Revista Brasileira em Promoção da Saúde

e-ISSN:1806-1230

Review Article

DOI: 10.5020/18061230.2022.11742

Effects of yoga practices on adolescents' mental health: an integrative review

Efeitos de práticas de yoga na saúde mental de adolescentes: revisão integrativa

Efectos de las prácticas de yoga en la salud mental de adolescentes: revisión integradora

Thaynan Faria Barros
Federal University of Sergipe (*Universidade Federal de Sergipe*) - Lagarto (SE) - Brazil

Geissiane Felizardo Vivian
Federal University of Sergipe (*Universidade Federal de Sergipe*) - Lagarto (SE) - Brazil

Anny Giselly Milhome da Costa Farre
Federal University of Sergipe (*Universidade Federal de Sergipe*) - Lagarto (SE) - Brazil

Priscilla Daisy Cardoso Batista
Federal University of Sergipe (*Universidade Federal de Sergipe*) - Lagarto (SE) - Brazil

ABSTRACT

Objective: To analyze the effects of yoga practices on the mental health of adolescents. **Methods:** An integrative review was carried out in January 2022 based on the research question: What are the effects of yoga practices and programs in improving adolescents' mental health indicators? Searches were carried out on OneFile, Scopus, MEDLINE/PubMed, Science Citation Index Expanded, PubMed Central, Social Sciences Citation Index, and Sage Journals databases using the descriptors yoga or ioga in the title and adolescent or teenager as an extended term. This process yielded 183 articles, with 34 of them being eligible for full text reading and 11 meeting the inclusion and exclusion criteria. **Results:** All articles were published in English, conducted in the United States of America or India, including three randomized clinical trials and three quasi-experimental studies, and published between 2012 and 2021. Hatha Yoga was the main modality applied and the synthesis of evidence showed that yoga can reduce anxiety traits and attitudes of aggression in adolescents, act on the control of anger and violence, favor emotional states and feelings, such as happiness, humor, self-esteem, self-control, well-being, and dimensions of quality of life. **Conclusions:** The effects of yoga on the mental and emotional health of adolescents were related to the reduction of anxiety and attitudes of aggression or violence and improvements in the development of emotional competences with feelings of happiness, humor, self-esteem, self-control, well-being, quality of life, and control of emotions and behaviors.

Descriptors: Yoga; Adolescent; School Mental Health Services; Health Promotion.

RESUMO

Objetivo: *Analisar os efeitos das práticas de yoga na saúde mental de adolescentes.* ***Métodos:*** *Revisão integrativa realizada em janeiro de 2022 com a pergunta norteadora: Quais os efeitos de práticas e programas de yoga na melhoria de indicadores de saúde mental dos adolescentes? Busca realizada nas bases de dados OneFile, Scopus, MEDLINE/ PubMed, Science Citation Index Expanded, PubMed Central, Social Sciences Citation Index, e Sage Journals por meio dos descritores yoga ou ioga no título e adolescent ou teenager como termo ampliado. Este processo resultou em 183 artigos, 34 elegíveis para leitura do texto completo e 11 que atenderam aos critérios de inclusão e exclusão.* ***Resultados:*** *Todos os artigos apresentaram-se publicados em língua inglesa, desenvolvidos nos Estados Unidos da América ou na Índia, dentre os quais, três ensaios clínicos randomizados e três pesquisas quase-experimentais, publicados entre 2012 e 2021. Com o Hatha Yoga enquanto a principal modalidade aplicada, a síntese das evidências demonstrou que o yoga possa reduzir traços de ansiedade e atitudes de agressão dos adolescentes, atuar no controle da raiva e violência, favorecer estados emocionais e sentimentos, como felicidade, humor, autoestima, autocontrole, bem-estar, e dimensões da qualidade de vida.* ***Conclusões:*** *Os efeitos do yoga na saúde mental*

Received on: *01/18/2021*
Accepted on: *08/03/2022*

e emocional de adolescentes relacionaram-se à redução da ansiedade e de atitudes de agressão ou violência, melhorias no desenvolvimento das competências emocionais com sentimentos de felicidade, humor, autoestima, autocontrole, bem-estar, qualidade de vida, controle das emoções e dos comportamentos.

