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REVIEW

Efficacy of nonpharmacologic interventions in preoperative anxiety: A systematic review of systematic reviews

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Abstract

Aims and Objectives: Evidence suggests that preparing patients for surgery using nonpharmacological strategies reduces their anxiety. However, there is no consensus on what the best practices are. This study aims to answer the question: Are interventions using nonpharmacological therapies effective in reducing preoperative anxiety?

Background: Preoperative anxiety causes physiological and psychological adverse effects, with a negative effect on postoperative recovery.

Introduction: According to the World Health Organization, between 266 and 360 million surgical procedures are performed annually worldwide, and it is estimated that more than 50% of patients will experience some degree of preoperative anxiety.

Design: Systematic review of systematic reviews with results of interventions aimed at mitigating preoperative anxiety.

Methods: A search was conducted for systematic reviews with meta-analyses published between 2012 and 2021 in Medline, Scopus, Web of Science and Cochrane Library. Quality was assessed using the AMSTAR-2 scale. The protocol was registered in PROSPERO.

Results: A total of 1016 studies were examined, of which 17 systematic reviews were selected, yielding 188 controlled trials with 16,884 participants. In adults, the most common intervention included music, followed by massage, in children virtual reality and clowns. Almost all controlled trials reported a reduction in preoperative anxiety after the intervention, of which almost half had statistically significant results.

Conclusion: Interventions that include music, massage and virtual reality reduce preoperative anxiety and have shown that they are cost-effective, minimally invasive and with a low risk of adverse effects. Preoperative anxiety can be reduced through a short-term intervention involving nursing professionals as an alternative or complement to drugs.

Relevance to clinical practice: This review suggests that nursing professionals, in collaboration with other health professionals, should continue to conduct research on

the reduction in preoperative anxiety. Further research in this area is needed, to reduce heterogeneity and consolidate the results.

No Patient or Public Contribution: Not applied to our study, as it is a systematic review of systematic reviews.

KEYWORDS
anxiety, comparative effectiveness research, music therapy, nursing, preoperative care, systematic review, virtual reality exposure therapy

1 | INTRODUCTION

According to the World Health Organization (WHO), between 266 and 360 million surgical procedures are performed annually worldwide (Weiser et al., 2016), and it is estimated that more than 50% of patients will experience some degree of preoperative anxiety (Abate et al., 2020; Bedaso & Ayalew, 2021).

Preoperative anxiety can be defined as a subjective and nonspecific state of apprehension, tension, uneasiness about something with an uncertain outcome and secondary to different concerns such as: the disease itself, the surgery, anaesthesia, fear of death, pain, separation from loved ones, not waking up from surgery, being permanently disabled, experiencing intense pain after surgery and long recovery (Gümüs, 2021; Guo, Li, et al., 2020; Ramsay, 1972).

Preoperative anxiety is multifactorial and is associated with negative effects including: increased blood pressure and heart rate, morbidity and pain (Abate et al., 2020; Bedaso & Ayalew, 2021; Kassahun et al., 2022). Moreover, if preoperative anxiety is not adequately managed, it can lead to an increase in the use of anaesthetic drugs before and during surgery, which is usually associated with a worse postoperative recovery as well as an increase in postoperative complications such as nausea, vomiting, fatigue, tachycardia or respiratory problems (Abate et al., 2020; Bedaso & Ayalew, 2021; Gümüs, 2021; Kassahun et al., 2022). Given the above, it is important to carry out interventions aimed at reducing preoperative anxiety.

The most common interventions for reducing the level of anxiety include anxiolytic drugs and sedatives (Bandelow et al., 2017). Nonetheless, an increasing number of authors advocate a holistic approach with the inclusion of less invasive and costly interventions as a complement or alternative to conventional medicine (Kallush et al., 2018; Norred, 2000).

Nursing professionals play an important role in the perioperative care pathway. Their direct contact with patients and care that provides a close relationship, promotes listening and trust, and addresses both the physical and emotional dimensions, thus helping to reduce their discomfort, fears and preoperative anxiety (Çengel & Andsoy, 2022; Dias et al., 2022a, 2022b; Medina-Garzón, 2019; Xu et al., 2020).

Research examining nonpharmacologic interventions aimed at reducing preoperative anxiety, especially in the form of systematic reviews, has grown considerably in the last decade. However, the evidence supporting the use of such interventions is very heterogeneous. To facilitate the understanding of this complex scenario, a systematic review (SR) of systematic reviews (SRs) was proposed, since none have been published to date.

What does this paper contribute to the wider global clinical community?

- This article presents how interventions including music, massage and virtual reality reduce preoperative anxiety and have been shown to be cost-effective, minimally invasive and with low risk of adverse effects.
- Most of the studies included in this review apply the intervention in a single session, which usually lasts less than 30 min on average. Carrying out an explosion of a short duration that is effective supposes an advantage in terms of its applicability and its derived costs.
- Nursing continues to be one of the pillars on which the patient and their family rely and trust. Improving health care for the population we serve is one of our best professional legacies.

Conducting a systematic review of systematic reviews on the efficacy of nonpharmacological interventions to reduce preoperative anxiety offers the possibility of identifying the most effective interventions, limitations of previous studies and areas requiring further research, as well as providing a critical assessment of the quality of existing systematic reviews and enabling a more comprehensive and reliable synthesis of the available evidence. Ultimately, this may improve our understanding of the efficacy of nonpharmacological interventions to reduce preoperative anxiety and guide clinical decision-making. Therefore, following the PICO structure, the aim of this SR of SRs was to answer the question Do nonpharmacological interventions reduce preoperative anxiety?

