ESCOLA SUPERIOR DE ENFERMAGEM DO PORTO

Curso de Mestrado em Enfermagem de Saúde Infantil e Pediátrica

EFETIVIDADE DAS INTERVENÇÕES NÃO FARMACOLÓGICAS NA ANSIEDADE EM ADOLESCENTES NO PERIOPERATÓRIO: REVISÃO SISTEMÁTICA DA LITERATURA

DISSERTAÇÃO

Maria João Araújo Sá Neves Pereira

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EFFECTIVENESS OF NON-PHARMACOLOGICAL INTERVENTIONS FOR ANXIETY IN ADOLESCENTS IN THE PERIOPERATIVE PERIOD: A SYSTEMATIC REVIEW

Dissertação orientada pela Professora Doutora Margarida Reis Santos e coorientada pela Professora Doutora Lurdes Lomba

Maria João Araújo Sá Neves Pereira

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SIGLAS E ABREVIATURAS

AV - AudioVisual

CG – Grupo Controlo

EG –Grupo Experimental

ESEP – Escola Superior de Enfermagem do Porto

INF – Intervenção Não Farmacológica

JBI – Instituto de Joanna Briggs

m-YPAS - Escala Modificada de Ansiedade Pré-operatória de Yale

NRS - Escala Numérica de Ansiedade

OMS – Organização Mundial de Saúde

PBE – Prática Baseada na Evidência

RCAAP - Repositório Científico de Acesso Aberto de Portugal

RCT – Estudo de Controlo Randomizado

RSL – Revisão Sistemática da Literatura

STAI-Y - Inventário de Ansiedade Traço-Estado

STAIC - Inventário de Ansiedade Traço-Estado para Crianças

UCPA - Unidade de Recuperação Pós-Anestésica

VAS-A - Escala Visual Analógica de Ansiedade

RESUMO

Introdução: A experiência cirúrgica, muitas vezes resulta num evento crítico na vida dos adolescentes, uma vez que estes percecionam o medo, a dor, a perda de controlo sobretudo quando não há uma preparação prévia. Os adolescentes em contexto perioperatório constituem um foco de atenção prioritário para o enfermeiro, que deverá apresentar competências para prevenir a ansiedade.

Objetivo: Avaliar a efetividade das intervenções não farmacológicas na redução da ansiedade em adolescentes no perioperatório.

Método: Elaboração de Protocolo e respetiva Revisão Sistemática da Literatura de acordo com a metodologia do Instituto *Joanna Briggs*. Pesquisa realizada nas bases de dados - PubMed, CINAHL, PsycInfo, Cochrane de Revisões Sistemáticas e Instituto *Joanna Briggs* de Revisões Sistemáticas. Pesquisa de estudos não publicados, Repositório Científico de Acesso Aberto de Portugal (RCAAP). Descritores utilizados: *Adolescent, Anxiety, Non-pharmacological and Perioperative Interventions*, assim como sinónimos em português, inglês e espanhol. Identificados 967 artigos. A identificação dos estudos, bem como a extração de dados foi conduzida, de forma independente, por dois investigadores. Todas as discordâncias foram discutidas com um terceiro investigador.

Resultados: Incluídos 10 estudos, com 807 participantes. Dois estudos com intervenção de hipnose e um sobre o Programa de Educação e Orientação em Cirurgia Escoliose, não apresentaram eficácia na redução de ansiedade em adolescentes no perioperatório. Contrariamente, os restantes seis estudos demonstraram eficácia na redução de ansiedade. Verificou-se, também, que os adolescentes com elevada ansiedade no perioperatório apresentaram mais dor no pós-operatório.

Conclusão: As evidências encontradas mostram eficácia das intervenções cognitivo-comportamental, imaginação guiada, relaxamento, musicoterapia e massagem terapêutica na diminuição da ansiedade em adolescentes em contexto perioperatório. Recomenda-se, no entanto, mais investigação sobre estas intervenções no sentido de fortalecer os resultados encontrados.

Palavra-chave: Adolescente, Ansiedade, Intervenções não farmacológicas e Perioperatório

ABSTRACT

Introduction: The surgical experience often results in a critical event in the adolescents' lives, since they perceive fear, pain, loss of control, especially when there is no prior preparation. Adolescents in the perioperative context are a priority focus of attention for nurses, who must have skills to prevent anxiety.

Objective: To evaluate the effectiveness of non-pharmacological interventions in reducing anxiety in adolescents in the perioperative period.

Method: Preparation of Protocol and respective Systematic Literature Review according to the methodology of the Joanna Briggs Institute. Research carried out in the databases - PubMed, CINAHL, PsycInfo, Cochrane for Systematic Reviews and Instituto *Joanna Briggs* for Systematic Reviews. Research of unpublished studies, Scientific Open Access Scientific Repository of Portugal (RCAAP). Descriptors used: Adolescent, Anxiety, Non-pharmacological and Perioperative Interventions, as well as synonyms in Portuguese, English and Spanish. 967 articles identified. The identification of the studies, as well as the data extraction was carried out, independently, by two researchers. All disagreements were discussed with a third investigator.

Results: Ten studies were included, with 807 participants. Two studies with hypnosis intervention and one on the Education and Orientation Program in Scoliosis Surgery, were not effective in reducing anxiety in adolescents in the perioperative period. In contrast, the remaining six studies demonstrated effectiveness in reducing anxiety.

It was also found that adolescents with high anxiety in the perioperative period had more pain in the postoperative period.

Conclusion: The evidence found shows the effectiveness of cognitive-behavioral interventions, guided imagination, relaxation, music therapy and massage therapy in reducing anxiety in adolescents in the perioperative context. However, more research on these interventions is recommended in order to strengthen the results found.

Keyword: Adolescent, Anxiety, Non-pharmacological and Perioperative Interventions

SUMÁRIO

NOTA INTRODUTÓRIA

Segundo a Organização Mundial de Saúde (OMS), adolescência é o período de transição entre a infância e a vida adulta, com idades compreendidas entre os dez e os 19 anos. Nesta fase, os adolescentes experimentam um rápido crescimento físico, cognitivo e psicossocial. De acordo com as suas características de desenvolvimento, a adolescência é dividida em três fases, nomeadamente: adolescência inicial (10–14 anos), adolescência média (15–16 anos) e adolescência tardia (17–19 anos) (WHO, 2020). Os adolescentes têm características particulares desenvolvimentais que os fazem reagir de um modo diferente comparativamente às crianças e adultos, nomeadamente ao stress associado à doença e à cirurgia. Neste sentido, os investigadores têm avançado com estudos sobre os processos de desenvolvimento neurocognitivo dos adolescentes, de modo a entender o porquê de determinados comportamentos e reações, distinto das crianças e dos adultos (Casey, 2015).

Os adolescentes são habitualmente considerados uma população saudável quando comparados com as outras faixas etárias, no entanto, existem vulnerabilidades, sendo por vezes, necessário recorrer a intervenção cirúrgica.

Nos Estados Unidos, há anualmente cerca de sete milhões de adolescentes submetidos a cirurgia (Monahan et al., 2010) e cerca de 65% deles vivenciam ansiedade e angústia antes da cirurgia (Fortier, Martin, MacLaren Chorney, Mayes, & Kain, 2011).

De acordo com o Instituto Nacional de Estatística (Portugal, 2020) o número de cirurgias em adolescentes tem aumentado, tendo sido realizadas cerca de 17.482 cirurgias pediátricas (0-18 anos), em 2018. Tendo em vista que este pode ser um evento crítico na vida do adolescente, os enfermeiros precisam conhecer as intervenções eficazes para prevenir ou reduzir a ansiedade nos adolescentes, no período perioperatório.

O período perioperatório compreende três fases distintas: pré-operatório, intra-operatório e pós-operatório (Goodman, & Spry, 2017). O pré-operatório inicia-se quando há a decisão de realizar uma intervenção cirúrgica e termina quando o cliente é transportado para a sala de cirurgia (Goodman, & Spry,

2017). Nesse período, os adolescentes experimentam altos níveis de ansiedade, má qualidade do sono e medo (Rabbitts, Groenewald, Tai, & Palermo, 2015; Rabbitts & Kain, 2019; Rabbitts, Zhou, Narayanan, & Palermo, 2017). Por estes motivos, o nível de ansiedade no período pré-operatório é avaliado de forma recorrente, verificando-se que atinge valores elevados no dia da cirurgia (Duparc-Alegria et al., 2018). O intraoperatório é o período em que é realizada a cirurgia e dura até ao encaminhamento do adolescente para a Unidade de Recuperação Pós-Anestésica – UCPA (Goodman, & Spry, 2017). Por fim, o pós-operatório inicia com a admissão na UCPA e termina com a alta hospitalar ou avaliação final do adolescente no domicílio (Goodman, & Spry, 2017). Durante este tempo - período perioperatório - podem ser realizadas intervenções psicossociais, entre outras, para controlar os fatores de risco e ensinar estratégias de *coping* adaptativas para os adolescentes controlarem a sua ansiedade e melhorar os resultados de recuperação da cirurgia. Este período constitui uma oportunidade para a implementação de intervenções que podem ajudar a minimizar a ansiedade e a melhorar os resultados no período pós-operatório em adolescentes (Rabbitts & Kain, 2019).

A ansiedade é definida como uma emoção negativa, sentimento de ameaça, de perigo ou angústia (ICNP, 2019). É comum, num determinado momento da vida, experienciar-se um certo nível de ansiedade, preocupação ou medo. Assim, a ansiedade pode ser vista como uma manifestação comportamental, e classifica-se em dois tipos: ansiedade de estado e de traço, não incluindo ansiedade como transtorno mental ou doença. Relativamente à ansiedade de estado, representa uma reação emocional transitória, percebida pela consciência e caracterizada por sentimentos subjetivos de tensão, nervosismo e preocupação, no entanto não persiste além da situação desencadeadora de ansiedade, sendo também influenciada pelas experiências do indivíduo (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Quanto à ansiedade de traço, trata-se de um padrão de ansiedade relacionado com a personalidade. Neste sentido, considera-se que a ansiedade de traço consiste na dissociação entre perceção e reação às situações vividas, ou seja, trata-se de comportamentos individuais que ficam ocultos, podendo ser ativados em qualquer fase da vida (Spielberger et al., 1983).

O procedimento cirúrgico, por si só, desencadeia ansiedade, que é influenciada pelas diferenças individuais de cada adolescente, resultando em comportamentos de ajuste, com o objetivo de encarar a ansiedade provocada pela circunstância. As manifestações da ansiedade em adolescentes no pré-operatório são experienciadas através da tensão muscular, taquipneia, taquicardia, hipertensão, aumento de sudorese e náuseas. Quando presentes

no pós-operatório, no domicílio, incluem, por exemplo pesadelos, transtornos alimentares, ansiedade de separação entre outros (Pestana-Santos, Reis Santos, Pestana-Santos, Pinto, & Lomba, 2020).

Os níveis de ansiedade do adolescente no período perioperatório podem ser medidos por diversos instrumentos, como o Inventário de Ansiedade Traço-Estado (STAI-Y), ou o Inventário de Ansiedade Traço-Estado para Crianças (STAIC), ou a Escala Visual Analógica de Ansiedade (VAS-A), ou a Escala Modificada de Ansiedade Pré-operatória de Yale (m-YPAS) ou a Escala Numérica de Ansiedade, score de zero a 10 (NRS).

As intervenções não farmacológicas (INF) são frequentemente implementadas para promover conforto e bem-estar por meio do controlo da ansiedade e da dor. Essas medidas também complementam as medidas farmacológicas, ao mesmo tempo que reduzem a necessidade do seu uso e evitam os efeitos colaterais que estas provocam (Pinheiro, 2019) Por exemplo, os opioides têm um perfil de segurança desfavorável em crianças, com efeitos colaterais que variam de náuseas e obstipação, a danos cognitivos e depressão respiratória, e podem ainda atrasar a alta hospitalar após a cirurgia (Hoffman et al., 2008). Além disso, as intervenções não farmacológicas têm-se mostrado alternativas eficazes ou adjuvantes às intervenções farmacológicas padrão (Croke, 2020).

As intervenções não farmacológicas consistem numa aplicação de métodos ou técnicas de prevenção e / ou tratamento que não envolvem a administração de medicamentos (OE, 2013), podendo ser divididas em diferentes categorias: psicológicas (cognitivas ou comportamentais) como a distração, imaginação guiada, hipnose, realidade virtual; física (por exemplo: massagem); ambiental, como o uso da sala de indução, ou o paciente ficar com a própria roupa; social, permitindo a presença dos pais ou de apoio; e suporte emocional onde se enquadram o reiki, conforto, toque terapêutico e a escuta ativa (Manyande, Cyna, Yip, Chooi, & Middleton, 2015; Pestana-Santos, Santos, Cardoso, & Lomba, 2019).

A importância da utilização dessas intervenções reside no facto de alterar o significado atribuído ao agente causador de ansiedade. Por meio da sua aplicação, é alcançada a reestruturação cognitiva, direcionada às cognições, expectativas, avaliações e construções que complementam a experiência de ansiedade (Pinheiro, 2019).

Não foi identificada nenhuma revisão sistemática atual ou em curso sobre esta temática, o que justifica a pertinência de realizar esta revisão. Deste modo, o

objetivo do estudo é, através de uma Revisão Sistemática da Literatura (RSL), avaliar os estudos disponíveis sobre a eficácia das intervenções não farmacológicas na ansiedade, em adolescentes no período perioperatório.

Sob o ponto de vista estrutural, esta dissertação encontra-se dividida em três capítulos. Após uma nota introdutória, onde se faz uma breve contextualização ao tema em estudo, apresenta-se no primeiro capítulo o método do estudo, nomeadamente, o tipo de estudo desenvolvido, de que forma foi concretizado e o objetivo da RSL. No segundo capítulo após uma breve introdução sobre a importância de elaborar um protocolo, seguindo as orientações do Instituto de Joanna Briggs (JBI), apresenta-se uma sumarização do que foi desenvolvido no protocolo e por último o protocolo, redigido em inglês, submetido à JBI, com o número de registo na PROSPERO, CRD42020184386. No terceiro capítulo expõe-se a RSL, manuscrita em inglês, desenvolvida de acordo com a metodologia do Instituto de Joanna Briggs para revisões sistemáticas de evidência de eficácia. Por fim, apresenta-se a conclusão de toda a investigação realizada com a descrição dos principais resultados da RSL, suas limitações, bem como, sugestões de melhoria para a prática de enfermagem baseada na evidência obtida.

Este estudo insere-se numa investigação mais ampla a ser desenvolvida pela Enfermeira Márcia Pestana-Santos no decurso do seu Doutoramento em Ciências de Enfermagem, do Instituto de Ciências Biomédicas Abel Salazar, da Universidade do Porto.

1.MÉTODO

O presente estudo consiste numa Revisão Sistemática da Literatura de abordagem quantitativa. A revisão será conduzida de acordo com a metodologia do Instituto de Joanna Briggs para revisões sistemáticas de evidências de eficácia (Tufanaru, Aromataris, Campbell, & Hopp, 2020). A opção por este modelo justifica-se pela confiabilidade e segurança das *guidelines* para a elaboração de RSL, mas também pelos instrumentos que o próprio instituto disponibiliza, nomeadamente, as *checklist*'s para avaliação da qualidade metodológica dos artigos a incluir na RSL, a grelha para a extração de dados, entre outros.

O objetivo desta revisão é avaliar a eficácia de intervenções não farmacológicas na ansiedade de adolescentes no período perioperatório.

Uma revisão sistemática deve iniciar-se com a definição do problema e formulação da questão de partida. A elaboração de uma questão de partida torna-se fundamental neste processo, na medida em que auxilia a pesquisa, proporciona a seleção da melhor evidência permitindo simultaneamente decidir criteriosamente se a mesma é ou não aplicável nos contextos da prática (Donato, & Donato, 2019).

O modelo de referência, definido pelo acrónimo PICO - população, intervenção, comparação e resultados (Quadro 1), é o método utilizado para a questão de partida da presente revisão sistemática.

Surge assim a seguinte questão de investigação: qual a eficácia das intervenções não farmacológicas na ansiedade dos adolescentes no período perioperatório?

População	Adolescentes (10-19 anos) no período perioperatório
Intervenção	Intervenção não farmacológica (INF) ▪ Musicoterapia ▪ Imaginação Guiada ▪ Hipnose ▪ Realidade Virtual/aumentada ▪ Massagem terapia
Comparação	▪ Intervenção farmacológica ▪ Combinação de intervenções não farmacológicas com os outros comparadores, incluindo outra intervenção não farmacológica, ou com os cuidados habituais ▪ Ausência de intervenção
Resultados	Ansiedade

Quadro 1 - Elaboração da questão de investigação, segundo o modelo PICO

O presente protocolo foi elaborado seguindo orientações do JBI. Foi registado no PROSPERO, com o número, CRD42020184386, posteriormente submetido à JBI, estando neste momento a aguardar-se uma nova avaliação, pois obteve-se um primeiro feedback recomendando pequenas alterações, estas foram realizadas e a nova versão do protocolo foi submetida. Essa nova versão é a que se apresenta neste documento, submetida, aguardando-se a aceitação da revisão.

