saturation vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.25 (-0.99 to 3.50)	VERY LOW[c,d]
Sensorial Saturation vs. Swaddling	_	MODERATE[a]	-0.74 (-2.30 to 0.83)	MODERATE[a]
Sensorial Saturation vs. Topical Anesthesia	_	MODERATE[a]	-1.09 (-2.81 to 0.62)	MODERATE[a]
Sensorial Saturation vs. Touch Massage	_	MODERATE[a]	-0.39 (-1.84 to 1.05)	MODERATE[a]
Sensorial Saturation vs. Touch Massage-NNS	_	MODERATE[a]	1.85 (-0.41 to 4.11)	MODERATE[a]
Sensorial Saturation vs. White noise	_	MODERATE[a]	0.69 (-0.79 to 2.17)	MODERATE[a]
Sensorial Saturation vs. White noise-Mother holding	_	VERY LOW[c,d]	2.49 (0.87 to 4.11)	VERY LOW[c,d]
Sterile water vs. Sucrose-Facilitated tucking	_	LOW[b]	0.82 (-0.53 to 2.16)	LOW[b]
Sterile water vs. Sucrose-Vibration	_	VERY LOW[c,d]	2.24 (0.39 to 4.08)	VERY LOW[c,d]
Sterile water vs. Swaddling	_	VERY LOW[b,d]	0.24 (-0.70 to 1.19)	VERY LOW[b,d]
Sterile water vs. Topical Anesthesia	_	VERY LOW[b,d]	-0.11 (-1.30 to 1.08)	VERY LOW[b,d]
Sterile water vs. Touch Massage	_	VERY LOW[b,d]	0.59 (-0.15 to 1.33)	VERY LOW[b,d]
Sterile water vs. Touch Massage-NNS	_	LOW[b]	2.83 (0.94 to 4.72)	LOW[b]
Sterile water vs. White noise	_	VERY LOW[b,f]	1.67 (0.85 to 2.50)	VERY LOW[b,f]
Sterile water vs. White noise-Mother holding	_	VERY LOW[c,d]	3.47 (2.42 to 4.53)	VERY LOW[c,d]
Sucrose vs. Swaddling	_	HIGH	-0.53 (-1.42 to 0.37)	HIGH
Sucrose vs. Topical Anesthesia	_	MODERATE[a]	-0.88 (-2.03 to 0.26)	MODERATE[a]
Sucrose vs. Touch Massage	_	HIGH	-0.18 (-0.85 to 0.48)	HIGH
Sucrose vs. Touch Massage-NNS	_	VERY LOW[b,f]	2.06 (0.20 to 3.92)	VERY LOW[b,f]

Sucrose vs. White noise	_	MODERATE[a]	0.90 (0.13 to 1.67)	MODERATE[a]
Sucrose vs. White noise-Mother holding	_	VERY LOW[c,d]	2.70 (1.70 to 3.71)	VERY LOW[c,d]
Sucrose-Facilitated tucking vs. Sucrose-Vibration	_	VERY LOW[c,d]	1.42 (-0.77 to 3.60)	VERY LOW[c,d]
Sucrose-Facilitated tucking vs. Swaddling	_	MODERATE[a]	-0.57 (-2.09 to 0.95)	MODERATE[a]
Sucrose-Facilitated tucking vs. Topical Anesthesia	_	MODERATE[a]	-0.93 (-2.61 to 0.75)	MODERATE[a]
Sucrose-Facilitated tucking vs. Touch Massage	_	MODERATE[a]	-0.23 (-1.62 to 1.17)	MODERATE[a]
Sucrose-Facilitated tucking vs. Touch Massage-NNS	_	MODERATE[a]	2.02 (-0.21 to 4.25)	MODERATE[a]
Sucrose-Facilitated tucking vs. White noise	_	MODERATE[a]	0.86 (-0.58 to 2.29)	MODERATE[a]
Sucrose-Facilitated tucking vs. White noise-Mother holding	_	VERY LOW[c,d]	2.66 (1.08 to 4.24)	VERY LOW[c,d]
Sucrose-Vibration vs. Swaddling	_	VERY LOW[c,d]	-1.99 (-3.97 to -0.01)	VERY LOW[c,d]
Sucrose-Vibration vs. Topical Anesthesia	_	VERY LOW[c,d]	-2.35 (-4.45 to -0.24)	VERY LOW[c,d]
Sucrose-Vibration vs. Touch Massage	_	VERY LOW[c,d]	-1.65 (-3.53 to 0.24)	VERY LOW[c,d]
Sucrose-Vibration vs. Touch Massage-NNS	_	VERY LOW[c,d]	0.60 (-1.97 to 3.16)	VERY LOW[c,d]
Sucrose-Vibration vs. White noise	_	VERY LOW[c,d]	-0.56 (-2.49 to 1.37)	VERY LOW[c,d]
Sucrose-Vibration vs. White noise-Mother holding	_	VERY LOW[c,d]	1.24 (-0.80 to 3.27)	VERY LOW[c,d]
Swaddling vs. Topical Anesthesia	_	MODERATE[a]	-0.36 (-1.68 to 0.97)	MODERATE[a]
Swaddling vs. Touch Massage	_	HIGH	0.34 (-0.60 to 1.29)	HIGH
Swaddling vs. Touch Massage-NNS	_	MODERATE[c]	2.59 (0.59 to 4.58)	MODERATE[c]
Swaddling vs. White noise	_	VERY LOW[b,f]	1.43 (0.43 to 2.43)	VERY LOW[b,f]
Swaddling vs. White noise-Mother holding	_	VERY LOW[c,d]	3.23 (2.04 to 4.42)	VERY LOW[c,d]
Topical Anesthesia vs. Touch Massage	_	MODERATE[a]	0.70 (-0.47 to 1.87)	MODERATE[a]
Topical Anesthesia vs. Touch Massage-NNS	_	MODERATE[a]	2.94 (0.83 to 5.06)	MODERATE[a]
Topical Anesthesia vs. White noise	_	VERY LOW[b,f]	1.78 (0.54 to 3.02)	VERY LOW[b,f]
Topical Anesthesia vs. White noise-Mother holding	_	VERY LOW[c,d]	3.59 (2.19 to 4.98)	VERY LOW[c,d]
Touch Massage vs. Touch Massage-NNS	_	VERY LOW[b,d]	2.24 (0.34 to 4.14)	VERY LOW[b,d]
Touch Massage vs. White noise	_	VERY LOW[b,f]	1.08 (0.26 to 1.91)	VERY LOW[b,f]
Touch Massage vs. White noise-Mother holding	_	VERY LOW[c,d]	2.88 (1.83 to 3.94)	VERY LOW[c,d]
Touch Massage-NNS vs. White noise	_	MODERATE[a]	-1.16 (-3.10 to 0.78)	MODERATE[a]
Touch Massage-NNS vs. White noise-Mother holding	_	VERY LOW[c,d]	0.64 (-1.40 to 2.69)	VERY LOW[c,d]