Descritores: *Yoga; Adolescente; Serviços de Saúde Mental Escolar; Promoção da Saúde.*

RESUMEN

Objetivo: *Analizar los efectos de las prácticas de yoga en la salud mental de adolescentes.* ***Métodos:*** *Revisión integradora realizada en enero de 20022 con la pregunta orientadora: ¿Cuáles los efectos de prácticas y programas de yoga en la mejora de indicadores de salud mental de los adolescentes? Búsqueda realizada en la base de datos OneFile, Scopus, MEDLINE/ PubMed, Science Citation Index, y Sage Journals por medio de los descriptores yoga o ioga en el título y adolecent o teennager como término ampliado. Este proceso resultó en 183 artículos, 34 elegibles para lectura del texto completo y 11 que atendieron a los criterios de inclusión y exclusión.* ***Resultados:*** *Todos los artículos se presentaron publicados en lengua inglesa, desarrollados en los Estados Unidos de América o en India, entre ellos, tres ensayos clínicos randomizados y tres investigaciones casi-experimentales, publicados entre 2012 y 2021. Con el Hatha Yoga como principal modalidad aplicada, la síntesis de las evidencias demostró que el yoga puede reducir rasgos de ansiedad y actitudes de agresión de los adolescentes, actuar en el control de la rabia y violencia, favorecer estados emocionales y sentimientos, como felicidad, humor, autoestima, autocontrol, bienestar, y dimensiones de la calidad de vida.* ***Conclusiones:*** *Los efectos del yoga en la salud mental y emocional de adolescentes se relacionan a la disminución de la ansiedad y de actitudes de agresión o violencia, mejoras en el desarrollo de competencias emocionales con sentimientos de felicidad, humor, autoestima, autocontrol, bienestar, calidad de vida, control de la emociones y de los comportamientos.*

Descriptores: *Yoga; Adolescente; Servicios de Salud Mental Escolar; Atención de Salud.*

INTRODUCTION

Adolescence is considered a period of physical, biological and psychosocial changes naturally expected and experienced in the second decade of people's lives, from 10 to 19 years of age, according to definition by the World Health Organization (WHO)[1]. A sensitive time for mental health, decisive in the development of social and emotional skills, as well as habits and strategies for dealing with problems and interpersonal conflicts. Thus, it is estimated that about 14% of all adolescents in the world live with a mental disorder[2].

A Brazilian study showed a prevalence rate of 52.2% for Common Mental Disorder (CMD) in public school adolescents, with a positive association with being female, Black, having a boyfriend and smoking cigarettes once in their lifetime. A higher education level was presented as a protective factor[3]. Another study revealed the prevalence of CMD in 30.0% of Brazilian adolescents, with a higher prevalence in women (38.4%) and in individuals aged 15 to 17 years (33.6%). The prevalence of these disorders also increased with age for both sexes, and there was no significant difference across macro-regions or types of school[4].

Pathological anxiety is the most common CMD in adolescent patients. It leads to the development of behaviors with compensatory strategies in an attempt to avoid contact with what causes fear, which can generate functional impairment in daily life activities. Frequent complaints are related to concern for the future, self-image, loneliness, and fear. The possible medium and long-term implications are a decrease in self-esteem and even a lack of interest in life[5].

One of the great challenges in public mental health policies is to structure really effective actions and programs for adolescents at the Primary Health Care (PHC) level. Most services do not have specific activities for this audience, and when they exist, they are one-off measures. Health professionals find it difficult to address broader issues other than disease prevention and drug use or carrying out actions that go beyond clinical care focused on sexuality[6].

The Integrative and Complementary Health Practices (*Práticas Integrativas e Complementares em Saúde – PICS*), regulated within the Unified Health System (*Sistema Único de Saúde – SUS*) since 2017, may be one of the options available to tackle the problem. About 92.8% of professionals in São Paulo considered PICS a potential resource for mental health care in PHC, but the issue of qualification still persists, as 76.8% of professionals had no training in the field[7].

Yoga is one type of PICS, a practical philosophy, a set of principles and techniques applied for good living, a process of mind-body integration. The benefits of yoga for the health field may be related to the psychosocial level, such as well-being, satisfaction with life, mindfulness and resilience, and even emotional control[8]. A meta-analysis examined the effect of Hatha Yoga on anxiety in adults and after analyzing 17 studies, of which 11 were controlled trials, conducted with 501 participants attested to its effectiveness being positively associated with the total number of hours practiced. Practitioners with high levels of anxiety benefited more from the practices, so Hatha Yoga was considered a promising method for the treatment of anxiety[9].