O protocolo de revisão descreve a justificação para a revisão, os critérios de seleção do estudo (critérios de inclusão/exclusão), as medidas de resultados, intervenções e comparações consideradas, a estratégia de pesquisa proposta para a identificação de estudos relevantes, o procedimento de seleção do estudo, o processo de avaliação crítica, o processo de extração de dados, o processo para resolver divergências entre os revisores na seleção dos estudos e o modo como será efetuada a extração de dados e decisões de avaliação crítica.

Por consequente, foi realizada uma pesquisa inicial limitada à PubMed e CINAHL, de seguida uma segunda pesquisa nas principais bases de dados do âmbito da saúde, por estudos publicados e não publicados - Open Gray e Repositório Científico de Acesso Aberto de Portugal - sem limitações de data de publicação. Foram incluídos estudos em inglês, espanhol e português. Após a seleção dos estudos acessíveis em texto completo, procedeu-se à avaliação da qualidade metodológica e à extração de dados, realizadas independentemente por dois revisores, usando instrumentos de avaliação crítica padronizados pelo JBI, para estudos experimentais e quase experimentais, de acordo com os desenhos dos estudos incluídos. Quando necessário, os autores dos artigos foram contatados para solicitar dados ausentes ou obter informações adicionais, para fins de esclarecimento. Quaisquer divergências que surgiram entre os revisores foram resolvidas por meio de discussão ou com um terceiro revisor. Quanto aos resultados da avaliação crítica, estes foram considerados na síntese das evidências e relatados de forma narrativa e em tabela na RSL. Todos os estudos, independentemente do resultado da avaliação da sua qualidade metodológica, foram submetidos à extração e síntese dos dados.

Os participantes dos estudos considerados para a revisão tinham idades compreendidas entre os 10 e os 19 anos e tinham sido submetidos a um procedimento cirúrgico, independente do tipo de cirurgia. Não houve limitações relativamente à frequência e intensidade da intervenção ou relativamente ao profissional que a realizava. Em todos os estudos, os grupos experimentais (com intervenção) e de controlo (cuidados habituais/padrão) foram tratados de forma idêntica, exceto para a intervenção em estudo.

Esta análise também incluiu estudos que compararam a combinação de intervenções não farmacológicas com outros comparadores, incluindo outra intervenção não farmacológica, ou com os cuidados habituais.

A estratégia abrangente das três etapas delineadas no protocolo de pesquisa foi conduzida até julho de 2020, usando as bases de dados e fontes da literatura cinzenta citadas anteriormente, tendo sido identificados 963 estudos, nomeadamente e por base de dados: PubMed (273), PsycINFO (42), CINAHL via EBSCO (92), Cochrane Central de Registo de Ensaios Controlados (82), SciELO (461), Open Gray (2) e RCAAP (11). Quatro estudos foram identificados por meio da lista de referências, resultando num total de 967 estudos. Destes, 163 artigos estavam duplicados, por isso foram excluídos, resultando 804 estudos. Dos 804 estudos, 750 foram excluídos, com base na análise do título e resumo. Ficaram 54 estudos selecionados para análise de texto completo. Destes, 43 estudos não atenderam aos critérios de inclusão e foram excluídos (os motivos de exclusão

estão listados no Apêndice II da revisão sistemática da literatura), resultando em 11 estudos. Estes foram avaliados quanto à qualidade metodológica. Um estudo foi excluído com base na qualidade metodológica, pois não atingiu a avaliação geral de 70% (Apêndice III da RSL). Assim, apenas dez estudos atenderam aos critérios de avaliação dos revisores. As avaliações críticas dos estudos incluídos podem ser consultadas nas Tabelas 1 e 2 presentes na RSL.

Os dados extraídos incluíram detalhes específicos sobre as populações, métodos dos estudos, intervenções e resultados que dão resposta à questão da revisão.

Os resultados foram apresentados sob forma de narrativa, incluindo tabelas para a apresentação dos dados.

2.PROTOCOLO DE PESQUISA

A elaboração de um protocolo de revisão sistemática é fundamental porque pré-define os objetivos e métodos da revisão sistemática da literatura e fornece o plano ou proposta para a revisão sistemática. Importa salientar que deve evitar-se fazer alterações ao protocolo durante a RSL. Contudo, estas podem ser necessárias devido a circunstâncias não previstas. No caso de ser imperativo proceder a reformulações essas deverão ser documentadas na RSL. A definição à priori da metodologia e posterior análise das regras, assegurará a validade do estudo. A validade da revisão sistemática dependerá da reprodutibilidade do protocolo, ou seja, outros investigadores, seguindo o protocolo, deverão obter os mesmos resultados da investigação (Tufanaru, Aromataris, Campbell, & Hopp, 2020).

Conforme mencionado anteriormente, o protocolo da nossa RSL seguiu orientações do JBI (Tufanaru, Aromataris, Campbell, & Hopp, 2020), foi registado no PROSPERO (CRD42020184386) e foi ressubmetido para avaliação à JBI, aguardando-se feedback após terem sido realizadas pequenas alterações sugeridas pelos revisores, sendo essa versão que se apresenta no documento.

Numa pesquisa inicial na base de dados Medline via PubMed (Apêndice I do protocolo de pesquisa desenvolvido), foram identificados 273 estudos realizados com adolescentes dos 10 aos 19 anos, submetidos a cirurgia.

Foram selecionados todos os estudos que abordavam a intervenção não farmacológica no período perioperatório com o objetivo de reduzir a ansiedade, sem restrições de comparadores, geográficos ou culturais. No entanto, os estudos que envolviam adolescentes com doença psiquiátrica previamente diagnosticada, foram excluídos.

Considerou-se as intervenções não farmacológicas que incluíam, massagem, hipnose, imaginação guiada, musicoterapia, música e realidade virtual. Contudo, quaisquer outras intervenções não farmacológicas usadas no contexto perioperatório com adolescentes para prevenir a ansiedade foram contempladas. Foram incluídos estudos que comparam a intervenção não farmacológica ou combinação de intervenções não farmacológicas com outros comparadores, outra intervenção não farmacológica, com os cuidados habituais/padrão ou sem tratamento. As INF não apresentam limitações quanto à frequência, intensidade ou sobre quem as realiza.

Estudos que usaram STAI-Y ou STAIC ou VAS-A ou m-YPAS ou NRS, ou outros instrumentos de avaliação da ansiedade, foram incluídos.

Quanto ao desenho dos estudos incluídos para a revisão poderão ser do tipo experimental ou quase-experimental, incluindo ensaios controlados randomizados e ensaios controlados não randomizados, estudos quase experimentais, antes e depois, estudos de coorte prospetivos e retrospetivos, estudos de caso-controle e estudos analíticos transversais. Os relatórios de casos individuais, séries de casos e revisões sistemáticas serão excluídos. Incluídos estudos publicados em inglês, espanhol e português. Os resultados foram apresentados através de uma síntese narrativa.

De seguida apresenta-se o protocolo de pesquisa elaborado "Effectiveness of non-pharmacological interventions for anxiety in adolescents in the perioperative period: a systematic review protocol".

Review title

Effectiveness of non-pharmacological interventions for anxiety in adolescents in the perioperative period: a systematic review protocol

Abstract

Objective: This review aims to evaluate the effectiveness of non-pharmacological interventions for anxiety in adolescents in the perioperative period.

Introduction: Adolescents undergoing surgery suffer considerable levels of anxiety and distress before surgery, which are maintained beyond the procedure. Although the benefit of non-pharmacological interventions in this area is significant, their efficacy is still under studied.

Inclusion criteria: This review will consider studies that focus on adolescents aged 10 to 19 years, who have undergone a surgical procedure. All studies that focus on non-pharmacological interventions occurring in the perioperative period designed to reduce anxiety without restrictions of comparators, geographical or cultural will be included.

Methods: An initial limited search of PubMed and CINAHL has been undertaken and will be followed by a second search for published and unpublished studies without limitations of publication date in major healthcare related electronic databases. Studies in English, Spanish and Portuguese will be included. After full text studies are retrieval, methodological quality assessment and data extraction will be performed independently by two reviewers in tabular form. A narrative synthesis will accompany the results and, if possible, meta-analysis will be performed and a Grading of Recommendations, Assessment, Development and Evaluation (GRADE) Summary of Findings presented.

Systematic review registration number: CRD42020184386.

Keywords: adolescent; anxiety; complementary therapy; non-pharmacological interventions; perioperative care.

Abstract word count: 195 words.

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Introduction

Only in the United States of America (USA) there are about seven million of adolescents who undergo surgery each year[1] and up to 65% of them experience considerable anxiety and distress before surgery.[2] Even though the surgical procedure has been well-known it could be a distressing and overwhelming experience for adolescent.[3]

The perioperative period comprises three phases: preoperative, intraoperative, and postoperative. The preoperative phase starts when the patient is informed of the need for surgical intervention and includes all events up to the scheduled surgical procedure – preparation for the surgery. The intraoperative phase consists of the surgical procedure and concludes once the procedure is completed - management strategies. Finally, the postoperative phase starts in the post anesthesia care unit (PACU) and lasts until the patient returns to the usual roles and responsibilities – post surgical management and recovery at home.[4,5]

Anxiety is defined as a vague and uncomfortable feeling of discomfort or fear, accompanied by an autonomic response and a feeling of apprehension caused by anticipation of danger.[6] The triggering factors to increase anxiety levels in the perioperative, are the way a person perceive fear of the unknown, physical injuries, pain, loss of control, uncertainty of what is expected, and separation from family routines, which means that anxiety levels may be higher, especially when there is no preoperative preparation.[7] Consequently, the higher levels of anxiety, the greater will be adolescents negative emotions, as well as their difficulty in cooperating with health care professionals.[8]

The adolescent's anxiety levels in the perioperative period are measured using several instruments, such State-Trait Anxiety Inventory (STAI-Y), or State-Trait Anxiety Inventory for Children (STAIC), or Visual Analogue Scale for Anxiety (VAS-A), or modified Yale Preoperative Anxiety Scale (mYPAS), or a Zero to 10 numeric rating scale (NRS).

Non-pharmacological interventions can be used to reduce anxiety, and especially in this field, by taking different methods such as cognitive-behavioral techniques (e.g. distraction, imagery), physical methods (e.g. positioning and massage) and emotional support.[9] Thus, the implementation of non-pharmacological interventions entails the application of any of these methods or techniques for anxiety prevention without involving drugs administration[10] and there are already several applications with adolescents in perioperative, such as distraction, guided imagery, hypnosis,[11] music therapy, music,[12,13] or massage.[14] The importance of using any of these interventions is due to the

change in the meaning attributed to the anxiety-causing agent. Through its application, cognitive restructuring is achieved, oriented to the cognitions, expectations, assessments and constructions that complement the experience of anxiety.[10]

According to the World Health Organization, "adolescence" is the phase of life between childhood and adulthood, from ages 10 to 19.[15] They experience rapid physical, cognitive and psychosocial growth.[15] However, their physical growth precedes the cognitive maturation.[16] According to their developmental characteristics, adolescence is divided into three stages, specifically: early adolescence (10–14 years), medium adolescence (15–16 years) and late adolescence (17–19 years).[17]

In the last decade a significant investment has been made in studies focusing on the neurocognitive development processes of adolescents in order to explain why they respond and behave differently from children and also from adults.[18] Similarly, a decade ago, Fortier and colleagues advised about the need to develop primary studies in the perioperative context, involving only adolescents in their samples.[2] Since then, several reviews studies have been done about non-pharmacologic interventions in perioperative and including adolescents in the studied population.[3,19-23] Manyande and colleagues focused their attention on the effects of non-pharmacological interventions in assisting induction of anaesthesia in children (zero to 18 years) by reducing their anxiety, distress or increasing their co-operation.[23] Chieng and colleagues examined the relationship between perioperative anxiety and postoperative pain in children and adolescents undergoing elective surgical procedures.[3] Woragidpoonpol and colleagues evaluated the best available evidence related to the use and effectiveness of non-pharmacological interventions as an adjunct therapy to pharmacological interventions and the perceptions and/or pain behaviors in children aged 0 to 19 years who had undergone a major surgery.[9] Additionally, in a previous scoping review it was concluded that there is sufficient literature concerning non-pharmacologic interventions delivered to adolescents' in the perioperative to conduct a systematic review and analyze the effectiveness of this interventions with this specific population.[24]

Thus, there is a need to summarize findings focusing on the effectiveness of non-pharmacological interventions in prevention of anxiety in the perioperative to provide the best evidence to health care professionals who work with adolescents in the perioperative context.

The objective of this review is to evaluate the effectiveness of non-pharmacological interventions for anxiety in adolescents in the perioperative period.

A preliminary search of PROSPERO, MEDLINE, the Cochrane Database of Systematic Reviews and the Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports was conducted and no current or underway systematic reviews on the topic were identified, neither published nor in progress.

Review question

What is the effectiveness of non-pharmacological interventions for anxiety in adolescents in the perioperative period?

Keywords

adolescent; anxiety; complementary therapy; non-pharmacological interventions; perioperative care

Inclusion criteria

Participants

The review will consider studies that include adolescents aged 10 to 19 years old who have undergone a surgical procedure, regardless of the type of surgery including ambulatory, minor or major surgery, and that participated in non-pharmacological interventions in the perioperative period to reduce anxiety. Studies involving adolescents with previously diagnosed psychiatric illness will be excluded.

Interventions

This review will consider studies that evaluate non-pharmacological interventions. For this purpose, it is considered that non-pharmacological interventions include, but are not limited to, any treatment that is not a registered drug, such as massage, hypnosis, guided imagery, music therapy, music, and virtual reality. Any other non-pharmacological interventions used in perioperative context with adolescents to prevent anxiety could be added. There are no limitations to frequency, intensity or who delivers the intervention.

Comparator(s)

This review will consider studies that compare the non-pharmacological intervention or combination of non-pharmacological interventions to the other comparators, including another non-pharmacological intervention, or with the usual care or no treatment control.

Outcomes

This review will consider studies that include outcomes that measures anxiety on adolescents in the perioperative period. This outcome could be measured using STAI-Y or STAIC or VAS-A or m-YPAS or NRS, or with other instrument to evaluate anxiety level in adolescents.

Context

There are no context constrains in this review.

Types of studies

This review will consider both experimental and quasi-experimental study designs including randomized controlled trials and non-randomized controlled trials, quasi-experimental, before and after studies, prospective cohort studies, and analytical cross-sectional studies. Individual case reports, case series and systematic reviews will be excluded. Studies published in English, Spanish and Portuguese will be included. There was no date, geographical or cultural limitation for the acceptance of studies.

Methods

This protocol followed the PRISMA-P guidelines.[25] The proposed systematic review will be conducted in accordance with the Joanna Briggs Institute methodology for systematic reviews of effectiveness evidence.[26] This protocol has been previously registered in PROSPERO (CRD42020184386).

Search strategy

The search strategy aims to locate both published and unpublished studies. A three-step search strategy will be utilized in this review.

An initial limited search of PubMed was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms used to describe the articles were used to develop a full search strategy for the PubMed (see Appendix I). The search strategy, including all identified keywords and index terms, will be adapted for each included

information source. The reference list of all studies selected for critical appraisal will be screened for additional studies.

Information sources

The databases to be searched will include PubMed, CINAHL via EBSCO, PsycInfo, SciELO, JBI and Cochrane Central Register of Controlled Trials. The search for unpublished studies and grey literature will include Open Grey and RCAAP - Portugal Open Access Scientific Repository.

Study selection

Following the search, all identified citations will be collated and uploaded into EndNote (Clarivate Analytics, PA, USA) and duplicates removed. Titles and abstracts will then be screened by two independent reviewers (MJP and MPS) for assessment against the inclusion criteria of the review. Potentially relevant studies will be retrieved in full and their citation details imported into the Joanna Briggs Institute System for the Unified Management, Assessment and Review of Information - JBI SUMARI.[27] The full text of selected citations will be assessed in detail against the inclusion criteria by two independent reviewers (MJP and MPS). Reasons for exclusion of full text studies that do not meet the inclusion criteria will be recorded and reported in the systematic review. Any disagreements that arise between the reviewers at each stage of the study selection process will be resolved through discussion, or with a third reviewer (ES). The results of the search will be reported in full in the final systematic review and presented in a Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flow diagram.[28]

Assessment of methodological quality

Eligible and selected studies will be critically appraised by two independent reviewers (MJP and MPS) at the study level for methodological quality in the review using standardized critical appraisal instruments from the JBI for experimental and quasi-experimental studies, and according to the remaining study designs included.[26] Authors of papers will be contacted to request missing or additional data for clarification, where required. Any disagreements that arise will be resolved through discussion, or with a third reviewer (ES). Following critical appraisal, studies will not be excluded based on their methodological quality. However, the results of critical appraisal will be considered in the synthesis of the evidence and reported in narrative form and

in a table.[26]

All studies, regardless of the results of their methodological quality, will undergo data extraction and synthesis.