Reasons for downgrading
[a]Downgraded by 1 as CI crosses 0.2 on one side
[b]Downgraded by 2 as CI crosses 0.2 on both sides
[c]Downgraded by 1 as the sample size is <100, although CI is not crossing -0.2 and 0.2
[d]Downgraded by 2 as RoB of all studies was high (the included study if there was only 1 study)
[e]Downgraded by 1 as RoB of studies contributing ≥50% sample size was high
[f]Downgraded by 2 as I2 ≥90% and CI on either side of '0'
[g]Downgraded by 1 as I2 60-90% and CI on either side of '0'

Web Table IV - GRADE assessment of primary outcome: Pain score at 30 s after heel prick

Comparison	Direct evidence - Certainty of Evidence	Indirect evidence - Certainty of Evidence	Network meta-analysis RR (CrI)	Certainty of Evidence
Acupressure vs. Control	LOW[a]	LOW[a]	-0.18 (-0.69 to 0.33)	LOW[a]
Acupressure vs. Touch Massage	LOW[a]	LOW[a]	0.18 (-0.33 to 0.69)	LOW[a]
Cobedding vs. Control	LOW[a]		-0.03 (-0.63 to 0.57)	LOW[a]
Control vs. EBM	VERY LOW[b,c]	MODERATE[d]	1.20 (0.81 to 1.59)	MODERATE[d]
Control vs. Facilitated tucking	HIGH	MODERATE[c]	0.75 (0.45 to 1.04)	HIGH
Control vs. Glucose	MODERATE[d]	MODERATE[c]	1.60 (1.29 to 1.91)	MODERATE[d]
Control vs. Mother holding	MODERATE[c]	MODERATE[c]	1.35 (0.91 to 1.79)	MODERATE[c]
Control vs. NNS	MODERATE[c]	LOW[d,e]	1.01 (0.59 to 1.43)	MODERATE[c]
Control vs. Opioid	LOW[a]	_	0.16 (-0.70 to 1.02)	LOW[a]
Control vs. Sterile water	VERY LOW[b,c]	VERY LOW[b,c]	0.72 (0.32 to 1.12)	VERY LOW[b,c]
Control vs. Topical Anesthesia	LOW[a]	_	-0.07 (-0.59 to 0.45)	LOW[a]
Control vs. Touch Massage	LOW[a]	LOW[a]	0.37 (0.03 to 0.71)	LOW[a]
Control vs. Vapo coolant	VERY LOW[b,c]	VERY LOW[a,b]	2.06 (1.24 to 2.87)	VERY LOW[b,c]
Control vs. White noise	MODERATE[e]	MODERATE[c]	0.36 (-0.07 to 0.80)	MODERATE[e]
EBM vs. Formula Milk	VERY LOW[b,c]	_	-1.78 (-2.49 to -1.08)	VERY LOW[b,c]
EBM vs. Glucose	VERY LOW[a,f]	LOW[a]	0.40 (0.08 to 0.72)	LOW[a]
EBM vs. Sterile water	LOW[a]	VERY LOW[a,f]	-0.48 (-0.85 to -0.10)	LOW[a]
EBM vs. Sucrose	LOW[a]	VERY LOW[a,g]	-0.06 (-0.42 to 0.30)	LOW[a]
Facilitated tucking vs. Facilitated tucking-NNS-Music	MODERATE[c]	_	1.65 (0.84 to 2.46)	MODERATE[c]
Facilitated tucking vs. Glucose	MODERATE[c]	LOW[a]	0.85 (0.50 to 1.21)	MODERATE[c]
Facilitated tucking vs. Mother holding	MODERATE[c]	MODERATE[c]	0.60 (0.16 to 1.04)	MODERATE[c]
Facilitated tucking vs. Sucrose	LOW[a]	LOW[a]	0.40 (0.02 to 0.78)	LOW[a]
Facilitated tucking vs. Sucrose-Facilitated tucking	LOW[a]	LOW[a]	0.50 (-0.06 to 1.07)	LOW[a]
Facilitated tucking vs. White noise	MODERATE[e]	MODERATE[e]	-0.38 (-0.82 to 0.05)	MODERATE[e]
Glucose vs. Sterile water	VERY LOW[a,g]	VERY LOW[a,f]	-0.88 (-1.23 to -0.52)	VERY LOW[a,g]
Glucose vs. Sucrose	MODERATE[e]	LOW[a]	-0.45 (-0.77 to -0.14)	MODERATE[e]
Glucose vs. Vapo coolant	VERY LOW[a,b]	VERY LOW[b,c]	0.46 (-0.34 to 1.26)	VERY LOW[a,b]
KMC vs. KMC-Sucrose	LOW[a]	LOW[a]	-0.06 (-0.54 to 0.41)	LOW[a]
KMC vs. Sucrose	LOW[a]	LOW[a]	-0.05 (-0.52 to 0.43)	LOW[a]
KMC-Sucrose vs. Sucrose	LOW[a]	LOW[a]	0.01 (-0.46 to 0.49)	LOW[a]
Mother holding vs. White noise	MODERATE[c]	MODERATE[c]	-0.99 (-1.46 to -0.51)	MODERATE[c]
NNS vs. NNS-Sucrose	MODERATE[d]	LOW[d,e]	0.67 (0.39 to 0.94)	MODERATE[d]
NNS vs. Sucrose	LOW[d,e]	LOW[d,e]	0.13 (-0.14 to 0.40)	LOW[d,e]
NNS-Sucrose vs. NNS-Sucrose-Swaddling	LOW[a]	HIGH	-0.04 (-0.39 to 0.31)	HIGH
NNS-Sucrose vs. NNS-Sucrose-Vibration	VERY LOW[b,e]	_	0.74 (-0.29 to 1.77)	VERY LOW[b,e]
NNS-Sucrose vs. Sucrose	HIGH	MODERATE[e]	-0.53 (-0.76 to -0.30)	HIGH