However, adults and adolescents may have different responses when it comes to interventions, especially in view of the peculiar characteristics of adolescence. This fact calls for the need to gather evidence that can demonstrate aspects of yoga relevance to the mental health of this population group.

Therefore, the present review aims to analyze the effects of yoga practices on the mental health of adolescents as it considers the dissemination of this knowledge essential for the use of this integrative practice as a strategy to promote mental health within SUS.

METHODS

This is an integrative review study based on the model originally proposed by Whittemore and Knafl[10] divided into five phases: 1) problem identification; 2) literature search; 3) data evaluation; 4) data analysis; and 5) presentation. In this type of study, it is possible to integrate experimental and non-experimental quantitative and qualitative research results in the search for scientific evidence to address relevant problems[10,11].

In phase 1, the research problem was contextualized and the following research question was formulated: What are the effects of yoga practices and programs in improving adolescents' mental health indicators?. The literature search, phase 2, was carried out in January 2022 by combining the descriptors yoga or *ioga* in the title and adolescent or teenager as an expanded term in the databases. This was done simultaneously and independently by two researchers with decision by consensus and final agreement with the senior researcher.

Articles published in the last 10 years (2012-2022) were searched considering the current panorama of the theme and its dynamics in the face of changes in health. To select the databases, the researchers accessed the Portal of Journals of the Coordination for the Improvement of Higher Education Personnel (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – CAPES*), Brazil, using a university institutional login and identified the one with the highest concentration of publications related to the area of knowledge.

The search on each database resulted in 522 indexed articles: OneFile® (n=117), Scopus® (n=117), MEDLINE/PubMed® (n=116), Science Citation Index Expanded® (n=56), PubMed Central® (n=55), Social Sciences Citation Index® (n=43), and Sage Journals® (n=18). After reading and cataloging the titles, 346 duplicates were excluded and their links were kept in the first registry in order of presentation.

A total of 183 articles proceeded to the next phase for reading of titles and abstracts followed by consultation of texts when vital information was not available in these sections. The inclusion criteria were: applied research with adolescents aged 10 to 19 years; use of yoga-based interventions; full article freely accessible or accessible via the CAPES Portal and ResearchGate®; peer-reviewed articles. Articles such as reflections, reviews, conference abstracts and opinions and those that used yoga associated with other PICS and/or evaluated only physical health indicators were excluded.

In all, thirty-four (34) articles were eligible for critical reading of the full text. At this phase, 23 articles did not answer the research question and/or did not clarify basic information on the quality of the applied research. The final sample consisted of 11 articles according to the process described in the flowchart in Figure 1.

The third phase of the review consisted of evaluating the data collected using a structured instrument, an important resource at this phase that guarantees all the relevant data are extracted and minimizes the risk of errors in transcription and ensures accuracy in checking information[13].

Data were analyzed based on the grouping of information divided into topics for general characterization of the studies and detailing of the yoga intervention (modality, techniques, duration, scales, before/after changes). The information was discussed between researchers based on the literature on the theme. The presentation of the data culminated in a summary chart highlighting the inclusion of significant results (relevant qualitative data or those with $p<0.05$).

