

Systematic Review on the Efficacy of Interventions for Fear of Childbirth, Anxiety and Fear in Pregnant Women

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**Systematic review on the efficacy of interventions for
fear of childbirth, anxiety and fear in pregnant women**

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Abstract

Background: Fears and anxieties during pregnancy and childbirth are a frequent phenomenon and can have negative consequences on wellbeing, psychological health and birth outcomes. Therefore, it is important to focus on the interventions to reduce those fears and anxieties during pregnancy and childbirth.

A systematic review was conducted to examine the current literature on psychological interventions to reduce anxieties and fears during pregnancy and childbirth.

Scopus and PubMed were searched from 2015 up until December 2020 for relevant studies.

Included were pregnant women, with no restriction on age ranges or parity. Entered in the review were quantitative studies, including randomized controlled trials (RCTs), non-randomized controlled trials as well as treatment evaluations. After reviewing titles, abstracts and studies, 72 studies were included in this review as they met the inclusion criteria.

Standard methodological procedures for systematic reviews were used. The quality assessment of included articles was done by using the Quality Assessment Tool for Quantitative Studies (EPHPP).

Results: The main results of this review concern the fear and anxiety reducing effects of psychoeducation, relaxation techniques, guided imagery, supportive care through a midwife, group discussion, “lifestyle based education”, writing therapy, cognitive behavioral therapy groups and stress intervention, individual structured psychotherapy, communication skills training, counseling approaches (except distraction techniques), a motivational interviewing psychotherapy, emotional freedom techniques, breathing awareness and different hypnotherapeutic techniques on different fears and anxieties during pregnancy and childbirth. For mindfulness-based interventions mixed results are found. The effect of an acceptance and commitment therapy, biofeedback interventions, a mind body intervention, mental health training courses, the group intervention Nyytti® as well as cognitive analytic therapy is unclear, due to weak ratings. Antenatal class attendance reduced delivery fear significantly only in first time mothers. An internet-based problem-solving treatment did not reduce anxiety during pregnancy.

Conclusion: A broad range of interventions show positive effects on fear of childbirth and fear and anxiety in pregnancy. Further research should address other acknowledged psychotherapeutic practices, like psychodynamic as well as systemic interventions, as they are underrepresented within this review. Furthermore, there is a need for manualized therapeutic interventions, with regards to a combination of effective intervention components.

Keywords: fear, anxiety, childbirth, pregnancy, intervention

Background and objectives

Background

In the current literature, the prevalence rate of high levels of fear of childbirth is stated as 36.7% in Ireland and in India the prevalence rate of severe pregnancy anxiety levels reached up to 22% (Madhavanprabhakaran et al., 2015; Maeve A. O'Connell et al., 2019).

Women with very high scores on Fear of Childbirth (FOC) or Tocophobia often suffer under longer birth processes and stronger to unbearable pain compared to women with less fear (Adams et al., 2012; Junge et al., 2018; Laursen et al., 2009; Nettelbladt et al., 1976; Reck et al., 2013; Striebich & Ayerle, 2020). FOC is reported as one of the most common reasons for unnecessary cesarean sections (Adams et al., 2012; Junge et al., 2018; Laursen et al., 2009; Nettelbladt et al., 1976; Reck et al., 2013; Striebich & Ayerle, 2020). Compared to women with low levels of FOC, women with intermediate or high levels of FOC seem to have more negative birth experiences (Elvander et al., 2013). FOC can not only have a negative impact on the birth process, but also influences the wellbeing during pregnancy (Slade et al., 2019).

There is also evidence for a connection between FOC, postpartal depressions and traumatic stress symptoms (Haines et al., 2012; Räisänen et al., 2014; Söderquist et al., 2009; Striebich & Ayerle, 2019). Furthermore, severe FOC or even anxiety may result in pre-term delivery, bonding issues and behavioral/emotional problems of the infant (Leigh & Milgrom, 2008; O'Connor et al., 2002; Sutter-Dallay et al., 2004; Viswasam et al., 2019).

A number of systematic reviews regarding interventions to treat fear of childbirth exist in the literature of the last five years. There are general systematic reviews and meta-analyses, that list different interventions and their effect on "fear of childbirth" (MoghaddamHosseini et al., 2018; Smith et al., 2019a; Striebich et al., 2018). Further systematic reviews focus on pregnancy specific anxiety (San Lazaro Campillo et al., 2017; Stoll et al., 2018), as well a mental disorders during pregnancy (van Ravesteyn et al., 2017).

Besides more general reviews, systematic reviews specifically focussing on mindfulness interventions (Dhillon et al., 2017; H. Hall et al., 2015; Lever Taylor et al., 2016; Matvienko-Sikar et al., 2016; Riet et al., 2019; Shi & MacBeth, 2017), psychotherapy interventions (Li et al., 2020; Ponting et al., 2020; Sockol, 2018) and e-health and technology based interventions exist (Bayrampour et al., 2019; Lee & Cho, 2019; Loughnan, Joubert, et al., 2019; Stratton et al., 2017). Further meta-analyses focus on the effect of expressive writing on anxiety related to pregnancy (Qian et al., 2020), psychoeducation interventions (Akgün et al., 2019) and hypnosis based interventions (Catsaros & Wendland, 2020).

The reviews of Bright et al. (2019), Brixval et al. (2014) and O'Connell et al. (2019) are not listed as only study protocols were found. The mentioned reviews included studies up to the year 2019.

The present systematic literature review is the broadest and up to December 2020 most recent overview regarding the effects of psychological interventions on fear and anxiety related to pregnancy and childbirth published in the last five years with 72 included and rated studies. While some of the past reviews focused only on certain outcome variables (e.g. only fear of childbirth as a narrow topic) (Moghaddam Hosseini et al., 2018; Smith et al., 2019b; Striebich et al., 2018), this present review focusses on broader fears and anxieties regarding the whole pregnancy and childbirth process and therefore addresses a research gap. Further previous studies examined studies until 2016, while this systematic review encloses studies up until December 2020.

The aim of this systematic review was to examine the effect of psychological interventions on “fear of childbirth” as well as fears and anxieties during pregnancy.

Previous reviews stated positive effects of psychological interventions. Hypnosis based, psychotherapeutic interventions and psychoeducation have a positive impact on fear of childbirth (Catsaros & Wendland, 2020; Stoll et al., 2018; Swift et al., in press). There is a need to keep those findings updated and an existing research gap to review further interventions stated within the literature.

Definitions

There is no clearly delimitable and common definition of fear of childbirth (FOC) in the literature. It is also difficult to draw a line between subclinical, phobic and pathological levels of FOC (Abdollahi et al. 2020). To give an overview over existing terms in the literature, this paper makes an attempt to define different phrases related to the term FOC. This systematic review focusses besides FOC on different anxieties and fears during pregnancy and childbirth.

FOC (Fear of Childbirth). Areskog (1982) defined „fear of childbirth“ (FOC) first in a population of Swedish pregnant women as: “a strong anxiety which had impaired their [the women’s] daily functioning and wellbeing”. Later, during the 2000s, a study from Sweden defined FOC as belonging to “the family of anxiety disorders” (Zar et al., 2002).

Klabbers (2016) pointed out, that FOC is an anxiety disorder or phobic fear.

In the classification of diseases – 10 (ICD 10) fear of childbirth could most likely be listed under code O99.8 as “other specific diseases and conditions complicating pregnancy, childbirth, or puerperium” (Størksen et al., 2015).

Wijma (2003) describes “clinical FOC”, as a “disabling fear that interferes with occupational or academic functioning, with domestic and social activities or with relationships”. The symptoms of FOC could be characterised as “worries or extreme fear” (Poggi et al., 2018).

FOC has different manifestations. It is “assumed to be a continuum with no or low fear on one end, and severe or extreme fear on the other” and is clinically relevant “if it affects a woman’s quality of life” (Striebich et al., 2018).

FOC can also be classified into primary FOC, which occurs in nulliparous women and secondary FOC relating to women who already had traumatic birth experiences (Abdollahi et al., 2020; K Hofberg & Ward, 2003). A third form is FOC as a symptom of prenatal depression (K Hofberg & Ward, 2003; Kristina Hofberg & Brockington, 2000; Klabbers, 2016).

Tocophobia. Primary tocophobia is defined as “severe fear precedes conception and leads to avoidance of tokos (Greek: childbirth)”, while secondary tokophobia is a “phobic fear resulting from a distressing or even traumatising childbirth experience” (Striebich et al., 2018). It is characterised as an “unreasoning dread of childbirth” relating to women in a “specific and harrowing condition” including a “pathological dread” and “avoidance of childbirth” (Kristina Hofberg & Brockington, 2000). Tocophobia is „a specific anxiety or fear of death during parturition precedes pregnancy“ that is „so intense that tokos (childbirth) is avoided whenever possible; this is a phobic state called tocophobia” (Kristina Hofberg & Ward, 2004).

Bhatia and Jhanjee (2012) defined tokophobia as “a pathological fear of pregnancy” and indicated the pathological aspect of tokophobia, which can result in avoidance of childbirth (Poggi et al., 2018). The authors distinguish tocophobia – similar to the classification of FOC - between primary fear of childbirth, in women without previous pregnancy experience and secondary fear of childbirth related to a „traumatic obstetric event in previous pregnancy” (Poggi et al., 2018).

Tocophobia often is defined by $\geq 85/165$ points on the Assessments Wijma Delivery Expectancy Questionnaire (W-DEQ A) (Maeve A. O’Connell et al., 2017; Striebich & Ayerle, 2020). A recent systematic review determined tocophobia to be synonymous with severe FOC (Maeve A. O’Connell et al., 2017). Based on this conclusion this present paper also refers to severe/high FOC as synonymous to tokophobia.

Childbirth Anxiety. Wijma and Wijma (2017) define childbirth anxiety as follows: “When a woman is afraid of the situation where a child will or is to be born [...] CA covers the whole continuum from a little fear that is easy to cope with to phobic fear, when the woman wants to avoid the situation by all means”.

Perinatal Anxiety (PNA) and Perinatal Generalized Anxiety Disorder (GAD). Harrison, Moore and Lazard (2020) characterized the term perinatal anxiety and Misri et al. (2015) introduced the term Perinatal Generalized Anxiety Disorder (GAD), which is defined as “excessive, uncontrollable worry that can cause functional impairment”.

Further forms of pregnant related anxieties. Pregnancy can be accompanied by a variety of anxiety disorders, like panic, disorder with or without agoraphobia, obsessive-compulsive disorder, generalized anxiety disorder, specific phobia, social anxiety disorder and post-traumatic stress disorder (Viswasam et al., 2019).

Methods

Criteria for considering studies

Papers included in this systematic review were limited to publications in English and German language only with the restriction for publication year between 2015 and December 2020.

Inclusion criteria

The inclusion criteria for this systematic review were outcomes regarding fears or anxieties during pregnancy and childbirth. Different definitions of the concept “fear of childbirth” and the understanding of fears and anxieties during childbirth were admitted. Besides, varying outcome measurements were valid. Pregnant women (both primi- and/or multiparous) with no restriction to age ranges were included. The interventions were restricted to psychological interventions, biofeedback interventions, mindfulness-based interventions and midwife counseling studies. Included studies focused on the prenatal period. Only intervention studies were included (no correlation studies about personality traits).

Exclusion criteria

Excluded were study protocols, qualitative studies, reviews, case series designs, case reports, consensus bundles, medical research counsel frameworks, studies with no described study design and uncorrected proof studies. Studies of pregnant women with specific somatic complains, (in)fertility or abortion studies, yoga interventions, pharmacological interventions (including psychopharmacology), music interventions, spiritual interventions, art therapy as

only intervention, and aroma therapy studies were excluded. Not included were medical studies, studies on pregnancy loss or sleeping problems, postpartum studies, traumatic birth studies, studies focusing on depression only, sport or physical activity interventions, studies relating to stillbirth, and ultrasound interventions. Studies written in other languages than German or English were also excluded.

Search methods for identification of studies

The electronic databases PubMed and Scopus were searched for articles using the terms “fear”, “anxiety”, “pregnancy”, “childbirth”, “intervention” from 2015 up to December 2020.