NNS-Sucrose vs. Sucrose-Swaddling	MODERATE[e]	MODERATE[e]	-0.13 (-0.47 to 0.22)	MODERATE[e]
NNS-Sucrose-Swaddling vs. Sucrose	HIGH	MODERATE[e]	-0.49 (-0.84 to -0.14)	HIGH
NNS-Sucrose-Swaddling vs. Sucrose-Swaddling	MODERATE[e]	MODERATE[e]	-0.09 (-0.47 to 0.29)	MODERATE[e]
Sterile water vs. Sucrose	VERY LOW[a,f]	VERY LOW[a,g]	0.42 (0.06 to 0.78)	VERY LOW[a,f]
Sucrose vs. Sucrose-Facilitated tucking	LOW[a]	LOW[a]	0.11 (-0.46 to 0.68)	LOW[a]
Sucrose vs. Sucrose-Swaddling	MODERATE[e]	MODERATE[e]	0.41 (0.06 to 0.76)	MODERATE[e]
Acupressure vs. Cobedding	_	LOW[a]	-0.15 (-0.94 to 0.64)	LOW[a]
Acupressure vs. EBM		VERY LOW[b,c]	1.02 (0.38 to 1.66)	VERY LOW[b,c]
Acupressure vs. Facilitated tucking	_	LOW[a]	0.56 (-0.03 to 1.15)	LOW[a]
Acupressure vs. Facilitated tucking-NNS-Music	_	LOW[a]	2.21 (1.21 to 3.21)	LOW[a]
Acupressure vs. Formula Milk	_	VERY LOW[b,c]	-0.77 (-1.72 to 0.19)	VERY LOW[b,c]
Acupressure vs. Glucose	_	LOW[a]	1.42 (0.82 to 2.02)	LOW[a]
Acupressure vs. KMC		VERY LOW[b,c]	1.01 (0.23 to 1.79)	VERY LOW[b,c]
Acupressure vs. KMC-Sucrose	_	VERY LOW[b,c]	0.95 (0.16 to 1.73)	VERY LOW[b,c]
Acupressure vs. Mother holding	_	LOW[a]	1.17 (0.49 to 1.84)	LOW[a]
Acupressure vs. NNS		LOW[a]	0.83 (0.17 to 1.49)	LOW[a]
Acupressure vs. NNS-Sucrose	_	LOW[a]	1.49 (0.83 to 2.15)	LOW[a]
Acupressure vs. NNS-Sucrose-Swaddling	_	LOW[a]	1.46 (0.74 to 2.17)	LOW[a]
Acupressure vs. NNS-Sucrose-Vibration	_	VERY LOW[b,c]	2.23 (1.01 to 3.46)	VERY LOW[b,c]
Acupressure vs. Opioid	_	LOW[a]	-0.02 (-1.02 to 0.98)	LOW[a]
Acupressure vs. Sterile water	_	VERY LOW[b,c]	0.54 (-0.11 to 1.19)	VERY LOW[b,c]
Acupressure vs. Sucrose	_	LOW[a]	0.96 (0.34 to 1.59)	LOW[a]
Acupressure vs. Sucrose-Facilitated tucking	_	LOW[a]	1.07 (0.28 to 1.86)	LOW[a]
Acupressure vs. Sucrose-Swaddling	_	LOW[a]	1.37 (0.66 to 2.08)	LOW[a]
Acupressure vs. Topical Anesthesia	_	LOW[a]	-0.25 (-0.98 to 0.48)	LOW[a]
Acupressure vs. Vapo coolant	_	VERY LOW[b,c]	1.88 (0.92 to 2.84)	VERY LOW[b,c]
Acupressure vs. White noise	_	LOW[a]	0.18 (-0.49 to 0.85)	LOW[a]
Cobedding vs. EBM		VERY LOW[b,c]	1.17 (0.46 to 1.88)	VERY LOW[b,c]
Cobedding vs. Facilitated tucking	_	LOW[a]	0.71 (0.05 to 1.38)	LOW[a]
Cobedding vs. Facilitated tucking-NNS-Music	_	LOW[a]	2.36 (1.31 to 3.41)	LOW[a]
Cobedding vs. Formula Milk	_	VERY LOW[b,c]	-0.62 (-1.62 to 0.39)	VERY LOW[b,c]
Cobedding vs. Glucose	_	LOW[a]	1.57 (0.89 to 2.24)	LOW[a]
Cobedding vs. KMC		LOW[a]	1.16 (0.32 to 2.01)	LOW[a]
Cobedding vs. KMC-Sucrose	_	LOW[a]	1.10 (0.25 to 1.94)	LOW[a]
Cobedding vs. Mother holding	_	LOW[a]	1.32 (0.57 to 2.06)	LOW[a]
Cobedding vs. NNS	_	LOW[a]	0.98 (0.25 to 1.71)	LOW[a]