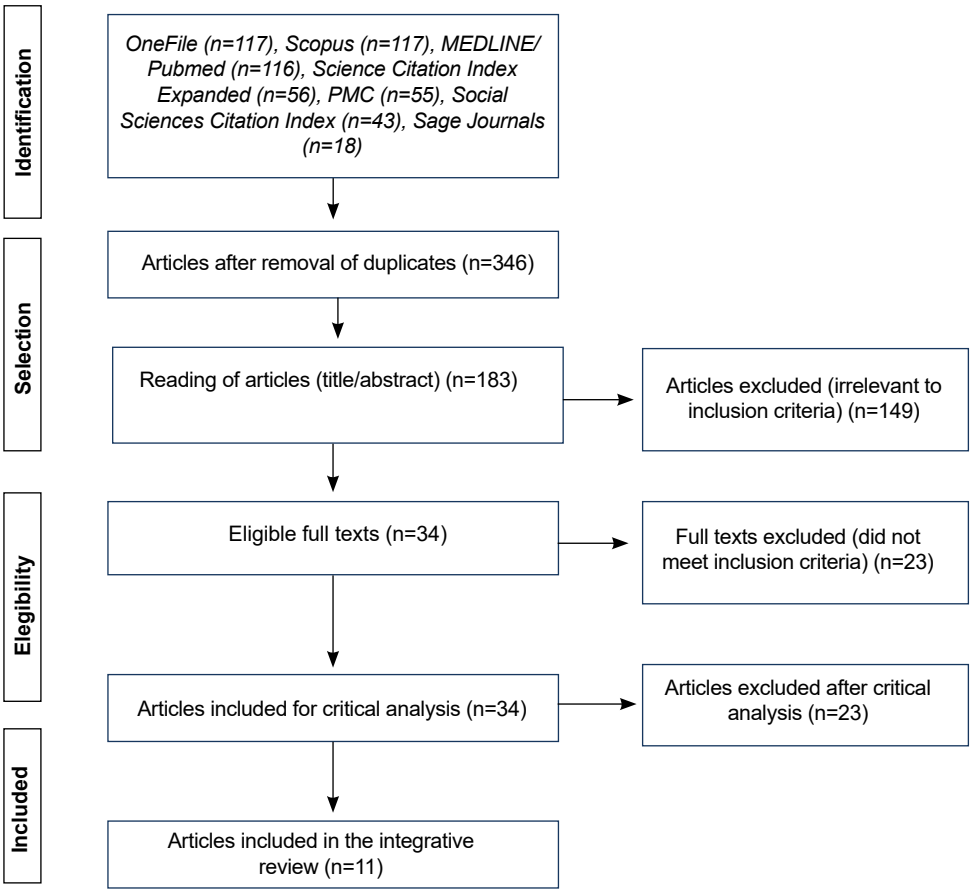

Figure 1 - Article selection flowchart adapated[12] from PRISMA.

RESULTS

A total of 11 articles published in international journals were analyzed, with at least one publication in each year in the period from 2012 to 2021 – except in the years 2019 and 2014. The United States of America (USA) was the country with the highest number of publications (n=6), followed by India (n=5). Chart 1 presents an overview of research on the most relevant topics.

Chart 1 - Description of yoga interventions with adolescents according to sample, intervention characterization, assessment instruments, comparative results and main conclusions

Authorship and year	Objective	Type of study, location and sample	Type of yoga and indicators	Main results
AlaKa Mani, Omkar, Sharma, Chouks, Nagendra, 2021[14]	- To develop a yoga program for anger management in high school adolescents	- Non-randomized controlled pilot study - High school in India - IG* n=28 - CG* n=22	- Integrated Approach of Yoga Therapy (IAYT) - Anger scores	- Yoga module with 16 techniques validated by experts - Significant reduction of anger scores in the yoga group - Recognized as an anger management program
Felver, Razza, Morton, Clawson, Mannion, 2020[15]	- To investigate the effects of the KYIS intervention integrated into physical education (PE) classes	- Non-randomized controlled pilot study - Primary school in the USA - IG* n=9 - CG* n= 14	- Kripalu Yoga in Schools (KYIS) - Socio-emotional competence (SEC) and problematic behavior (PB)	- Increase in SEC over time in the IG, but these students scored significantly lower before the intervention - There were no significant differences in PB
Vaishnav, Vaishnav, Vaishnav, Varma 2018[16]	- To assess the effects of yoga nidra on various dimensions of well-being	- Mixed-methods study - School in India - n=36	- Yoga nidra - Happiness, perceived stress, quality of life, psychological well-being, reported experiences	- Improvement in all quantitative indicators - Reports: being happier, excited, quiet, alert, inspired, active. Greater clarity of thought, control over anger and self-confidence