2 | MATERIALS AND METHODS

This review has been carried out in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA) statement (Urrútia & Bonfill, 2010) and PRISMA 2020 checklist (Appendix S1).

2.1 | Search methods

The search was conducted in December 2021. It included documents published between 2012 and 2021. Four databases were consulted: Medline, Scopus, Web of Science and Cochrane Library. A combination of controlled MeSH terms and free text were used as descriptors, which were combined with the Boolean operators 'AND' and 'OR' (Appendix 1).

To carry out this review, a protocol was created and registered in PROSPERO (international prospective register of systematic reviews) under the number: CRD4202230342.

2.2 | Inclusion and exclusion criteria

The following inclusion criteria were established:

- Systematic reviews with meta-analyses containing primary studies that employ a non-pharmacological strategy or intervention to reduce preoperative anxiety.
- Reviews providing quantitative results on preoperative anxiety.
- Systematic reviews in which the primary studies are controlled trials.
- Manuscripts written in Spanish or English.
- Published in the last 10 years.

Only systematic reviews that included primary studies with controlled trials were included because they have greater statistical power than other types of designs (Frieden, 2017; Ioannidis, 2005). Likewise, according to the bibliometric law of exponential growth of scientific literature and Price's obsolescence, the most relevant publications are dated from the last 10 years and, therefore, it is recommended for reviews to be based on the last 10 years of publication (Tomás-Górriz & Tomás-Casterá, 2018). Finally, only studies published in Spanish and English were selected because the researchers lacked the resources to review and code studies published in other languages. Qualitative meta-syntheses and scoping reviews were excluded. Also, systematic reviews were excluded if they did not include quantitative syntheses or systematic reviews in which the quantitative synthesis was estimated on the basis of primary studies without a control group.

2.3 | Data extraction

Two coders independently coded the selected studies. Discrepancies were resolved through deliberation and a third coder was used if necessary. Once coding was completed, intercoder agreement was estimated; Cohen's Kappa coefficient was used for qualitative variables and the Spearman-Brown correlation was used for quantitative variables.

The AMSTAR 2 scale (assessment of multiple systematic reviews) (Shea et al., 2017) was used to evaluate the quality of the selected SRs.

3 | RESULTS

3.1 | Search results

Of the 1016 studies identified, 17 systematic reviews were selected (Álvarez-García & Yaban, 2020; Bradt, Dileo, & Shim, 2013; Chow et al., 2018; Eijlers et al., 2019; V. Fu et al., 2019; Guo, Fan, et al., 2020; He et al., 2015; Hudson & Ogden, 2016; Kakar et al., 2021; Kerimaa et al., 2021; Könsgen et al., 2019; Koo et al., 2020; Kühlmann et al., 2018; Ruiz-Hernández et al., 2021; Simonetti et al., 2022; Van Der Heijden et al., 2015; Weingarten et al., 2021) (Figure 1).

After coding, the intercoder agreement was 0.81 (mean Cohen's Kappa coefficient was $\kappa = 0.73$, and the mean Spearman-Brown correlation was $\rho = 0.89$).

Of the 17 systematic reviews selected, 58.82% ($n = 10$) had high methodological quality, 17.64% ($n = 3$) were considered medium and 23.52% ($n = 4$) were considered low quality (Appendix 2).

3.2 | Overview of selected systematic reviews (*n*)

The 17 selected reviews included 330 primary studies, although of these, only 188 provided pre-post data on preoperative anxiety (27 primary studies that were duplicated in another systematic review have been excluded in this computation). These 188 studies provided a total of 16,884 participants (Table 1).

The selected systematic reviews were published between June 2013 and January 2022, the most frequent year being 2020, representing 23.52% ($n = 4$). The majority ($n = 14$) were funded (82.35%).

All the selected reviews included meta-analyses and to estimate the effect size index all employed the random effects model. Of these, 17.64% ($n = 3$) used Cohen's coefficient and 76.47% ($n = 13$) used the standardised mean difference (SMD).

3.3 | Design and methodological characteristics of primary studies (k)

The primary studies were conducted in 29 countries, although most were conducted in the USA, concretely 32.44% (k = 61), followed by Iran, representing 7.97% (k = 15), China, with 6.38% (k = 12) and Sweden, with 5.31% (k = 10).

The most frequent type of primary study included in the systematic reviews was randomised controlled trials (RCT), at a rate of 94.68% (k = 178) and 3.72% (k = 7) controlled clinical trials (CCT). A total of 23.93% (k = 45) were single center studies.

According to the service of origin of the patients, 58.82% (k = 10) came from outpatient surgery, 52.94% (k = 9) were from general surgery, 47.05% (k = 8) were from cardiology and 35.29% (k = 6) were from gynaecology, obstetrics and urological surgery.