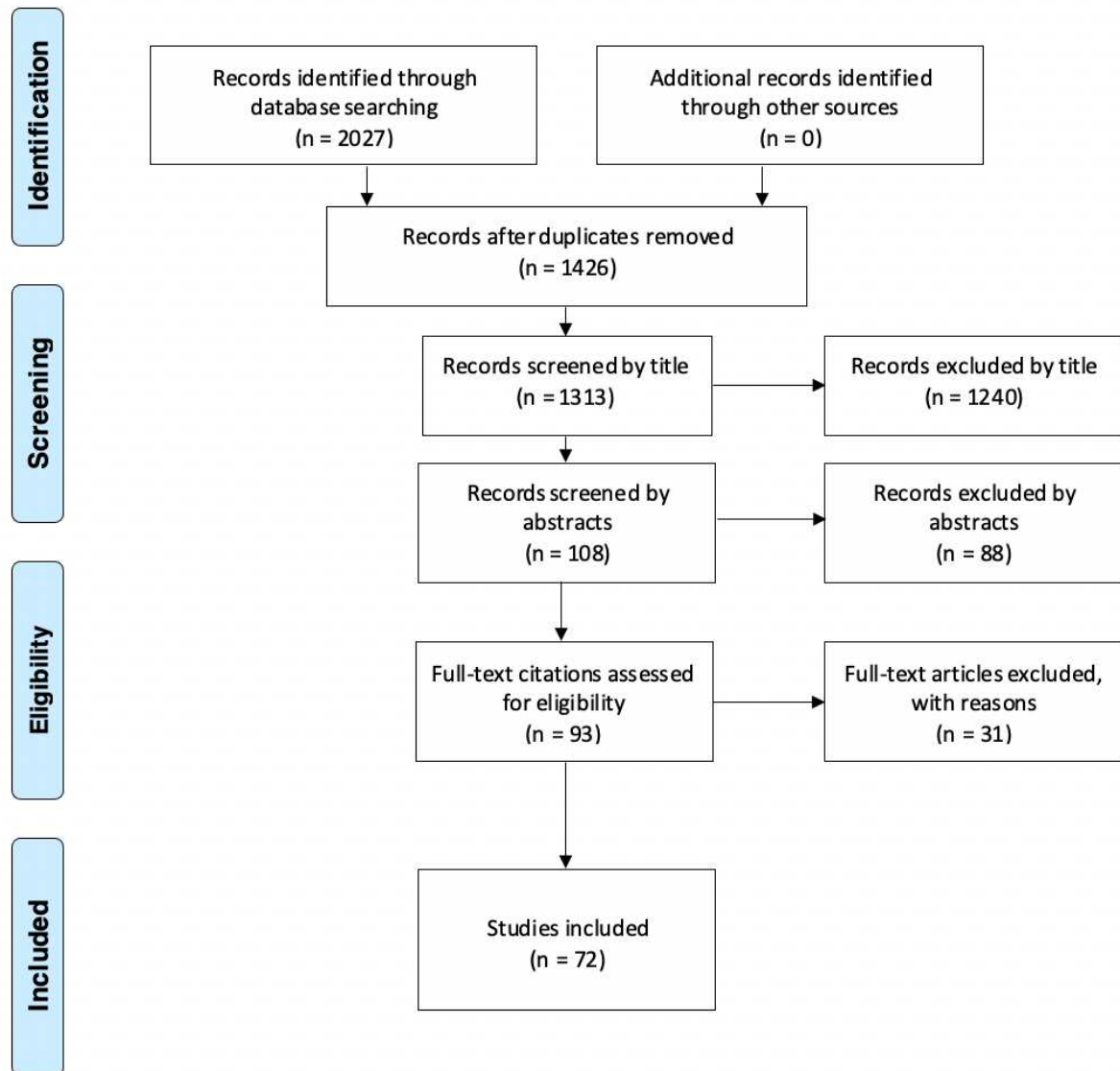
The initial search yielded a total of 3029 studies, after setting the time (year 2015-2020) and language filters a total of 2027 studies were displayed and a total of 1426 studies were screened for this review, after removing all duplicates. Further studies were excluded as they were either not relevant to the review or did not meet the inclusion criteria or were not found. 72 records were screened. See figure 1 for the summary of search item identification. For the final included studies and their results see table 2.

Data collection and analysis

One person was included in the data collection, management and analysis of the studies. No software tools were used to support selection of studies. With an excel programme duplicates were analyzed. No standardized data collection forms were used. The data items are described in table 2.

Figure 1

Systematic Review Profile based on the prisma flow diagram (Moher et al., 2009)



Quality assessment and risk of bias in included studies

Of the 72 studies included, 22, 31 and 19, respectively, received a strong, moderate and weak rating on the “Quality Assessment Tool for Quantitative Studies” of the “Effective Public Health Practice Project (EPHPP)”. The risk of bias in the included studies was assessed with this tool. One author was involved in the assessment of risk of bias in included studies. All studies (strong, moderate, weak ratings) were included in the analysis and interpretation. The ratings are listed in table 1.

Table 1

Ratings of included studies based on the “Quality Assessment Tool for Quantitative Studies” of the “Effective Public Health Practice Project (EPHPP)”

		Selection Bias	Study Design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	Global rating of paper
(1)	Aksoy Derya (2021)	moderate	strong	moderate	moderate	strong	weak	moderate
(2)	Montazeri (2020)	moderate	strong	strong	weak	strong	strong	moderate
(3)	Waters (2020)	moderate	weak	weak	moderate	weak	weak	weak

		Selection Bias	Study Design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	Global rating of paper
(4)	Zarenejad (2020)	moderate	strong	strong	moderate	strong	strong	strong
(5)	Firouzan (2020)	strong	strong	strong	moderate	strong	strong	strong
(6)	Kang (2020)	moderate	strong	weak	moderate	strong	weak	weak
(7)	Goetz (2020)	moderate	moderate	weak	moderate	strong	weak	weak
(8)	Alipour (2020)	moderate	strong	strong	strong	strong	weak	moderate
(9)	Sridhar (2020)	moderate	strong	strong	strong	strong	moderate	strong
(10)	Esfandiari (2020)	moderate	strong	weak	strong	strong	moderate	moderate
(11)	Mirtabar (2020)	moderate	strong	strong	strong	strong	strong	strong
(12)	Abbasi (2020)	strong	strong	strong	weak	strong	strong	moderate
(13)	Larsson (in press)	weak	strong	strong	weak	weak	weak	weak
(14)	Swift (in press)	moderate	strong	strong	strong	moderate	moderate	strong
(15)	Shahsavan (2020)	strong	moderate	strong	moderate	strong	strong	strong
(16)	Boz (2020)	moderate	strong	strong	moderate	strong	weak	moderate
(17)	Abdollahi (2020)	weak	strong	strong	moderate	strong	strong	moderate
(18)	Hamilton (2020)	weak	strong	weak	weak	strong	weak	weak
(19)	Noorbala (2019)	moderate	strong	strong	moderate	strong	weak	moderate

		Selection Bias	Study Design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	Global rating of paper
(20)	Uludağ (2020)	moderate	strong	strong	moderate	weak	strong	moderate
(21)	Rajeswari (2020)	moderate	strong	weak	moderate	strong	strong	moderate
(22)	Bazrafsahn (2020)	strong	strong	strong	moderate	strong	strong	strong
(23)	Munkhondya (2020)	moderate	strong	strong	moderate	strong	strong	strong
(24)	Price (2019)	moderate	moderate	weak	moderate	strong	strong	moderate
(25)	Yang (2019)	moderate	strong	strong	moderate	strong	strong	strong
(26)	van der Zwan (2019)	moderate	strong	strong	weak	strong	weak	weak
(27)	Loughnan (2019)	moderate	strong	weak	moderate	strong	weak	weak
(28)	Zemestani (2019)	strong	strong	strong	moderate	strong	strong	strong
(29)	Amiri (2019)	moderate	strong	strong	moderate	strong	strong	strong
(30)	Rahmani (2019)	strong	strong	strong	weak	strong	strong	moderate
(31)	Zhang (2019)	moderate	strong	strong	moderate	strong	weak	moderate
(32)	Hildingsson (2019)	weak	strong	strong	moderate	strong	strong	strong
(33)	Klabbers (2019)	strong	strong	strong	weak	strong	weak	weak
(34)	Irmak Vural (2019)	moderate	strong	strong	moderate	strong	strong	strong
(35)	Heller (2020)	moderate	strong	weak	moderate	strong	moderate	moderate

		Selection Bias	Study Design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	Global rating of paper
(36)	Mohammadi (2019)	strong	strong	strong	weak	strong	strong	moderate
(37)	Ekrami (2019)	moderate	strong	strong	moderate	strong	strong	strong
(38)	Sobhani (2019)	moderate	strong	weak	moderate	strong	weak	weak
(39)	Kacperczyk-Bartnik (2019)	moderate	weak	strong	moderate	strong	strong	moderate
(40)	Uçar & Golbasi (2019)	weak	moderate	strong	moderate	strong	weak	weak
(41)	Narita (2018)	moderate	moderate	strong	weak	strong	weak	weak
(42)	Boryri (2018)	moderate	moderate	strong	moderate	strong	weak	moderate
(43)	Warriner (2018)	moderate	weak	weak	moderate	strong	weak	weak
(44)	Akbarian (2018)	moderate	strong	weak	moderate	strong	weak	weak
(45)	Krusche (2018)	strong	strong	strong	moderate	strong	weak	moderate
(46)	Rondung (2018)	moderate	strong	strong	strong	weak	strong	moderate
(47)	Hajmohamadi (2018)	strong	strong	strong	moderate	weak	strong	moderate
(48)	Airo (Toivanen) (2018)	weak	strong	weak	moderate	weak	strong	weak
(49)	Duncan (2017)	moderate	strong	weak	moderate	strong	strong	moderate
(50)	Andaroon (2017)	strong	strong	weak	moderate	strong	strong	moderate

		Selection Bias	Study Design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	Global rating of paper
(51)	Seyed (2017)	moderate	strong	strong	moderate	strong	strong	strong
(52)	Mary (2017)	moderate	moderate	weak	moderate	strong	weak	weak
(53)	Legrand (2017)	weak	weak	-	-	strong	moderate	weak
(54)	Waisblat (2017)	strong	moderate	strong	moderate	weak	strong	moderate
(55)	Toosi (2017)	moderate	strong	strong	strong	moderate	strong	moderate
(56)	Sanaati (2017)	strong	strong	strong	moderate	strong	strong	strong
(57)	Kordi (2017)	moderate	strong	strong	moderate	strong	strong	strong
(58)	Beattie (2017)	moderate	strong	strong	strong	strong	weak	moderate
(59)	Haapio (2017)	weak	strong	strong	moderate	weak	moderate	weak
(60)	Parsa (2016)	moderate	moderate	strong	moderate	strong	strong	strong
(61)	Aslami (2016)	moderate	moderate	strong	moderate	strong	weak	moderate
(62)	Khojasteh (2016)	moderate	strong	strong	moderate	strong	weak	moderate
(63)	Sheikh-Azadi (2016)	moderate	strong	strong	moderate	strong	weak	moderate
(64)	Salehi (2016)	strong	strong	strong	moderate	strong	strong	strong
(65)	Beevi (2016)	moderate	moderate	strong	moderate	strong	weak	moderate

		Selection Bias	Study Design	Confounders	Blinding	Data collection method	Withdrawals and dropouts	Global rating of paper
(66)	Fontein-Kuipers (2016)	moderate	strong	strong	moderate	strong	moderate	strong
(67)	Yazdanimehr (2016)	moderate	strong	strong	moderate	strong	moderate	strong
(68)	Nieminen (2016)	moderate	moderate	weak	weak	strong	weak	weak
(69)	Karabulut (2016)	moderate	moderate	strong	moderate	strong	moderate	strong
(70)	Karamoozian (2015)	moderate	strong	strong	moderate	strong	weak	moderate
(71)	Rouhe (2015a)	weak	strong	strong	moderate	strong	weak	weak
(72)	İsbir (2015)	moderate	strong	strong	moderate	strong	strong	strong

Dealing with missing data

Few studies without access were excluded from analysis: Nasiri et al. (2018), Kao et al. (2017), Jahdi et al. (2016), Anton and David (2015), Soltani et al. (2017), Najafi et al. (2019), Hennelly et al. (2020). No authors or sponsors were contacted to obtain missing information or clarify the information available. Missing data (e.g. the period of time of data collection) within the viewed studies were marked as such in table 2.