Setty, Subramanya, Mahadevan, 2017[17]	- To describe the effects of yoga practice on healthy adolescents' attitudes towards violence	- Case-control study - Schools in India - IG n= 90 (Yoga) - CG n=90 (Physical Education)	- Yoga program with five techniques - Attitude towards violence	- Both groups reduced reactions to violence with increased use of non-violent strategies - Boys in IG had significant improvements when compared to CG
Shastri, Hankey, Sharma, Patra, 2017[18]	- To study the effects of Yoga Pranayama and Vedic Mathematics (VM) on mindfulness, aggression and emotional self-regulation	- Case-control study - Pre-university school in India - IG n=73 (Yoga) - IG n=80 (VM) - CG n= 90	- Yoga Pranayama (YP) - Mindfulness, aggression, negative and positive emotional self-regulation	- All indicators changed positively in the Yoga group; - Improvement only in mindfulness in the VM group; - No group changed the positive regulation of emotions
Butzer, LoRusso, Shin, Khalsa, 2017[19]	- To assess the effectiveness of a school yoga program in preventing risk factors for drug use and abuse in early adolescence	- Randomized controlled trial - School in the USA - IG n= 110 - CG n= 91 (Physical Education)	- Kripalu Yoga in the Schools (KYIS) - Mood, perceived stress, impulsive behavior, control, yoga and substance use	- Before/after: CG were more willing to smoke cigarettes than the yoga group - No other immediate changes - Follow-up: yoga women and control men with improvements in emotional self-control
Wang, Hagins 2016[20]	- To report the results of a qualitative evaluation of a yoga program for urban youth	- Qualitative study - 4 US high schools - n=74	- Yoga program with six techniques - Free reports	- Reports: greater self-regulation, mindfulness, self-esteem, physical conditioning, academic performance, concentration and stress reduction
Hall, Ofei-Tenkorang, Machan, Gordon, 2016[21]	- To find out the benefits of yoga and whether they are involved in promoting self-acceptance in girls with eating disorders	- Quantitative pilot study - Urban clinic in the USA - n=20	- Let's Yoga Program with Hatha Yoga - Depression, anxiety, eating attitudes, and eating disorders	- Reduction in anxiety scores [47–42], depression [18–19], anorexia nervosa [10–6], and body image disorders: weight and shape; - No significant change in body mass index
Daly, Haden, Hagins, Papouchis, Ramirez 2015[22]	- To assess the impact of a yoga intervention on high school students' emotional self-control compared to physical education	- Randomized controlled trial - US School - IG n=19 - CG n=18 (Physical Educaton)	- Yoga program with four techniques - Emotion regulation, mindfulness, interoceptive awareness and self-compassion	- Emotion regulation increased in IG compared to CG - No other immediate changes - Positive and significant correlation between body awareness and emotion regulation
Khalsa, Butzer, Shorter, Reinhardt, Cope, 2013[23]	- To assess the effects of a yoga intervention on performance anxiety in a population of teenage musicians	- Controlled trial without randomization - School of Music in the USA - IG n=84 - CG n=51 (Physical Educaton)	- Kripalu Yoga in the Schools (KYIS) - Music performance anxiety and skeletal muscle disorders	- IG with lower averages than the CG for musical performance anxiety. - Solo presentation of the IG participants resulted in lower anxiety scores. - No body changes.
Nidhi, Padmalatha, Nagarathna, Amritanshu 2012[24]	- To compare the effect of a holistic yoga program with Physical Education on the level of anxiety in girls with PCOS	- Randomized controlled trial - School in India - IG n=37 - CG n=35 (physical education)	- Yoga program with four techniques - State/trait anxiety and other body indicators	- Both groups showed improvement in trait anxiety, with no change in "state anxiety" - The IG observed a greater reduction in trait anxiety than the CG

*IG = Intervention Group; CG = Control Group. Source: own elaboration, 2022

The level of evidence[25] of the research was classified as follows: Level II - Evidence obtained from at least one randomized, controlled and well-designed clinical trial (n=3)[19,22,24]; Level III - Evidence from a well-designed and controlled study without randomization (n=3)[14,15,23]; Level IV - Evidence from a study with a case-control design (n=2)[17,18]; Level VI - Evidence from a single descriptive or qualitative study (n=3)[16,20,21].

The number of adolescents submitted to at least one of the yoga techniques ranged from 20[21] to 243[18], with age ranging between 10[20] and 18[18,21,24] years. In all, 63.6%[16,17,20,21,22,23,24] of the 11 studies were targeted at a 15-year-old audience.

With regard to the modalities of yoga used in the research, four were based on Hatha Yoga, a practice associated with physical and breathing postures, which can be divided into several branches associated with a style or lineage[26]. Some studies[15,19,23] used the Kripalu style (KYIS), a Hatha Yoga style with techniques following a calm and relaxing rhythm that is ideal for people of all ages and that uses postures, breathing exercises, meditation and relaxation with a focus on stress reduction. There was also the use of another style, the Let's Yoga at work[21].

Two studies used only one of the various techniques that can compose the practice of yoga: yoga nidra or relaxation technique[16] and pranayamas or breathing techniques[18]. In the first study[16], the author used the conscious relaxation technique that involved a guided relaxation process. In the second study[18], the yoga used in the intervention consisted only of performance of breathing exercises, which involve concentration and focus on the process of breathing in and out to raise awareness of the breathing process.