Data extraction

Data will be extracted from studies included in the review by two independent reviewers (MJP and MPS), using the standardized data extraction form developed by JBI. Any disagreements that arise between the reviewers will be resolved through discussion, or with a third reviewer (ES). Authors of papers will be contacted to request missing or additional data, where required.[26]

The data extracted will include specific details about the setting, population - adolescent subgroups, early, middle and late - study methods, interventions, and outcomes of significance to the review question. Also, it can be modified and revised as necessary all long the process of extracting data from each included study.[26]

Data synthesis

Studies will, where possible, be pooled in statistical meta-analysis using JBI SUMARI.[27] Effect sizes will be expressed as either odds ratios (for dichotomous data) and weighted (or standardized) final post-intervention mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard chi-squared and I^2 tests. Statistical analyses will be performed using a random effects models only in the presence of moderate to high heterogeneity (I^2>50%) and in their absence fixed effects models will be used instead.[29] Subgroup analyses will be conducted where there is sufficient data to investigate, based on the different study designs, different settings/ contexts and different age categories.[26] Sensitivity analyses will be conducted to test decisions made regarding the inclusion of any mega-trials. A funnel plot will be generated, using JBI SUMARI software[27] to assess publication bias if there are 10 or more studies included in a meta-analysis. Statistical tests for funnel plot asymmetry will be performed where appropriate. Where statistical pooling is not possible the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

Assessing certainty in the findings

The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) approach for grading the certainty of evidence will be followed and a Summary of Findings (SoF) will be created using GRADEPro software (McMaster University, ON, Canada).[30] The SoF will present the following information where appropriate: the absolute risks for the treatment and control, estimates of relative risk, a ranking of the quality of the evidence based on the risk of bias, the directness, the heterogeneity, the precision and the risk of publication bias of the review results. All the outcomes will be included in the SoF: Anxiety.

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Conflicts of interest

The authors declare no conflict of interest.

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Appendix I: search strategy

Search strategy conducted on Medline, via PubMed - on June 21st, 2020

Search	Query	Records retrieved
#1	("Young Adult"[Mesh]) OR "Adolescent"[Mesh]	2,405,294
#2	(((((("Complementary Therapies"[Mesh]) OR "Imagery, Psychotherapy"[Mesh]) OR "Hypnosis"[Mesh:NoExp]) OR "Music Therapy"[Mesh]) OR "Virtual Reality Exposure Therapy"[Mesh]) OR "Massage"[Mesh:NoExp]	227,063
#3	(("Perioperative Care"[Mesh]) OR "Preoperative Care"[Mesh]) OR "Operating Rooms"[Mesh]	162,277
#4	"Anxiety"[Mesh:NoExp]	80,390
#5	(adolescen*[Title/Abstract] OR teen*[Title/Abstract] OR youth*[Title/Abstract] OR paediatric*[Title/Abstract] OR pediatric*[Title/Abstract] OR child*[Title/Abstract])	1,768,344
#6	(nonpharmacologic*[Title/Abstract] OR Non-pharmacologic*[Title/Abstract] OR “Non pharmacologic”[Title/Abstract] OR “Non pharmacological”[Title/Abstract] OR “psychological therapy”[Title/Abstract] OR “psychological intervention”[Title/Abstract] OR “Alternative therapy”[Title/Abstract] OR “Alternative therapies”[Title/Abstract] OR “complementary therapy”[Title/Abstract] OR “complementary therapies”[Title/Abstract] OR “guided imagery”[Title/Abstract] OR imagery[Title/Abstract] OR music[Title/Abstract] OR "music therapy"[Title/Abstract] OR “virtual reality”[Title/Abstract] OR hypnosis[Title/Abstract])	81,232

#7	(perioperative[Title/Abstract] OR postoperative[Title/Abstract] OR preoperative[Title/Abstract] OR operati*[Title/Abstract] OR surgery[Title/Abstract] OR "preoperative period"[Title/Abstract])	2,141,446
#8	(anxiety[Title/Abstract] OR "anxiety level"[Title/Abstract] OR "STAIC"[Title/Abstract] OR "STAI"[Title/Abstract] OR "VAS-A"[Title/Abstract] OR "STAI-Y"[Title/Abstract])	190,956
#9	#1 OR #5	3,543,818
#10	#2 OR #6	289,863
#11	#3 OR #7	2,194,676
#12	#4 OR #8	212,892
#13	#9 AND #10 AND #11 AND #12	299
Filters: English, Portuguese, Spanish		273

3.REVISÃO SISTEMÁTICA DA LITERATURA

A revisão sistemática sintetiza os resultados de todos os estudos originais de um determinado tema. São consideradas como evidência de alta qualidade, isto porque a literatura científica produzida é crescente e as revisões sistemáticas que agregam as evidências disponíveis têm-se tornado cada vez mais importantes. Para além disso, as revisões sistemáticas permitem: solucionar controvérsias em estudos com avaliações divergentes, generalizar dados, aumentando a validade externa dos estudos, uma análise mais consistente de subgrupos, identificar a necessidade de planeamento de estudos, fornecer dados para avaliação do tamanho de amostra e responder a questões de investigação não abordadas pelos estudos individualmente. Outro motivo, é que a revisão sistemática é reprodutível e tende a ser imparcial. Visa diminuir o erro através do uso de métodos bem definidos previamente para realizar uma pesquisa bibliográfica abrangente e avaliar criticamente os estudos individuais (Donato, & Donato, 2019).

Esta revisão, como referido anteriormente, foi desenvolvida de acordo com a metodologia do Instituto de Joanna Briggs para revisões sistemáticas de evidência de eficácia, tendo por base o protocolo elaborado previamente. Salienta-se, a possibilidade da presente revisão sistemática ter de ser posteriormente revista com base nos pareceres dos revisores do protocolo submetido à JBI.

Para a elaboração da RSL realizou-se uma estratégia de pesquisa em três etapas que teve como objetivo encontrar estudos publicados e não publicados. Inicialmente realizou-se uma pesquisa limitada no PubMed, para identificar artigos sobre a temática em estudo. Esta, incluiu todas as palavras-chave identificadas e termos de índice, tendo sido adaptada a cada base de dados. A segunda etapa de pesquisa foi realizada através de análise dos artigos por título e resumo. Na terceira etapa, 11 artigos foram selecionados para a leitura integral e avaliação quanto à qualidade metodológica. No final ficaram selecionados dez estudos para a análise e discussão de resultados. O fluxograma PRISMA referente ao processo de seleção de artigos está descrito na figura 1 da RSL.

Dos dez estudos selecionados para a revisão, oito eram estudos de controlo randomizados (RCTs) e dois quase-experimentais. Todos os estudos foram

publicados entre 1996 e 2019, em inglês. A maioria dos estudos foram desenvolvidos nos Estados Unidos da América (EUA), enquanto que os restantes estudos foram desenvolvidos na França, Suécia, Turquia e Polónia. No quadro 2, é feita uma breve apresentação dos estudos incluídos. Uma síntese sobre participantes, comparadores, intervenções, instrumentos de avaliação e resultados é apresentada no Apêndice IV da RSL.

AUTOR	TÍTULO DO ESTUDO	PAÍS DO ESTUDO	ANO DO ESTUDO
Lambert, S.	*The effects of hypnosis/guided imagery on the postoperative course of children*	EUA	1996
LaMontagne, L., Hepworth, J., Cohen, F. & Salisbury, M.	*Cognitive-behavioral intervention effects on adolescents' anxiety and pain following spinal fusion surgery*	EUA	2003
Nilsson, S., Kokinsky, E., Nilsson, U., Sidenvall, B. & Enskar, K.	*School-aged children's experiences of postoperative music medicine on pain, distress, and anxiety*	Suécia	2009
Charette, S., Fiola, J., Charest, M-C., Villeneuve, E., Théroux, J., Joncas, J., Parent, S. & Le May, S.	*Guided imagery for adolescent post-spinal fusion pain management: a pilot study*	EUA	2015
Rhodes, L., Nash, C., Moisan, A., Scott, D., Barkoh, K., Warner, W., Sawyer, J. & Kelly, D.	*Does preoperative orientation and education alleviate anxiety in posterior spinal fusion patients? A prospective, randomized study*	EUA	2015
Nelson, K., Adamek, M. & Kleiber, C.	*Relaxation training and postoperative music therapy for adolescents undergoing spinal fusion surgery*	EUA	2017
Duparc-alegria, N., Dahmani, S. & Thiollier, A-F.	*Assessment of short hypnosis in a paediatric operating room in reducing postoperative pain and anxiety: A randomized study*	França	2018
Karakul, A. & Bolisik, Z.	*The effect of music listened to during the recovery period after day surgery on the anxiety state and vital signs of children and adolescents*	Turquia	2018
Staveski, S., Boulanger, K., Erman, L., Almgren, C., Journel, C., Roth, S. & Golianu, B.	*The impact of massage and reading on children's pain and anxiety after cardiovascular surgery: a pilot study*	EUA	2018
Tomaszek,L., Cepuch, G. & Fenikowski, D.	*Influence of preoperative information support on anxiety, pain and satisfaction with postoperative analgesia in children and adolescents after thoracic surgery: A randomized double blind study*	Polónia	2019

Quadro 2-caraterísticas dos estudos incluídos na RSL

A idade dos participantes nos estudos incluídos variou entre os 12 aos 15 anos para os grupos de intervenção não farmacológica e entre os 11 aos 15 anos nos grupos em que os cuidados prestados foram os habituais/padrão (sem intervenção não farmacológica). Globalmente, não foram encontradas diferenças significativas nos estudos selecionados, entre os grupos (intervenção/controlo) quanto ao sexo, etnia ou nível socioeconómico.

As intervenções incluídas nos estudos selecionados, usadas para reduzir a ansiedade, foram as técnicas cognitivo-comportamentais, hipnose, imaginação guiada, música e massagem, programa de intervenção para a educação pré-operatória e orientação para cirurgia de escoliose (PEOSS), e programa de treino de relaxamento e musicoterapia. O tempo de intervenção variou de cinco a 60 minutos. A maioria das intervenções foi realizada no período pré-operatório, embora houvesse intervenções implementadas no pós-operatório. As intervenções aplicadas de forma individualizada foram mais frequentes do que as realizadas em grupo. As INF foram aplicadas pelo musicoterapeuta, psicólogo, fisioterapeuta, pediatra, ortopedista, enfermeiros e até pelo próprio investigador.

Os instrumentos de avaliação mais utilizados foram o Inventário de Ansiedade Traço-Estado para Crianças (STAIC) e o Inventário de Ansiedade Traço-Estado (STAI). Contudo, outras escalas foram aplicadas, como o Inventário de Ansiedade Traço-Estado (STAI) forma curta, o Inventário de Ansiedade Traço-Estado Formulário Y e a Escala Visual Analógica de Ansiedade.

No estudo de LaMontagne et al. (2003), os adolescentes foram submetidos a intervenções cognitivo-comportamentais combinadas (informação e estratégias de *coping*) e isoladas (apenas informação ou apenas estratégias de *coping*), sendo que a intervenção que mostrou ser mais eficaz na diminuição da ansiedade foi a intervenção combinada – informação e estratégias de *coping*. A imaginação guiada, a música ouvida durante o período de recuperação após a cirurgia (Charette et al., 2015; Karakul & Bolışık, 2018; LaMontagne, Hepworth, Cohen, & Salisbury, 2003; Staveski et al., 2018; Tomaszek, Cepuch, & Fenikowski, 2019) e o programa de treino de relaxamento com musicoterapia (Nelson, Adamek, & Kleiber, 2017) mostraram ser promotores de efeitos positivos, nomeadamente na diminuição da dor, ansiedade e menor tempo de recuperação, em adolescentes no pós-operatório. A massagem terapêutica quando aplicada três vezes por semana com duração máxima de 30 minutos mostrou-se eficaz na redução da ansiedade em adolescentes, no estudo de Staveski et al. (2018). Nos dois estudos (Duparc-Alegria et al., 2018; Lambert, 1996) que avaliaram a hipnose como intervenção não farmacológica, não se

verificaram diferenças estatisticamente significativas relativamente à ansiedade nos adolescentes. No entanto, no grupo (experimental) submetido à intervenção, verificou-se uma diminuição da ansiedade comparativamente com o tratamento habitual (grupo controlo) (Duparc-Alegria et al., 2018; Lambert, 1996; Nilsson et al., 2009). Em suma, em cinco dos estudos incluídos na revisão (Charette et al., 2015; Karakul & Bolışık, 2018; LaMontagne et al., 2003; Staveski et al., 2018; Tomaszek et al., 2019) foi demonstrada a eficácia das intervenções não farmacológicas na redução de ansiedade em adolescentes no período perioperatório. E, adolescentes com scores elevados de ansiedade durante perioperatório tiveram mais dor no pós-operatório. Por outro lado, apenas um dos dois programas de intervenções não farmacológicas, apresentou eficácia na redução da ansiedade (Nelson et al., 2017).

Em seguida, é apresentada a revisão sistemática da literatura relativamente ao estudo da eficácia de intervenções não farmacológicas na ansiedade em adolescentes, em contexto perioperatório.

Review title

Effectiveness of non-pharmacological interventions for anxiety in adolescents in the perioperative period: a systematic review

Abstract

Objective: The objective of this review is to evaluate the effectiveness of non-pharmacological interventions in anxiety of adolescents in the perioperative period.

Introduction: Adolescents in perioperative period have significant anxiety before surgery, which are maintained beyond the surgical procedure. In practice clinical, usually, the anxiety is controlled through pharmacological interventions as a first-line treatment. But the positive effect of non-pharmacological interventions is significant, although, their efficacy is still under studied. The purpose of this systematic review is to compare the effectiveness of the combination of non-pharmacological interventions with the other comparators, or with the usual care, in order to implement the best evidence in clinical practice.

Inclusion criteria: The age range of participants will include adolescents, ages 10 to 19 years who had undergone a surgical procedure. This review considered all studies that focus on non-pharmacological intervention occurring in the perioperative period designed to reduced anxiety without comparators, geographical or cultural restrictions.

Methods: An initial limited search of PubMed and CINAHL was undertaken and was followed by a second search for published and unpublished studies in major healthcare related electronic databases, without limitations of publication date. Studies in English, Spanish and Portuguese were included. After full text studies were retrieval, methodological quality assessment and data extraction was applied independently by two reviewers.

Results: Ten studies were included in this review from the 867 studies initially retrieved. A total of 807 adolescents from five different countries were represented. Adolescents who had a higher level of perioperative anxiety experienced a higher level of postoperative pain. There are differences between experimental (with non-pharmacological intervention) and control (with standard care) groups.

Conclusions: In conclusion, this systematic review highlights some important features of effective for anxiety non-pharmacological interventions in

adolescents. The results of this review show to healthcare providers the effectiveness of non-pharmacological interventions in perioperative anxiety and indicate the need of using these strategies for reducing anxiety postoperative.

Systematic review registration number: CRD42020184386.

Keywords: adolescent; anxiety; complementary therapy; non-pharmacological interventions; perioperative care.

Abstract word count: 328 words.

Introduction

Perioperative anxiety in adolescents can cause adverse effects on surgical experience and postoperative course. This fact has been associated with the increase of postoperative pain, analgesic consumption, and sleep disturbances in adolescents (Connelly et al., 2014; Kain, Mayes, Caldwell-Andrews, Karas, & McClain, 2006). These effects aren't limited to the immediate postoperative period as some data show a continuation of negative behaviors a year after surgery (Connelly et al., 2014; Kain et al., 2006).

The common use of pharmacological interventions to efficiently manage preoperative anxiety in adolescents appears to be effective and the preferred one intervention (Wright, Stewart, Finley, & Buffett-Jerrott, 2007). However, pharmacological interventions are associated with increased cost to the hospital and delayed discharge from the recovery room (Kain et al., 2007). Nonpharmacological interventions, which help adolescents to cope with surgery, have been recommended to reduce distress, anxiety, and pain (Blount, Piira, Cohen, & Cheng, 2006).

The aim of this review is to evaluate the effectiveness of non-pharmacological interventions in anxiety of adolescents in the perioperative period. A preliminary search of PROSPERO, MEDLINE, the Cochrane Database of Systematic Reviews and the JBI Database of Systematic Reviews and Implementation Reports was conducted and no current or underway systematic reviews on the topic were identified.

The effectiveness of non-pharmacological interventions on anxiety of adolescents in the perioperative period are not well known or properly studied until today. Therefore, there is a need to summarize findings focusing on the effectiveness of non-pharmacological interventions in prevention of anxiety in the perioperative as to provide the best evidence to healthcare professionals who work with adolescents in the perioperative context.

Review question(s)

The review question is: what is the effectiveness of non-pharmacological interventions on anxiety of adolescents in the perioperative period?

Inclusion criteria

Participants

Took into account studies that include adolescents aged 10 to 19 who had undergone a surgical procedure, regardless of the type of surgery, and undertaken in non-pharmacological interventions in the perioperative period to reduce anxiety.

Intervention(s)

It was considered studies that evaluated non-pharmacological interventions. It was considered that non-pharmacological interventions included, but weren't limited to, any treatment that wasn't a registered drug, such as massage, hypnosis, guided imagery, music therapy, music, and virtual reality.

There were no limitations related to frequency, intensity or the professional who delivers the intervention.

Comparator(s)

This analysis also included studies that compared the combination of non-pharmacological interventions to the other comparators, including another non-pharmacological intervention, or with the usual care.

Outcomes

This review considered studies that included the outcomes of non-pharmacological interventions in anxiety on adolescents, in the perioperative period. Outcomes were operationalized according to the effectiveness in the anxiety of the considered non-pharmacological interventions. These outcomes were measured using STAI-Y, STAIC, VAS-A, m-YPAS or NRS.