Results

Description of Studies

Table 2

Summary of the included studies

	First Author, Year	Country/ date of data collection/ study design/ EPHPP rating	Target population (sample size/age (mean, \pm SD)/parity)	Intervention/ comparators	Study outcome: Interventions Key findings	Measurements (for fear and anxiety during childbirth and FOC)	For this study relevant research topic
(1)	Aksoy Derya (2021)	Turkey 2020 RCT moderate	N=96 Age: IG: 28.70 \pm 4.73 CG: 28.06 \pm 4.12 Not stated if primi- or/and multiparous	IG: individual tele-education (interactive education and consultancy provided by phone calls, text message and digital education booklet) CG: No intervention	The posttest PRAQ-R2 total mean scores ($t=-4.095$, $p=.000$) of the pregnant women in the IG and CG, as well as the subscales “fear of giving birth” ($t=-3.275$, $p=.001$) and “worries of bearing a physically or mentally handicapped child” ($t=-4.354$, $p=.000$) showed a statistically significant difference between the groups. The subscale “concerns about own appearance” did not show a statistical difference between the groups. When the intragroup comparisons of the pre- and posttest in the IG were examined, their “pretest prenatal distress”, “fear of giving birth”, “worries of bearing a physically or mentally handicapped child” and “pregnancy-related anxiety” total mean scores were significantly lower than their posttest mean scores ($p<.05$). In the CG only the “pretest fear of giving birth” subscale mean score was significantly lower than the posttest mean score ($p<.05$).	Pregnancy Related Anxiety Questionnaire-Revised-2 (PRAQ-R2) “Revised Prenatal Distress Questionnaire (NuPDQ)”	Pregnancy related anxiety

(2)	Montazeri (2020)	Iran 2018 RCT moderate	N= 70 Age: IG: 27.5 ± 5.9 CG: 27.7 ± 5.8 Primi- and Multiparous	IG: Three protocol-based writing therapy sessions CG: routine pregnancy care	The results of the independent <i>t</i> -test showed no significant difference in the mean score of pre-intervention anxiety in the IG and CG ($p=.287$). According to ANCOVA with baseline score adjustment, the score of anxiety had a significant reduction in the IG compared to the CG (adjusted mean difference: -6.8; 95% confidence interval: -9.1 to -4.5; $p<.001$).	Beck anxiety inventory	Anxiety during pregnancy
(3)	Waters (2020)	UK Date of data collection not stated open-label pilot study weak	N= 74 Age: 33.5 (3.87) Primi- and Multiparous	8-week, group-delivered Acceptance and Commitment Therapy (ACT) intervention	At post-treatment, 38 of 55 women (69%) demonstrated a statistically reliable decrease in global distress ($d=0.99$).	Diagnoses of moderate-to-severe anxiety disorders were made by the PCMHS team Consultant Perinatal Psychiatrist (SS) (reviewed all routinely obtained clinical data against ICD-10 criteria). Clinical Outcomes in Routine Evaluation – Outcome Measure (CORE-OM)	Perinatal mood and anxiety disorders
(4)	Zarenejad (2020)	Iran Date of data collection not stated RCT strong	N=70 Age: IG: 27 ± 5 CG: 24.5 ± 5.0 Not stated if primi- or/and multiparous	IG: received 6 mindfulness-based stress reduction (MBSR) training sessions CG: routine care	The results of analysis of variance with repeated measures in assessing the changes in pregnancy anxiety score before, immediately after, and 1 month after the intervention showed that the length of time affects the anxiety score of pregnancy by decreasing it ($p=.03$) and that a significant difference was observed between the two groups in this regard ($p=.001$). After the intervention, the CG showed significant	Pregnancy-Related Anxiety Questionnaire	Pregnancy related anxiety

					higher scores in anxiety compared to the IG.		
(5)	Firouzan (2020)	Iran 2019 RCT strong	<i>N</i> =80 Age: IG: 26.27 ± 4.48 CG: 25.87 ± 4.58 Primiparous	IG: face-to-face counselling sessions based on the BELIEF protocol + tele-phone-counseling sessions CG: prenatal routine care	After adjusting for the pretest scores, there was a significant difference between the IG and CG on post-test scores of W-DEQ-A ($F(1,65)=100.42$, $p=.0001$, partial eta squared = .60). The IG got lower scores on W-DEQ-A at post-test than the CG, indicating that the BELIEF protocol was effective in decreasing childbirth fear.	W-DEQ A	FOC
(6)	Kang (2020)	China 2012-2014 RCT weak	<i>N</i> =100 Age: 26.9 ± 1.5 Primi- and multi-parous	IG: psychological intervention CG: Routine Nursing Care	Postoperative SAS scores were significantly lower in the IG than in the CG and the differences were statistically significant ($p < 0.01$). In the CG, differences in anxiety and fear levels were not statistically significant between preoperation and postoperation ($p > 0.05$).	Self-rating Anxiety Scale (SAS)	Anxiety of pregnant women undergoing interventional prenatal diagnosis
(7)	Alipour (2020)	Iran 2017-2018 RCT moderate	<i>N</i> =54 Age: IG: 29.1 (4.3) CG: 29.4 (4.5) Primi- and multiparous	IG: communication skills training package + couple-based intervention CG: two sessions of childbirth preparation + after the completion of the third phase of the study: given educational pamphlets	The level of anxiety three months after intervention was lower ($p=.001$) in the IG than in the CG. The results showed the impact of group in the level of anxiety ($p<.001$) was significant. During the study follow-ups in the IG, a significant change in the level of anxiety ($p<.001$) occurred.	Questions related to the subscales of depression and anxiety of General Health Questionnaire (GHQ)	Anxiety during pregnancy

(8)	Goetz (2020)	Germany 2019 prospective pilot study with an explorative study design weak	<i>N</i> =68 Age: 32.07 (4.74) Primi- and multiparous	Intervention: electronic Mindfulness-based interventions (eMBIs)	After completing the 1-week electronic course on mindfulness, the participants showed a significant reduction in the mean state anxiety levels ($p<.05$).	State-Trait Anxiety Inventory (STAI-S) Pregnancy-Related Anxiety Questionnaire (PRAQ-R)	Pregnancy related anxiety State/Trait Anxiety
(9)	Sridhar (2020)	USA 2018 Pilot feasibility study moderate	<i>N</i> =30 Age: 30.1 (7.4) Not stated if primi- or/and multiparous	IG: Participants could choose any of the three available virtual reality (VR) environments (dream beach, Iceland, dolphins) CG: receiving standard care	The median decrease in the VAS anxiety score from before to after the procedure was greater in the IG than in the CG (Wilcoxon rank-sum, $p=.3324$) All but one participant reported that VR was either very effective (53%) or somewhat effective (40%) in relieving anxiety during and after the procedure.	Modified Amsterdam Pre-operative Anxiety and Information Scale (APAIS) + a visual analogue scale (VAS) for anxiety, ranging from 0 (minimum anxiety) to 10 (maximum anxiety)	Anxiety during pregnancy
(10)	Esfandiari (2020)	Iran 2018-2019 RCT moderate	<i>N</i> =80 Age: IG: 27.87(5.26) CG: 23.72(4.27) Primi- and Multiparous	IG: group supportive counseling (SC) CG: antenatal usual care (AUC)	In the IG scores of state-anxiety were reduced more remarkably than in the CG with a large effect size ($B=-8.47$, $p<0.001$, $\eta^2=0.40$).	Spielberger State-Anxiety Inventory (STAI-Y).	State anxiety during pregnancy
(11)	Mirtabar (2020)	Iran 2017-2018 RCT	<i>N</i> =60 Age: 29.0 ± 5	IG: received individual structured psychotherapy + pre-	Both the IG and CG had significant reductions in the mean scores of state-anxiety and pregnancy distress from the baseline to end of study ($p<.05$). The ANCOVA tests	State-Anxiety Inventory (STAI)	State anxiety in preterm labor

		strong	Primi- and Multiparous	term labor inpatient medical care CG: inpatient medical care for preterm labor	determined that the IG had a significant improvement in the state-anxiety scores compared with the CG ($p<.001$).		Pregnancy distress
(12)	Abbasi (2020)	Iran 2015-2016 RCT moderate	$N=153$ Age: IG Educational software :25.5 (3.8) IG: Educational Booklet: 25.9 (3.6) Control: 25.1 (3.2) Primiparous	IG Educational software: studied the educational content of the educational software IG: Educational Booklet: studied the educational content of the educational booklet CG: routine care	The average state anxiety score in the educational software group and the educational booklet group was significantly lower than the CG ($p<.001$). Also, the mean state anxiety score in the educational software group was significantly decreased compared to the educational booklet group after the intervention ($p<.001$). The average score of trait anxiety in the educational software group and the educational booklet group was significantly lower than the control group ($p<.001$). Also, there was no significant difference between the two intervention groups ($p=.952$)	State-Anxiety Inventory (STAI)	State and trait anxiety during pregnancy
(13)	Larsson (in press)	Sweden 2014- 2015 RCT weak	$N=258$ Age (n, %) <25: 14 (10.4) 25-35: 100 (74.6) >35: 20 (14.9) Primi- or/and multiparous could not be stated	IG: internet-based cognitive behavioral therapy (iCBT) CG: standard care (i.e. counseling with midwives)	No statistically significant difference in the perceptions of the birth experience, regardless of treatment method for fear of birth.	Fear of birth scale	FOC
(14)	Swift (in press)	Iceland 2017-2018	$N=92$ Age: IG: 28.3 (5.1)	IG: Enhanced Antenatal Care (EAC)	At baseline, a higher proportion of IG participants (28%) reported high fear (>60 points) compared with women in CG (21%). By T2 fewer women reported high	Fear of birth scale (FOBS)	FOC

		quasi-experimental control-led trial strong	CG: 27.9 (4.4) Primiparous	CG: usual antenatal care	fear of birth in IG (9.4%) compared with CG (15.0%). For the full sample, the mean childbirth fear change score was 7.2 points among women in IG and -3.0 points among women in usual care $p=0.315$). Based on Cohen's criteria the effect of participating in IG on the reduction in mean childbirth fear was small (Cohen's $d=0.21$). Restricting the main analysis to women who had not attended classes alongside antenatal care ($n = 26$) resulted in a large effect size difference in fear change between women in IG and CG (Cohen's $d=-0.83$), with a change score of -14.1 points among women in IG and a slight increase in fear among women in CG (1.2 points; $p=.003$).		
(15)	Shahsavani (2020)	Iran 2018 quasi-experimental study strong	$N=102$ Age: IG: 28.10 (± 5.20) CG: 28.69 (± 5.31) Primiparous	IG: Internet-based guided self-help cognitive-behavioral therapy (I-GSH-CBT) CG: normal pregnancy care	The IG intervention could significantly reduce the scores of childbirth fear ($p=.002$). The fear scores in the control group were significantly increased in parallel with the I-GSH-CBT intervention ($p<.001$).	W-DEQ	FOC
(16)	Boz (2020)	Turkey 2018 RCT moderate	$N=24$ Age: 28.21 (± 4.37) Primiparous	IG: Psychoeducation Program based on Human Caring Theory in The Management of Fear of Childbirth CG: Antenatal education classes group	The FOC of women from pretest to posttest was statistically more reduced in the psychoeducation group compared to the antenatal education group ($p=.000$).	W-DEQ-A/B	FOC

(17)	Abdollahi (2020)	Iran 2018 RCT moderate	N=70 Age (range): aged 18–50 Primi- and Multiparous	IG: Motivational Interviewing (MI) Psychotherapy CG: Prenatal usual care (PUC)	The total score of W-DEQ declined more considerably in the IG than in the CG between pre-trial (T0) and post-trial (T1), with a large effect size ($B=-23.54$, $p<.001$, $\eta^2 = 0.27$). Scores of the six subscales of W-DEQ diminished more substantially in psychotherapy than in prenatal usual care.	W-DEQ Spielberger state anxiety	FOC
(18)	Hamilton (2020)	UK Date of data collection could not be stated RCT weak	N=39 Age: TAU+CAT: 30.2 (6.4) TAU: 31 (2.9) Not stated if primi-and/or multiparous	IG: cognitive an- alytic therapy (CAT) plus treat- ment as usual (TAU) CG: treatment as usual (TAU)	The analysis found no difference in the primary outcome. The STAI scale at 24 weeks after randomization between the groups, with an adjusted difference in means of 6.1 points (95% CI: -4.2 to 16.3) was in favor of CAT for the State domain and 6.2 points (95% CI: -2.8 to 15.2) for the Trait domain. The CAT + TAU group having lower (better) STAI scores at all four post-randomization assessment points than the TAU group. For the four post-randomization repeated STAI measures, a simple summary measure for each individual patient, the average post-randomization score was calculated. Average post-randomization STAI scores were compared between the two arms (CAT and TAU), again with analyses unadjusted and adjusted for covariates. All the 95% CIs for the difference in mean follow-up scores between the CAT and TAU groups, include zero, which is compatible with no difference in outcomes between the randomized groups.	Spielberger State/Trait Anxi- ety Inventory (STAI)	State/ Trait Anxiety
(19)	Noorbala (2019)	Iran 2015–2018	N=202 Age: 27.92 ± 5.41	IG: life skills and stress manage- ment training, supportive psy-	In the investigation of mental health subscales in the IGs and CGs, results demonstrated a significant intergroup difference in the 35–37 week follow-up in terms of	General Health Questionnaire- 28 (GHQ-28)	Mental health of pregnant women - anxiety

		Clinical Trial Study weak	Primi- or/and multiparous not stated	chotherapy, educational package and drug therapies CG: routine pregnancy treatment	anxiety ($p=.003$). Anxiety showed a significant decrease compared to the CG.	Golombok Rust Inventory of Marital State (GRIMS)	
(20)	Uludağ (2020)	Turkey Date of data collection could not be stated RCT moderate	$N=60$ Age: IG: 25.66 ± 4.33 CG: 24.70 ± 4.75 Primiparous	IG: Philosophy of HypnoBirthing CG: Routine Care	A statistically significant difference was found between the labor fear mean score in terms of group, time and group*time interaction ($p<.05$). There was a significant difference between the post-intervention, active phase and transition phase labor fear mean score of the groups in terms of the intervention performed: the fear of labor was lower in the IG compared to the CG.	Visual analog scale of determining the fear and pain of labor	Labor fear
(21)	Rajeswari (2020)	India 2015-2016 RCT moderate	$N=250$ Age: Majority were in the age group of 25–29 years (IG 60 [48%]; CG 57 [45.60%]). primiparous	IG: Routine Care + progressive muscle relaxation CG: routine antenatal care	In the posttest, the groups exhibited significant difference for stress ($F_3=24.81$, $p<.001$) and overall anxiety ($F_3=19.80$ with $p<.001$). After the test, there was a significant reduction in state anxiety ($F_3=17.80$, $p<.001$) and trait anxiety ($F_3=18.60$, $p<.001$) between the intervention and control groups. There was a strong negative correlation between PMR and state anxiety ($r = -0.26$, $p<.001$),	State-Trait Anxiety Inventory (STAI)	State/Trait Pregnancy anxiety
(22)	Bazrafsahn (2020)	Iran 2019 RCT strong	$N=72$ Age: IG: 28.06 ± 4.33 CG: 26.22 ± 4.43	IG: group educational counseling sessions (integration of psychological instructions and	There was a significant difference in the mean anxiety score between the IG and CG before the group educational counseling sessions. After this intervention, a significant reduction in the mean anxiety scores of intervened pregnant women compared to the control was found. This decrease in mean anxiety score after the	Pregnancy-related anxiety questionnaire Short-form PRAQ with 17 items (PRAQ-17)	Pregnancy related anxiety