The other studies[14,17,20,22,23,24] did not present a specific type of yoga, but detailed the program with the chosen techniques, which included physical, breathing, relaxation and meditation practices. Some studies[14,23] included readings on philosophy and theoretical content on yoga. One of them[14] piloted a project with a model of yoga practice validated by specialists in an interdisciplinary sphere (practitioners, instructors, researchers in the field of yoga, psychologists and adolescent behavior researchers) who evaluated 18 yoga techniques at different levels in order to list the best ones to compose the practice model to be used.

The duration of yoga practices lasted from one month to four months (n=8)[14,15,16,17,21,22,23,24], more than four months (n=2)[19,20] and less than one month (n=1)[18]. Classes were held from one[19,20,21] to seven[18,24] times a week, lasting from 6 hours[16] to 84 hours[24] of practice in total and taught by 100% of instructors qualified in yoga[19,20,21,22,23]. However, the studies[14,15,16,17,18,24] did not discuss how many hours or the type of training these teachers had.

All the studies[14,15,16,17,18,19,20,21,22,23,24] included at least two data collection moments – before and after the intervention. Follow-up assessment was done in three studies[19,21,22]. One study[19] analyzed the effects of yoga practices at the 6th and 12th month post-intervention, with effects that remained positive for emotional self-regulation in women, but without a significant increase; another study[21] used the follow-up at the 6th and 12th week to assess physical aspects (weight, body mass index - BMI, waist circumference) that did not show any changes; the third study[22] analyzed the 8th and 12th weeks plus 2 weeks post-intervention, but due to incomplete completion of the questionnaires by the participants the analysis of all the tools was not performed.

The studies applied validated scales to assess mental/emotional health indicators, which were grouped in this review as follows: reduction of anxiety (n=3)[21,23,24]; reduction of aggressive or violent attitudes (n=4)[14,16,17,18]; emotional states and feelings (n=5)[15,16,20,21,22]; and control of emotions and behaviors (n=5)[15,18,19,22]. Ten (10) studies[14,15,16,17,18,19,21,22,23,24] reported quantitative results and one study[20] reported qualitative findings for the variables mindfulness, self-regulation, self-esteem, the intervention itself and reduction of stress in students. There was also a mixed-methods study[16] that qualitatively reported a state of happiness, peace, vitality, well-being and other physical indicators.

With the aim of evaluating the results of the yoga intervention on anxiety, two studies used the state trait anxiety inventory - (STAI) questionnaire. As for the results, there was an improvement in trait and state anxiety[21], whereas in another study[24] only trait anxiety improved. One of the studies[17] sought to understand the causes related to attitudes of violence by adolescents through the Likert-type Scale of Attitude towards Violence (ATV), which assesses "attitudes towards violence in interpersonal relationships" and "attitudes towards violence in other domains" (war and death penalty). Another study[14] applied the Adolescent Anger Rating scale validated in India based on the well-known Anger Rating Scale STAXI-2A of Western origin.

Some studies[15,16,20,21,22] analyzed emotional states and feelings, such as: happiness, mood, self-esteem, self-compassion, well-being, quality of life, stress and self-control, the latter being defined as the ability to organize attention and behaviors in different circumstances and events, that is, it can influence other emotional states or feelings. Other studies[21,22] focused, respectively, on eating disorders and prevention of risk factors regarding the use of drugs.

The resilience, emotion and behavior variables showed a socio-emotional improvement in the intervention group, but no differences in the behavior variable in relation to the control group made up the control of emotions and feelings category in one of the studies[15]. In the qualitative study(19), self-regulation emerged as a benefit of yoga practice for students' emotions and actions, with a strong impact on both physical and mental health.

There were studies[15,19,20] that used scales or questionnaires to analyze the effects of the intervention itself, but another study[14] also evaluated the method itself, but through an external analysis by 22 specialists (6 practitioners

and yoga therapists, 4 yoga teachers, 4 yoga researchers, 10 psychologists and 2 experts in adolescent counseling) of the techniques to be used in the construction of the intervention practice model through the calculation of content rationality through the Content Validity Ratio (CVR). Other studies[16,18,20,22] have looked for indicators of intervention effectiveness, evaluating only one of the yoga techniques - the effect of yoga nidra and mindfulness worked on in meditation.