Cobedding vs. NNS-Sucrose	_	LOW[a]	1.64 (0.91 to 2.37)	LOW[a]
Cobedding vs. NNS-Sucrose-Swaddling	_	LOW[a]	1.61 (0.83 to 2.38)	LOW[a]
Cobedding vs. NNS-Sucrose-Vibration	_	VERY LOW[b,c]	2.38 (1.12 to 3.65)	VERY LOW[b,c]
Cobedding vs. Opioid	_	LOW[a]	0.13 (-0.92 to 1.18)	LOW[a]
Cobedding vs. Sterile water	_	LOW[a]	0.69 (-0.03 to 1.41)	LOW[a]
Cobedding vs. Sucrose		LOW[a]	1.11 (0.41 to 1.81)	LOW[a]
Cobedding vs. Sucrose-Facilitated tucking	_	LOW[a]	1.22 (0.37 to 2.07)	LOW[a]
Cobedding vs. Sucrose-Swaddling	_	LOW[a]	1.52 (0.74 to 2.30)	LOW[a]
Cobedding vs. Topical Anesthesia	_	LOW[a]	-0.10 (-0.89 to 0.69)	LOW[a]
Cobedding vs. Touch Massage	_	LOW[a]	0.33 (-0.36 to 1.02)	LOW[a]
Cobedding vs. Vapo coolant	_	VERY LOW[b,c]	2.03 (1.02 to 3.04)	VERY LOW[b,c]
Cobedding vs. White noise	_	LOW[a]	0.33 (-0.41 to 1.07)	LOW[a]
Control vs. Facilitated tucking-NNS-Music	_	MODERATE[c]	2.40 (1.53 to 3.26)	MODERATE[c]
Control vs. Formula Milk	_	VERY LOW[b,c]	-0.58 (-1.39 to 0.22)	VERY LOW[b,c]
Control vs. KMC	_	LOW[a]	1.19 (0.60 to 1.79)	LOW[a]
Control vs. KMC-Sucrose	_	LOW[a]	1.13 (0.54 to 1.73)	LOW[a]
Control vs. NNS-Sucrose	_	MODERATE[c]	1.68 (1.26 to 2.09)	MODERATE[c]
Control vs. NNS-Sucrose-Swaddling	_	LOW[a]	1.64 (1.14 to 2.13)	LOW[a]
Control vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	2.42 (1.30 to 3.53)	VERY LOW[b,e]
Control vs. Sucrose	_	MODERATE[e]	1.14 (0.79 to 1.50)	MODERATE[e]
Control vs. Sucrose-Facilitated tucking	_	LOW[a]	1.25 (0.65 to 1.85)	LOW[a]
Control vs. Sucrose-Swaddling	_	MODERATE[e]	1.55 (1.05 to 2.05)	MODERATE[e]
EBM vs. Facilitated tucking	_	LOW[a]	-0.45 (-0.88 to -0.03)	LOW[a]
EBM vs. Facilitated tucking-NNS-Music	_	LOW[a]	1.19 (0.28 to 2.11)	LOW[a]
EBM vs. KMC	_	LOW[a]	-0.01 (-0.60 to 0.59)	LOW[a]
EBM vs. KMC-Sucrose	_	LOW[a]	-0.07 (-0.67 to 0.53)	LOW[a]
EBM vs. Mother holding	_	VERY LOW[b,c]	0.15 (-0.41 to 0.71)	VERY LOW[b,c]
EBM vs. NNS		LOW[a]	-0.19 (-0.63 to 0.25)	LOW[a]
EBM vs. NNS-Sucrose	_	LOW[a]	0.47 (0.05 to 0.90)	LOW[a]
EBM vs. NNS-Sucrose-Swaddling	_	LOW[a]	0.44 (-0.06 to 0.94)	LOW[a]
EBM vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	1.22 (0.10 to 2.33)	VERY LOW[b,e]
EBM vs. Opioid		LOW[a]	-1.04 (-1.98 to -0.09)	LOW[a]
EBM vs. Sucrose-Facilitated tucking	_	LOW[a]	0.05 (-0.59 to 0.69)	LOW[a]
EBM vs. Sucrose-Swaddling	_	LOW[a]	0.35 (-0.15 to 0.85)	LOW[a]
EBM vs. Topical Anesthesia	_	VERY LOW[b,c]	-1.27 (-1.92 to -0.62)	VERY LOW[b,c]
EBM vs. Touch Massage	_	VERY LOW[b,c]	-0.84 (-1.35 to -0.32)	VERY LOW[b,c]
EBM vs. Vapo coolant		VERY LOW[b,c]	0.86 (0.01 to 1.71)	VERY LOW[b,c]
EBM vs. White noise		VERY LOW[b,c]	-0.84 (-1.40 to -0.28)	VERY LOW[b,c]