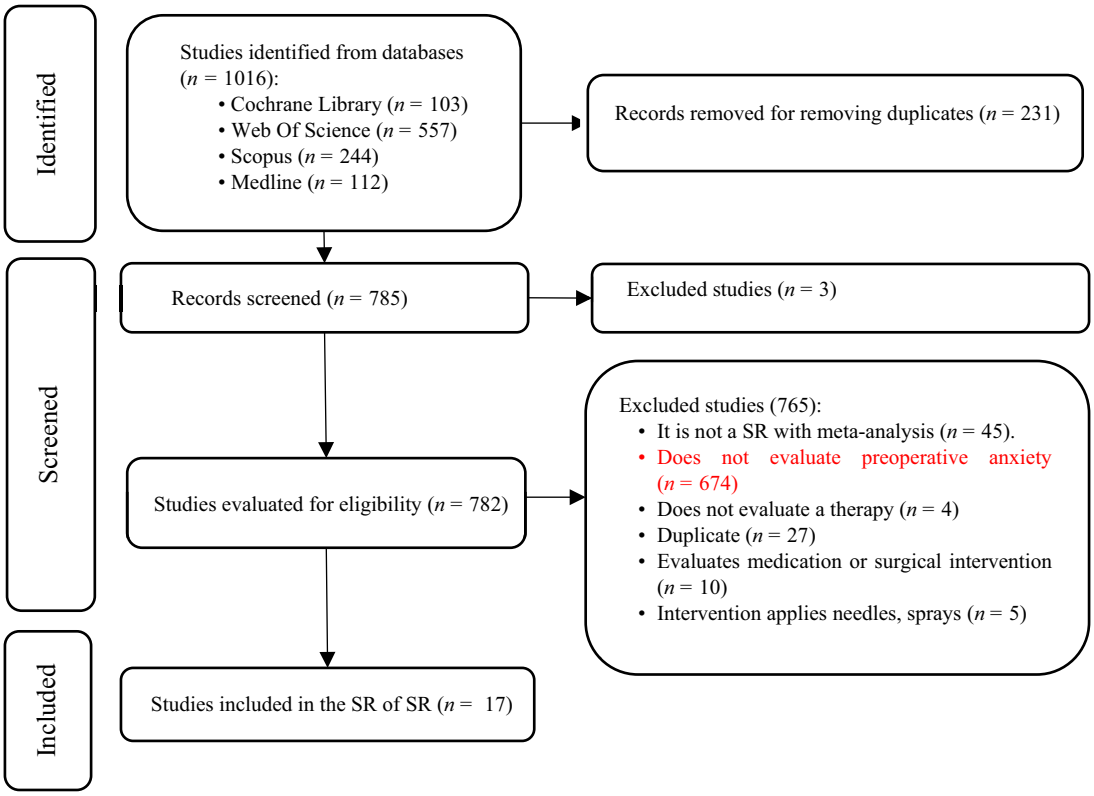

FIGURE 1 Flow chart of the selection process.

3.4 | Description of participants (I)

Of the 16,884 participants, a total of 52.23% (I = 8820) participated in the intervention group and 47.76% (I = 8064) participated in the control group. Of the overall total, 56.48% (I = 9536) were women, and 43.52% (I = 7348) were men (Appendix 3).

Adult participants in the intervention group had a mean age of 42.53 years, and the mean age of children was 8.08 years. Adult participants in the control group had a mean age of 47.49 years, and the mean age of children was 7.89 years.

3.5 | Description of interventions

In general, when describing the intervention, the studies do not report the underpinning theoretical model. A total of 78.72% (k = 148) of the interventions were carried out in a single session, with an average duration of 19.15 min. All the interventions had a control group. In 52.65% of the studies (k = 99) usual care was administered in the control group, followed by no intervention in 22.34% (k = 42) (Table 2).

In all the studies, anxiety was assessed by means of questionnaires. Table 2 shows the scales used in the primary studies. The most used scale to measure preoperative anxiety was the State-Trait Anxiety Inventory (STAI), which was used by 28.19% (k = 53) and the modified Yale preoperative anxiety scale (mYPAS), used by 5.85% (k = 11).

Nursing staff were involved in the interventions in 75% (k = 141) of the primary studies.

When comparing the interventions used in adults and children, significant differences are obtained ($\chi^2 = 118.37$, $p = 0.000$). Thus, virtual reality and clowns are employed significantly more in children whereas massage, music and video are used more in adults. Music was the most used intervention to reduce preoperative anxiety, although only used in adults. In two studies, participants were given the option to choose the music, in the remainder, either they were given the possibility to select the music among several options or a specific melody was played. Different types of techniques were used in the interventions with music: 51.06% (k = 96) used ambient music, 14.36% (k = 27) played the music through headphones and 1.06% (k = 2) used musical pillows. The type of music varied from new age, country, classical, pop, jazz, popular piano, Bach, synthesisers, harp, piano, orchestra, pan flute, Spanish guitar, hymns, traditional Korean music, religious, natural sounds, Turkish classical and folk music, Malay or Chinese music, bird sounds and Vivaldi's four seasons.

Massage was used in 13.82% of the studies (k = 26), of which 11 were general massages, four were hand massages, three were foot massages, two were Swedish massages and one was a combined hand and foot massage. Five of the interventions used foot reflexology. All techniques were applied exclusively to adults by qualified professionals. Virtual reality was used in 9.57% (k = 18) of the studies. It was used in both children and adults, although in children it was the most used intervention. The main difference between virtual reality

TABLE 1 Description of selected systematic reviews.