			Primi-and/or Multiparous could not be stated	interactive lectures) + routine care CG: routine pregnancy care	1-month post-counseling was more pronounced than the 6 th week after the study onset $p<.001$). Low anxiety scores in the intervention group over time were also maintained.		
(23)	Munkhondya (2020)	Malawi 2018 quasi-experimental study moderate	$N=70$ Age: IG: 19.83 (\pm 2.90) CG: 20.11 (\pm 2.70) Primiparous	IG: companion-integrated childbirth preparation (structured childbirth education) CG: Routine care	At post-test, being in the intervention group significantly decreased childbirth fears ($\beta:=-.866$, $t(68)=-14.27$, $p<.001$).	Childbirth Attitude Questionnaire (CAQ)	FOC
(24)	Price (2019)	USA Date of data collection could not be stated one-group repeated measures design moderate	$N=12$ Age (median, range): 30.5 (24–40) Primi- and multiparous	Mindfulness-Based Childbirth and Parenting (MBCP) – online audios	The significant pre-post intervention improvements included a decrease in prenatal pregnancy anxiety ($p=.002$), and increased interoceptive awareness skills of self-regulation ($p=.016$) The significant longitudinal improvements included interoceptive awareness skills of self-regulation ($p=.04$). The effect sizes for these significant improvements were large, ranging from 0.62 to 1.18.	Generalized Anxiety Disorder Scale (GAD-7)	General anxiety during pregnancy
(25)	Yang (2019)	China 2018 RCT strong	$N=123$ Age: IG: 31.31 (4.97) CG: 30.38 (3.91)	IG: online mindfulness intervention program (training acceptance for internal and external experiences) CG: routine prenatal care	In the IG, the mean scores of the PHQ-9 and GAD-7 before the intervention indicated mild symptoms of anxiety; these scores decreased significantly at the end of the intervention, indicating no symptoms ($t=6.218$, $p<.001$; $t=5.422$, $p<.001$, respectively). No changes in the PHQ-9 and GAD-7 scores were observed in women in the CG when scores before versus after intervention were compared.	Generalized Anxiety Disorder Scale (GAD-7)	General Anxiety during pregnancy

			Primi- and multiparous		Postintervention scores of both PHQ-9 and GAD-7 were significantly lower in the IG than in the CG. Additionally, a larger proportion of women in the IG had no symptoms of anxiety after the IG compared with women in the CG.		
(26)	Van der Zwan (2019)	Netherlands Date of data collection could not be stated RCT weak	<i>N</i> =50 Age: 31.6 (5.9) Primi- and Multiparous	IG: heart rate variability (HRV)-biofeedback + Stress-Reducing Intervention (psychoeducation + taught abdominal breathing and HRV biofeedback) CG: Waitlist condition	In both conditions anxiety and stress levels were reduced and well-being increased between pre- and post-test (T1–T2). In the HRV-biofeedback condition, within-group effect sizes were medium, and long-term improvements six weeks after the training (T1–T3) were similar to those at post-test for all outcome measures except depression. Statistically significant long-term improvements in the HRV-biofeedback condition were present for stress and psychological well-being. Effect sizes were larger in the HRV-biofeedback condition than in the waitlist condition on all outcome variables except anxiety. When comparing the treatment effect between pregnant and non-pregnant women (the Condition–Pregnancy interaction), a statistically significant interaction effect for anxiety appeared. Additional analyses showed that HRV-biofeedback was more beneficial regarding anxiety reduction for pregnant women than for non-pregnant women (pregnant women: $B=-4.18$, $t=-2.74$, $p=.006$; non-pregnant women: $B=2.55$, $t=1.99$, $p=.046$).	Dutch version of the Depression Anxiety Stress Scales (DASS)	Anxiety during pregnancy
(27)	Loughnan (2019)	Australia Date of data collection could not be stated	<i>N</i> =77 Age: 31.61 (4.00)	IG: internet-delivered cognitive behavioral therapy	The group by time interactions for psychological distress ($F(2,53.93)=7.07$, $p<.01$) and anxiety ($F(2,54.67) = 6.48$, $p<.01$) were significant. Participants in the IG demonstrated large and superior reduc-	Generalized Anxiety Disorder 7-item scale (GAD-7)	General Anxiety during pregnancy

		RCT weak	Primi - & Multi- parous	CG: treatment as usual (TAU)	tions in distress at post-assessment compared to CG ($g(95\%CI) = 0.88(0.34, 1.43)$), and moderate differences at follow-up, although these were not statistically significant ($g(95\%CI) = 0.52(-0.07, 1.10)$). The between group differences for anxiety severity were small and non-significant post-assessment ($g(95\%CI)=0.40(-0.13, 0.93)$). However, IG demonstrated a moderate to large effect size reduction in anxiety symptom severity at follow-up assessment compared to the CG ($g=0.76$; 95% CI: 0.17, 1.35).		
(28)	Zemestani (2019)	Iran Date of data collection could not be stated RCT strong	$N=38$ Age: IG: 28.63 (3.02) CG: 30.54 (4.15) Primi- and multiparous	IG: Mindfulness-based cognitive therapy (MBCT) intervention CG: Did not receive any intervention; after 1-month follow-up, two psychoeducational sessions were conducted	Results from the mixed method repeated measure (MMRM) indicate greater improvements in levels of anxiety in the IG than in the CG. As to BAI, results indicated a significant effect of time, $F=(43.72)$, $p<.0001$, $\eta^2=.62$; and a significant time \times group interaction, $F=(52.68)$, $p<.0001$, $\eta^2=.67$. Post hoc comparisons showed that the IG had a significant decrease in BAI scores from baseline to post-treatment and BAI scores remained significantly lower than those of the CG at follow-up ($p<.0001$).	Beck Anxiety Inventory (BAI)	Anxiety during pregnancy
(29)	Amiri (2019)	Iran 2018 RCT strong	$N=68$ Age: IG: 26.2 (5.4) CG: 27.0 (5.6) Primi-and Multiparous	IG: Counseling based on distraction techniques for controlling stress, fear and pain CG: training about signs and stages of delivery and the appropriate time	There was no statistically significant difference between the two groups before the intervention ($p=.117$). But in the 36th week of pregnancy the mean score of the fear of childbirth in the IG was less than that of the CG, but the difference was not statistically significant (AMD: 5.4; 95% CI: -2.4 to 13.0; $p=.117$). There was no statistically significant difference between the groups after intervention ($p=.170$).	W-DEQ-A	FOC

				for a referral to the hospital			
(30)	Rahmani (2019)	Iran Date of data collection could not be stated RCT moderate	N=108 Age (18-35): IG 1: 24.4 (4.14) IG 2: 26.52 (4.6) CG: 25.6 (4.35) Primi- and Multiparous	IG 1: Peer Education + training booklet IG 2: Discussion Groups + training booklet CG: not described	Significant difference among the 3 groups ($p=.007$) after 4 weeks of intervention. Further, the Scheffe test showed a significant difference between the peer education and control groups ($p=.04$), as well as the training and discussion groups with the peer education group ($p=.013$).	Widget's Maternity Fear Awareness Questionnaire	FOC
(31)	Zhang (2018)	China 2016 RCT moderate	N=66 Age: IG: 25.7(2.79) CG: 25.58(2.33) Primi- and multiparous	IG: Mindfulness stress reduction (MBSR) CG: treatment-as-usual	The results found a significant interaction between time and condition for anxiety ($F=19.30, p<.001, \eta^2 = 0.240$). Post hoc comparisons showed that the mindfulness stress reduction had a stronger decrease in STAI from baseline to post-treatment compared to the CG.	State Trait Anxiety Inventory (STAI)	State/ Trait Anxiety during pregnancy
(32)	Hildingsson (2019)	Sweden 2016- 2017 Experimental Study strong	N=70 Age: <32: 29 (41.4) ≥ 32: 41 (58.6) Primiparous	IG: Counseling through known midwives CG: Counseling through unknown midwives	No differences on level of fear in IG (mean FOBS 71.25; 20.41) versus CG (70.83; 21.52).	Fear of Birth Scale (FOBS)	FOC
(33)	Klabbers (2019)	Netherlands 2012-2015 RCT weak	N=134 Age: IG 1: 32.8 (SD 4.6) IG 2: 31.8 (SD 3.9)	IG 1: Hypnotherapy (HT) IG 2: Psychoeducation via the Internet (INT)	In the intention to treat analysis, only the IG1 showed a significant decrease of fear of childbirth, $F(2,99)=.321, p=.040$. In the as treated analysis, the IG1 showed a greater reduction in fear of childbirth than the other two groups, $F(3,83)=6.717, p<.001$.	W-DEQ	FOC

			CG: 32.6 (SD 5.3) Primi-and Mul- tiparous	CG: Care as usual (CAU)			
(34)	Irmak (2019)	Turkey 2016- 2017 RCT strong	N=120 Age: IG 1: 27.29 ± 3.97 IG 2: 27.51 ± 4.65 CG: 27.36 ± 4.19 Primiparous	IG 1: Emotional free- dom techniques (EFT) IG 2: breathing awa- reness (BA) CG: Standard care.	No significant difference in the scores for the W-DEQ-A between the groups ($p>.05$). However, the difference in the scores for the W-DEQ-B between the groups was significant ($p<.001$). This difference was due to the high score of the W-DEQ-B of the CG. Both IG1 and IG2 interventions enabled to reduce the level of birth fear perceived at postpartum. There was also a significant difference in the scores for the W-DEQ-B subscales related to worries about childbirth ($p<.05$). There was a significant difference in childbirth fear measured with the SUDS in the latent phase between the groups ($p=.010$; $p<.05$). After the intervention, the IG2 had a considerably higher score for SUDS in the latent phase than the IG1, although the difference was not significant ($p=.055$; $p>.05$). After the intervention, the IG2 had a significantly higher score for SUDS in the active phase than the IG 1 ($p=.001$; $p<.001$). The scores for the SUDS during the transition phase differed significantly between the groups ($p=.008$; $p<.05$). The IG1 had a significantly lower score for the SUDS in the transition phase than the IG2 ($p=.001$; $p<.001$).	W-DEQ Subjective Units of Distress Scale (SUDS)	FOC
(35)	Heller (2020)	Netherlands Date of data collection could not be stated	N=79 IG: 32.08 (4.61) CG: 31.94 (4.83)	IG: internet- based problem solving treat- ment (PST)	In the IG, affective symptoms decreased more than that in the CG, but between-group effect sizes were small to medium (Cohen's d at T3=0.45, 0.21, and 0.23 for the 3 questionnaires, respectively) and statistically not significant.	Hospital Anxiety and Depression Scale-Anxiety subscale (HADS-A)	Anxiety during preg- nancy