Types of studies

Considered both experimental and quasi-experimental study designs including randomized controlled trials, non-randomized controlled trials and quasi-experimental, before and after studies, prospective and retrospective cohort studies, case control studies and analytical cross-sectional studies. Individual case reports, case series and systematic reviews were excluded. Studies published in English, Spanish and Portuguese were considered for inclusion in

this review. There was no date, geographical or cultural limitation for the acceptance of the studies.

Methods

This study was carried out in accordance with the Joanna Briggs Institute methodology for systematic reviews of effectiveness evidence (Tufanaru, Munn, Aromataris, Campbell, & Hopp, 2017) along with *a priori* protocol registered in PROSPERO (CRD42020184386).

Search strategy

The search strategy aimed to find both published and unpublished studies. A three-step search strategy was used in this review. Firstly, an initial limited search of PubMed was undertaken to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the index terms as to describe the articles were considered to develop a full search strategy for PubMed (see Appendix I). This strategy, including all identified keywords and index terms, was adapted for each included information source. The reference list of all studies selected for critical appraisal was screened for additional studies.

Information sources

The databases that were searched included PubMed, CINAHL via EBSCO, PsycInfo, SciELO and Cochrane Central Register of Controlled Trials. Sources of unpublished studies. Grey literature searched included Open Grey and RCAAP - Portugal Open Access Scientific Repository.

Study selection

Following the search, all studies identified references were collated and uploaded into EndNote (Clarivate Analytics, PA, USA), and duplicates were removed. Titles and abstracts were screened by two independent reviewers (MPS and MJP) for assessment according to the inclusion criteria of the review. Potentially relevant studies were retrieved in full and their citation details imported into the Joanna Briggs Institute System for the Unified Management, Assessment and Review of Information - JBI SUMARI (Munn et al., 2019). Full text studies that did not meet the inclusion criteria were excluded. The reasons for their exclusion are provided in Appendix II. Any disagreements that arose between the reviewers were resolved through discussion or through a third reviewer (ES).

Assessment of methodological quality

Eligible studies were critically appraised by two independent reviewers (MPS and MJP) at the study level for methodological quality in the review using standardized critical appraisal instruments from the Joanna Briggs Institute for experimental and quasi-experimental studies, according to the included remaining study designs (Tufanaru, Aromataris, Campbell, & Hopp, 2020). When required, authors of papers were contacted to request missing or additional data for clarification purposes. Any disagreements that arose between the reviewers, were resolved through discussion or with a third reviewer (ES). Following critical appraisal, studies based on their methodological quality were excluded. However, the results of critical appraisal were considered in the synthesis of the evidence and reported in a narrative form and in a table (Tufanaru, Aromataris, Campbell, & Hopp, 2020).

All studies, regardless of the results of their methodological quality, were undergone data extraction and synthesis.

Data extraction

Two review authors independently extracted the following data (using a form designed for this specific review):

- participants: age, inclusion and exclusion criteria;
- methods: objective, design, randomization, recruitment, blinding (participant, assessor, other staff, statistician), methods of analysis, follow-up;
- interventions: intervention type, timing (when intervention used), control (usual care description);
- outcomes: outcome type, author's definition of the outcome, measurement tool (including validity), the timing of assessment;
- results: means, standard deviations, numbers of events, proportions.

Data synthesis

Statistical pooling of quantitative data in a meta-analysis wasn't possible. Therefore, the findings have been presented in a narrative form, including tables and figures in data presentation, when appropriate.

Results

Study inclusion

The comprehensive three-step strategy outlined above was conducted up to Jully 2020, using the databases and Gray literature sources cited above, leading

to the identification of 963 studies PubMed (273), PsycINFO (42), CINAHL via EBSCO (92), Cochrane Central Register of Controlled Trials (82), SciELO (461), Open Grey (2) and RCAAP (11). Four studies were identified through the reference list, resulting in a total of 967 studies. A total of 163 duplicates identified through EndNote X7.7 were removed, resulting in 804 studies. These were screened for relevance based on title and abstract by two independent reviewers. From the 804 studies, 750 were excluded based on title and abstract, and 54 were selected for full-text analysis. Among these, 43 studies did not meet the inclusion criteria and were excluded (reasons for exclusion are listed in Appendix II), resulting in 11 studies. These were then assessed for methodological quality. As a result, 10 studies were retained for content analysis. The PRISMA flowchart of the selection process for papers is outlined in figure 1.

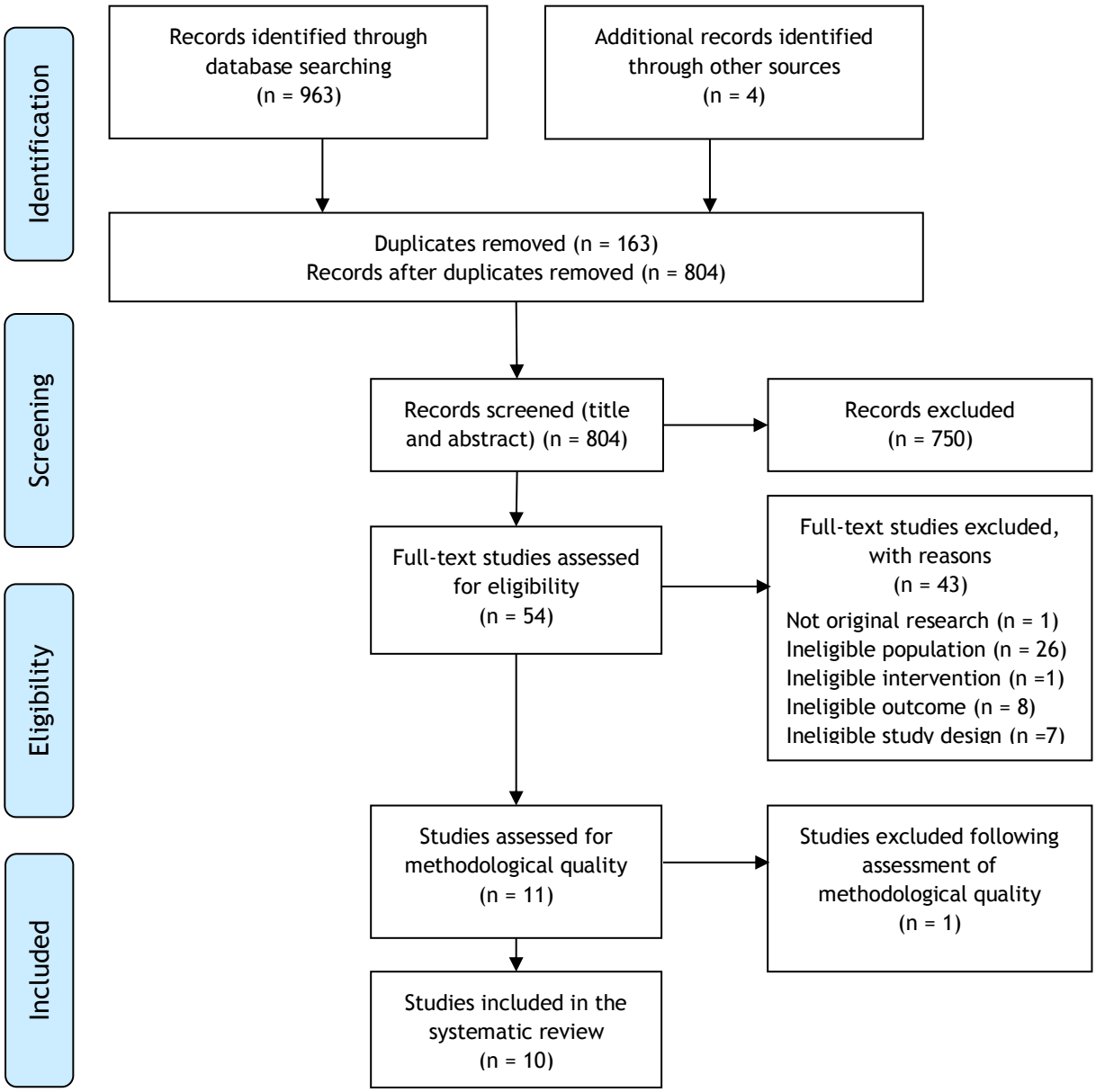

Figure 1: Search results and study selection and inclusion process (Moher, Liberati, Tetzlaff, Altman, & Group, 2009)

Methodological quality

Among the 11 studies critically assessed for methodological validity, one study was excluded based on methodological quality because it didn't meet the 70% overall appraisal. The reason for exclusion is in Appendix III. Ten studies met the reviewers' appraisal criteria. These ten studies were assessed as being of moderate quality. Tables 1 and 2 present the quality assessment scores for the 11 studies that were retained, according to study design. As these tables indicate, there are variation in the quality of the included studies. Two studies met all the critical appraisal criteria and achieved a score of 100%; five studies achieved a score of 84.6%; two studies achieved a score of 76.9% or more; one study achieved a score of 69.2% and one study achieved a score of a minimum of 46.2%.

Among the randomized controlled trials (RCTs), seven studies were considered truly random (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Nilsson, Kokinsky, Nilsson, Sidenvall, & Enskär, 2009; Rhodes et al., 2015; Staveski et al., 2018; Tomaszek et al., 2019) with a clear description of the specific randomization procedure used. Randomization was computer-based in five studies (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Rhodes et al., 2015; Tomaszek et al., 2019). The methods of randomization included block randomization (Staveski et al., 2018) and simple randomization (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Nilsson et al., 2009; Rhodes et al., 2015; Tomaszek et al., 2019).

Group allocation was concealed from the allocation in eight studies (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Rhodes et al., 2015; Staveski et al., 2018; Tomaszek et al., 2019), while the concealment of the allocation from the allocator was unclear in one study, (Robb, Nichols, Rutan, Bishop, & Parker, 1995) inducing potential performance bias.

Eight studies demonstrated equivalency between groups at baseline, (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Rhodes et al., 2015; Staveski et al., 2018; Tomaszek et al., 2019) while the differences between participants in the experimental group (EG) and control group (CG) were unclear in one study, (Robb et al., 1995) which may have induced selection bias.

Blinding of participants to the treatment allocation was not applicable in all studies. The blinding of those delivering the treatment was applied in two studies, (Nelson et al., 2017; Nilsson et al., 2009) but not possible for seven

studies (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Rhodes et al., 2015; Robb et al., 1995; Staveski et al., 2018; Tomaszek et al., 2019). Assessors were blinded to treatment allocation in four studies (Charette et al., 2015; Duparc-Alegria et al., 2018; Nelson et al., 2017; Tomaszek et al., 2019). Assessors were aware of the assignment status of participants in four studies, (LaMontagne et al., 2003; Nilsson et al., 2009; Robb et al., 1995; Staveski et al., 2018) while the blinding of assessors was not mentioned in one study, (Rhodes et al., 2015) which generates performance and detection bias.

In all studies, EGs and CGs were treated identically other than for the named intervention.

Intention-to-treat analysis was performed in eight studies (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Rhodes et al., 2015; Staveski et al., 2018; Tomaszek et al., 2019) In one study (Robb et al., 1995) where intention-to-treat was not conducted, attrition analysis was performed, and missing data was taken into account.

In eight studies (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Robb et al., 1995; Staveski et al., 2018; Tomaszek et al., 2019), participants were analyzed in the groups to which they were randomized. In the same way, outcomes were measured between groups in all studies except one (Rhodes et al., 2015).

In all studies, outcomes were measured consistently and in a reliable way.

All studies reported appropriate statistical analysis, appropriate use of statistical tests, and appropriate trial design.

Concerning to the two quasi-experimental studies, (Karakul & Bolışık, 2018; Lambert, 1996) all met the methodological criteria.

Further details of the critical appraisals for the included studies can be found in Tables 1 and 2.

Table 1: Critical appraisal of eligible quasi-experimental studies

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Overall appraisal
(Lambert, 1996)	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
(Karakul & Bolışık, 2018)	Y	Y	Y	Y	Y	Y	Y	Y	Y	100
Total %	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Y = Yes, N = No, U = Unclear; JBI critical appraisal checklist for quasi-experimental studies: Q1 = Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)? Q2 = Were the participants included in any comparisons similar?; Q3 = Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?; Q4 = Were there a control group?; Q5 = Were there multiple measurements of the outcome both pre and post the intervention/exposure?; Q6 = Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?; Q7 = Were the outcomes of participants included in any comparisons measured in the same way?; Q8 = Were outcomes measured in a reliable way?; Q9 = Was appropriate statistical analysis used?

Table 2: Critical appraisal of eligible quasi-experimental studies

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Overall appraisal
(Robb et al., 1995)	U	U	U	NA	N	N	Y	N	Y	Y	Y	Y	Y	46.2
(LaMontagne et al., 2003)	Y	Y	Y	NA	N	N	Y	Y	Y	Y	Y	Y	Y	76.9
(Nilsson et al., 2009)	Y	Y	Y	NA	Y	N	Y	Y	Y	Y	Y	Y	Y	84.6
(Charette et al., 2015)	Y	Y	Y	NA	N	Y	Y	Y	Y	Y	Y	Y	Y	84.6
(Rhodes et al., 2015)	Y	Y	Y	NA	N	U	Y	Y	N	Y	Y	Y	Y	69.2
(Nelson et al., 2017)	U	Y	Y	NA	Y	Y	Y	Y	Y	Y	Y	Y	Y	84.6
(Duparc-Alegria et al., 2018)	Y	Y	Y	NA	N	Y	Y	Y	Y	Y	Y	Y	Y	84.6
(Staveski et al., 2018)	Y	Y	Y	NA	N	N	Y	Y	Y	Y	Y	Y	Y	76.9
(Tomaszek et al., 2019)	Y	Y	Y	NA	N	Y	Y	Y	Y	Y	Y	Y	Y	84.6
Total %	**77.8**	**88.9**	**88.9**	**-**	**22.2**	**44.4**	**100**	**88.9**	**88.9**	**100**	**100**	**100**	**100**	**76.9**

Y = Yes, N = No, U = Unclear; NA = Not Applicable JBI critical appraisal checklist for randomized controlled trials: Q1 = Was true randomization used for assignment of participants to treatment groups?; Q2 = Was allocation to treatment groups concealed?; Q3 = Were treatment groups similar at baseline?; Q4 = Were participants blind to treatment assignment?; Q5 = Were those delivering treatment blind to treatment assignment?; Q6 = Were outcome assessors blind to treatment assignment?; Q7 = Were treatment groups treated identically other than the intervention of interest?; Q8 = Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analyzed?; Q9 = Were participants analyzed in the groups to which they were randomized?; Q10 = Were outcomes measured in the same way for treatment groups?; Q11 = Were outcomes measured in a reliable way?; Q12 = Was appropriate statistical analysis used?; Q13 = Was the trial design appropriate for the topic, and any deviations from the standard RCT design accounted for in the conduct and analysis?

Characteristics of included studies

The ten studies retained for this review included eight RCTs and two quasi-experimental studies. All studies were published between 1996 and 2019 and were available in English. A table of a description of the included studies is provided in Appendix IV.

Settings

Studies recruited participants in pediatric hospital context from various clinical settings such as nursing unit (Karakul & Bolışık, 2018; Lambert, 1996) pediatric orthopedic department, (Charette et al., 2015; LaMontagne et al., 2003; Nelson et al., 2017; Rhodes et al., 2015) pediatric surgery department, (Duparc-Alegria et al., 2018; Nilsson et al., 2009) preoperative appointment by a Collaborative Institutional Training Initiative–trained advanced practice provider, (Staveski et al., 2018) and thoracic pediatric surgery department (Tomaszek et al., 2019).

Six studies were conducted in the United States of America (USA) (Charette et al., 2015; Lambert, 1996; LaMontagne et al., 2003; Nelson et al., 2017; Rhodes et al., 2015; Staveski et al., 2018), one study in France (Duparc-Alegria et al., 2018), one in Sweden (Nilsson et al., 2009), one in Turkey (Karakul & Bolışık, 2018), and another one in Poland (Tomaszek et al., 2019).

Participants

All studies focused on adolescents 10-19 years old. Only one study evaluated the participants considering the place of residence: 79.2% of the participants were included in the city center; 16.9% in town and 3.8% in the village (Karakul & Bolışık, 2018). Among the included studies just two studies evaluated the participants as for economic status (Karakul & Bolışık, 2018; LaMontagne et al., 2003). When it comes to the participants' race, three studies revealed significant difference. One of them included predominantly African-American (Rhodes et al., 2015) while (the other two) involved more white participants (Lambert, 1996; LaMontagne et al., 2003). The other studies did not evaluate the participants as to race (Charette et al., 2015; Duparc-Alegria et al., 2018; Karakul & Bolışık, 2018; Nelson et al., 2017; Nilsson et al., 2009; Staveski et al., 2018; Tomaszek et al., 2019).

In nine studies no substantial differences between groups were found on age, sex, ethnic background, or socioeconomic status (Charette et al., 2015; Duparc-Alegria et al., 2018; Karakul & Bolışık, 2018; LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Rhodes et al., 2015; Staveski et al., 2018; Tomaszek et al., 2019). Only one study showed a difference in the participants

considering age, in CG was older than the EG (Lambert, 1996).