Facilitated tucking vs. Formula Milk	_	VERY LOW[b,c]	-1.33 (-2.16 to -0.51)	VERY LOW[b,c]
Facilitated tucking vs. KMC	_	LOW[a]	0.45 (-0.16 to 1.05)	LOW[a]
Facilitated tucking vs. KMC-Sucrose	_	LOW[a]	0.38 (-0.22 to 0.99)	LOW[a]
Facilitated tucking vs. NNS	_	MODERATE[c]	0.26 (-0.18 to 0.71)	MODERATE[c]
Facilitated tucking vs. NNS-Sucrose	_	LOW[a]	0.93 (0.49 to 1.37)	LOW[a]
Facilitated tucking vs. NNS-Sucrose-Swaddling	_	LOW[a]	0.89 (0.38 to 1.40)	LOW[a]
Facilitated tucking vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	1.67 (0.55 to 2.79)	VERY LOW[b,e]
Facilitated tucking vs. Opioid	_	LOW[a]	-0.58 (-1.49 to 0.33)	LOW[a]
Facilitated tucking vs. Sterile water	_	VERY LOW[a,f]	-0.02 (-0.46 to 0.42)	VERY LOW[a,f]
Facilitated tucking vs. Sucrose-Swaddling	_	LOW[a]	0.80 (0.29 to 1.32)	LOW[a]
Facilitated tucking vs. Topical Anesthesia	_	LOW[a]	-0.82 (-1.41 to -0.22)	LOW[a]
Facilitated tucking vs. Touch Massage	_	LOW[a]	-0.38 (-0.83 to 0.07)	LOW[a]
Facilitated tucking vs. Vapo coolant	_	VERY LOW[b,c]	1.31 (0.47 to 2.16)	VERY LOW[b,c]
Facilitated tucking-NNS-Music vs. Formula Milk	_	VERY LOW[b,c]	-2.98 (-4.14 to -1.82)	VERY LOW[b,c]
Facilitated tucking-NNS-Music vs. Glucose	_	LOW[a]	-0.80 (-1.68 to 0.09)	LOW[a]
Facilitated tucking-NNS-Music vs. KMC	_	LOW[a]	-1.20 (-2.21 to -0.19)	LOW[a]
Facilitated tucking-NNS-Music vs. KMC-Sucrose	_	LOW[a]	-1.27 (-2.28 to -0.25)	LOW[a]
Facilitated tucking-NNS-Music vs. Mother holding	_	MODERATE[c]	-1.05 (-1.97 to -0.13)	MODERATE[c]
Facilitated tucking-NNS-Music vs. NNS	_	MODERATE[c]	-1.39 (-2.31 to -0.46)	MODERATE[c]
Facilitated tucking-NNS-Music vs. NNS-Sucrose	_	LOW[a]	-0.72 (-1.64 to 0.20)	LOW[a]
Facilitated tucking-NNS-Music vs. NNS-Sucrose-Swaddling	_	LOW[a]	-0.76 (-1.72 to 0.20)	LOW[a]
Facilitated tucking-NNS-Music vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	0.02 (-1.36 to 1.40)	VERY LOW[b,e]
Facilitated tucking-NNS-Music vs. Opioid	_	LOW[a]	-2.23 (-3.45 to -1.01)	LOW[a]
Facilitated tucking-NNS-Music vs. Sterile water	_	VERY LOW[a,f]	-1.67 (-2.59 to -0.75)	VERY LOW[a,f]
Facilitated tucking-NNS-Music vs. Sucrose	_	LOW[a]	-1.25 (-2.14 to -0.36)	LOW[a]
Facilitated tucking-NNS-Music vs. Sucrose-Facilitated tucking	_	LOW[a]	-1.14 (-2.13 to -0.16)	LOW[a]
Facilitated tucking-NNS-Music vs. Sucrose-Swaddling	_	LOW[a]	-0.85 (-1.80 to 0.11)	LOW[a]

Facilitated tucking-NNS-Music vs. Topical Anesthesia	_	LOW[a]	-2.47 (-3.47 to -1.46)	LOW[a]
Facilitated tucking-NNS-Music vs. Touch Massage	_	LOW[a]	-2.03 (-2.96 to -1.10)	LOW[a]
Facilitated tucking-NNS-Music vs. Vapo coolant	_	VERY LOW[b,c]	-0.34 (-1.51 to 0.83)	VERY LOW[b,c]
Facilitated tucking-NNS-Music vs. White noise	_	MODERATE[e]	-2.03 (-2.95 to -1.12)	MODERATE[e]
Formula Milk vs. Glucose	_	VERY LOW[b,c]	2.18 (1.41 to 2.96)	VERY LOW[b,c]
Formula Milk vs. KMC		VERY LOW[b,c]	1.78 (0.85 to 2.70)	VERY LOW[b,c]
Formula Milk vs. KMC-Sucrose	_	VERY LOW[b,c]	1.71 (0.79 to 2.64)	VERY LOW[b,c]
Formula Milk vs. Mother holding	_	VERY LOW[b,c]	1.93 (1.03 to 2.83)	VERY LOW[b,c]
Formula Milk vs. NNS	_	VERY LOW[b,c]	1.59 (0.76 to 2.43)	VERY LOW[b,c]
Formula Milk vs. NNS-Sucrose	_	VERY LOW[b,c]	2.26 (1.43 to 3.08)	VERY LOW[b,c]
Formula Milk vs. NNS-Sucrose-Swaddling	_	VERY LOW[b,c]	2.22 (1.36 to 3.09)	VERY LOW[b,c]
Formula Milk vs. NNS-Sucrose-Vibration	_	VERY LOW[b,c]	3.00 (1.68 to 4.32)	VERY LOW[b,c]
Formula Milk vs. Opioid	_	VERY LOW[b,c]	0.75 (-0.43 to 1.93)	VERY LOW[b,c]
Formula Milk vs. Sterile water	_	VERY LOW[b,c]	1.31 (0.51 to 2.11)	VERY LOW[b,c]
Formula Milk vs. Sucrose	_	VERY LOW[b,c]	1.73 (0.93 to 2.52)	VERY LOW[b,c]
Formula Milk vs. Sucrose-Facilitated tucking	_	VERY LOW[b,c]	1.84 (0.88 to 2.79)	VERY LOW[b,c]
Formula Milk vs. Sucrose-Swaddling	_	VERY LOW[b,c]	2.13 (1.27 to 3.00)	VERY LOW[b,c]
Formula Milk vs. Topical Anesthesia	_	VERY LOW[b,c]	0.51 (-0.44 to 1.47)	VERY LOW[b,c]
Formula Milk vs. Touch Massage	_	VERY LOW[b,c]	0.95 (0.07 to 1.82)	VERY LOW[b,c]
Formula Milk vs. Vapo coolant	_	VERY LOW[b,c]	2.64 (1.54 to 3.75)	VERY LOW[b,c]
Formula Milk vs. White noise	_	VERY LOW[b,c]	0.95 (0.05 to 1.85)	VERY LOW[b,c]
Glucose vs. KMC	_	LOW[a]	-0.41 (-0.97 to 0.16)	LOW[a]
Glucose vs. KMC-Sucrose	_	LOW[a]	-0.47 (-1.04 to 0.10)	LOW[a]
Glucose vs. Mother holding	_	MODERATE[c]	-0.25 (-0.76 to 0.26)	MODERATE[c]
Glucose vs. NNS	_	MODERATE[c]	-0.59 (-0.98 to -0.19)	MODERATE[c]
Glucose vs. NNS-Sucrose	_	MODERATE[e]	0.08 (-0.31 to 0.46)	MODERATE[e]
Glucose vs. NNS-Sucrose-Swaddling	_	MODERATE[e]	0.04 (-0.43 to 0.50)	MODERATE[e]
Glucose vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	0.82 (-0.28 to 1.92)	VERY LOW[b,e]
Glucose vs. Opioid		LOW[a]	-1.44 (-2.35 to -0.52)	LOW[a]
Glucose vs. Sucrose-Facilitated tucking	_	LOW[a]	-0.35 (-0.95 to 0.26)	LOW[a]
Glucose vs. Sucrose-Swaddling	_	MODERATE[e]	-0.05 (-0.51 to 0.42)	MODERATE[e]
Glucose vs. Topical Anesthesia	_	LOW[a]	-1.67 (-2.27 to -1.06)	LOW[a]
Glucose vs. Touch Massage	_	LOW[a]	-1.23 (-1.70 to -0.77)	LOW[a]