N° SR	First author (year of publication)	Publication interval	Country[a]	Databases used[b]	Inclusion criteria[c]	No. of primary studies (k) included in the SR	No. of primary studies (k) providing pre-post anxiety estimation	Effect size (d)	Cohen classified
1	Álvarez-García and Yaban (2020)	2003–2016	IS, US, IR, US, NE and IT	PM, CL, WOS, S, CH, Lilacs, CU and CHED	Preoperative intervention, preoperative anxiety outcomes, RCT study, English, Spanish, Turkish.	21	4	Children (d = −3,71) Adults (d = −0,64)	Large Medium
2	Bradt et al. (2013)	1994–2012	TU, US, CH, PO TA and HOTA	CH, CL, E, PsycINFO, Lilacs, AMED, SCI,SCI, CAIRSS, Proquest, CT, G and RNI	Inpatients, outpatients, emergency and nonemergency surgical patients undergoing surgical procedures.	26	20	−0.60 (95% CI [−0.90 to −0.31], $p < 0.01$)	Medium
3	Chow et al. (2018)	2007–2015	CA, US, CH, TU and JA	CL, E, M, PsycINFO, WOC and CH	RCT, NRC; Parents of children SI results anxiety parents	11	6	−0.56 (95% CI [−0.59 to −0.53], $p < 0.01$)	Medium
4	Eijlers et al. (2019)	1999–2018	SE, IRE, US and PO	PM, E, M, CH, WOS and PsycINFO	VR, audiovisual glasses, excluded SRs, meta-analyses, single cases, dissertations, conferences and abstracts.	17	7	−1.30 (95% CI [−0,68 to −1.91], $p < 0.001$)	Large
5	Fu et al. (2019)	2003–2011	AL, IT, US, CA and IR	E, M, CH, WOS and GS	RCT music recorded before, during and/or after SI	18	8	−0.30 (95% CI [−0.53 to −0,07], $p < 0.01$)	Medium
6	Guo, Fan, et al. (2020) and Guo, Li, et al. (2020)	2000–2019	IS, US, CA, AU, UK, KO SW, CH, IR and TA	PM, CL, E, CH, WOS and PsycINFO	Adults (≥18) CS, MIS	29	25	−0.64 (95% CI [−0.83 to −0.46], $p < 0.01$)	Medium
7	He et al. (2015)	1998–2012	US, HO, AU and US	PM, ProQuest, S, WOS and AHL	Children (2 to 12) elective surgery, RCT, therapeutic games, pre/post/ operative anxiety	6	6	–	–
8	Hudson and Ogden (2016)	1997–2013	US, BE, KO, IN, UK, DE, SP, TU, SW, CA, TA, HO and BEI	CL, M, PsycINFO and WOS	Anxiety and pain management intervention	20	20	–	–
9	Kakar et al. (2021)	2008–2016	IR, IN and DE	E, M, WOS, CH and GS	RCT, assessment substitutes anxiety and pain, perioperative recorded music in a hospital setting	20	16	−0.50 (95% CI [−0.67 to −0.32], $p < 0.01$)	Medium
10	Kerimaa et al. (2021)	1999–2018	US, SW, CA, BE and FR	PM, CL, S, Medic and WOS	RCT, postintervention measures (parental anxiety and/or fear and pain for the children)	15	9	−0.22 (95% CI [−0.03 to −0.41], $p = 0.023$)	Medium
11	Könsgen et al. (2019)	2005–2018	IT, IS, US and TU	E, M and CH	Children (0–17), intervention with clowns, Studies that mentioned "clowning, children's anxiety, parents"	11	10	−7.16 (95% CI [−10.58 to −3.75], $p < 0.0001$)	Large

(Continues)

TABLE 1 (Continued)

N° SR	First author (year of publication)	Publication interval	Country[a]	Databases used[b]	Inclusion criteria[c]	No. of primary studies (k) included in the SR	No. of primary studies (k) providing pre-post anxiety estimation	Effect size (d)	Cohen classified
12	Koo et al. (2020)	2017–2020	US, IR, NE, AU and KO	PM, CL, E, CH, S, WOS and KoreaMed	RCT, patients with pre SI VR intervention	10	10	−0.64 (95% CI [−1.08 to −0.20], $p = 0.004$)	Medium
13	Kühlmann et al. (2018)	1988–2016	UK, US, CA, SW, TA, TH, IR, SW, SK, FR, CH, SP, TU, TH, ME, SW and DE	PM, CL E, M, OvidSP, WOS, S, PsycINFO, CH and GS	RCT; musical interventions on anxiety	92	59	−0.69 (95% CI. [−0.88 to −0.50], $p < 0.001$)	Medium
14	Ruiz-Hernández et al. (2021)	2006–2018	SP, POR and IR	PM, CL, CU, ProQuest and S	Meta-analysis estimating preoperative anxiety with STAI	9	4	−5.51 (95% CI [−10.68 to −034], $p < 0.001$)	Large
15	Simonetti et al. (2022)	2019–2020	US and SK	CL, M, S, WOS and Ovid	RCT, VR efficacy investigated in perioperative anxiety	7	6	−0.35 (95% CI [−0.60 to −0.107], $p = 0.025$)	Medium
16	Van Der Heijden et al. (2015)	2007–2010	US, BR and SW	CL, E, M, CH, PsycINFO, AMED, WOS, CAIRSS, ClinicalTrials.gov and RNI	RCT, live musical interventions or recorded music	3	2	−0.34 (95% CI [−0.66 to −0.01], $p < 0.01$)	Medium
17	Weingarten et al. (2021)	2013–2018	GE and IR	PM, CL, ClinicalTrials.gov and CH	Studies measure pre-, intra- or postoperative anxiety by means of visual analog scale, State–Trait Anxiety Inventory or Zung Self-Rated Anxiety Scale.	15	3	−0.87 (95% CI, [−1.55 to −0.19], $p < 0.01$)	Large

Abbreviation: SR: systematic review.

[a]Country: GE AL, Germany; AU, Australia; BE, Belgium; BEI, Beirut; BR, Brazil; CA, Canada; CH, China; KO, Korea; DE, Denmark; FR, France; HO, Hong Kong; IN, India; IR, Iran; IRE, Ireland; IS, Israel; IT, Italia; JA, Japan; ME, Mexico; NE, Netherlands; PO, Polonia; PO, Portugal; SE, Seul; SK, South Korea; SP, Spain; SW, Switzerland; TA, Taiwan; TH, Thailand; TU, Turkey; UK, United Kingdom; US, USA.