In nine studies the inclusion criteria were based on elective surgery (Charette et al., 2015; Duparc-Alegria et al., 2018; Lambert, 1996; LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Rhodes et al., 2015; Staveski et al., 2018; Tomaszek et al., 2019). However, one study considered a dental or ear-nose-throat surgery exclusion criteria (Nilsson et al., 2009). In four studies the inclusion criteria were based on the English language both speaking and writing, (LaMontagne et al., 2003; Nelson et al., 2017; Rhodes et al., 2015; Staveski et al., 2018) two studies for French, (Charette et al., 2015; Duparc-Alegria et al., 2018), and one study for Swedish (Nilsson et al., 2009). Inclusion criteria for one study also required participants who had either a computer or DVD player at home (Charette et al., 2015). Another study required participants who had never undergone a surgery (Karakul & Bolışık, 2018; LaMontagne et al., 2003). Deafness was an exclusion criterion for four studies (Duparc-Alegria et al., 2018; Karakul & Bolışık, 2018; Nelson et al., 2017; Nilsson et al., 2009). In one study exclusion criteria included participants with hypotension postoperative, those requiring delayed sternal closure, those at high risk for pulmonary hypertensive crisis, those with severe coagulopathy, and/or parental/child declination (Staveski et al., 2018). A similar exclusion criterion was applied in another study such as anticancer treatment, preoperative pain, problems with verbal communication, and lack of postoperative drainage of the chest (Tomaszek et al., 2019). In five studies the mental disorders or patients with cognitive deficits weren't eligible (Charette et al., 2015; Duparc-Alegria et al., 2018; LaMontagne et al., 2003; Rhodes et al., 2015; Tomaszek et al., 2019).

Among the included studies, sample sizes ranged from 40 (Charette et al., 2015) to 130 (Karakul & Bolışık, 2018) participants. The number of participants included in the EGs ranged from 19 (Nelson et al., 2017) to 65 (Karakul & Bolışık, 2018) , and from 20 (Charette et al., 2015) to 65 (Karakul & Bolışık, 2018) in the CGs. The mean age of the participants ranged from 12 (Nilsson et al., 2009; Staveski et al., 2018) to 15 (Charette et al., 2015) years in the EGs, and from 11 (Staveski et al., 2018) to 15 (Charette et al., 2015) years in the CGs. Two studies expressed the mean age of participants but didn't differentiate by EG and CG (Lambert, 1996; LaMontagne et al., 2003). One study didn't mentioned the mean age of participants (Karakul & Bolışık, 2018).

Seven studies included more females than males (Charette et al., 2015; Duparc-Alegria et al., 2018; Lambert, 1996; LaMontagne et al., 2003; Nelson et al., 2017; Rhodes et al., 2015; Staveski et al., 2018). Conversely, two studies included more males than females participants, (Karakul & Bolışık, 2018;

Tomaszek et al., 2019), and one study included both males and females equally (Nilsson et al., 2009).

Interventions

The included interventions used to reduce anxiety toked a different method such as cognitive-behavioral techniques (LaMontagne et al., 2003), hypnosis, (Duparc-Alegria et al., 2018; Lambert, 1996) guided imagery (Charette et al., 2015; Lambert, 1996), music (Karakul & Bolışık, 2018; Nilsson et al., 2009) and massage (Staveski et al., 2018). Two studies included a program interventional for the preoperative education and orientation for scoliosis surgery (PEOSS)(Rhodes et al., 2015) and another study included a program for a video training (relaxation training and music therapy) (Nelson et al., 2017). Only one study included additional information supported from a psychologist (Tomaszek et al., 2019).

The length of intervention ranged from five to 60 minutes. The duration of the intervention was until ten minutes in two of the selected studies (Duparc-Alegria et al., 2018; LaMontagne et al., 2003). In one study the length of the intervention was 20 minutes (Karakul & Bolışık, 2018). Four studies reported that the length of the intervention was 30 minutes (Charette et al., 2015; Lambert, 1996; Rhodes et al., 2015; Staveski et al., 2018). In two studies the length of the intervention was 45 minutes (Nilsson et al., 2009; Tomaszek et al., 2019) and only one program interventional was 60 minutes long (Nelson et al., 2017).

Three interventions were conducted in the postoperative period, (Karakul & Bolışık, 2018; Nilsson et al., 2009; Staveski et al., 2018) while seven interventions were implemented during the preoperative period (Charette et al., 2015; Duparc-Alegria et al., 2018; Lambert, 1996; LaMontagne et al., 2003; Nelson et al., 2017; Rhodes et al., 2015; Tomaszek et al., 2019).

The intervention was conducted individually in seven studies (Charette et al., 2015; Karakul & Bolışık, 2018; Lambert, 1996; LaMontagne et al., 2003; Nelson et al., 2017; Staveski et al., 2018; Tomaszek et al., 2019) and considering a group format in three of the studies (Duparc-Alegria et al., 2018; Nilsson et al., 2009; Rhodes et al., 2015).

One intervention was delivered by a massage therapist (Staveski et al., 2018) and another intervention was delivered by a psychologist (Tomaszek et al., 2019). Five combined interventions were developed by one or more health professionals (music therapist, psychologist, physio therapist, child life specialist, nurse, orthopedic nurse practitioners), and a researcher (Charette

et al., 2015; Lambert, 1996; LaMontagne et al., 2003; Nelson et al., 2017; Rhodes et al., 2015). Two interventions were delivered by a researcher (Karakul & Bolışık, 2018; LaMontagne et al., 2003; Nilsson et al., 2009). One intervention was developed by the nursing team (Duparc-Alegria et al., 2018). One study used a combination of both interventionists (child life specialist and orthopedic nurse practitioners) and used educational materials to deliver the intervention (Rhodes et al., 2015).

Comparison

All studies included in this review had two arms (Charette et al., 2015; Duparc-Alegria et al., 2018; Karakul & Bolışık, 2018; Lambert, 1996; LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Rhodes et al., 2015; Staveski et al., 2018; Tomaszek et al., 2019). Two of the included studies had an active CG, (Rhodes et al., 2015; Staveski et al., 2018) and eight had a passive CG (Charette et al., 2015; Duparc-Alegria et al., 2018; Karakul & Bolışık, 2018; Lambert, 1996; LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Tomaszek et al., 2019). Active CG conditions included a minimal intervention in two studies (Rhodes et al., 2015; Staveski et al., 2018). Passive CG conditions included standard or usual care in five studies, (Charette et al., 2015; Duparc-Alegria et al., 2018; Lambert, 1996; LaMontagne et al., 2003; Tomaszek et al., 2019) and no intervention in three studies (Karakul & Bolışık, 2018; Nelson et al., 2017; Nilsson et al., 2009).

Outcomes

Outcomes, outcomes measures, and measurement points were used to assess outcomes varied across studies. The primary outcomes were the reduce of anxiety/the effects of the interventions and program interventions to reduce anxiety. Secondary outcomes were the timing of outcomes assessments.

Anxiety assessments in the preoperative/pre-intervention: In two studies, control and experimental groups experienced the highest levels of anxiety during the preoperative interval (Rhodes et al., 2015; Tomaszek et al., 2019). Anxiety was low in both groups before surgery in only one study.(Duparc-Alegria et al., 2018) No statistically significant difference was detected in six studies in the preoperative (Charette et al., 2015; Karakul & Bolışık, 2018; LaMontagne et al., 2003; Nilsson et al., 2009), as in pre-intervention (Nelson et al., 2017; Staveski et al., 2018) state anxiety levels of the experimental and control groups. One study was unclear as to anxiety assessment during the preoperative period (Lambert, 1996).

Anxiety assessments in the postoperative/post-intervention: Only at one

study the experimental group experienced higher levels of anxiety during the postoperative period (LaMontagne et al., 2003; Rhodes et al., 2015). Anxiety was lower in the experimental group than in the control group during the postoperative period (Charette et al., 2015; Karakul & Bolışık, 2018; LaMontagne et al., 2003; Tomaszek et al., 2019) and also post-intervention (Staveski et al., 2018) in five studies. Anxiety decreased in both groups (control and experimental) at post-intervention on one study (Nelson et al., 2017). No statistically significant difference was detected in three studies between the postoperative anxiety levels of the experimental and control groups (Duparc-Alegria et al., 2018; Lambert, 1996; Nilsson et al., 2009).

Overall, five of the included studies (Charette et al., 2015; Karakul & Bolışık, 2018; LaMontagne et al., 2003; Staveski et al., 2018; Tomaszek et al., 2019) demonstrated the effectiveness of non-pharmacological interventions on anxiety levels of adolescents in the perioperative period. Comparing two programs of non-pharmacological interventions, only one showed effectiveness to reduce anxiety in both groups (experimental and control) (Nelson et al., 2017).

The cognitive-behavioral interventions' unique modality (information only or coping strategies only) was effective. However, once it combine the two interventions the effect was reversed - increased the anxiety in adolescents (LaMontagne et al., 2003). The guided imagery, (Charette et al., 2015) music listened to during the recovery period after day surgery, (Karakul & Bolışık, 2018) and program relaxation training and music therapy (Nelson et al., 2017) were proved as promoting positive effects in adolescents on the postoperative.

The preoperative information support from a psychologist was helpful for decreased anxiety (Tomaszek et al., 2019).

The physical method as massage therapy applied three times a week with a maximum of 30 minutes revealed to be effective in reducing anxiety on adolescents.

Most studies used versions of the The State-Trait Anxiety Inventory for Children (STAIC), (Karakul & Bolışık, 2018; Lambert, 1996; Rhodes et al., 2015; Staveski et al., 2018) and State-Trait Anxiety Inventory (STAI) (LaMontagne et al., 2003; Nelson et al., 2017; Nilsson et al., 2009; Tomaszek et al., 2019). Other scales used were the State-Trait Anxiety Inventory (STAI) short form in one study (Nilsson et al., 2009), the State-Trait Anxiety Inventory - Form Y (STAI-Y)(Charette et al., 2015) and the Visual Analogue Scale - Anxiety (VAS-A) (Duparc-Alegria et al., 2018).

Guided imagery

State anxiety levels tended to be lower at one month after surgery in the experimental group (guided imagery intervention) compared with the control group (usual care) (44.75 ± 3.46 vs. 47.68 ± 4.52, respectively; p= 0.03) (Charette et al., 2015). However, this value didn't reach statistical significance (Charette et al., 2015). None of the other group comparisons were statistically significant (Charette et al., 2015). Usually, in both groups, state anxiety levels were moderate before surgery (preoperative) and declined only slightly thereafter (Charette et al., 2015).

Hypnosis

The main difference in anxiety scores in the sample of the experimental group (hypnosis intervention) decreased postoperative (-1.00), and the difference in the control group (usual care) increased (2.04) (Lambert, 1996). However, there was no significant difference in state anxiety scores between the groups postoperatively (Lambert, 1996).

Anxiety scores were similar in experimental and control groups of the study (p = 0.29) (Duparc-Alegria et al., 2018). The decrease in anxiety day -1 and day +1 was significant in both groups (p = 0.00), but no differences were found between both groups (Duparc-Alegria et al., 2018).

Statistically, in two of the studies there were no significant anxiety levels. However, hypnosis intervention decreased anxiety if compared to the usual care.

Music therapy

The mean preoperative state anxiety scale total score was 38.58 in the experimental group (music therapy intervention), while it was 38.32 in the control group (without music therapy intervention) (Karakul & Bolışık, 2018). No statistically significant difference was detected between the pre-operative anxiety levels of the study between the experimental and control groups ($p>0.05$) (Karakul & Bolışık, 2018). In the postoperative experimental group the total points of state anxiety scale of the groups found in the experimental group was 35.01 and 41.23 in the control group (Karakul & Bolışık, 2018). The anxiety level of the experimental group seemed to be lower than anxiety of the control group ($p<0.00$) (Karakul & Bolışık, 2018).

The mean preoperative and postoperative short State-Trait Anxiety Inventory scale between groups wasn't different (p = 0.61; p = 0.50, respectively) (Nilsson et al., 2009).

Adolescents experienced the music as calming and relaxing.

Relaxation training and music therapy program

The experimental group (relaxation training and music therapy program) effect size was 0.88 vs. 0.86 for the control group (no participation in the program's interventions). Although the experimental group had slightly greater changes for anxiety, the difference between groups wasn't statistically significant (Nelson et al., 2017). In the experimental group, levels of the anxiety pre-intervention were 6 and post-intervention were 3.5; in the control group was 6.1 in the pre-intervention and post-intervention was 3.7. Between groups in pre- and post-intervention didn't have significant difference (p=0.88; p=0.76, respectively) (Nelson et al., 2017).

Massage therapy

Adolescents receiving massage therapy had marginally significantly lower (p = 0.01) STAIC scores at time of discharge (48 hours after surgery) than adolescents receiving standard of care plus three reading visits (Staveski et al., 2018).

The massage therapy in postoperative pediatric heart surgery patients was safe and feasible to be used immediately following surgery. Overall, massage therapy was a well-tolerated treatment throughout the course of a child's hospitalization.

Cognitive-behavioral interventions

Preoperative anxiety showed a significant covariate (preoperative anxiety) by intervention group interaction (p =0.01). Regressing postoperative anxiety on preoperative anxiety for the four groups indicated that not all the regression lines showed similar slopes (LaMontagne et al., 2003). The regression for the information plus coping group was markedly different from the ones in the other three groups. The intercept for the information plus coping group was more than twice the size of the other groups (63.5) presenting a negative slope (-0.78) which indicated that higher levels of preoperative anxiety were associated with lower levels of postoperative anxiety. The regressions for the other three groups were all quite similar, with positive slopes ranging from .23 –.27 and positive intercepts ranging from 27.51 –31.46. When the information only (intervention, experimental group) and coping only (intervention, other experimental group), and control groups were analyzed together, there was no covariate by group interaction effect (p = 0.99) and no group effect (p = 0.32), indicating that the slopes and intercepts were not significantly different among the three groups. Based on the homogeneity of the three groups, the two single

modality intervention groups (information only, coping only) and the control group were combined into a single redefined group and compared with the information plus coping group (LaMontagne et al., 2003). The information plus coping group and the redefined group yielded a significant interaction effect (p= 0.01), indicating that the regression of postoperative anxiety on preoperative anxiety differed for the two groups (LaMontagne et al., 2003). For preoperative anxiety scores greater than 37 (i.e., higher anxiety), the information plus coping intervention was significantly more effective for decreasing postoperative anxiety than in the redefined group. For preoperative anxiety scores less than 26 (i.e., lower anxiety), the redefined group had lower postoperative anxiety than the information plus coping group (LaMontagne et al., 2003). No significant differences were found in postoperative anxiety among the three intervention groups and the control group (p = 0.44) (LaMontagne et al., 2003).

For adolescents whose preparation for surgery included psychological consultation, the level of postoperative state anxiety was significantly lower than the preoperative level of this variable (p=0.00) (Tomaszek et al., 2019).

Preoperative educational program

Both the experimental group (Scoliosis Surgery Education and Guidance Program) and the control group (usual care) of patients had significantly higher state anxiety scores than trait anxiety scores at all intervals, indicating that their anxiety level, in general, was less than their anxiety at each time point (control, p=0.00; interventional, p=0.01) (Rhodes et al., 2015). The only significant difference in state anxiety between the intervention group and the control group occurred in the postoperative period when the intervention group scored higher on state anxiety than the control group (p=0.02) (Rhodes et al., 2015).

Discussion

The purpose of this systematic review was to evaluate the effectiveness of non-pharmacological interventions in anxiety levels of adolescents in the perioperative period.

This review found mixed results. Most of the included studies (60%) showed effectiveness of non-pharmacological interventions in reducing anxiety in adolescents in the perioperative period, even if partially. Regarding the two studies addressing the hypnosis as the non-pharmacological intervention, (Duparc-Alegria et al., 2018; Lambert, 1996) and the only study about the program PEOSS, (Rhodes et al., 2015) no effect was found regarding the

outcomes considered in this review. Nilsson and colleagues' study (2009) demonstrated that increased sound level in the staff's working environment maybe had an adverse effect, therefore the absence of significant results.

Guided imagery is a technique in which an experienced practitioner helps a patient provoking a state of mind or mental images in the absence of that stimuli. The guided imagery is currently understood to be mainly an "alternative" or "complementary" therapeutic technique (Tick et al., 2018). Álvarez-García, & Yaban's meta-analysis revealed the guided imagery, especially in the pre-operative period, was to be effective in ease preoperative state anxiety in children. Vagnoli and colleagues' study (2019) showed that relaxation guided imagery reduced preoperative anxiety and postoperative pain in children (6 to 12 years old). One of the strengths of the intervention was the length of follow-up (1 month vs. 2-4 postsurgical days in previous studies). Another was that a nurse guided participant throughout the initial stages of the intervention, accompanying them through the process and answering questions. This interactive aspect of the home-based DVD intervention was an added bonus to the self-guided nature of the exercises. Chow, Van Lieshout, Schmidt, Dobson, & Buckley study (2016), on outcomes the AudioVisual (AV) interventions (DVD) showed that there was an overall −11.4 (95% CI = −17.29 to −5.59, $p < 0.01$) statistically significant reduction between preoperative anxiety scores in AV interventions and control groups in children.