Glucose vs. White noise	_	MODERATE[e]	-1.24 (-1.74 to -0.73)	MODERATE[e]
KMC vs. Mother holding	_	LOW[a]	0.16 (-0.56 to 0.87)	LOW[a]
KMC vs. NNS	_	LOW[a]	-0.18 (-0.73 to 0.36)	LOW[a]
KMC vs. NNS-Sucrose	_	LOW[a]	0.48 (-0.05 to 1.01)	LOW[a]
KMC vs. NNS-Sucrose-Swaddling	_	LOW[a]	0.44 (-0.15 to 1.03)	LOW[a]
KMC vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	1.22 (0.06 to 2.38)	VERY LOW[b,e]
KMC vs. Opioid		LOW[a]	-1.03 (-2.08 to 0.02)	LOW[a]
KMC vs. Sterile water	_	VERY LOW[a,f]	-0.47 (-1.07 to 0.13)	VERY LOW[a,f]
KMC vs. Sucrose-Facilitated tucking	_	LOW[a]	0.06 (-0.68 to 0.80)	LOW[a]
KMC vs. Sucrose-Swaddling	_	LOW[a]	0.36 (-0.23 to 0.95)	LOW[a]
KMC vs. Topical Anesthesia	_	LOW[a]	-1.26 (-2.05 to -0.47)	LOW[a]
KMC vs. Touch Massage	_	LOW[a]	-0.83 (-1.51 to -0.14)	LOW[a]
KMC vs. Vapo coolant	_	VERY LOW[b,c]	0.87 (-0.10 to 1.83)	VERY LOW[b,c]
KMC vs. White noise	_	LOW[a]	-0.83 (-1.54 to -0.12)	LOW[a]
KMC-Sucrose vs. Mother holding	_	LOW[a]	0.22 (-0.50 to 0.93)	LOW[a]
KMC-Sucrose vs. NNS		LOW[a]	-0.12 (-0.67 to 0.43)	LOW[a]
KMC-Sucrose vs. NNS-Sucrose	_	LOW[a]	0.55 (0.02 to 1.07)	LOW[a]
KMC-Sucrose vs. NNS-Sucrose-Swaddling	_	LOW[a]	0.51 (-0.08 to 1.10)	LOW[a]
KMC-Sucrose vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	1.29 (0.13 to 2.45)	VERY LOW[b,e]
KMC-Sucrose vs. Opioid	_	LOW[a]	-0.97 (-2.01 to 0.08)	LOW[a]
KMC-Sucrose vs. Sterile water	_	VERY LOW[a,f]	-0.41 (-1.00 to 0.19)	VERY LOW[a,f]
KMC-Sucrose vs. Sucrose-Facilitated tucking	_	LOW[a]	0.12 (-0.62 to 0.86)	LOW[a]
KMC-Sucrose vs. Sucrose-Swaddling	_	LOW[a]	0.42 (-0.17 to 1.01)	LOW[a]
KMC-Sucrose vs. Topical Anesthesia	_	LOW[a]	-1.20 (-1.99 to -0.41)	LOW[a]
KMC-Sucrose vs. Touch Massage	_	LOW[a]	-0.77 (-1.45 to -0.08)	LOW[a]
KMC-Sucrose vs. Vapo coolant	_	VERY LOW[b,c]	0.93 (-0.04 to 1.90)	VERY LOW[b,c]
KMC-Sucrose vs. White noise	_	LOW[a]	-0.77 (-1.48 to -0.06)	LOW[a]
Mother holding vs. NNS	_	MODERATE[c]	-0.34 (-0.92 to 0.24)	MODERATE[c]
Mother holding vs. NNS-Sucrose	_	MODERATE[e]	0.33 (-0.25 to 0.90)	MODERATE[e]
Mother holding vs. NNS-Sucrose-Swaddling	_	LOW[a]	0.29 (-0.35 to 0.93)	LOW[a]
Mother holding vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	1.07 (-0.11 to 2.25)	VERY LOW[b,e]
Mother holding vs. Opioid	_	LOW[a]	-1.19 (-2.15 to -0.22)	LOW[a]
Mother holding vs. Sterile water	_	VERY LOW[b,c]	-0.63 (-1.20 to -0.05)	VERY LOW[b,c]
Mother holding vs. Sucrose	_	LOW[a]	-0.20 (-0.74 to 0.33)	LOW[a]