		RCT moderate	Primi- and Multiparous	CG: Care as usual			
(36)	Mohammadi (2019)	Iran 2018 RCT moderate	N=60 Age: IG: 28.18±3.38 CG: 28.63±3.14 Primi- and multiparous	IG: Intervention group attended Benson's re- laxation techni- que (BRT) and brief psychoeducatio- nal intervention (BPI) education- al sessions CG: Received no intervention	Significant statistical difference in the IG before and after intervention ($p<.001$). In the IG, the mean stress and anxiety scores, and total score were decreased significantly ($p<.001$). The CG did not show any significant statistical differences ($p> .05$). There was a significant difference between the mean scores of IG and CG ($p<.001$).	Depression Anxiety Stress Scale-21	Anxiety during preg- nancy
(37)	Ekrami (2019)	Iran 2017 RCT strong	N=80 Age: IG: 28.5 (7.4) CG: 30.7 (5.4) Primiparous	IG: sessions of individual coun- seling + ses- sions of group counseling CG: received routine care	The mean (SD) state anxiety score in the IG decreased from before intervention to 4 weeks after counseling; the mean (SD) state anxiety score in the CG increased from before the intervention to 4 weeks af- ter the completion of the counseling. No significant difference between the IG and CG before the intervention in terms of state anxiety score ($p=.759$). The mean state anxiety score in the IG was significantly lower than on the CG (ad- justed mean difference: -7.8, CI 95% -4.5 to -11.1; $p<.001$) after intervention. The mean (SD) trait anxiety score in the IG decreased from before counseling to 4 weeks after counseling; the mean (SD) trait anxiety score in the IG was increased from before the intervention to 4 weeks after the completion of the counseling. There was no significant difference between the IG and CG before the intervention in terms of trait anxiety score ($p=.473$). The mean trait	Spielberger State-Trait Anxi- ety Inventory (STAI)	State/ Trait Anxi- ety of women with un- planned preg- nancy

					anxiety score in the IG was significantly lower than on the CG (adjusted mean difference: -8.2 , CI 95% -10.9 to -5.4 ; $p<.001$) after intervention.		
(38)	Sobhani (2019)	Iran 2017 RCT weak	$N=40$ Age could not be stated. Primi- or/and multiparous not stated	IG: Mindfulness Based Stress Reduction (MBSR) CG: unclear	Mindfulness training had a significant effect on reducing anxiety and stress.	Depression Anxiety Stress Scale (DASS-21)	Anxiety during pregnancy
(39)	Kacperczyk-Bartnik (2019)	Poland 2016 cross-sectional survey-based study moderate	$N=147$ Age: $31.5 (\pm 4.8)$ Primi- and Multiparous	IG: Antenatal classes attendance CG: No antenatal classes attendance	Women who gave birth for the first time and attended antenatal classes scored significantly lower in the DFS questionnaire ($p<.03$). No significant differences in the DFS score were observed in case of patients giving birth for the second or subsequent time. Respondents in the IG scored slightly lower in comparison to the CG ($p<.90$).	Delivery Fear Scale (DFS)	FOC
(40)	Uçar (2019)	Turkey 2012-2013 pretest–post-test experimental design weak	$N=111$ Age: $25.5 (SD 4.2)$ Primiparous	IG: educational program on coping with child-birth fears based on CBT CG: did not receive any intervention	The post-education W-DEQ-A score was significant higher in the CG compared to the IG ($p<.000$). No statistically significant difference was found between the anxiety levels of the IG and CG during the active phase of labor, according to the sum of SAI scores ($p=.533$).	State Anxiety Inventory (SAI) W-DEQ-A	FOC State anxiety during pregnancy
(41)	Narita (2018)	Japan Date of data collection could not be stated	$N=97$ Age: IG: $32.4 (\pm 3.8)$ CG: $32.7 (\pm 5.0)$	IG: heart rate variability (HRV) biofeedback Intervention (Stress Eraser)	The W-DEQ scores reduced significantly in women who performed HRV biofeedback ($n=18$, $p<.001$), but there was no change in those who did not perform the method ($n=20$).	W-DEQ-A	FOC

		Experimental Study weak	Primi- and Multiparous	CG: women did not agree to practice the method			
(42)	Boryri (2018)	Iran 2017 Quasi Experimental Study moderate	N=180 Age: 24.54 ± 4.40 Primiparous	IG 1: muscle relaxation IG 2: guided imagery CG: Routine care	The scores of delivery fear before the intervention significantly differed in the three groups ($p=.01$). A significant difference was found between IG1 and IG2 ($p=.01$), while the other groups represented no difference. However, the mean score of the fear of delivery was significant in the three groups after the intervention ($p=.0001$). The post-hoc test further indicated a statistically significant difference in the mean scores of childbirth fear between the IG1 and IG2 ($p=.0001$), IG1 and CG ($p=.0001$), as well as IG2 and CG ($p=.0001$).	Brislin's questionnaire	FOC
(43)	Warriner (2018)	UK 2014-2015 initial pilot study weak	N=155 (86 women, 69 men) Age (mean): 35 years Primi- or/and multiparous could not be stated	IG: 'MBCP-4-NHS' - Brief four week course (developed from the nine week Mindfulness Based Childbirth and Parenting (MBCP) intervention)	Change in mood pre-to post course showed that all scores improved and were statistically significant for prospective mothers, except for positive pregnancy experience intensity. Anxiety score has reduced to the 'mild' cut-off.	Generalized Anxiety Disorder Scale (GAD-7) Oxford Worries about Labor Scale (OWLS) Pregnancy Experience Scale (PES) Brief Tilbury Pregnancy Distress Scale (TPDS)	General anxiety during pregnancy Worries about labor Pregnancy distress

(44)	Akbarian (2018)	Iran 2016 RCT weak	<i>N</i> =120 Age could not be stated. Primiparous	IG: couples (mental health training course; with the partner present), pregnant women (mental health training course without the partner present) CG: routine care	In the pregnant women group and couples group, the average anxiety score of pregnant women after the intervention was significantly lower than before the intervention ($p<.001$). A significant difference was shown among the three groups after the intervention. After the intervention, the mean anxiety score of the pregnant women group was significantly lower than that of the CG ($p=.002$) and this score was significantly lower in the couples group than that in the pregnant women group ($p=.045$).	Depression, Anxiety, and Stress Scales (DASS-42)	Anxiety during pregnancy
(45)	Krusche (2018)	UK Date of data collection could not be stated RCT moderate	<i>N</i> = 185 Age (mean): 32.7 Primi- and multiparous	IG: online mindfulness course ('Be Mindful Online') - immediate CG: waiting to take the mindfulness course after the baby was born	A pairwise comparisons showed a decrease in anxiety for immediate, [$F(1,69) = 18.42, p<.001, \eta^2=.21$] (mean difference - 3.88) and waitlist participants, [$F(1,69) = 14.27, p<.001, \eta^2=.17$] (mean difference - 2.23). There was a trend for immediate participants to have lower anxiety at T1 compared to waitlist controls, [$F(1,69) = 3.15, p=.08, \eta^2=.04$].	The General Anxiety Disorder-7 (GAD-7)	General anxiety during pregnancy
(46)	Rondung (2018)	Sweden 2014-2015 RCT moderate	<i>N</i> =258 Age: <25: 37 (14.3) 25-35: 186 (72.1) >35: 35 (13.6) Primi- and multiparous women	IG: Guided internet-based on cognitive behavioral therapy (ICBT) CG: Standard care group	The reduction in FOB over time was significantly larger in the guided IG group than in the CG group. However, the predicted level of FOB at the estimated due date did not differ significantly ($t_{1,240.996}=-0.24, p=.81$). Hence, when comparing the intervention groups, no difference was observed in FOB in late pregnancy.	Fear of Birth Scale (FOBS)	FOC

(47)	Hajmohamadi (2018)	Iran 2014 RCT moderate	<i>N</i> =114 Age was not stated Not stated if primi- or/and multiparous	IG: Psychoeducation CG: not stated	The mean score of depression and anxiety decreased significantly after the intervention in comparison to that before the intervention and that of CG ($p<.001$).	Researcher made questionnaire based on the Predisposing, Reinforcing and Enabling Constructs in Educational Diagnosis and Evaluation	Anxiety during pregnancy
(48)	Airo (Toivonen) (2018)	Finland 2007-2010 Randomized trial weak	<i>N</i> = 460 Age: IG: 29.8 (\pm 4.4) CG: 28.3 \pm 5.0 Primiparous	IG: group intervention Nyytti® (with psychoeducation elements, the lifespan model of motivation, practices to support mentalisation and mind-body connection). CG: standard childbirth preparation course	FOC decreased statistically significantly during the intervention from the baseline (mean=7.60, SD=1.72) to the last session before the childbirth (sixth session; mean=4.56, SD=2.42, Wald=230.43, df=6, $p<.001$).	W-DEQ-A Visual Analog Scale (VAS) to measure subjective FOC	FOC
(49)	Duncan (2017)	USA Date of data collection could not be stated RCT moderate	<i>N</i> =30 Age could not be stated Primiparous	IG: Short, time-intensive course. Mind in Labor (MIL): Working with Pain in Childbirth, based on Mindfulness-Based Childbirth and Parenting (MBCP) education CG: standard childbirth preparation course	Pain catastrophizing dropped by 3.6 points in the IG group and was essentially unchanged in the CG. The timegroup interaction was not significant ($t = -1.06$, $p=.30$; estimated treatment effect = -3.26 points, 80% CI [-7.3, 0.8]). When the missing data was imputed, the result did not change ($t = -.71$, $p=.48$).	Pain Catastrophizing Scale (PCS)	Pain catastrophizing

				with no mind-body focus			
(50)	Andaroon (2017)	Iran 2015-2016 RCT moderate	<i>N</i> =93 Age could not be stated Primiparous Women	<i>IG</i> : face to face individual counseling <i>CG</i> : Usual services	The present study showed that an individual counseling program provided by a midwife based on a counseling consultant by a midwife based on BELIFE counseling is effective in reducing fear of childbirth in a way that the level of fear of childbirth in primiparous women in the weeks 36–34 of pregnancy in the <i>IG</i> was significantly lower than the <i>CG</i> .	W-DEQ	FOC
(51)	Seyed Kaboli (2017)	Iran 2016 RCT strong	<i>N</i> =62 Age: 24-18: 19 (30.64) 29-25: 29 (46.77) 35-30: 14 (22.58) Primiparous	<i>IG</i> : counseling for 6 sessions of 90 minutes + routine prenatal care <i>CG</i> : routine prenatal care + instructional package for dealing with pregnancy stresses	The PWSQ score did not differ significantly between the 2 groups before the intervention ($p > .05$). After the intervention, the mean subscale scores were lower in the <i>IG</i> than in the <i>CG</i> and made a statistically significant post-intervention difference between the groups ($p = .01$). These scores suggest the effectiveness of the intervention in reducing pregnancy-specific stress.	Pregnancy Worries and Stress Questionnaire (PWSQ)	Pregnancy worries and stress
(52)	Mary (2017)	India Date of data collection could not be stated pre- test, post-test quantitative research design weak	<i>N</i> =50 Age: 64 % of participants in <i>CG</i> and <i>IG</i> were between 24-29 years Primiparous	<i>IG</i> : performed selected mind body interventions (Active visualisation with Birth Affirmations, <i>yogic</i> breathing and relaxation) for 4 weeks <i>CG</i> : routine standard hospital care	Statistical findings proved that there was a significant difference in anxiety level among antenatal women who were subjected to mind body intervention than those who do not.	W-DEQ	FOC

(53)	Legrand (2017)	France Date of data collection could not be stated single-subject A (baseline) – B (hypnotherapy treatment) – A' (return-to-baseline) re-search design weak	N=1 Age: 23 years Primiparous	Hypnotherapy treatment	A statistically significant declining trend in anxiety scores was observed during the hypnosis phase, and anxiety re-increased in the return-to-baseline phase ($p<.05$).	State Anxiety Inventory (SAI)	State anxiety during pregnancy
(54)	Waisblat (2017)	France Date of data collection could not be stated longitudinal repeated measures quasi-experimental design moderate	N=155 Age: Group S: 44.3 (13.3) Group H: 46.3 (7.1) Could not be stated if primi-and/or multiparous	Group S: standard hypnotic communication Group H: hypnotic communication	The mean fear ratings in the Group H participants was significantly lower than that of the Group S participants ($p=.001$).	Rating fear of the epidural puncture using the numerical rating scale (NRS) with 0 = No pain (fear) and 10 = Worst imaginable pain (fear).	Fear of women undergoing labor
(55)	Toosi (2017)(Toosi et al., 2017)(Toosi et al., 2017)(Toosi et al., 2017)(Toosi et al., 2017)	Iran Date of data collection could not be stated	N=80 Age: IG: 29.0 ± 2.4 CG: 28.7 ± 2.7 Primiparous	IG: Relaxation Training (Benson's relaxation technique) CG: Routine care	No significant difference between the two groups regarding the anxiety score before the intervention ($p=.903$). A statistically significant difference was observed regarding the anxiety score after the intervention ($p<.001$). The anxiety score had significantly decreased in the IG ($p<.001$), but had significantly increased in the CG ($p=.033$).	Spielberger's state-trait anxiety scale	State/Trait anxiety during pregnancy

	i et al., 2017)(Toosi et al., 2017)(Toosi et al., 2017)(Toosi et al., 2017)(Toosi et al., 2017)(Toosi et al., 2017)	semi-experimental clinical trial moderate			Thus, relaxation training was effective in reduction of anxiety score after the intervention.		
(56)	Sanaati (2017)	Iran 2015 RCT strong	<i>N</i> =189 Age: IG1: 28.2 (5.1) IG2: 27.5 (4.9) CG: 27.7 (4.9) Primi- and multiparous	Lifestyle based education: included issues related to sleep, hygiene, nutrition, physical activity and exercise, self-concept and sexuality IG 1: both women and their husbands received the lifestyle-based education. IG2: only women received the lifestyle-based education. CG: Routine care	No significant difference on state or trait anxiety was observed between the groups before the intervention ($p=.257$; $p=.137$) The mean score of state anxiety 8 weeks after intervention showed a statistically significant difference among the groups ($p<.001$). The mean state anxiety scores in the IG1 and IG2 were significantly reduced compared to the CG. The mean state anxiety score was also significantly reduced in the IG1 compared to the IG2. The mean post-intervention score of trait anxiety showed a statistically significant difference among the groups ($p<.001$). Compared to the CG, the mean trait anxiety score was significantly reduced in the IG1 and IG2; however, no significant difference was observed between the two intervention groups.	Spielberger State-Trait Anxiety Inventory (STAI)	State/ Trait Anxiety during pregnancy