In Lambert study (1996), the findings that the older children (CG) experienced an increase in anxiety and more perceived pain is interesting and supports the effect of hypnosis as an intervention to reduce these untoward effects of surgery. State anxiety decreased postoperatively for children who were taught imagery techniques, providing beginning support of hypnosis/imagery as an intervention for the pediatric surgical patient. With training and practice, clinicians may incorporate these techniques into practice to reduce stress and anxiety for children and families. A limitation of the Lambert and Charette studies was the sample size. As so, in certain instances, results were very close to reaching significance with moderate effect sizes.

Hypnosis it is an altered state of consciousness, different from ordinary consciousness and stages of sleep (Kuttner, 2012). Medical hypnosis is now practiced across western countries. Hypnosis has a useful role in pre-, peri-, and post-anesthesia to minimize anticipatory anxiety, and as adjunctive treatment to reduce and control pain. It is a therapeutic technique in which the professional make suggestions to individuals who have undergone a procedure designed to relax and focus their minds. Closely resembling meditative states, hypnotherapy differs from meditation by the careful and

deliberate use of therapeutic suggestions that allow the patient to optimize perceptual, sensory, memory and performance abilities (Kuttner, 2012). Is defined as a procedure in which health professionals make suggestions for specific changes in the experience (change of feelings, perceptions, thoughts, or behaviors) of an adolescent, with therapeutic intent (OE, 2013). There were no statistically significant differences regarding anxiety in adolescents (Duparc-Alegria et al., 2018; Lambert, 1996; Nilsson et al., 2009). A limitation of the Duparc-Alegria and colleagues' study (2018) was the nurses dealing with the control group were the same individuals as those who performed the hypnosis. So, they might involuntarily have used similar communication techniques. Another reason was the hypnosis session duration in the operating room was very short, only lasting for 5 min. And knows the short session is not as deep as a conventional session. The endpoint assessment was limited to the first 24 postoperative hours. It would have been interesting to keep on assessing anxiety and pain up to Day +2 and Day +4. No evaluation of long-term remembrance and experience of children was recorded. Hypnosis can be used to modify perception of symptoms such as pain, anxiety and fatigue, in different health related contexts, namely, in surgery. Hypnosis can be a complement to other medication therapy to reduce anxiety preoperative (Akgul et al., 2016; Chen et al., 2018; Valentine, Milling, Clark, & Moriarty, 2019) and also postoperative (Treggiari-Venzi, Suter, de Tonnac, & Romand, 2000). A recent meta-analysis showed that hypnosis is a highly effective intervention for anxiety and is more effective when combined with other psychological interventions and various clinical applications (Valentine et al., 2019). Other meta-analysis (2019) conclude that hypnosis reduced anxiety but was better when joined with other psychological interventions than when used as a stand-alone treatment (Rousseaux et al., 2020). In Kuttner review's (2012), children in hypnosis treatment conditions had less anxiety and shorter hospital stays and experiences less long-term pain and discomfort than do patients in control conditions. There appears little reason not to provide hypnosis as an adjunctive treatment for children (two to 11 years old) undergoing anesthesia.

Music listening may reduce the physiological, emotional, and mental effects of distress and anxiety (Ames et al., 2017). Music also has a therapeutic potential on the blood pressure levels of individuals in different clinical situations, including the perioperative period, acting to decrease the levels of anxiety, pain, and help with relaxation. Thus, it presents itself as a non-pharmacological and non-invasive intervention, promoting the healthy development of adolescents (Zanettini et al., 2015). Karakul and Bolışık (2018), supports the practice of listening to music to reduce post-operative anxiety and lower systolic and diastolic blood pressure, respiratory rate and heart rate in patients

after a day surgery. The results of the analysis demonstrated that anxiety of the control group increased, while decreases were observed in the anxiety of the experimental (music) group. Music was found to prevent an increase in postoperative anxiety levels and contribute to a decrease in anxiety. The results of studies selected for this review were consistent with others studies and it was concluded that music therapy applied during the recovery period after pediatric day case surgery decreased anxiety levels. In a systematic mapping study (2019), the demonstration that music intervention was found to be effective in reducing anxiety (54%) and pain (34.1%) of the 44 studies examining the effectiveness of receptive music therapy, respectively (Ciğerci, Kısacık, Özyürek, & Çevik, 2019).

Massage therapy involves the manipulation of soft tissue structures of the body to prevent or alleviate pain, spasm, tension, anxiety, or stress and to promote health and wellness.(El Geziry, Toble, Al Kadhi, Pervaiz, & Al Nobani, 2018; Tick et al., 2018) There are some studies suggesting that massage decreases pain and anxiety in many of surgical and nonsurgical patients (El Geziry et al., 2018). Staveski et al. (2018) reported that the participants who received massage intervention had lower STAIC scores at postoperative. The mechanism of action for massage may include decreasing cortisol levels and a subsequent reduction in anxiety (Moyer, Seefeldt, Mann, & Jackley, 2011). In a similar results of the study, Moyer et al.(2011) reported massage therapy has reduced cortisol levels. Guan et al. (2014) described the positive effect of massage therapy on autonomic activity in critically ill children that persisted over time when repeated massage therapy sessions were offered. The physiologic processes underlying the positive effects of massage require further delineation.

Tomaszek et al. (2019) revealed extended information about pain coping strategies, adjusted to children's perception, strengthening their feeling of safety, and thus, contributing to less anxiety. In contrast, routine preoperative information provided in the control group wasn't adjusted to individual patients' demand, personal resources, and current psycho-emotional status. Therefore, it did not adequately alleviate their anxiety. Rhodes and colleagues (2015) showed that the preoperative education and orientation would reduce adolescent anxiety in pre and postoperative treatment. Besides, it would decrease pain medication requirements, shorten hospital stays, and improve overall satisfaction. O'Conner-Von study (2008) reported that a preoperative preparation is beneficial for children undergoing surgery. Consequently, the programs must be individualized taking into account age, previous experience, personal character and timing to be carried out (Patel et al., 2006). These

presentation programs present advantages, as they increase knowledge, as well as reinforcing strategies for accepting and reducing anxiety (Justus et al., 2006).

Usually, the adolescents are included in studies with younger children but concerning preoperative anxiety, their behavior could most certainly confound research findings (Carlsson & Henningsson, 2018). The same happens with the review studies, where the adolescents are included but there are no specifications about the results for them as example in the Manyande and colleagues systematic review (2015).

Conclusions

This review has shown that several non-pharmacological interventions are likely to help to reduce adolescent's anxiety and prevention their anxiety during the perioperative period. These include cognitive-behavioral intervention, guided imagery, massage therapy, relaxation training, and music therapy. Most of the outcomes of this review were based on single studies only. However, even single studies can provide useful information of relevance both for clinical practice and, to guide future research.

Recommendations for practice

Results advocate training for nurses to provide individually tailored information support to adolescents before surgery. Adolescents with elevated levels of trait anxiety should be identified prior to surgery and offered a dedicated educational program to prepare them for the surgical procedure adequately to their emotional status.

Preoperative preparation for adolescents who are undergoing significant surgical procedures is difficult. These young people need to be prepared with coping strategies and realistic expectations for recovery, but care must be taken not to make them overly anxious about the upcoming hospital stay. With restricted time available for teaching and a large amount of information to convey, it is imperative that the health care disciplines collaborate to design preoperative education programs that are effective and feasible.

Suggestion for the practice include to develop, optimize, incentivize, and coordinate care across disciplines with nondiscriminatory access to evidence-based nonpharmacologic therapies, as a stand-alone first line of care and as an essential part of comprehensive care.

Recommendations for research

Ten studies included in the review and 807 participants were still too small

sample size to be adequately powered. Large randomized controlled trials are required, confirming or refuting the usefulness of some of the promising non-pharmacological interventions, such as cognitive-behavioral intervention, guided imagery, massage therapy, relaxation training, and music therapy. This is particularly important for appraising, for which more effectiveness studies are needed. More studies conducted in various countries are needed to test the effectiveness of interventions in various cultural and socioeconomic contexts.

Future studies should plan for subgroup analyses of different age groups; adolescents with chronic illness, behavioral problems, or developmental delay. Such trials need to use reliable methods of allocation concealment and to describe these methods in the trial publications. Thus, a longer follow-up period of up to six to nine months would permit further refinements.

This review found possible benefits to the adolescent at postoperative when reduced anxiety is achieved using only information or coping, guided imagery, relaxation training, and music therapy. This effect was not seen when used standard care and information pamphlets as preparation for the adolescents for surgery.

Other potential areas for future research that have not been adequately investigated include the frequency, “dosage” and timing for apply the non-pharmacologic interventions for prevent or reduce anxiety in adolescents during perioperative.

Standardization of reporting of randomized controlled trials should facilitate meta-analyses of results and increase the likelihood of definitive recommendations regarding the utility of the various non-pharmacological interventions in the future.

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Conflicts of interest

The authors declare no conflict of interest.

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Appendix I: Search strategy

Search strategy conducted on PubMed - on June 21st, 2020

Search	Query	Records retrieved
#1	("Young Adult"[Mesh]) OR "Adolescent"[Mesh]	2,405,294
#2	(((((("Complementary Therapies"[Mesh]) OR "Imagery, Psychotherapy"[Mesh]) OR "Hypnosis"[Mesh:NoExp]) OR "Music Therapy"[Mesh]) OR "Virtual Reality Exposure Therapy"[Mesh]) OR "Massage"[Mesh:NoExp]	227,063
#3	(("Perioperative Care"[Mesh]) OR "Preoperative Care"[Mesh]) OR "Operating Rooms"[Mesh]	162,277
#4	"Anxiety"[Mesh:NoExp]	80,390
#5	(adolescen*[Title/Abstract] OR teen*[Title/Abstract] OR youth*[Title/Abstract] OR paediatric*[Title/Abstract] OR pediatric*[Title/Abstract] OR child*[Title/Abstract])	1,768,344
#6	(nonpharmacologic*[Title/Abstract] OR Non-pharmacologic*[Title/Abstract] OR "Non pharmacologic"[Title/Abstract] OR "Non pharmacological"[Title/Abstract] OR "psychological therapy"[Title/Abstract] OR "psychological intervention"[Title/Abstract] OR "Alternative therapy"[Title/Abstract] OR "Alternative therapies"[Title/Abstract] OR "complementary therapy"[Title/Abstract] OR "complementary therapies"[Title/Abstract] OR "guided imagery"[Title/Abstract] OR imagery[Title/Abstract] OR music[Title/Abstract] OR "music therapy"[Title/Abstract] OR "virtual reality"[Title/Abstract] OR hypnosis[Title/Abstract])	81,232
#7	(perioperative [Title/Abstract] OR postoperative [Title/Abstract] OR preoperative [Title/Abstract] OR operati*[Title/Abstract] OR surgery [Title/Abstract] OR "preoperative period"[Title/Abstract])	2,141,446

#8	(anxiety [Title/Abstract] OR "anxiety level"[Title/Abstract] OR "STAIC"[Title/Abstract] OR "STAI"[Title/Abstract] OR "VAS-A"[Title/Abstract] OR "STAI-Y"[Title/Abstract])	190,956
#9	#1 OR #5	3,543,818
#10	#2 OR #6	289,863
#11	#3 OR #7	2,194,676
#12	#4 OR #8	212,892
#13	#9 AND #10 AND #11 AND #12	299
Filters: English, Portuguese, Spanish		273

Search strategy conducted on PsycINFO via EBSCO - on July 1st, 2020

Search	Query	Records retrieved
#1	TI (adolescent* OR teen OR youth* OR paediatric* OR pediatric* OR child*) OR AB (adolescent* OR teen OR youth* OR paediatric* OR paediatric* OR child*)	875,489
#2	TI (nonpharmacologic* OR Non- pharmacologic* OR “Non pharmacologic” OR “Non pharmacological” OR “psychological therapy” OR “psychological intervention” OR “Alternative therapy” OR “Alternative therapies” OR “complementary therapy” OR “complementary therapies” OR “guided imagery” OR imagery OR music OR "music therapy" OR “virtual reality” OR hypnosis) OR AB (nonpharmacologic* OR Non- pharmacologic* OR “Non pharmacologic” OR “Non pharmacological” OR “psychological therapy” OR “psychological intervention” OR “Alternative therapy” OR “Alternative therapies” OR “complementary therapy” OR “complementary therapies” OR “guided imagery” OR imagery OR music OR "music therapy" OR “virtual reality” OR hypnosis)	73,717
#3	TI (perioperative OR postoperative OR preoperative OR operati* OR surgery OR "preoperative period") OR AB (perioperative OR postoperative OR preoperative OR operati* OR surgery OR "preoperative period")	136,217
#4	TI (anxiety OR "anxiety level" OR "STAIC" OR "STAI" OR "VAS-A" OR "STAI-Y") OR AB (anxiety OR "anxiety level" OR "STAIC" OR "STAI" OR "VAS-A" OR "STAI-Y")	197,134
#5	MA adolescents OR teenagers OR teen OR youth	258,490
#6	MA complementary therapy	1,538
#7	MA perioperative OR peri-operative OR pre-operative OR preoperative OR post-operative OR postoperative OR surgical	7,335
#8	MA anxiety	52,853
#9	#1 OR #5	1,023,122

#10	#2 OR #6	74,902
#11	#3 OR #7	138,397
#12	#4 OR #8	210,553
#13	#9 AND #10 AND #11 AND #12	45
Filters: English, Spanish		42

Search strategy conducted on CINAHL via EBSCO - on July 1st, 2020

Search	Query	Records retrieved
#1	TI (adolescent* OR teen OR youth* OR paediatric* OR pediatric* OR child*) OR AB (adolescent* OR teen OR youth* OR paediatric* OR paediatric* OR child*)	709,066
#2	TI (nonpharmacologic* OR Non- pharmacologic* OR “Non pharmacologic” OR “Non pharmacological” OR “psychological therapy” OR “psychological intervention” OR “Alternative therapy” OR “Alternative therapies” OR “complementary therapy” OR “complementary therapies” OR “guided imagery” OR imagery OR music OR "music therapy" OR “virtual reality” OR hypnosis) OR AB (nonpharmacologic* OR Non- pharmacologic* OR “Non pharmacologic” OR “Non pharmacological” OR “psychological therapy” OR “psychological intervention” OR “Alternative therapy” OR “Alternative therapies” OR “complementary therapy” OR “complementary therapies” OR “guided imagery” OR imagery OR music OR "music therapy" OR “virtual reality” OR hypnosis)	38,503
#3	TI (perioperative OR postoperative OR preoperative OR operati* OR surgery OR "preoperative period") OR AB (perioperative OR postoperative OR preoperative OR operati* OR surgery OR "preoperative period")	431,958
#4	TI (anxiety OR "anxiety level" OR "STAIC" OR "STAI" OR "VAS-A" OR "STAI-Y") OR AB (anxiety OR "anxiety level" OR "STAIC" OR "STAI" OR "VAS-A" OR "STAI-Y")	99,342
#5	MH adolescence	566,153
#6	MH hypnosis OR massage OR virtual reality	24,093
#7	MH preoperative period	6,123
#8	MH anxiety	46,839
#9	#1 OR #5	1,031,305

#10	#2 OR #6	58,091
#11	#3 OR #7	433,119
#12	#4 OR #8	114,647
#13	#9 AND #10 AND #11 AND #12	95
Filters: English		92

Search strategy conducted on Cochrane Central Register of Controlled Trials - on July 1st, 2020

Search	Query	Records retrieved
#1	TI (adolescent* OR teen OR youth* OR paediatric* OR paediatric* OR child*) OR AB (adolescent* OR teen OR youth* OR paediatric* OR paediatric* OR child*)	161,986
#2	TI (nonpharmacologic* OR Non- pharmacologic* OR “Non pharmacologic” OR “Non pharmacological” OR “psychological therapy” OR “psychological intervention” OR “Alternative therapy” OR “Alternative therapies” OR “complementary therapy” OR “complementary therapies” OR “guided imagery” OR imagery OR music OR "music therapy" OR “virtual reality” OR hypnosis) OR AB (nonpharmacologic* OR Non- pharmacologic* OR “Non pharmacologic” OR “Non pharmacological” OR “psychological therapy” OR “psychological intervention” OR “Alternative therapy” OR “Alternative therapies” OR “complementary therapy” OR “complementary therapies” OR “guided imagery” OR imagery OR music OR "music therapy" OR “virtual reality” OR hypnosis)	18,505
#3	TI (perioperative OR postoperative OR preoperative OR operati* OR surgery OR "preoperative period") OR AB (perioperative OR postoperative OR preoperative OR operati* OR surgery OR "preoperative period")	230,423
#4	TI (anxiety OR "anxiety level" OR "STAIC" OR "STAI" OR "VAS-A" OR "STAI-Y") OR AB (anxiety OR "anxiety level" OR "STAIC" OR "STAI" OR "VAS-A" OR "STAI-Y")	73,218
#5	MH adolescent	102,689
#6	MH hypnosis OR massage OR virtual reality	911
#7	MH preoperative period	263
#8	MH anxiety	867
#9	#1 OR #5	241,939

#10	#2 OR #6	19,111
#11	#3 OR #7	230,447
#12	#4 OR #8	73,512
#13	#9 AND #10 AND #11 AND #12	167
Filters: English, Spanish		82