Mother holding vs. Sucrose-Facilitated tucking	_	LOW[a]	-0.10 (-0.80 to 0.60)	LOW[a]
Mother holding vs. Sucrose-Swaddling	_	LOW[a]	0.20 (-0.43 to 0.84)	LOW[a]
Mother holding vs. Topical Anesthesia	_	LOW[a]	-1.42 (-2.10 to -0.74)	LOW[a]
Mother holding vs. Touch Massage	_	LOW[a]	-0.98 (-1.54 to -0.43)	LOW[a]
Mother holding vs. Vapo coolant	_	VERY LOW[b,c]	0.71 (-0.21 to 1.63)	VERY LOW[b,c]
NNS vs. NNS-Sucrose-Swaddling	_	LOW[d,e]	0.63 (0.21 to 1.04)	LOW[d,e]
NNS vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	1.41 (0.34 to 2.47)	VERY LOW[b,e]
NNS vs. Opioid		LOW[a]	-0.85 (-1.80 to 0.11)	LOW[a]
NNS vs. Sterile water	_	VERY LOW[a,f]	-0.29 (-0.73 to 0.15)	VERY LOW[a,f]
NNS vs. Sucrose-Facilitated tucking	_	LOW[d,e]	0.24 (-0.38 to 0.86)	LOW[d,e]
NNS vs. Sucrose-Swaddling	_	LOW[d,e]	0.54 (0.13 to 0.95)	LOW[d,e]
NNS vs. Topical Anesthesia	_	LOW[a]	-1.08 (-1.75 to -0.41)	LOW[a]
NNS vs. Touch Massage	_	LOW[a]	-0.65 (-1.18 to -0.11)	LOW[a]
NNS vs. Vapo coolant	_	VERY LOW[b,c]	1.05 (0.17 to 1.92)	VERY LOW[b,c]
NNS vs. White noise	_	MODERATE[c]	-0.65 (-1.22 to -0.07)	MODERATE[c]
NNS-Sucrose vs. Opioid	_	LOW[a]	-1.51 (-2.47 to -0.56)	LOW[a]
NNS-Sucrose vs. Sterile water	_	VERY LOW[b,c]	-0.95 (-1.38 to -0.53)	VERY LOW[b,c]
NNS-Sucrose vs. Sucrose-Facilitated tucking	_	LOW[a]	-0.42 (-1.04 to 0.19)	LOW[a]
NNS-Sucrose vs. Topical Anesthesia	_	LOW[a]	-1.75 (-2.41 to -1.08)	LOW[a]
NNS-Sucrose vs. Touch Massage	_	LOW[a]	-1.31 (-1.85 to -0.77)	LOW[a]
NNS-Sucrose vs. Vapo coolant	_	VERY LOW[b,c]	0.38 (-0.49 to 1.25)	VERY LOW[b,c]
NNS-Sucrose vs. White noise	_	MODERATE[e]	-1.31 (-1.89 to -0.74)	MODERATE[e]
NNS-Sucrose-Swaddling vs. NNS-Sucrose-Vibration	_	VERY LOW[b,e]	0.78 (-0.31 to 1.87)	VERY LOW[b,e]
NNS-Sucrose-Swaddling vs. Opioid	_	LOW[a]	-1.47 (-2.47 to -0.48)	LOW[a]
NNS-Sucrose-Swaddling vs. Sterile water	_	VERY LOW[b,e]	-0.91 (-1.41 to -0.41)	VERY LOW[b,e]
NNS-Sucrose-Swaddling vs. Sucrose-Facilitated tucking	_	LOW[a]	-0.39 (-1.05 to 0.28)	LOW[a]
NNS-Sucrose-Swaddling vs. Topical Anesthesia	_	LOW[a]	-1.71 (-2.42 to -0.99)	LOW[a]
NNS-Sucrose-Swaddling vs. Touch Massage	_	LOW[a]	-1.27 (-1.87 to -0.67)	LOW[a]
NNS-Sucrose-Swaddling vs. Vapo coolant	_	VERY LOW[b,c]	0.42 (-0.49 to 1.33)	VERY LOW[b,c]
NNS-Sucrose-Swaddling vs. White noise	_	LOW[a]	-1.28 (-1.91 to -0.64)	LOW[a]
NNS-Sucrose-Vibration vs. Opioid	_	VERY LOW[b,e]	-2.25 (-3.66 to -0.85)	VERY LOW[b,e]