(57)	Kordi (2017)	Iran 2015-2016 RCT strong	N=122 Age: IG: 23.2±3.6 CG: 24.2±4.4 Primiparous	IG: psycho-educational program for three weeks CG: Routine prenatal care	No significant differences between the groups with respect to the mean pre-intervention FOC scores. A significant difference was observed between the IG and CG in terms of the mean post-intervention FOC scores ($p=.007$). The FOC score significantly diminished in the intervention group in the post-intervention phase ($p=.001$).	W-DEQ	FOC
(58)	Beattie (2017)	Australia 2014 Pilot randomized trial moderate	N=48 Age: IG: 28.9 (5.7) CG: 28.5 (6.4) Primi- and Multiparous	IG: mindfulness-based support program (MiPP) CG: pregnancy support program (PSP)	No statistically significant differences between the IG and the CG were shown on perceived stress across the three time periods ($p=.82$).	Perceived Stress Scale (PSS-10) (PSS)	Perceived stress during pregnancy
(59)	Haapio (2017)	Finland Date of data collection has not been stated RCT weak	N=659 Age (%): 18–22: IG: 3.0%; CG: 4.0% 23–29: IG: 48.0%; CG: 47.0% 30–35: IG: 44.0%; CG: 45.0% 36–40: IG: 5.0%; CG: 4.0% Primiparous	IG: extended childbirth education (defined as a midwife-led intervention with low medicalization) CG: regular childbirth education	The mothers in the IG had less childbirth-related fear than those in the CG [odds ratio (OR) 0.58, 95% confidence level (CL) 0.38– 0.88].	'Feelings of Fear and Security Associated with Pregnancy and Childbirth' Questionnaire	FOC
(60)	Parsa (2016)	Iran 2015 Quasi experimental study	N=110 Age (IG/CG): 18-22: 16.4%/5.5%	IG: counseling sessions based on the GATHER approach	Trait anxiety levels of pregnant women significantly changed (were lowered) as a result of intervention ($p<.001$). However, no significant difference was found in trait anxiety levels of pregnant women in the CG before and after the intervention.	Spielberger's State-Trait Anxiety Inventory	State/Trait Anxiety during pregnancy

		strong	23-27: 47.3%/49.1 % 28-32: 29.1%/36.4% 33-37: 7.3%/9.1% Primiparous	CG: not described	State anxiety levels of pregnant women significantly changed (were lowered) as a result of intervention ($p<.001$). However, no significant difference was found in state anxiety levels of pregnant women in the CG before and after the intervention.		
(61)	Aslami (2016)	Iran 2015 RCT moderate	$N=75$ Age: IG 1: 29.4 ± 3.8 IG 2: 27 ± 3.2 CG: 28.6 ± 4.3 Could not been stated if primi-or/and multiparous women	IG1: treatment of mindfulness based on Islamic spiritual schemes IG2: cognitive behavioral therapy group CG: no course	The significant levels of all tests reveal that between the anxiety of pregnant women in the IGs and CG, at least in one of the dependent variables in the $p<.001$ level, there was a significant difference. This finding shows that in the aforesaid related variables statistically significant differences are seen between IG1 and IG2 and CG. These findings revealed that both IG1 and IG2 in comparison to the CG led to a decrease in anxiety in pregnant women. The difference between the average IG1 and IG2 in anxiety was significant in the level of .001. Therefore, the mindfulness treatment method in comparison with group cognitive behavioral therapy was more effective on the reduction of anxiety of pregnant women.	Beck anxiety-depression questionnaire	Anxiety during pregnancy
(62)	Khojasteh (2016)	Iran 2016 RCT moderate	$N=75$ Age: IG1: 22.76 ± 3.85 IG2: 23.76 ± 3.74 CG: 23.92 ± 4.41 Primiparous	IG1: Massage IG2: Guided Imagery CG: Routine Care	No significant difference before intervention between groups ($p=.063$). The mean score of anxiety in all three groups had statistically significant differences after the intervention ($p<.001$). The post-hoc test showed that the IG1 ($p=.000$) and IG2 ($p=.000$) had significant lower anxiety scores compared to the CG, while no significant differences were found between IG1 and IG2 ($p=.928$).	Pregnancy-related Anxiety Questionnaire - revised	Pregnancy related anxiety

(63)	Sheikh-Azadi (2016)	Iran Date of data collection could not be stated RCT moderate	<i>N</i> =60 Age: IG: 24 (4.388) CG: 25 (4.387) Primiparous	IG: Routine pregnancy care + group discussion courses CG: Routine pregnancy care	Mean anxiety score before the intervention was not significantly different between the IG and CG ($p=.674$). The results showed, that the mean anxiety score of maternal state anxiety was significantly different between the two groups after the intervention ($p=.001$).	Spielberger Anxiety Inventory	State anxiety during pregnancy
(64)	Salehi (2016)	Iran 2015 quasi experimental trial strong	<i>N</i> =91 Age: 26.04±4.68 Primiparous	IG1: group cognitive behavioral therapy (GCBT) IG2: interactive lectures group (IL) CG: standard prenatal care	There was a significant difference in the level of state and trait anxiety in both the IG1 and IG2 groups before and after the intervention ($p<.001$). However, there were no differences in state anxiety ($p=.330$) or trait anxiety ($p=.147$) in the CG between baseline and 4 weeks later. The results showed significant differences between the 3 groups in state anxiety ($p=.011$) and trait anxiety ($p=.016$). No significant difference was found between IG1 and IG2 for state anxiety ($p=.079$) or trait anxiety ($p=.069$).	Spielberger's State-Trait Anxiety Inventory	State/Trait Anxiety during pregnancy
(65)	Beevi (2016)	Malaysia Date of data collection could not be stated pre-test/post-test quasi-experimental design moderate	<i>N</i> =56 Age: IG: $M = 28.23$ SD = 3.12 CG: ($M = 29.28$ SD = 2.65) Primi- and Multiparous	IG: Hypnosis intervention CG: Traditional antenatal care	Homogeneity of variance ($p>.05$) as well as homogeneity of covariance given ($p=.314$). There was a statistically significant interaction between the group and time for anxiety symptoms, $F(3,126)=7.933$, $p<.037$, partial $\eta^2=.16$. Results for the simple main effect for group indicated that there was a statistically significant difference in anxiety symptoms at time point 3, $F(1,44)=10.764$, $p=.002$, partial $\eta^2=.20$, but not at baseline, time point 1 and time point 2. There was a statistically significant effect of time on anxiety symptoms for the IG, $F(2.138,58.457)=12.352$, $p=.0005$, partial $\eta^2=.38$ and the effect of	Depression Anxiety Stress Scale—21 (DASS-21)	Anxiety during pregnancy

					time on anxiety symptoms for the CG was not significant, $F(3,66) = 0.756$, $p=.523$, partial $\eta^2 = .03$. Following the significant effect of time for the IG, a pairwise comparison was performed and results indicated that anxiety symptoms were statistically significantly reduced between time point 1 and baseline ($M=2.48$, $SE=0.80$, $p=.035$), between time point 2 and baseline ($M=3.91$, $SE=1.18$, $p=.020$), between time point 3 and baseline ($M=6.10$, $SE=1.27$, $p=.001$), between time point 3 and time point 1 ($M=3.62$, $SE=1.13$, $p=.026$), but not statistically significant between time point 1 and time point 2 ($M=1.43$, $SE=0.89$, $p=.734$) and between time point 2 and time point 3 ($M=2.19$, $SE=0.82$, $p=.085$)		
(66)	Fontein-Kuipers (2016)	Netherlands 2013-2015 RCT strong	$N=433$ Age: IG: 30.11 (± 4.09) CG: 29.98 (± 3.71) Primi- and multiparous	IG: Wazzup Mama?! focused 1. on the signs and symptoms of maternal distress and identification of the origin of the state of mood 2. identifying stressors 3. measurement of maternal distress. CG: antenatal care as usual	In the CG, the mean STAI scores significantly increased from baseline (T1) to post-intervention (T2) ($p<.001$, $p<.001$, $p<.001$). Mean PRAQ scores increased but did not reach statistical significance ($p=0.12$). The proportion of STAI and PRAQ scores above cut-off level significantly increased from baseline (T1) to post-intervention (T2) ($p<.001$, $p=.045$, $p=.03$). In the IG, the mean STAI and PRAQ scores were significantly lower at T2 compared to T1 ($p=.001$, $p<.001$, $p<.001$). The proportion of PRAQ scores above cut-off level were significantly lower at T2 compared to T1 ($p=.002$, $p=.009$). The STAI scores above cut-off level decreased, but this did not reach statistical significance ($p=.4$, $p=.4$).	State-Trait Anxiety Inventory (STAI) and Pregnancy-Related Anxiety Questionnaire (PRAQ)	State/Trait Anxiety in pregnancy

(67)	Yazdani-mehr (2016)	Iran Date of data collection has not been stated RCT strong	<i>N</i> =80 Age: IG: 26 (5.82) CG: 26.73 (4.54) Primi-and Multiparous	IG: Mindfulness-integrated cognitive behavior therapy CG: Routine prenatal care services	The differences between the study groups regarding the pretest mean scores of anxiety were not statistically significant ($p<.05$). The results showed that at T2 and T3, the mean scores of anxiety in the IG were significantly lower than the CG ($p<.001$).	Beck Anxiety Inventory	Anxiety during pregnancy
(68)	Nieminen (2016)	Sweden 2012- 2013 feasibility study weak	<i>N</i> =28 Age: 30.5 (24-39) Primiparous	IG: Internet-delivered therapist-supported self-help program based on cognitive behavioral therapy (ICBT)	Statistically significant ($p<.0005$) decrease of FOC. The W-DEQ sum score decreased pre- to post-therapy, with a large effect size (Cohen's $d=0.95$).	W-DEQ	FOC
(69)	Karabulut (2016)	Turkey date of data collection has not been stated quasi-experimental & prospective study strong	<i>N</i> =192 Age: IG: 28.87 ± 4.54 CG: 25.73 ± 5.35 Primiparous	IG: Antenatal educational program (health in pregnancy, birth and breathing exercises, breastfeeding, baby care, post-partum period and family planning) CG: routine pregnancy care and information	The IG's pre-education and IG's first measurement levels of FOC showed significant differences ($p<.005$). The IG's post-education and CG's second measurement levels of FOC also showed significant differences ($p<.005$). According to this finding, antenatal education was effective in reducing the FOC among primipara.	W-DEQ-A	FOC
(70)	Karamoozian (2015)	Iran Date of data collection has not been stated	<i>N</i> =30 Age is not reported Primiparous	IG: cognitive-behavioral stress management (CBSM)	There is a significant difference in the adjusted average scores of total anxiety between the IG and CG. The effect of pretest was significant with $\eta^2_p=0.57$, $p<.01$, and $f=34.83$. As a result, it can be said that	Pregnancy- Related Anxiety Questionnaire	Pregnancy related anxiety

		RCT moderate		CG: prenatal care	CBSM significantly reduced the total anxiety in the IG.		
(71)	Rouhe (2015a)	Finland 2007-2009 RCT Weak	N=371 Age is not reported Primiparous	IG: group psycho-education with relaxation exercises CG: conventional care	There was a significant difference between the groups in mean W-DEQ-B sum scores ($F=1.1$, $df=199$, $p=.016$ Cohen's $d=0.35$, small effect size), indicating a more fearful childbirth experience in the CG. Childbirth experience was less fearful in the IG compared to the CG across all modes of delivery, although none of the differences reached significance, potentially because of small sample sizes.	W-DEQ A+B	FOC
(72)	Isbir(2015)	Turkey 2014 RCT strong	N=72 Age: IG: 24.9 (5.9) CG: 25.0 (4.7) Primi- and Multiparous	IG: Supportive Care during labor by midwives (physical, emotional, instructional, informational, advocacy support) CG: routine hospital care	The IG reported less fear of delivery during the active and transient phases of labor than the CG ($p<.05$).	W-DEQ "Delivery fear scale"	Fear of delivery

Note. IG=experimental group/intervention group; CG=control group; RCT=randomized controlled trial; FOC = fear of childbirth

Characteristics of the included studies

Details of the search results are presented in table 2. 72 studies fulfilled the inclusion criteria, with a total of 8288 pregnant women. The 72 studies were the basis of the findings within this review. The studies were conducted across 18 countries with most studies from Iran (32 studies), second most from Turkey (7 studies) and third most from Sweden, Netherlands and UK (4 studies), China, Finland and USA (3 each), India, Australia and France (2 each), Germany, Iceland, Malawi, Poland, Japan and Malaysia (1 each). Most studies were RCTs, with 47 RCT study designs. The period of time of data collection ranged from 2007 up until 2020.

29 studies included primi- and multiparous women and 31 studies included primiparous women. For 12 studies parity could not be stated.

Outcome variables

14 studies focused on „fear of childbirth” as an outcome (Abdollahi et al., 2020; Airo (Toivanen) et al., 2018; Amiri et al., 2019; Andaroon et al., 2017; Boryri et al., 2018; Boz et al., 2020; Firouzan et al., 2020; Haapio et al., 2017; Hildingsson et al., 2019; Irmak Vural & Aslan, 2019; Kacperczyk-Bartnik et al., 2019; Karabulut et al., 2016; Klabbers et al., 2019; Kordi et al., 2017; Larsson et al., in press; Mary et al., 2017; Munkhondya et al., 2020; Narita et al., 2018; Nieminen et al., 2016; Rahmani et al., 2019; Rondung et al., 2018; Rouhe et al., 2015b; Shahsavan et al., 2020; Swift et al., in press; Uçar & Golbasi, 2019).