[b]Databases used AHL, Allied Health Literature; CH, Cochrane; CHED, Council of Higher Education Database; CIN, Cumulative Index to Nursing; CL, CINAHL; CT.G, ClinicalTrials.gov; CU, CUIDEN Plus; E, ENBASE; GS, Google Scholar; M, MEDLINE; PM, PubMed; RNI, Registro Nacional de Investigación; S, Scopus; SCI, Science Citation Index; WOS, Web of Science.

[c]Inclusion criteria: CS, conventional surgery; MIS, minimally invasive surgery; RCT, randomised clinical trial; NRC, nonrandomised control study; SI, surgical Intervention; STAI, Trait Anxiety Inventory; VR,virtual reality.

TABLE 2 Description of interventions aimed at reducing preoperative anxiety.

N° SR	Anxiety rating Scale[a]	Intervention group	Control Group[b]	No. of sessions	Minutes	Results postintervention (categorised)[c]			
						SR	NSR	NC	NR
1	STAI (k = 3), APAIS (k = 1)	Guided imagery (k = 6)	UC (k = 6)	2.2	17.2	3	1	3	0
2	STAI (k = 6), STAI-S (k = 5)	Music (k = 20)	UC (k = 1), VS (k = 2), HWM (k = 1)	1.85	27.25	12	8	0	0
3	STAI (k = 4), STAI-C (k = 1) STAI-S (k = 1), APAIS (k = 1), mYPAS (k = 4)	Video (k = 4), Web (k = 1), DrawMD APP (k = 1)	UC (k = 6)	1	5	2	4	0	0
4	STAI (k = 1), mYPAS (k = 1)	Virtual reality (k = 7)	UC (k = 5), Info (k = 1), Video game (k = 1)	1	4	3	4	0	0
5	-	Music (k = 5)	UC(k = 1), Waves music (k = 1) NM (k = 2)	1	30	0	4	0	1
6	STAI-S (k = 8), HADS (k = 1)	Reflexology (k = 5), Massage (k = 19)	UC (k = 5), D (k = 5), Relax (k = 4) NI (k = 10)	1.82	21.9	7	17	0	0
7	STAI (k = 1), SASC-R (k = 1)	Guided tour (k = 3), Games (k = 3)	NI k = (6)	1	42.5	3	3	0	0
8	STAI (k = 2)	Hypnosis (k = 2), massage (k = 2), music (k = 12), video(k = 3)	UC (k = 20)	–	–	7	13	0	0
9	STAI (k = 1)	Music (3)	UC (1), Breathing (k = 1), Rest(k = 1)	2	28.33	1	3	0	0
10	STAI (k = 6), APAIS (k = 2)	Draw (k = 1), video (k = 3), web (k = 1), leaflet (k = 3)	UC (k = 8)	1	14.5	2	4	0	2
11	STAI(k = 3), STAI-C (k = 1), mYPAS (4)	Clowns (k = 6)	UC (k = 11)	1	25	7	4	0	0
12	APAIS (k = 2), mYPAS (k = 3), HADS (k = 1)	Virtual reality (k = 9)	UC (k = 9)	–	–	7	2	0	0
13	STAI (k = 20), HADS (k = 1)	Music (k = 51)	UC (k = 20), Rest (k = 8), NI (k = 22), D (k = 1)	1.42	40.42	27	24	0	0
14	STAI (k = 4)	Educational interview (k = 4)	NI (k = 4)	1	15	2	2	0	0
15	mYPAS (k = 2)	Virtual reality (k = 2)	UC (k = 2)	1	4.5	1	1	0	0
16	STAI (k = 1)	Music (k = 3)	UC (k = 3)	1	40	1	1	1	0
17	STAI (k = 1)	Music (k = 2)	UC (k = 1), NM (k = 1)	1	10	2	0	0	0
	Total					87	94	4	3

Abbreviation: SR, Systematic review; k, number of primary studies that met these characteristics.

[a]Anxiety Rating Scale: APAIS, The Amsterdam Preoperative Information and Anxiety Scale; HADS, Hospital Anxiety and Depression Scale; mYPAS, Modified Yale Preoperative Anxiety Scale; SASC-R, Social Anxiety Scale Children-Revised; STAI, State Trait Anxiety Inventory; STAI-C, State–Trait Anxiety Inventory in children; STAI-S, State Trait Anxiety Inventory, State form.

[b]Control Group: HWM, Headphones without music; VS, Verbal support; UC, Usual care; D, Drugs; NI, No intervention; NM, No music.

[c]Results after the intervention (Categorised): SR = number of studies obtaining a statistically significant reduction in anxiety in intervention group, NSR, number of studies obtaining a nonsignificant result, although anxiety is reduced in the intervention group, NC, number of studies providing inconclusive information; NR, number of studies that did not reduce or increase anxiety in the intervention group.

applied to adults and children was that in the case of children, animated characters, cartoons or games were used, whereas in adults, guided visits to the operating room or information on the procedure to be followed were most common.

In children, the most used intervention after virtual reality involved clowns, in 5.85% of studies (k = 11). Clowns were not involved in the interventions with adults. The clowns performed different activities with the children, such as: entering the waiting room and starting to play, applying semistructured intervention and distraction techniques or accompanying them on their way to the operating room.

3.6 | Intervention results

The values of the overall effect size indices (d), provided in the selected systematic reviews ranged from −7.16 to −0.22. In all reviews

the sign of the index was negative and significant indicating a significant reduction in preoperative anxiety in the intervention group. Following the classification proposed by Cohen, which establishes a small effect when the value of the index is ≤0.2, a medium effect with d = 0.5 and a large effect with d ≥ 0.8 (Cohen, 1988), 59% (*n* = 10) obtained medium effect size indices, 29% (*n* = 5) were large and 12% (*n* = 2) did not report this value (Table 1).