NNS-Sucrose-Vibration vs. Sterile water	_	VERY LOW[b,e]	-1.69 (-2.81 to -0.58)	VERY LOW[b,e]
NNS-Sucrose-Vibration vs. Sucrose	_	VERY LOW[b,e]	-1.27 (-2.33 to -0.21)	VERY LOW[b,e]
NNS-Sucrose-Vibration vs. Sucrose-Facilitated tucking	_	VERY LOW[b,e]	-1.16 (-2.36 to 0.03)	VERY LOW[b,e]
NNS-Sucrose-Vibration vs. Sucrose-Swaddling	_	VERY LOW[b,e]	-0.87 (-1.95 to 0.22)	VERY LOW[b,e]
NNS-Sucrose-Vibration vs. Topical Anesthesia	_	VERY LOW[b,e]	-2.49 (-3.71 to -1.26)	VERY LOW[b,e]
NNS-Sucrose-Vibration vs. Touch Massage	_	VERY LOW[b,e]	-2.05 (-3.21 to -0.89)	VERY LOW[b,e]
NNS-Sucrose-Vibration vs. Vapo coolant	_	VERY LOW[b,e]	-0.36 (-1.71 to 0.99)	VERY LOW[b,e]
NNS-Sucrose-Vibration vs. White noise	_	VERY LOW[b,e]	-2.05 (-3.23 to -0.87)	VERY LOW[b,e]
Opioid vs. Sterile water		VERY LOW[b,c]	0.56 (-0.39 to 1.51)	VERY LOW[b,c]
Opioid vs. Sucrose	_	LOW[a]	0.98 (0.05 to 1.91)	LOW[a]
Opioid vs. Sucrose-Facilitated tucking	_	LOW[a]	1.09 (0.04 to 2.14)	LOW[a]
Opioid vs. Sucrose-Swaddling	_	LOW[a]	1.39 (0.39 to 2.38)	LOW[a]
Opioid vs. Topical Anesthesia	_	LOW[a]	-0.23 (-1.24 to 0.77)	LOW[a]
Opioid vs. Touch Massage	_	LOW[a]	0.20 (-0.72 to 1.13)	LOW[a]
Opioid vs. Vapo coolant	_	VERY LOW[b,c]	1.90 (0.71 to 3.08)	VERY LOW[b,c]
Opioid vs. White noise	_	LOW[a]	0.20 (-0.77 to 1.16)	LOW[a]
Sterile water vs. Sucrose-Facilitated tucking	_	VERY LOW[a,f]	0.53 (-0.11 to 1.17)	VERY LOW[a,f]
Sterile water vs. Sucrose-Swaddling	_	VERY LOW[a,f]	0.83 (0.33 to 1.33)	VERY LOW[a,f]
Sterile water vs. Topical Anesthesia	_	VERY LOW[b,c]	-0.79 (-1.45 to -0.14)	VERY LOW[b,c]
Sterile water vs. Touch Massage	_	VERY LOW[b,c]	-0.36 (-0.88 to 0.17)	VERY LOW[b,c]
Sterile water vs. Vapo coolant	_	VERY LOW[b,c]	1.34 (0.47 to 2.20)	VERY LOW[b,c]
Sterile water vs. White noise	_	VERY LOW[b,c]	-0.36 (-0.93 to 0.21)	VERY LOW[b,c]
Sucrose vs. Topical Anesthesia	_	LOW[a]	-1.21 (-1.84 to -0.58)	LOW[a]
Sucrose vs. Touch Massage	_	LOW[a]	-0.78 (-1.27 to -0.28)	LOW[a]
Sucrose vs. Vapo coolant	_	VERY LOW[a,b]	0.91 (0.07 to 1.76)	VERY LOW[a,b]
Sucrose vs. White noise	_	LOW[a]	-0.78 (-1.31 to -0.25)	LOW[a]
Sucrose-Facilitated tucking vs. Sucrose-Swaddling	_	LOW[a]	0.30 (-0.37 to 0.96)	LOW[a]
Sucrose-Facilitated tucking vs. Topical Anesthesia	_	LOW[a]	-1.32 (-2.11 to -0.53)	LOW[a]
Sucrose-Facilitated tucking vs. Touch Massage	_	LOW[a]	-0.89 (-1.58 to -0.20)	LOW[a]

Sucrose-Facilitated tucking vs. Vapo coolant	_	VERY LOW[b,c]	0.81 (-0.17 to 1.79)	VERY LOW[b,c]
Sucrose-Facilitated tucking vs. White noise	_	LOW[a]	-0.89 (-1.59 to -0.19)	LOW[a]
Sucrose _Swaddling vs. Topical Anesthesia	_	LOW[a]	-1.62 (-2.34 to -0.90)	LOW[a]
Sucrose _Swaddling vs. Touch Massage	_	LOW[a]	-1.19 (-1.79 to -0.58)	LOW[a]
Sucrose _Swaddling vs. Vapo coolant	_	VERY LOW[b,c]	0.51 (-0.40 to 1.42)	VERY LOW[b,c]
Sucrose _Swaddling vs. White noise	_	MODERATE[e]	-1.19 (-1.82 to -0.56)	MODERATE[e]
Topical Anesthesia vs. Touch Massage	_	LOW[a]	0.43 (-0.19 to 1.05)	LOW[a]
Topical Anesthesia vs. Vapo coolant	_	VERY LOW[b,c]	2.13 (1.16 to 3.09)	VERY LOW[b,c]
Topical Anesthesia vs. White noise	_	LOW[a]	0.43 (-0.24 to 1.11)	LOW[a]
Touch Massage vs. Vapo coolant	_	VERY LOW[b,c]	1.69 (0.81 to 2.58)	VERY LOW[b,c]
Touch Massage vs. White noise	_	LOW[a]	-0.00 (-0.55 to 0.55)	LOW[a]
Vapo coolant vs. White noise	_	VERY LOW[b,c]	-1.70 (-2.61 to -0.78)	VERY LOW[b,c]

Reasons for downgrading

[a]Downgraded by two levels for very serious imprecision as the CI crosses both 0.2 and -0.2

[b]Downgraded by two levels for very serious ROB due to high risk of bias in all included trials (this includes high risk of bias in the only included trial)

[c]Downgraded by one level for serious imprecision as sample size is less than 100

[d]Downgraded by one level for serious ROB due to high risk of bias in >50% included trials

[e]Downgraded by one level for serious imprecision as CI crosses either 0.2 or -0.2

[f]Downgraded by one level for serious inconsistency as I2 is between 60 and 90%

[g]Downgraded by two levels for very serious inconsistency as I2 is > 90%