Search strategy conducted on SciELO - on July 1st, 2020

Search	Query	Records retrieved
#1	TI (adolescent* OR teen OR youth* OR paediatric* OR paediatric* OR child*) OR AB (adolescent* OR teen OR youth* OR paediatric* OR paediatric* OR child*)	70,497
#2	TI (nonpharmacologic* OR Non-pharmacologic* OR “Non pharmacologic” OR “Non pharmacological” OR “psychological therapy” OR “psychological intervention” OR “Alternative therapy” OR “Alternative therapies” OR “complementary therapy” OR “complementary therapies” OR “guided imagery” OR imagery OR music OR "music therapy" OR “virtual reality” OR hypnosis)) OR AB (nonpharmacologic* OR Non-pharmacologic* OR “Non pharmacologic” OR “Non pharmacological” OR “psychological therapy” OR “psychological intervention” OR “Alternative therapy” OR “Alternative therapies” OR “complementary therapy” OR “complementary therapies” OR “guided imagery” OR imagery OR music OR "music therapy" OR “virtual reality” OR hypnosis)	149,694
#3	TI (perioperative OR postoperative OR preoperative OR operati* OR surgery OR "preoperative period") OR AB (perioperative OR postoperative OR preoperative OR operati* OR surgery OR "preoperative period")	49,259
#4	TI (anxiety OR "anxiety level" OR "STAIC" OR "STAI" OR "VAS-A" OR "STAI-Y") OR AB (anxiety OR "anxiety level" OR "STAIC" OR "STAI" OR "VAS-A" OR "STAI-Y")	5,241
#5	#1 AND #2 AND #3 AND #4	746,724
Filters: English, Portuguese, Spanish		3,912
Filters: Human Sciences, Health Sciences (thematic areas)		461

Search strategy conducted on Open Grey - on July 1st, 2020

Search	**Query**	**Records retrieved**
#1	Adolescent* AND surgery AND anxiety	2
Filters: English		2

Search strategy conducted on RCAAP - on July 1st, 2020

Search	**Query**	**Records retrieved**
#1	Adolescent* AND perioperative AND anxiety	11
Filters: --		11

Appendix II: Studies ineligible following full text review

Arnon Z, Hanan H, Mogilner J. The effect of a hypnotic-based animated video on stress and pain reduction in pediatric surgery. International Journal of Clinical & Experimental Hypnosis. ***Reason for exclusion***: The participants' age was 3-16 years old and the mean age of the participants was 7 (±4.1) years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Augustin P, Hains AA. Effect of music on ambulatory surgery patients' preoperative anxiety. ***Reason for exclusion:*** The participants was adults, isn't the population interest. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Aytekin A, Doru O, Kucukoglu S. The Effects of Distraction on Preoperative Anxiety Level in Children. ***Reason for exclusion:*** Outcome post the intervention wasn't measurements. Ineligible outcome

Coşkuntürk AE, Gözen D. The effect of interactive therapeutic play education program on anxiety levels of children undergoing cardiac surgery and their mothers. ***Reason for exclusion***: The outcomes for the population interest (adolescents) not clearly. Ineligible outcome

Bailey Jr PD, Bastien JL. Preinduction techniques for pediatric anesthesia. ***Reason for exclusion***: The study design was review and the according of types of studies, previously defined in protocol for this systematic review, the study was excluded. Ineligible study design

Borimnejad L, Arbabi N, Seydfatemi N, Inanloo M, Haghanii H. The effects of acupressure on preoperative anxiety reduction in school aged children. ***Reason for exclusion***: This study wasn't complete, the author was asked for the full article, but it wasn't possible to get a response to the request. Not original research

Borji M, Pouy S, Yaghobi Y, Nabi BN. Effectiveness of acupressure on anxiety of children undergoing anesthesia. ***Reason for exclusion:*** The participants' age was 5-12 years old and the mean age of the participants of the control group was 7.67 years old and for the experimental group was 7.75 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Calipel S, Lucas-Polomeni MM, Wodey E, Ecoffey C. Premedication in children:

hypnosis versus midazolam. ***Reason for exclusion***: The participants' age was 2-11 years old and the mean age of the participants of the control group was 5 years old and for the experimental group was 4.5 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Carlsson RNE, Henningsson RN. Visiting the Operating Theatre Before Surgery Did Not Reduce the Anxiety in Children and Their Attendant Parent. ***Reason for exclusion***: The outcomes for the population interest (adolescents) not clearly. Ineligible outcome

Costa Fernandes S, Arriaga P. The effects of clown intervention on worries and emotional responses in children undergoing surgery. ***Reason for exclusion***: The participants' age was 5-12 years old and the mean age of the participants was 7.93 (±2.36) years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Dehghan F, Jalali R, Bashiri H. The effect of virtual reality technology on preoperative anxiety in children: a Solomon four-group randomized clinical trial. ***Reason for exclusion***: The participants' age was 6-12 years old and the mean age of the participants was 7.35 (±2.05) years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Eijlers R, Legerstee JS, Dierckx B, Staals LM, Berghmans J, van der Schroeff MP, et al. Development of a virtual reality exposure tool as psychological preparation for elective pediatric day care surgery: methodological approach for a randomized controlled trial. ***Reason for exclusion***: The outcomes for the population interest (adolescents) not clearly. Ineligible outcome

Eijlers R, Dierckx B, Staals LM, Berghmans JM, Van Der Schroeff MP, Strabbing EM, et al. Virtual reality exposure before elective day care surgery to reduce anxiety and pain in children: a randomised controlled trial. ***Reason for exclusion***: The participants' age was 4-12 years old and the mean age of the participants was 5 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Fancourt D, Lee C, Baltzer Nielsen S, Capps S, Brooks P. Relax anaesthetics: the effect of a bespoke distraction app on anxiety levels in children undergoing induction of anaesthesia. ***Reason for exclusion***: The participants' age was 2-16 years old and the mean age of the participants was 4.9 (±2.7) – 7.5 (±3.8)

years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Franzoi MA, Goulart CB, Lara EO, Martins G. Music listening for anxiety relief in children in the preoperative period: a randomized clinical trial. ***Reason for exclusion***: The participants' age divided in pre-school children 3-6 years and schoolchildren 6-12 years old. The mean age of the participants of the schoolchildren for control group was 7.87 years old and for the experimental group was 8.72 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Huth MM, Broome ME, Good M. Imagery reduces children's post-operative pain. ***Reason for exclusion***: The participants' age was 7-12 years old and the mean age of the participants was 9.42 (±1.74) years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Kain ZN, Wang SM, Mayes LC, Krivutza DM, Teague BA. Sensory stimuli and anxiety in children undergoing surgery: a randomized, controlled trial. ***Reason for exclusion***: The participants' age was 2-7 years old and the according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Kain ZN, Caldwell-Andrews AA, Krivutza DM, Weinberg ME, Gaal D, Wang SM, et al. Interactive music therapy as a treatment for preoperative anxiety in children: a randomized controlled trial. ***Reason for exclusion***: The participants' age was 3-7 years old and the according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Ko JS, Whiting Z, Nguyen C, Liu RW, Gilmore A. A randomized prospective study of the use of iPads in reducing anxiety during cast room procedures. ***Reason for exclusion***: The participants' age was 1-18 years old and the mean age of the participants was for the control group was 8.7 years old; for the experimental group- ipad with video was 9,1 years old and for the experimental group- ipad with game was 8.7 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Kumar A, Das S, Chauhan S, Kiran U, Satapathy S. Perioperative anxiety and stress in children undergoing congenital cardiac surgery and their parents: Effect of brief intervention—A randomized control trial. ***Reason for exclusion***:

The participants' age was 5-15 years old and the mean age of the participants was for the control group was 8.4 (±2.5) years old and the experimental group was 8.92 (±2.6) years old. Ineligible population

Li HCW, Lopez V, Lee TLI. Psychoeducational preparation of children for surgery: the importance of parental involvement. ***Reason for exclusion***: The participants' age was 7-12 years old and the mean age of the participants was for the control group was 9.41 (±1.40) years old and the experimental group was 9.55 (±1.41) years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Li HCW. Evaluating the effectiveness of preoperative interventions: the appropriateness of using the Children's Emotional Manifestation Scale. ***Reason for exclusion***: The participants' age was 7-12 years old and the mean age of the participants was for the control group was 9.41 (±1.40) years old and the experimental group was 9.55 (±1.41) years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Li HCW, Lopez V. Effectiveness and appropriateness of therapeutic play intervention in preparing children for surgery: A randomized controlled trial study. ***Reason for exclusion***: The outcomes for the population interest (adolescents) not clearly. Ineligible outcome

Li W, Chan S, Wong E, Kwok M, Lee I. Effect of therapeutic play on pre-and post-operative anxiety and emotional responses in Hong Kong Chinese children: a randomised controlled trial. ***Reason for exclusion***: The outcomes for the population interest (adolescents) not clearly. Ineligible outcome

Mainer JA. Nonpharmacological interventions for assisting the induction of anesthesia in children. ***Reason for exclusion***: The study design was review and the according of types of studies, previously defined in protocol for this systematic review, the study was excluded. Ineligible study design

Messina M, Molinaro F, Meucci D, Angotti R, Giuntini L, Cerchia E, et al. Preoperative distraction in children: hand-held videogames vs clown therapy. ***Reason for exclusion***: The outcomes for the population interest (adolescents) not clearly. Ineligible outcome

Millett CR, Gooding LF. Comparing Active and Passive Distraction-Based Music Therapy Interventions on Preoperative Anxiety in Pediatric Patients and Their Caregivers. ***Reason for exclusion***: The participants' age was 0-5 years old, didn't include adolescents in this study. Ineligible population

Moro ET, Módolo NSP. Ansiedade, a criança e os pais. ***Reason for exclusion***: The study design was review and the according of types of studies, previously defined in protocol for this systematic review, the study was excluded. Ineligible study design

Park JW, Nahm FS, Kim JH, Jeon YT, Ryu JH, Han SH. The Effect of Mirroring Display of Virtual Reality Tour of the Operating Theatre on Preoperative Anxiety: a Randomized Controlled Trial. ***Reason for exclusion***: The participants' age was 4-10 years old and the mean age of the participants was 6.75 – 7,08 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Robinson PJ, Kobayashi K. Development and evaluation of a presurgical preparation program. ***Reason for exclusion***: The participants' age was 4-13 years old and the mean age of the participants was 6.71 – 7,49 (± 1.82 – 2.83) years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Rodriguez S, Caruso T, Tsui B. Bedside Entertainment and Relaxation Theater: size and novelty does matter when using video distraction for perioperative pediatric anxiety. ***Reason for exclusion***: The study design was an individual case report and the according of types of studies, previously defined in protocol for this systematic review, the study was excluded. Ineligible study design

Ryu JH, Park JW, Nahm FS, Jeon YT, Oh AY, Lee HJ, et al. The effect of gamification through a virtual reality on preoperative anxiety in pediatric patients undergoing general anesthesia: a prospective, randomized, and controlled trial. ***Reason for exclusion***: The participants' age was 4-10 years old and the mean age of the participants was 6 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Ryu JH, Park SJ, Park JW, Kim JW, Yoo HJ, Kim TW, et al. Randomized clinical trial of immersive virtual reality tour of the operating theatre in children before anaesthesia. ***Reason for exclusion***: The participants' age was 4-10 years old and the mean age of the participants was 6 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Ryu JH, Oh AY, Yoo HJ, Kim JH, Park JW, Han SH. The effect of an immersive virtual reality tour of the operating theater on emergence delirium in children undergoing general anesthesia: a randomized controlled trial. ***Reason for***

exclusion: The participants' age was 4-10 years old and the mean age of the participants was 6 years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Sagredini R, Mascheroni C, Diotto V, Tranquillini E, Paracchini F, Mercuri P. Treatment of anxiety at induction of anaesthesia in children: a randomized controlled trial of non-pharmacological approach versus midazolam or placebo. ***Reason for exclusion***: The study design was a case series the according of types of studies, previously defined in protocol for this systematic review, the study was excluded. Ineligible study design

Scheel T, Hoeppner D, Grotevendt A, Barthlen W. Clowns in Paediatric Surgery: Less Anxiety and More Oxytocin? A Pilot Study Clowns in der Kinderchirurgie: weniger Angst und mehr Oxytocin? ***Reason for exclusion***: The mean age of the participants was 8.93 years, and the according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Sola C, Lefauconnier A, Bringuier S, Raux O, Capdevila X, Dadure C. Childhood preoperative anxiolysis: is sedation and distraction better than either alone? A prospective randomized study. ***Reason for exclusion***: The mean age of the participants was 4.8 - 6.1 (± 2.8 - 3.1) years old, and the according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Soliveres J, Sánchez A, Balaguer J, Estruch M, Sánchez J, Solaz C. Parental presence in the operating room: effect on the quality of anesthetic induction and postoperative agitation in children. ***Reason for exclusion***: The mean age of the participants was for the control group was 4.1 (±1.5) years old and the experimental group was 4.2 (±1.2) years old. The according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Strom S. Preoperative evaluation, premedication, and induction of anesthesia in infants and children. ***Reason for exclusion***: The study design was review and the according of types of studies, previously defined in protocol for this systematic review, the study was excluded. Ineligible study design

Verschueren S, van Aalst J, Bangels A-M, Toelen J, Allegaert K, Buffel C, et al. Development of Clinipup, a serious game aimed at reducing perioperative anxiety and pain in children: mixed methods study. ***Reason for exclusion***: The participants' age was 6-10 years old and the according of inclusion criteria,

previously defined in protocol for this systematic review, the study was excluded. Ineligible population

Wang ZX, Liu SL, Sun CH, Wang Q. Psychological intervention reduces postembolization pain during hepatic arterial chemoembolization therapy: a complementary approach to drug analgesia. ***Reason for exclusion***: The intervention of this study didn't apply, because this was during an anesthesia examination procedure. Ineligible intervention

Whipple J. Surgery Buddies: A Music Therapy Program for Pediatric Surgical Patients. ***Reason for exclusion***: The study design was individual case report and the according of inclusion criteria, previously defined in protocol for this systematic review, the study was excluded. Ineligible study design

William Li HC, Lopez V, Lee TLI. Effects of preoperative therapeutic play on outcomes of school-age children undergoing day surgery. ***Reason for exclusion***: In this study, the age of the participants was 7-12 years, and the mean age of the participants for the control group was 9.41 and the experimental group was 9.55. The study didn't show outcomes for adolescents (10-12 years). Ineligible outcome

Appendix III: Studies excluded on methodological quality

Robb SL, Nichols RJ, Rutan RL, Bishop BL, Parker JC. The effects of music assisted relaxation on preoperative anxiety.

Reason for exclusion: Methodology lacked rigor - 7 criteria on the critical appraisal checklist for randomized controlled trials not met, leading to a risk of selection, performance and detection bias that seriously weakened confidence in the results. Namely, the randomization used for assignment of participants to treatment groups was unclear. Allocation to treatment groups concealed and treatment groups similar at baseline were unclear. The participants blind to treatment assignment wasn't applicable. Those delivering treatment weren't blind to treatment assignment and outcome assessors weren't blind to treatment assignment, too. Follow up wasn't complete, futhermore had differences between groups in terms of their follow up.

Appendix IV: Characteristics of included studies

Robb 1995

STUDY DETAILS	Robb, S., Nichols, R., Rutan, R., Bishop, B. & Parker, J. 1995
STUDY DESIGN	Randomized Study
PARTICIPANTS DETAILS	n=20 children/adolescents Participants age: 8-20 years EG (n=10); CG (n=10)
SETTING & LOCATION	Preoperative ▪ Transport to the operating room ▪ Induction Postoperative ▪ Recovery room Post Anesthetic Care Unit (UCPA) Reconstruction Unit of the Pediatric Hospital for Burns USA
INTERVENTION	EG: Music Assisted Relaxation (MAR), lasting 30 to 50 minutes MAR intervention includes: ▪ Listening to music ▪ Deep diaphragmatic breathing ▪ Progressive muscle relaxation ▪ Guided imagination
COMPARISION	CG: Usual care for preoperative interventions
OUTCOME MEASURES	STAIC (use of part regarding Anxiety-State) Postoperative questionnaire
MEASUREMENT POINTS	Pre-test Post-test

STUDY RESULTS	STAIC's Anxiety-State Scores reveal significant decrease in EG (p = 0.0082). Pre-test = 33.5 Post-test = 27.9 While in the CG there was no significant difference in the assessment of STAIC Anxiety-State (Pre-test = 33.9 and Post-test = 34.4). In the post-test, it appears that anxiety is lower in EG (27.9), compared to CG (34.4), p = 0.04. In terms of physiological assessment (heart rate, breathing, temperature and blood pressure) without significant differences between Pre-test and Post-test in any of the groups (EG / CG). There was a significant decrease in anxiety at the time of transport to the operating room for EG. Anxiety levels with no significant difference during induction, in both groups (EG / CG). At UCPA, no significant increase in agitation observed during the postoperative period, as well as, no significant difference was detected between the groups (EG / CG) regarding comfort and time to wake up after anesthesia. All of the participants refer to the MAR intervention as useful. MAR intervention proves to be effective in the preoperative period for controlling anxiety and stress, as it reduces anxiety levels and increases relaxation, coping strategies, promoting emotional support for children / adolescents and their family.