Upon analysis of the primary studies (k) included in the systematic reviews, when comparing the results between the intervention and control groups, 46.27% (k = 87) of the studies obtained a statistically significant reduction in anxiety after the intervention, 50% (k = 94) reported a reduction in preoperative anxiety after the intervention, although this was not statistically significant, 1.59% (k = 3) of the results did not reduce anxiety and 2.12% (k = 4) increased anxiety (Table 2).

According to the type of intervention, statistically significant favourable results were obtained in the intervention group using music in 49.42% (k = 43), virtual reality or images guided by video, web or app in 24.13% (k = 21), clowns, games and distraction in 8.04% (k = 7) and reflexology and massage in 8.04% (k = 7).

4 | DISCUSSION

The results obtained in this systematic review of systematic reviews allow us to affirm that interventions that include music, massage and virtual reality reduce preoperative anxiety. These results are consistent with the long-standing support that several authors have shown for nonpharmacological approaches to reduce preoperative anxiety (Wang et al., 2022), arguing that they are cost-effective, minimally invasive and with a low risk of adverse effects (Agbayani et al., 2020).

This research has identified the relationship between preoperative anxiety and postoperative recovery. By controlling preoperative anxiety levels, postoperative complications are significantly reduced as well as the dose of anaesthesia and analgesia required and consequently recovery is enhanced (Bayrak et al., 2019; Chen et al., 2022).

In this review, interventions with music were most common, possibly because their costs are much lower than medications. Musical interventions may represent a viable alternative to sedatives and anxiolytics for reducing preoperative anxiety, or at least, decrease the need for these drugs, (Bradt, Dileo, & Potvin, 2013; Gökçek & Kaydu, 2020). According to Carrasco García, J., et al., music therapy reduces pain and produces autogenic relaxation (Carrasco-García et al., 2020). Fu et al. concluded that perioperative music significantly reduces postoperative opioid drug requirements and intraoperative sedative drug requirements (V. X. Fu et al., 2020). Kahloul et al. reflect the controversy reported in several studies regarding the effects of music therapy on heart rate and blood pressure and suggest that patients should choose the music they listen to in order to improve these physiological parameters (Kahloul et al., 2017).

In children the most used intervention was virtual reality and clowns. Chow et al. reported that for children, videos, multifaceted programs and interactive games were the most effective in reducing preoperative anxiety, whereas music therapy and Internet programs were the least effective (Chow et al., 2016). Ortiz et al. state that due to the rise of technology and electronic devices, digital games are highly effective for promoting health, children's well-being and reducing preoperative anxiety (Ortiz, 2021). However, Chaurasia et al. believe that the limited affordability of these devices may limit their applicability in low-income settings (Chaurasia et al., 2019). In addition, a nonpharmacological intervention to reduce preoperative anxiety using clowns is also cost-saving overall, compared with a pharmacological intervention (Kocherov et al., 2016).

Most studies apply the intervention in a single session, with an average duration of less than 30 min, anxiety is usually assessed with the State–Trait Anxiety Inventory (STAI), one of the most researched and widely used measures of general anxiety, which is also available in many different languages (Julian, 2011). The implementation of effective short interventions is an advantage in terms of their applicability and their associated costs. However, most of the primary studies do not mention the theoretical model underpinning their intervention. The theoretical principles underpinning the research are important for understanding how and why interventions succeed or fail and is an element that increases the effectiveness of the interventions (Amo-Setién et al., 2019).

Nursing professionals are actively involved in interventions aimed at reducing preoperative anxiety in both adults and children. Anxiety is a nursing diagnosis included in the NANDA taxonomy (Herdman & Kamitsuru, 2019) of the nursing care process that has a series of interventions associated with it, including: providing the patient with objective information, explaining all the activities to be performed, providing a serene environment and using active listening.

The nurses play an important role in implementing interventions to reduce preoperative anxiety because they are in direct contact with patients throughout the entire process, from admission to discharge. In addition, they have specific training in patient care and are trained to provide emotional care and support. Thus, nurses can use a variety of strategies and practices aimed at reducing preoperative anxiety and stress, helping patients feel more prepared and confident and improving their emotional well-being including: 1/effective communication with patients, 2/education: about the procedure, potential complications, pain management and postoperative care, 3/implementing relaxation techniques, 4/creating a calm and relaxing environment both in the waiting room and in the patient's room and 5/emotional support throughout the process (Dias et al., 2022a, 2022b; Ng et al., 2022; Ruiz-Hernández et al., 2021) In addition, nurses can work with other health care professionals to develop an individualised treatment plan that addresses specific patient needs (Turunen et al., 2017).

Several studies (Dias et al., 2022a, 2022b; Medina-Garzón, 2019; Ruiz-Hernández et al., 2021; Xu et al., 2020) have found that the preoperative nursing visit can decrease anxiety and postoperative complications. In these visits, nursing professionals, in addition to collecting data and educating patients on how to cooperate during their surgical process, can offer psychological support.

4.1 | Limitations

The main limitation of this systematic review of systematic reviews is the extensive heterogeneity detected in the interventions, methodology and results, which has hampered the ability to compare and synthesise the results. Articles published in languages other than English or Spanish, and the scarcity of statistical data or information provided by some of the selected reviews, are further limitations that could imply that some research results have been ignored.

Furthermore, because it may constitute a bias, it is important to bear in mind that although the interventions aimed at reducing preoperative anxiety are carried out in different parts of the world, the derived controlled trials are preferentially published in the United States and are mostly funded. This is possibly due to the fact that the United States appoints greater resources for research and the existence of a stronger research culture (Hansen et al., 2021; Ramirez et al., 2022).

Therefore, when extrapolating these results, it is advisable to consider these limitations.