Some studies focused on “state/trait anxiety during pregnancy” (Abbasi et al., 2020; Ekrami et al., 2019; Fontein-Kuipers et al., 2016; Goetz et al., 2020; Hamilton et al., 2020; Parsa et al., 2016; Rajeswari & SanjeevaReddy, 2020; Salehi et al., 2016; Sanaati et al., 2017; Toosi et al., 2017; J.-Y. Zhang et al., 2019), while others focused only on “state anxiety during pregnancy (Esfandiari et al., 2020; Legrand et al., 2017; Mirtabar et al., 2020; Sheikh-Azadi et al., 2016; Uçar & Golbasi, 2019).

Some studies had “pregnancy related anxiety as an outcome” (Aksoy Derya et al., 2021; Bazrafshan et al., 2020; Goetz et al., 2020; Karamoozian & Askarizadeh, 2015; Khojasteh et al., 2016; Zarenejad et al., 2020) and others focused on “anxiety during pregnancy” (Akbarian et al., 2018; Alipour et al., 2020; Aslami et al., 2016; Beevi et al., 2016; Hajmohamadi et al., 2018; Heller et al., 2020; Mohammadi & Parandin, 2019; Montazeri et al., 2020; Sobhani et al., 2019; Sridhar et al., 2020; van der Zwan et al., 2019; Yazdanimehr et al., 2016; Zehmestani, 2019).

Another outcome was “general anxiety during pregnancy” (Krusche et al., 2018; Loughnan, Sie, et al., 2019; Price et al., 2019; Warriner et al., 2018; Yang et al., 2019).

Few studies focused on specific outcome variables like “mental health of pregnant women – anxiety” (Noorbala et al., 2019), “perinatal mood and anxiety disorders” (Waters et al., 2020), “anxiety of pregnant women undergoing interventional prenatal diagnosis” (Kang, 2020), “labor fear” (Uludağ & Mete, 2020), “fear of women undergoing labor” (Waisblat et al., 2017), “pain catastrophizing” (Duncan et al., 2017), “pregnancy worries and stress” (Seyed Kaboli et al., 2017), “fear of delivery” (İsbir & Serçekuş, 2015) and “perceived stress during pregnancy” (Beattie et al., 2017).

Interventions applied to pregnant women

Online vs. offline

Interventions were delivered in two forms: Via the internet respectively online or digital (Aksoy Derya et al., 2021; Fontein-Kuipers et al., 2016; Heller et al., 2020; Klabbers et al., 2019; Krusche et al., 2018; Larsson et al., in press; Loughnan, Sie, et al., 2019; Nieminen et al., 2016; Price et al., 2019; Rondung et al., 2018; Shahsavan et al., 2020; Yang et al., 2019) or offline respectively face to face. Online “mindfulness based interventions” seem to be effective online/digital (Goetz et al., 2020; Krusche et al., 2018; Price et al., 2019; Yang et al.,

2019). For the offline „mindfulness-based interventions“ results are inconsistent: Several studies find a positive effect (Sobhani et al., 2019; Warriner et al., 2018; Yazdanimehr et al., 2016; Zarenejad et al., 2020; Zemestani, 2019; J.-Y. Zhang et al., 2019), while Beattie et al. (2017) did not show a positive effect of mindfulness-based interventions on perceived stress and Duncan et al. (2017) did not show a positive result on pain catastrophizing. This result does not seem to be affected by the weak ratings of the studies from Goetz et al. (2020), Sobhani et al. (2019) and Warriner et al. (2018).

There are also mixed results concerning the effectiveness of internet based cognitive behavioral therapy, while Larsson et al. (in press) and Loughnan (2019) did not find a between group effect for internet based cognitive behavioral therapy, Nieminen et al. (2016), Rondung et al. (2018) and Shahsavan et al. (2020) showed significant effects in favour of internet based cognitive behavioral therapy. This result has to be interpreted carefully as the studies from Larsson et al. (in press), Loughnan (2019) and Nieminen et al. (2016) are rated as weak.

Fontein-Kuipers (2016) focused on identifying (potential) stress factors, problems or difficult situations in the past or present that may contribute to the development of maternal distress plus gave personal feedback regarding questionnaire results in a web-based tailored program. In the intervention group, the mean state anxiety and pregnancy anxiety scores were significantly lower at T2 compared to T1. The proportion of pregnancy anxiety scores above cut-off level were significantly lower at T2 compared to T1 and the state trait anxiety scores above cut-off level decreased, but this did not reach statistical significance.

Categories of interventions

Summarized within this review are *educational interventions: psychoeducation* (Bazrafshan et al., 2020; Boz et al., 2020; Hajmohamadi et al., 2018; Klabbers et al., 2019; Kordi et al., 2017; Uçar & Golbasi, 2019) and more *general education* (Abbasi et al., 2020; Aksoy Derya et al., 2021; Haapio et al., 2017; Karabulut et al., 2016; Munkhondya et al., 2020; Noorbala et al., 2019). Bazrafshan et al. (2020), Boz et al. (2020), Hajmohamadi et al. (2018), Kordi et al. (2017) and Uçar and Golbasi (2019) found a positive effect for psychoeducation, while the

study of Klabbers (2019) did not validate this result. Taking the ratings of Uçar (2019) and Klabbers (2019) as weak ratings into account, the results could be interpreted as positive effects for psychoeducational interventions. Abbasi et al. (2020), Haapio et al. (2017), Karabulut et al. (2016), Munkondhya et al. (2020) and Noorbala et al. (2019) showed a positive effect of general education, but the study of Aksoy Derya (2021) is contrary to this result. The weak rating of the study from Haapio et al. (2017) does not seem to affect this result. One study examined the effect of partly psychoeducational, but mostly physiological education and only found a small effect of education on fear of childbirth (Swift et al., in press), while Rahmani et al. (2019) showed that peer education is effective in decreasing FOC in pregnant women.

With regards to relaxation trainings two studies show a positive effect of *relaxation techniques* like progressive muscle relaxation and relaxation training (Rajeswari & SanjeevaReddy, 2020; Toosi et al., 2017).

The included studies show mixed results regarding *mindfulness-based interventions* and their positive effect on anxiety/fear and stress. While several authors found positive influences (Goetz et al., 2020; Krusche et al., 2018; Price et al., 2019; Sobhani et al., 2019; Warriner et al., 2018; Yang et al., 2019; Zarenejad et al., 2020; Zemestani, 2019; J.-Y. Zhang et al., 2019), two studies did not show positive effects of mindfulness-based interventions on perceived stress (Beattie et al., 2017) or on pain catastrophizing (Duncan et al., 2017). This result does not seem to be affected by the weak ratings of the studies from Goetz (2020), Sobhani (2019) and Warriner (2018).

Four studies included in this review examined the effect of *hypnotherapeutic interventions*. Beevi et al. (2016) stated that an hypnotherapeutic intervention has a positive effect on reducing anxiety during pregnancy. Legrand et al. (2017) also found a positive effect on decreasing state anxiety and also showed a re-increase in the return-to-baseline phase, but this study has to be interpreted carefully, as only one person was examined and the rating of the study

was weak. Waisblat et al. (2017) examined the effect of hypnotic communication on fear of women undergoing labor and found that hypnotic communication (communication that focuses on the awareness of the patient towards sensations and images that support relaxation and comfort) was more effective than standard communication. In addition fear of labor was significantly lower in a “philosophy of hypnobirthing” group compared to the control group (received routine care) (Uludağ & Mete, 2020).

Boryri et al. (2018) and Khojasteh et al. (2016) studied the effect of *guided imagery* on FOC and pregnancy related anxiety and found a significant decrease of fear of delivery on anxiety though guided imagery.

Narita et al. (2018) studied the effect of a heart rate variability (HRV) *biofeedback intervention* on fear of childbirth and found that FOC was significantly reduced in women who performed HRV biofeedback. Contrary to this result, van der Zwan et al. (2019), who studied a heart rate variability (HRV)-biofeedback intervention combined with a stress-reducing intervention, did not find significant long-term improvements in the HRV-biofeedback condition. But the results on both of those biofeedback intervention studies have to be interpreted carefully due to weak ratings.

Seven studies examined the effect of *counselling* on anxieties and fears related to pregnancy and childbirth. Seyed Kaboli et al. (2017) showed an effect of counselling on reducing pregnancy-specific stress. Another study, that studied face to face individual counselling conducted by a midwife was effective in reducing fear of childbirth (Andaroon et al., 2017). Ekrami et al. (2019) examined individual and group counselling. The authors found that the mean state and trait anxiety score of the counselling groups were significantly reduced compared to the control group without counselling. In addition Hildingsson et al. (2019) found that it does not make a difference if the counselling is done by a known or unknown midwife. Counselling based on distraction techniques is did not show a significant difference compared

to a control group intervention (training about signs and stages of delivery and the appropriate time for a referral to the hospital) (Amiri et al., 2019). Parsa et al. (2016) examined counselling sessions based on the GATHER approach and showed that trait and state anxiety levels were lowered due to the intervention. Esfandiari et al. (2020) showed that group supportive counselling scores of state-anxiety were reduced more remarkably than in the CG with a large effect size. Firouzan (2020) examined the difference between face to face counselling and telephone counselling sessions and found that counselling based on the BELIEF protocol was effective in decreasing childbirth fear.

This systematic review also included studies about different *therapy tools*. Montazeri et al. (2020) showed a significant and reductional effect of *writing therapy* sessions on anxiety during pregnancy. An *acceptance and commitment therapy (ACT)* intervention studied by Waters et al. (2020) showed a positive effect on global distress, but must be interpreted carefully due to weak ratings. Alipour et al. (2020) examined the effect of a *communication skills training* package combined with a couple based intervention as significantly effective in the reduction of anxiety during pregnancy. A *cognitive analytic therapy* intervention examined by Hamilton et al. (2020) did not show any difference in trait/state anxiety between the randomized groups, but this result has to be interpreted carefully due to a weak rating. Mirtabar et al. (2020) examined the effect of *individual structured psychotherapy* on state anxiety in preterm labor and showed a significant improvement in the state-anxiety scores compared with the control group (received inpatient medical care for preterm labor). Aslami et al. (2016) studied the effect of a *cognitive behavioral therapy* group on anxiety during pregnancy and revealed that the cognitive behavioral therapy group in comparison to the control group (no intervention course) led to a decrease in anxiety in pregnant women. This matches the result of Salehi (2016) which also studied the effect of *group cognitive behavioral therapy (GCBT)* on state/trait anxiety during pregnancy. There was a significant decrease in the level of state and trait anxiety in the GCBT group before and after the intervention. A study about a *cognitive*

behavioral stress management intervention showed that this intervention significantly reduced the total anxiety (Karamoozian & Askarizadeh, 2015).

Also calming *virtual reality environments* seem to be effective on reducing anxiety during pregnancy, but this effect was mainly seen by qualitative data of the study (Sridhar et al., 2020). A *motivational interviewing (MI)* psychotherapy intervention showed a large and significant effect on the reduction of fear of childbirth (Abdollahi et al., 2020). Irmak Vural and Aslan (2019) examined the effect of *emotional freedom techniques and breathing awareness*, both interventions enabled to reduce the level of worries about childbirth. An *internet based problem solving treatment* studied by Heller et al. (2020) did not show a significant effect in reducing anxiety during pregnancy. *Antenatal class attendance* reduced delivery fear significantly in first time mothers, but not in multiparous mothers (Kacperczyk-Bartnik et al., 2019). A *mental health training course* with and without the partner present studied by Akbarian (2018) showed that after the intervention, the mean anxiety score of the pregnant women group was significantly lower than that of the control group and this score was significantly lower in the couples group than that in the pregnant women group. This result has to be interpreted carefully, due to a weak rating. Another study examined the *group intervention Nyytti®* (with psychoeducation elements, the lifespan model of motivation, practices to support mentalisation and mind–body connection) and showed a significant decrease of fear of childbirth, but has to be interpreted carefully due to weak ratings (Airo (Toivanen) et al., 2018). İsbir and Serçekus (2015) studied the effect of *supportive care during labor* by a midwife (physical, emotional, instructional, informational, advocacy support) and found that women supported by the midwives showed significantly less fear on delivery. A *“lifestyle based education”* (included issues related to sleep, hygiene, nutrition, physical activity and exercise, self-concept and sexuality) found a significant and positive effect, in the direction of reducing state and trait anxiety during pregnancy (Sanaati et al., 2017).

Kang et al. (2020) examined the effect of different psychological interventions (like psychological support, education, relaxation training, family support, music listening) on anxiety of pregnant women undergoing interventional prenatal diagnosis. The authors found that post-operative anxiety scores were significantly lower in the psychological intervention than in the control group (Kang, 2020), but the results have to be interpreted carefully due to weak ratings. A *mind body intervention* on the effect of FOC showed a significantly reducing effect on the level of anxiety and anxiety symptoms among antenatal women who were subjected to mind body intervention than those who were not (Mary et al., 2017), but this effect has to be interpreted carefully due to a weak rating. Another study focused on the effect of *group discussion* in combination with routine care with a significant decrease of state anxiety during pregnancy (Sheikh-Azadi et al., 2016).