Lambert 1996

STUDY DETAILS	Lambert, S. 1996
STUDY DESIGN	Pre-test and post-test Experimental Group and Control Group
PARTICIPANTS DETAILS	n=52 children/adolescents Participants age: 7-19 years Female 62%; Male 38% EG (n = 26); CG (n = 26)
SETTING & LOCATION	Preoperative ▪ approximately one week before surgery on a readmission visit USA
INTERVENTION	EG: Guided image hypnosis, with a maximum duration of 30 minutes
COMPARISION	CG: Usual preoperative care ▪ Nursing preparation for hospitalization ▪ Postoperative Pain and Medication
OUTCOME MEASURES	STAIC
MEASUREMENT POINTS	Pre-test ▪ preoperative visit ▪ before intervention Post-test ▪ day 2 of the postoperative period ▪ before hospital discharge
STUDY RESULTS	In EG, the Anxiety-State in the postoperative period is lower (-1) than in the CG (+2.04). There is no statistically difference between groups in the postoperative period.

LaMontagne 2003

STUDY DETAILS	LaMontagne, L., Hepworth, J., Cohen, F. & Salisbury, M. 2003
STUDY DESIGN	RCT with 4 groups
PARTICIPANTS DETAILS	n=109 adolescents Participants age: 11-18 years (average 13.9 years) Female n=88 adolescents; Male n=21 adolescents EG1 (n=27); EG2 (n=27); EG3 (n=30); CG (n=25) n=32 adolescents are 11-12 years old and are female
SETTING & LOCATION	Preoperative ▪ Day before surgery ▪ Visiting the orthopaedic clinic Southeastern Medical Center USA
INTERVENTION	EG: Cognitive-behavioral intervention - consists of viewing a video lasting 8 to 10 minutes. EG1: information only EG2: coping strategies only EG3: information and coping strategies
COMPARISION	CG: Usual care
OUTCOME MEASURES	STAIC
MEASUREMENT POINTS	Preoperative Postoperative (day 2)

STUDY RESULTS	The mean difference in state anxiety scores for the sample in the preoperative: CG = 34.99; EG1 = 32.52; EG2 = 34.93; EG3 = 33.72 The mean difference in state anxiety scores for the sample in the postoperative (day 2) with no significant difference between groups (p = 0.44): CG = 39.88; EG1 = 38.93; EG2 = 37.07; EG3 = 37.13 Preoperative anxiety showed to be a significant covariate due to the interaction of the intervention group. The regression for the information and coping group (EG3) was significantly different compared to the remaining three groups. The interception for EG3 was more than twice the size of the other groups (63.5) and had a negative slope (-.78), indicating that higher levels of preoperative anxiety were associated with lower levels of post-operative anxiety. The regressions for the remaining groups (EG1, EG2 and CG) were similar. The relationship between age and postoperative anxiety differs depending on the group. The Johnson-Neyman technique revealed that, for adolescents under 13.25 years, interventions that included coping (EG2 or EG3) were significantly more effective in reducing postoperative anxiety than interventions that did not include coping (EG1 or CG). The difference between interventions was not significant for older adolescents. Single intervention modality (EG1 and EG2) is useful in reducing postoperative anxiety for adolescents with low preoperative

	anxiety. While the combination (EG3), it may increase the level of anxiety in the postoperative period. Single or combined interventions of coping strategies (EG2 or EG3) for the age group from 11 to 13 years are more effective in reducing anxiety and pain in the postoperative period. Intervention of only coping strategies (EG2), demonstrated efficacy for age less than or equal to 13 years and in the postoperative period showed less anxiety and pain. Adolescents aged 14 to 18 years did not find a significant difference between the intervention groups.

Nilsson 2009

STUDY DETAILS	Nilsson, S., Kokinsky, E., Nilsson, U., Sidenvall, B. & Enskar, K. 2009
STUDY DESIGN	RCT
PARTICIPANTS DETAILS	n n=80 children/adolescents Participants age: 7-16 years EG (n=40); CG (n=40)
SETTING & LOCATION	Postoperative Pediatric surgical unit at Queen Silvia Children's hospital Gothenburg, Sweden
INTERVENTION	EG: listening to music via MP3 at UCPA for 45 minutes.
COMPARISION	CG: without music
OUTCOME MEASURES	STAI (short)
MEASUREMENT POINTS	Preoperative Postoperative 1h post UCPA
STUDY RESULTS	Anxiety no significant difference between groups and pre and postoperative (p=0.608 and p=0.504, respectively).

Charette 2015

STUDY DETAILS	Charette, S., Fiola, J., Charest, M-C., Villeneuve, E., Théroux, J., Joncas, J., Parent, S. & Le May, S. 2015
STUDY DESIGN	RCT (pilot study)
PARTICIPANTS DETAILS	n=40 adolescents Participants age: 11-20 years (average 15 years) Female n=33 adolescents; Male n=7 adolescents EG (n=20); CG (n=20)
SETTING & LOCATION	Preoperative Montreal Third Care Hospital Quebec, Canada USA
INTERVENTION	EG ▪ In the preoperative teenagers watch an informative DVD lasting 30 minutes; ▪ Information on postoperative pain management through demonstration, guided imagination and relaxation exercises; ▪ Upon discharge, the investigating nurse returns to show the DVD to parents and adolescents and answers questions; ▪ The teenager is instructed to take a DVD at home and apply relaxation and guided imagination through visible exercises, at least 3x a week;

	▪ 2 weeks after discharge, the investigating nurse calls the teenager for technical reinforcement of the intervention and answers any questions that may arise.
COMPARISION	CG: Usual care and analgesic administration ▪ Physiotherapy ▪ 1 month post-follow-up outpatient visit
OUTCOME MEASURES	STAI-Y
MEASUREMENT POINTS	Preoperative (T0) Surgery Day (T1) 1month postoperatively (T3)
STUDY RESULTS	Preoperatively (T0) and day of surgery (T1), with no significant difference between groups EG (49.30/47.25) and CG (48.55/47.85). Anxiety decreased in postoperative EG (T3): EG (44.75) and CG (47.68), p=0.03.

Rhodes 2015

STUDY DETAILS	Rhodes, L., Nash, C., Moisan, A., Scott, D., Barkoh, K., Warner, W., Sawyer, J. & Kelly, D. 2015
STUDY DESIGN	Randomized Prospective Study
PARTICIPANTS DETAILS	n=65 adolescents Participants age: 11-21 years EG (n=26); CG (n=39)
SETTING & LOCATION	Preoperative USA
INTERVENTION	EG: Scoliosis Surgery Education and Guidance Program (PEOSS) ▪ Hospital visit with a 30-minute itinerary conducted by a child health specialist and with 1 or 2 orthopedic nurses.
COMPARISION	CG: Preoperative consultation 2 weeks before surgery (risks, benefits and alternatives for posterior spinal fusion-PSF are discussed).
OUTCOME MEASURES	STAIC
MEASUREMENT POINTS	Preoperative ▪ consultation ▪ in the waiting room Postoperative ▪ Orthopedic Unit ▪ discharge
STUDY RESULTS	Both groups - experimental and control - experienced increased anxiety during the preoperative interval.

	EG showed higher anxiety-state scores than the CG in the postoperative interval (p=0.024).

Nelson 2017

STUDY DETAILS	Nelson, K., Adamek, M. & Kleiber, C. 2017
STUDY DESIGN	Randomized Study
PARTICIPANTS DETAILS	n=41 adolescents Participants age: 10-19 years EG (n=19); CG (n=22)
SETTING & LOCATION	Preoperative Midwestern tertiary hospital USA
INTERVENTION	EG: 12-minute video training program, included: ▪ a brief description of music therapy at the pediatric hospital ▪ relaxation aided by music 20-30 minutes; ▪ a demonstration and training - relaxation and breathing techniques 15 minutes; ▪ sample music therapy session with a spinal fusion model patient.
COMPARISION	CG: Do not watch the video training program.
OUTCOME MEASURES	STAI
MEASUREMENT POINTS	Pre-intervention Post-intervention
STUDY RESULTS	Anxiety score in the pre-intervention in the EG was 6 while in the CG it was 6.1 Both groups after music therapy session significantly decreased anxiety scores EG (3.5) and CG (3.7).

Duparc-Alegria 2018

STUDY DETAILS	Duparc-alegria, N., Dahmani, S. & Thiollier, A-F. 2018
STUDY DESIGN	RCT
PARTICIPANTS DETAILS	n=118 adolescents Participants age: 10-18 years EG (n=59); CG (n=59)
SETTING & LOCATION	Preoperative ▪ pre-induction Pediatric hospital France
INTERVENTION	EG ▪ Experimental analgesic procedure ▪ pre-session 5 to 10 minutes short induction hypnosis
COMPARISION	CG: usual care
OUTCOME MEASURES	VAS-A
MEASUREMENT POINTS	Preoperative ▪ 1 day before surgery; ▪ surgery day Postoperative ▪ day+1 (24 Hours after surgery)
STUDY RESULTS	Anxiety levels 24 hours after surgery (Day+1), between EG and CG groups with no significant difference (p=0.17). Both groups had a significant decrease in the level of anxiety between the day before surgery (Day-1) and the day after surgery (Day+1) (p <0.0001).

Karakul 2018

STUDY DETAILS	Karakul, A. & Bolisik, Z. 2018
STUDY DESIGN	Pre-test, Post-test and Control Group
PARTICIPANTS DETAILS	n=130 adolescents Participants age: 9-17 years EG (n=65); CG (n=65)
SETTING & LOCATION	Postoperative Turkey
INTERVENTION	EG: listening to postoperative music 20 minutes
COMPARISION	CG: no listening to music
OUTCOME MEASURES	STAIC
MEASUREMENT POINTS	Preoperative Postoperative
STUDY RESULTS	Preoperatively no significant differences between groups, EG (38.58) and CG (38.32), p=0.718 The music heard during the postoperative recovery period (EG 35.01) decreases the level of anxiety among adolescents (CG 41.23), p= 0.000.

Staveski 2018

STUDY DETAILS	Staveski, S., Boulanger, K., Erman, L., Almgren, C., Journel, C., Roth, S. & Golianu, B. 2018
STUDY DESIGN	RCT Prospective
PARTICIPANTS DETAILS	n=60 children/adolescents Participants age: 6-18 years EG (n=36); CG (n=24)
SETTING & LOCATION	Postoperative Academic Children's Hospital USA
INTERVENTION	EG: Massage therapy 3 times a week with a maximum duration of 30 minutes
COMPARISION	CG: Usual care and reading up to 20 minutes
OUTCOME MEASURES	STAIC
MEASUREMENT POINTS	Pre-intervention Post-intervention (24 hours postoperatively and 48 hours before hospital discharge)
STUDY RESULTS	No statistically significant difference in State-Trait Anxiety scores in the initial 24 hours after heart surgery (T1) and within 48 hours of transfer to the acute care unit (T2), (p=0.21) EG pre-test 34.33; post-test 29.20 CG pre-test 33.94; post-test 31.06 Adolescents receiving massage therapy had significantly lower State-Trait Anxiety scores

	after receiving massage therapy at the time of discharge (T3; p = 0.0075) than adolescent receiving standard of care plus three reading visits, EG pre-test 31.50; post-test 26.10 CG pre-test 31.31; post-test 29.69 The massage mechanism can lower cortisol levels which leads to decreased anxiety

Tomaszek 2019

STUDY DETAILS	Tomaszek,L., Cepuch, G. & Fenikowski, D. 2019
STUDY DESIGN	Randomized double-blind study
PARTICIPANTS DETAILS	n=112 adolescents Participants age: 9-18 years EG (n=56); CG (n=56)
SETTING & LOCATION	Preoperative Poland
INTERVENTION	EG: additional 45-minute psychology consultation
COMPARISION	CG: routine preoperative information performed by a nurse
OUTCOME MEASURES	STAI
MEASUREMENT POINTS	Preoperative ▪ 1 day before surgery Postoperative
STUDY RESULTS	In the experimental group the level of state anxiety at 48 h post-surgery was significantly lower than prior to the procedure ($z=3.357$, $p<0.001$), the level of postoperative anxiety in the controls increased significantly compared to its preoperative level ($z=2.146$, $p=0.031$). In the control group with preoperative trait anxiety ≥7 sten, the level of postoperative state anxiety was significantly higher than prior to the procedure ($p=0.045$). In contrast, the level of postoperative state anxiety in patients in the experimental group with preoperative trait anxiety ≥7

	sten remained at a similar level than preoperatively (p=0.674). The absence of preoperative psychological consultation, trait anxiety ≥7 points, and a higher level of preoperative anxiety-state were independent predictors of greater anxiety-state 48 hours after surgery. The support of information provided by a psychologist before a thoracic surgery decreases the level of postoperative anxiety only in children with lower levels of trait anxiety.

CONCLUSÃO

A investigação em Enfermagem contribui para o desenvolvimento e reconhecimento da profissão e constitui-se como uma base sólida de conhecimento teórico que sustenta as intervenções da prática clínica. Para uma prática de excelência o enfermeiro deve basear-se na melhor e mais atualizada evidência científica.

De acordo com o Regulamento do Exercício Profissional do Enfermeiro, as intervenções dos Enfermeiros são autónomas e interdependentes. Desta forma, o Enfermeiro assume um papel preponderante no processo cirúrgico dos adolescentes, pois acompanha-os em todas as fases do perioperatório, contribuindo significativamente para a diminuição da ansiedade, gestão da dor e consequentemente, do tempo de recuperação pós-operatório.

Quanto à questão inicial: "qual a eficácia das intervenções não farmacológicas na ansiedade de adolescentes no período perioperatório?" em seis dos estudos analisados nesta RSL, verificou-se existir eficácia na implementação de intervenções não farmacológicas na redução da ansiedade em adolescentes em contexto perioperatório. As intervenções implementadas foram as cognitivo-comportamental, imaginação guiada, relaxamento, musicoterapia e massagem terapêutica. Em quatro dos dez estudos incluídos para a revisão sistemática, verificou-se diminuição da ansiedade intragrupo (grupo experimental - com intervenção), contudo intergrupo (entre grupo experimental e controlo) não se verificou diferenças estatisticamente significativas – como demonstrado nos dois estudos que abordaram a hipnose como intervenção não farmacológica e num estudo com música como INF. Num dos estudos incluídos concluíram que adolescentes mais velhos submetidos a cuidados habituais (grupo controlo) tiveram mais ansiedade e dor pós-operatória. Outro estudo mostrou que a música diminuiu a ansiedade pós-operatória e consequentemente a pressão arterial sistólica/diastólica, frequência respiratória e cardíaca. Também, as INF como a informação e estratégias de *coping* revelaram contribuir para redução da ansiedade em adolescentes. A educação e a orientação pré-operatória, reduziram a ansiedade do adolescente no tratamento pré e pós-operatório. Além disso, diminuíram a quantidade de medicação administrada para controlo da dor, o tempo de internamento e verificou-se melhoria do estado geral dos adolescentes.

No entanto, é necessário desenvolver mais estudos, para se poder confirmar ou refutar a vantagem de algumas das intervenções não farmacológicas promissoras. Assim como a realização de meta-análise para clarificar resultados da revisão sistemática, que atendendo ao fator tempo não foi possível realizar. Também, será relevante mais estudos para testar a eficácia das intervenções em diferentes contextos culturais e socioeconómicos. Um período de acompanhamento pós-operatório mais prolongado de até seis a nove meses, permitirá obter mais informações sobre a eficácia das medidas adotadas. Outras áreas potenciais para pesquisas futuras que não foram adequadamente investigadas incluem a frequência, "dosagem" e tempo de aplicação das intervenções não farmacológicas para prevenir ou reduzir a ansiedade em adolescentes durante o perioperatório. Também se sugere que sejam analisados subgrupos de diferentes grupos de idade; adolescentes com doenças crónicas, problemas de comportamento ou atraso no desenvolvimento.

A RSL apresentou oito estudos ensaios clínicos randomizados (RCT) e dois estudos do tipo quase-experimental. Entre os estudos de controlo randomizados, sete estudos foram considerados verdadeiramente aleatórios com uma descrição clara do procedimento de randomização específico usado. A randomização foi por computador em cinco estudos. Os métodos de randomização incluíram a randomização em bloco e a randomização simples. Relativamente à qualidade metodológica, dois estudos apresentaram todos os critérios de avaliação crítica, obtendo uma pontuação de 100%; cinco estudos obtiveram uma pontuação de 84,6%; dois estudos uma pontuação de 76,9%; um estudo uma pontuação de 69,2% e outro estudo uma pontuação 46,2%.

Na revisão sistemática da literatura verificou-se que as INF ao serem implementadas proporcionam benefícios adicionais, como a diminuição da dor, ansiedade, náuseas e vómitos, facilitam um sono reparador, e aumentaram a sensação de bem-estar, assim como, uma boa e rápida recuperação, comparativamente à terapêutica habitual. Recomenda-se, por isso, a sua aplicação em adolescentes no perioperatório.

Atendendo ao fator tempo, para elaboração desta dissertação, a elaboração da meta-análise, como referido, não foi exequível. Como limitação da RSL, também, foi o tamanho da amostra (807 participantes) dos dez estudos incluídos.

As intervenções não farmacológicas que promovem o bem-estar e a prevenção/diminuição da ansiedade, deverão ser uma prioridade no âmbito dos cuidados de enfermagem em contexto perioperatório. Contudo, são necessários

mais estudos de campo tendo como população-alvo os adolescentes (10-19 anos), para que os resultados encontrados possam ser mais consistentes.

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