Despite the limitations, this review has several strengths, such as the fact that all the selected reviews included meta-analyses of controlled trials, which has allowed us to have a large number of quantitative pre-post results on anxiety, both in the experimental and control groups, and most of the selected reviews were of high quality.

5 | CONCLUSION

Preoperative anxiety is detected in both children and adults and can be significantly reduced through short-term nonpharmacological interventions including music or massage for adults and virtual reality or clowns for children. These interventions usually involve nursing professionals.

It is important to continue research in this area, not only through controlled trials, but also by incorporating other types of methodological designs that allow us to offer a broader and increasingly reinforced vision of the interventions aimed at reducing preoperative anxiety, providing increasingly well founded conclusions.

6 | RELEVANCE TO CLINICAL PRACTICE

Nursing professionals, due to our training and proximity to patients, have a fundamental role to play in offering and implementing alternatives that are more holistic and cost-effective and which avoid the side effects of the drugs used in current models of preoperative anxiety reduction. Thus, the development of nursing protocols that include music, massage or virtual reality can create an institutional precedent in the treatment of patient anxiety.

The results of this review suggest that nursing professionals, in collaboration with other health professionals, should continue to conduct research on the reduction in preoperative anxiety. Furthermore, it is important to base research on theoretical models and to conduct it under high quality and evidence-based standards.

It is necessary for nurses to reflect their work on their patients, not only through theoretical studies, but also by venturing into the field and demonstrating on-site the theories that are relevant on paper. Nursing is one of the pillars on which patients and their families rely on, therefore, improving the health care of the population we serve is one of our greatest professional legacies.

AUTHOR CONTRIBUTIONS

O-M C was involved in study design. A-M B and O-M C were involved in data collection. A-M B and O-M C were involved in data analysis. A-B R and O-M C were involved in study supervision. A-M B, A-B R and O-M C were involved in manuscript writing. A-B R and O-M C were involved in critical revisions for important intellectual content.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to disclose.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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SUPPORTING INFORMATION

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

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APPENDIX 1

CHARACTERISTICS OF THE SEARCH.

No. Records	Terms used (free language)	Search field Limits used
Medline (112)	1- Intervention*[Title/Abstract] OR Treatment*[Title/Abstract] OR Care[Title/Abstract] OR Education[Title/Abstract] OR Efficiency[Title/Abstract] OR Therap*[Title/Abstract] OR Efficacy[Title/Abstract] OR Effectiveness[Title/Abstract] OR Effective[Title/Abstract] OR Outcome*[Title/Abstract]	Search field
	2- Angst[Title/Abstract] OR Anxiety[Title/Abstract] OR Anxieties[Title/Abstract] OR Nervousness[Title/Abstract] OR Anxiousness[Title/Abstract]	Title/Abstract
	3- Pre-operative[Title/Abstract] OR Preoperative[Title/Abstract] OR Perioperative[Title/Abstract] OR "Minor surgical procedure"[Title/Abstract] OR Surgical[Title/Abstract] OR Surgery[Title/Abstract]	Limits used
	4- #1 AND #2 AND #3	meta-analysis English, Spanish 2012–2022 (both inclusive)
SCOPUS (244)	1- TITLE-ABS-KEY (intervention*) OR TITLE-ABS-KEY (treatment*) OR TITLE-ABS-KEY (care) OR TITLE-ABS-KEY (education) OR TITLE-ABS-KEY (efficiency) OR TITLE-ABS-KEY (therap*) OR TITLE-ABS-KEY (efficacy) OR TITLE-ABS-KEY (effectiveness) OR TITLE-ABS-KEY (effective) OR TITLE-ABS-KEY (outcome*)	Search field
	2- TITLE-ABS-KEY (pre-operative) OR TITLE-ABS-KEY (preoperative) OR TITLE-ABS-KEY (perioperative) OR TITLE-ABS-KEY (minor AND surgical AND procedure) OR TITLE-ABS-KEY (surgical) OR TITLE-ABS-KEY (surgery)	Title/Abstract/KeyWords
	3- TITLE-ABS-KEY (angst) OR TITLE-ABS-KEY (anxiety) OR TITLE-ABS-KEY (anxieties) OR TITLE-ABS-KEY (nervousness) OR TITLE-ABS-KEY (anxiousness)	Limits used
	4- TITLE-ABS-KEY (meta-analysis) OR TITLE-ABS-KEY (metaanalysis))	meta-analysis
	5- #1 AND #2 AND #3 AND #4	English, Spanish 2012–2022 (both inclusive)
Web Of Science (557)	1- Intervention* (Topic) or Treatment* (Topic) or Care (Topic) or Education (Topic) or Efficiency (Topic) or Therap* (Topic) or Efficacy (Topic) or Effectiveness (Topic) or Effective (Topic) or Outcome* (Topic)	Search field
	2- Pre-operative (Topic) or Preoperative (Topic) or Perioperative (Topic) or Minor surgical procedure (Topic) or Surgical (Topic) or Surgery (Topic)	Topic
	3- Angst (Topic) or Anxiety (Topic) or Anxieties (Topic) or Nervousness (Topic) or Anxiousness (Topic)	
	4- Meta-analysis (Topic) or Metaanalysis (Topic)	Limits used
	5- #1 AND #2 AND #3 AND #4	English, Spanish 2012–2022 (both inclusive)
Cochrane Library	Intervention* OR Treatment* OR Care OR Education OR Efficiency OR Therap* OR Efficacy OR Effectiveness OR Effective OR Outcome*	Search field
43 reviews	AND Pre-operative OR Preoperative OR Perioperative OR Minor surgical procedure OR Surgical OR Surgery in Title Abstract Keyword	Title Abstract Keyword
60 trials	AND Angst OR Anxiety OR Anxieties OR Nervousness OR Anxiousness in Title Abstract Keyword	Limits used
	AND Meta-analysis OR Metaanalysis	2012–2022 (both inclusive)