Discussion

Summary of main findings

This systematic review found a positive effect of *psychoeducation, relaxation techniques, guided imagery, counselling* (face to face individual counselling from a known or unknown midwife; group (supportive) counselling; counselling based on the GATHER approach or BELIEF protocol) and *different hypnotherapeutic techniques* on different fears and anxieties during pregnancy and childbirth, in the sense that those interventions can reduce fears and anxieties in the time of pregnancy and childbirth. Counselling based on distraction techniques did not show a significant difference to a control condition.

For *mindfulness-based interventions*, mixed results are found, regarding the positive effect of those interventions. Specially an effect on perceived stress and pain catastrophizing could not be shown.

This systematic review also included studies on *different therapeutic schools and therapy tools*, showing a significant and reductional effect of *writing therapy sessions, cognitive behavioral therapy groups, a cognitive behavioral stress intervention, a communication skills training package* combined with a couple-based intervention as well as a *behavioral therapy*

group in comparison to the control group (no intervention course) on anxiety during pregnancy. *Individual structured psychotherapy* showed a significant improvement on state anxiety scores.

An *acceptance and commitment therapy (ACT)* intervention showed a positive effect on global distress, but must be interpreted carefully due to weak ratings. A *cognitive analytic therapy* did not show any difference in trait/state anxiety between the randomized groups, but this result has to be interpreted carefully due to a weak rating.

Contrary results were shown regarding *biofeedback interventions*, while one study found that FOC was significantly reduced through biofeedback, another study did not find significant long-term improvements, but those results have to be interpreted carefully due to weak ratings.

Further, single studies about *calming virtual reality environments* (result only shown within qualitative data), a *motivational interviewing psychotherapy*, *emotional freedom techniques*, *breathing awareness*, a *mental health training course* (weak rating), the *group intervention Nyytti®* (with psychoeducation elements, the lifespan model of motivation, practices to support mentalisation and mind–body connection) (weak rating), *supportive care* through a midwife (physical, emotional, instructional, informational, advocacy support), *“lifestyle based education”*, different psychological interventions (like psychological support, education, relaxation training, family support, music listening) (weak rating), a *mind body intervention* (weak rating) and *group discussion* together with routine care seem to be effective in reducing anxiety during pregnancy and childbirth. While an *internet-based problem-solving treatment* did not show positive effects on reducing anxiety during pregnancy and antenatal class attendance reduced delivery fear significantly in first time, but not multiparous mothers.

Comparisons with other studies

Comparison of reviews based on mindfulness-based interventions

Compared to earlier systematic reviews within the literature, there are on the one side conflicting on the other side similar results. The systematic review and meta-analysis of Dhillon et al. (2017) also found benefits of mindfulness based interventions in RCT and non-RCT studies on anxiety, while mixed results are shown for perceived stress. The pilot randomized trial of Beattie et al. (2017) in this present review did not find a beneficial effect of mindfulness based interventions on perceived stress.

The study of Hall et al. (2012) was not accessible for this review, as only the abstract exists, but the results seem to show a non-significant trend of mindfulness training towards a decrease in anxiety, this stands in conflict with the results within this present study.

Conflicting results also exist in comparison with the study of Lever and Taylor (2016) who in their between-group analyses did not find any significant effect of mindfulness based interventions on anxiety in comparison to control conditions, this is opposed to the results from RCTs (with moderate to strong ratings) of the present study, finding significant between group differences on those examined variables (Krusche et al., 2018; Warriner et al., 2018; Yang et al., 2019; Zarenejad et al., 2020; Zemestani, 2019; J.-Y. Zhang et al., 2019).

Consistent to the present review, Matvienko-Sikar et al. (2016) found in the majority of reviewed papers significant decreases of anxiety through mindfulness based interventions.

In the review of Riet et al. (2019) mixed results were found in three studies regarding between-group effects of mindfulness based interventions on anxiety. While two studies found a significant between-group effect in favor of the intervention group, one did not, but showed a significant decrease of anxiety due to mindfulness in the intervention group (Riet et al., 2019). In the present study the between-group effect of mindfulness in moderate to strong RCTs on the outcome anxiety is significant and finds similar results compared to Riet et al. (2019).

In the study of Shi and MacBeth (2017) seven RCTs showed significant reductions on anxiety due to mindfulness based interventions compared with control groups and four of five

non-controlled studies also showed a significant decrease of anxiety. The RCT results within this present review with anxiety as an outcome seem to match with this result.

Comparison of reviews based on hypnotherapeutic interventions

Two systematic reviews examined the effect of hypnosis based interventions and found a positive impact of hypnosis-based interventions on childbirth experience (Catsaros & Wendland, 2020; MoghaddamHosseini et al., 2018; Smith et al., 2019a). This finding fits the positive effect of hypnosis-based interventions found in the present study on anxiety and fear.

Comparison of reviews based on (psycho-) educational interventions

Akgün (2019) examined in their systematic review and meta-analysis the effect of psychoeducation on fear of childbirth and as a result stated, that fear of childbirth was reduced through psychoeducation. This result also fits the result stated within this present review, as positive effects of psychoeducation for fears are summarized. Only one study did not validate this result, but has to be interpreted carefully, due to weak ratings. The clinical review and meta-analysis of MoghaddamHosseini et al. (2018) found a significant effect of educational interventions on reducing fear of childbirth. The systematic reviews of Striebich et al. (2018) supported this result and Stoll et al. (2018) had also positive effects in reducing different anxiety/fear levels.

Comparison of reviews based on different therapeutic techniques/schools

Three reviews focussed on psychotherapy interventions (Li et al., 2020; Ponting et al., 2020; Sockol, 2018). Li et al. (2020) examined the effect of interpersonal psychotherapy (IPT) on fears and anxieties and found that interpersonal psychotherapy and peer supported interpersonal psychotherapy reduces fears and anxieties during pregnancy and childbirth. Sockol et al. (2018) found similar effects of IPT on anxiety and fears in perinatal women. Contrary to

this outcome, the review of Ponting (2020) could not confirm this positive effect of IPT. No study within this review focussed on interpersonal psychotherapy.

Regarding cognitive behavioral therapy (studied was the general CBT, not mindfulness based), the systematic review of Li et al. (2020) found mixed effects. While one study did not find a significant between-group effect (Loughnan, Joubert, et al., 2019), other studies found a significant reduction of fear and anxiety during pregnancy and childbirth (Li et al., 2020). Striebich et al. (2018) stated, that cognitive therapy sessions are effective in reducing fear of childbirth and van Ravesteyn (2017) found the same effect for anxiety disorders. Within this present study mixed results about internet based cognitive behavioral therapy are found, while Larsson et al. (in press) and Loughnan (2019) did not find a between-group effect for internet based cognitive behavioral therapy, Nieminen et al. (2016), Rondung et al. (2018) and Shahsavan et al. (2020) showed significant effects in favour of internet based cognitive behavioral therapy. This result has to be interpreted carefully as the studies from Larsson et al. (in press), Loughnan (2019) and Nieminen et al. (2016) are rated as weak.

Based on the studies of the review of Li et al. (2020), Striebich et al. (2018) and the present study, mixed results for CBT are shown, but when taking the ratings of these studies into account, CBT seems to be effective in reducing fears and anxieties during pregnancy and childbirth.

Comparison of reviews based on writing therapy

Within this present systematic review, Montazeri et al. (2020) showed a significant and reductional effect of writing therapy sessions on anxiety during pregnancy, which opposes the result of the meta-analysis from Quian et al. (2020), which did not find a significant reducing effect of expressive writing therapy on anxiety.

Comparison with reviews based on e-health and technology-based interventions

The systematic review and meta-analysis of Bayrampour et al. (2019) showed a significant reduction of anxiety scores in the e-health compared to a control group. Another systematic

review and meta-analysis showed mixed results for the effect of online cognitive behavioral therapy (Loughnan, Joubert, et al., 2019). Mixed results about internet based cognitive behavioral therapy are also found within the present systematic review. For e-health interventions and their effect on reducing anxiety and fear regarding pregnancy and childbirth, mixed results are found within the present study and earlier systematic reviews and meta-analyses.

Limitations and Strengths

Limitations of the present systematic review are differences in the conceptualisations and operationalisations of prenatal anxiety and anxiety and fear during childbirth. Most of the studies are from Iran, so the results could be biased due to cultural background. Also the present review only included studies written in English and German. Another limitation is, that only one person rated the EPHPP criteria. The settings and duration of interventions differed between the studies and this fact could bias the results.

One strength is, that the present study includes the largest number of studies yet known in systematic reviews addressing similar topics.

Study Implications

The present review only focused on certain therapeutic schools and psychotherapeutic interventions based on cognitive behavioral therapies are overrepresented, while there is only one psychoanalytic study and no study on systemic therapy. Furthermore, there is a need for manualized therapeutic interventions, with regards to a combination of effective intervention components.

Conclusion

Within this systematic review, a wide range of psychological interventions are shown to be effective in reducing fears and anxieties during pregnancy and childbirth. These results are partly consistent with earlier systematic reviews and meta-analyses. Further research should

address other acknowledged psychotherapeutic practices, like psychoanalytic or psychodynamic as well as systemic interventions, as they are underrepresented within this review. Furthermore, there is a need for manualized therapeutic interventions, with regards to a combination of effective intervention components.

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Declarations

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Consent for publication: I declare, that all co-authors have given informed consent to publication of the manuscript.

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Authors' contributions: CB conceived the study and screened and selected the studies. GG independently checked the content. All authors helped draft the manuscript. CB and GG read and approved the final manuscript. CB is the lead author.

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Figures

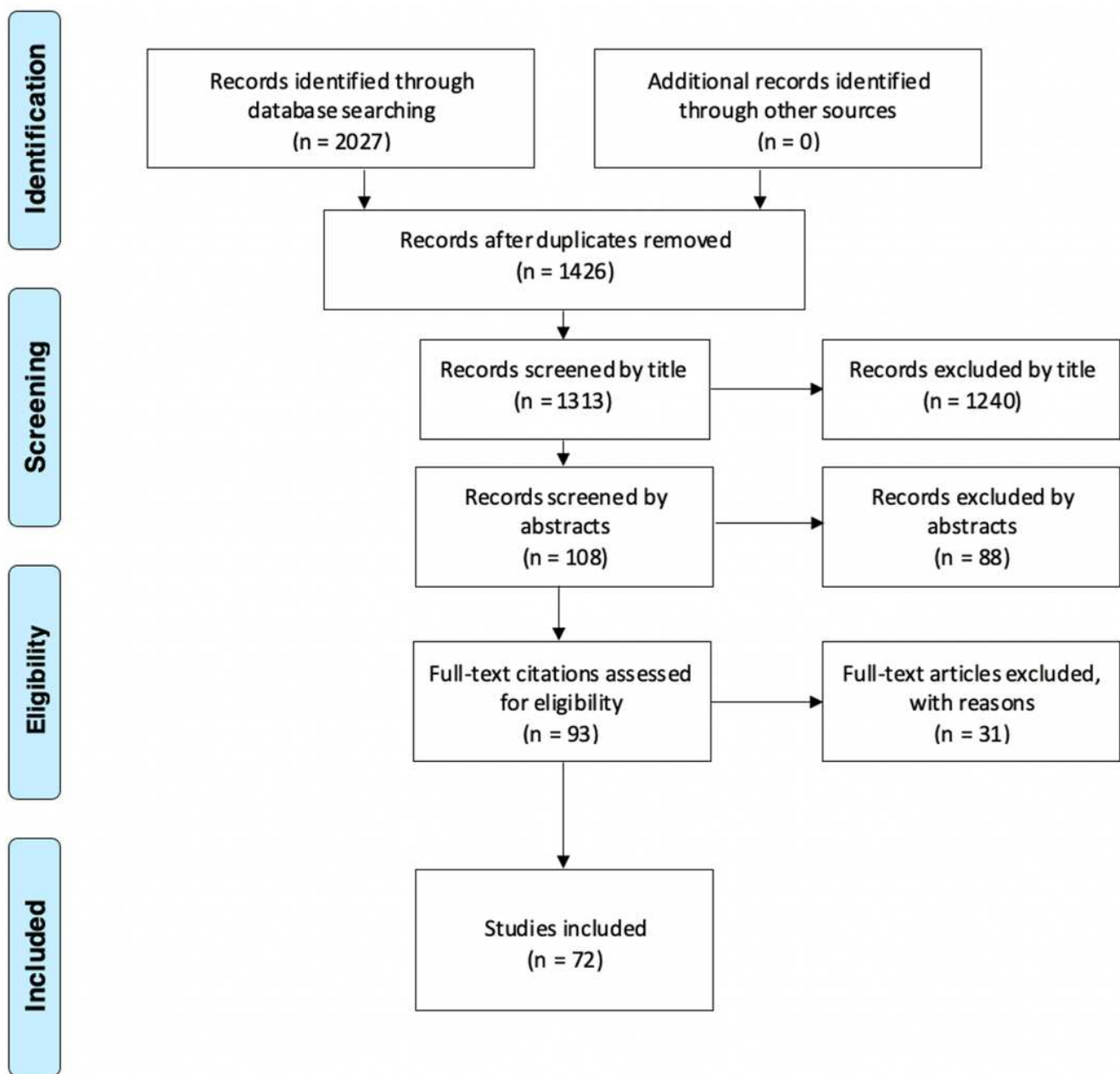


Figure 1

Systematic Review Profile based on the prisma flow diagram (Moher et al., 2009)