TOTAL: 1016 records

The study selection process was organised in four phases: identification, screening, selection and inclusion. After completing the first phase of identification by exploring the literature and eliminating duplicate studies, we proceeded to the screening phase in which the titles of all the articles were examined using the inclusion criteria to exclude, if necessary, those that were not relevant. In this phase, those papers whose titles appeared doubtful were included for an in-depth analysis in the next phase. Subsequently, the abstract of the selected studies was reviewed. Along the same lines, any references with abstracts that did not clearly deal with preoperative anxiety were included for review in the last phase where the studies were evaluated by reading the full text. In this selection process, all the inclusion criteria had to be met in order to be included in the SR.

APPENDIX 2

QUALITY ASSESSMENT ACCORDING TO THE AMSTAR-2 SCALE.

		AMSTAR-2 items																
N° SR	Main author (year of publication)	Question and inclusion	Protocol	Study design	Exhaustive search	Study selection	Data extraction	Justification of excluded studies	Details of included studies	Risk of bias	Sources of funding	Statistical methods	Risk of bias in meta-analysis	Risk of bias in individual studies	Explanation of heterogeneity	Publication bias	Conflict of interest	Global
1	Álvarez-García and Yaban (2020)	1	2	3	1	1	1	2	1	1	3	1	1	1	3	1	1	M
2	Bradt et al. (2013)	1	2	1	2	1	1	2	2	2	1	3	3	1	1	3	1	H
3	Chow et al. (2018)	1	1	1	2	1	1	1	2	2	1	1	3	1	1	1	1	L
4	Eijlers et al. (2019)	1	2	1	1	1	1	1	2	2	1	3	3	1	1	3	1	M
5	Fu et al. (2019)	1	1	1	2	1	1	1	2	2	3	3	1	1	1	1	1	L
6	Guo, Fan, et al. (2020) and Guo, Li, et al. (2020)	1	1	1	2	1	1	2	2	1	1	3	3	1	1	3	1	H
7	He et al. (2015)	1	2	1	2	1	1	2	2	1	1	4	4	1	1	4	1	L
8	Hudson and Ogden (2016)	1	2	3	2	1	1	2	2	2	3	3	3	1	1	3	1	L
9	Kakar et al. (2021)	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	H
10	Kerimaa et al. (2021)	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	H
11	Könsgen et al. (2019)	3	2	1	1	1	1	1	3	1	1	1	1	1	1	3	1	M
12	Koo et al. (2020)	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	H
13	Kühlmann et al. (2018)	1	1	1	2	1	1	2	1	1	1	1	1	1	1	1	1	H
14	Ruiz-Hernández et al. (2021)	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	H
15	Simonetti et al. (2022)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	H
16	Van Der Heijden et al. (2015)	1	1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	H
17	Weingarten et al. (2021)	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	H

Note: 1 = yes; 2 = yes partial; 3 = no; 4 = no meta-analysis, CL = critically low; L = low, M = medium; H = high

APPENDIX 3

DESCRIPTION OF THE PARTICIPANTS IN THE PRIMARY STUDIES INCLUDED IN THE SELECTED SRS.

					Intervention group		Control group	
N° SR	Type of participants	N° participants	Women	Men	n° participants	Mean age	n° participants	Mean age
1	Adults: CA, GS, EN, GI and LA	673	379	208	373	49.29	300	47.9
2	Adults: CA, GS, GI, LA, NE, O, OPH, ON, OR, PL and U	1543	676	702	860	48.21	683	48.21
3	Children: OS, GS, O, OPH and U	688	–	–	341	5.4	347	5
4	Children and adolescents ≤21:CA, DE and ON	458	116	129	236	11	222	11
5	Adults: OS, DS, GS, OR and U	216	30	-	118	50	98	48.52
6	Adults: OS, CA, GS, EN, GI, LA and OPH	2507	1151	1276	1291	53.9	1216	56.54
7	Children (2–12 years):AM and O	625	216	269	331	6.95	294	6.95
8	Adults: OS, CA, EN, GI, DE, OPH, OR, PL and U	1823	741	479	978	36	845	34
9	Adults: CA	161	–	–	82	61.73	79	63.01
10	Children: OS, GS and O	812	–	–	402	–	410	–
11	Children: OS, AL, VA and U	741	–	–	439	–	302	–
12	Adults and Children: OS, GS, GI, O and OR	744	–	–	372	46.96–6.33	372	46.60–6.57
13	Adults: A, AM, CA, GS, GI, LA, DE, OR and U	4324	2652	1672	2181	47.21	2143	47.21
14	Adults: AM and GS	855	428	427	439	51.55	416	51.55
15	Children and adolescents ≤19 years: Inpatients	150	69	81	73	6	77	5
16	Adults and Children: CA and OR	196	54	58	119	12.85	77	12.85
17	Adults and Children: GI	368	368	0	185	34.36	183	31.36
Total		16,884	6880	5301	8820	A = 42.53 /N = 8.08	8064	A = 47.49 /N = 7.89

Abbreviation: A, adults; AL, allergology; C, children; CA, cardiology; DE, dentistry; DS, digestive surgery; EN, endoscopy; GI, gynaecology & obstetrics; GS, general surgery; LA, laparoscopy; NE, neurology; O, otorhinolaryngology; ON, oncology; OPH, ophthalmology; OR, orthopaedics; OS, outpatient surgery; PL, plastic surgery; SR, systematic review; U, urological surgery; VA, venous access.