DISCUSSION

The school has become a positive environment for the development of strategies to promote mental health through yoga, either by means of the concentration of adolescents or the learning environment itself, as demonstrated by nine studies[14,15,16,17,18,19,20,22,24]. However, there are difficulties in the practice of yoga in the school environment, such as the lack of a suitable place for the practice as most schools are in urban areas and the practices are developed at times that interfere with other activities[19].

Adolescents between 12 and 14 years old had higher rates of reduction in violent attitudes. This is because in these first years of training they tend to be more influenced; therefore, it is an ideal time to insert the practice of yoga in the lives of these students[21]. The more advanced the development, the better the students' ability to articulate and perceive, which directly influences the assessments made from the experiences generated by the intervention, especially when evaluating emotional indicators[19]. Two studies found a significant reduction in attitudes towards violence in the group of adolescents who practiced yoga, especially in male participants, with aggressiveness scores in the ATV also decreasing with age[14,17].

As for yoga practices, it has been observed that classes involving more physical activities with greater movement and challenges aroused greater interest in adolescents[21]. Also, the long-term effect of yoga sessions is influenced by exposure as their ability to regulate emotions is evidenced by increased scores and effects maintained for up to one year post intervention, with girls benefitting more from them than boys. It should also be noted that at schools there is a female preference for the practice of yoga in relation to Physical Education[22].

Another fundamental point to consider is the predisposition of adolescents to practice yoga as this strategy only benefits participants if they are interested and willing to perceive the effects of this PIC. Therefore, non-randomized studies of yoga interventions would be a better strategy[23]. Another study[16] reinforces this idea and emphasizes the need for a control group to measure whether the positive effects of the program are effects of yoga or the sense of strengthening of and belonging to a group[20]. However, it is important to keep the control group motivated as it was observed in one of the studies[16] that this group was not interested in completing the questionnaires that were not addressing any innovative or different activity in students' opinions.

Despite not being the focus of this research, the analysis of the intervention model to be used was intensely assessed by the studies already published. The attempt to normalize and standardize yoga techniques is moving towards a design. The study[14] that proposed a pilot program and those that involved Kripalu Yoga in the Schools (KYIS)[15,19,23] seem to be a little more advanced in this process of integrating not only physical practice but also theoretical knowledge about the healthy lifestyle and habits of yoga practitioners.

Yoga is an important health promotion strategy acting on different aspects of adolescents[17]. Health promotion is understood as a process of training the individual and community to improve their quality of life and health and empowering them towards their care process[27], with one of the aspects of this care being mental health[27]. Within the individual's maturation, emotional self-knowledge allows adolescents to develop emotional competence skills that will impact their behaviors and choices[24], such as the choice to smoke cigarettes[23].

The improvements in socio-emotional competence generated by yoga were translated in the ability to manage life's stressors and create coping strategies to deal with these problems[16]. With practice, the cognitive-behavioral effects result in greater awareness of the practitioner about how thoughts and emotions arise in response to various environmental events, thus allowing them to reduce negative emotions and improve vitality and the ability to cope with adversity[24]. The adolescents' reports indicated that these benefits extended during the day and in school classes[19].

Mindfulness was influenced by both the practice of yoga and Vedic Mathematics[17]. Mindfulness is understood as the mental attitude of total concentration on the present moment, but it can also be a specific type of meditation training – an induced and guided state of mind that contemplates or observes, whether it is an object, a place, sound or breathing itself[28]. In both cases, the facilitator needs to consider factors specific to adolescence, such as the physiological immaturity of the frontal lobe and the identification and forced control of negative emotional attitudes, which generates even more stress[29].

Yoga is an alternative tool for health promotion[30], and it can also be used as an online resource for a care strategy, especially at a time of a recently experienced COVID-19 pandemic[31]. It is important to emphasize that in order to develop the practice of yoga within the school environment, it is also necessary to have professionals trained to administer the sessions[30]. Thus, if yoga is to be used as a health promotion strategy in schools, the following aspects should be observed: choosing a dynamic, attractive type of yoga with emphasis on physical postures; promoting a quiet environment conducive to concentration; keeping a continuous practice in order to maintain a strong bond and improve understanding that the benefits of yoga are gradual.

For scientific research purposes, the complexity of adapting such a theme to a scientific model becomes increasingly clear, since biases are involved in the process, such as: the search for a set of practices, a method to be replicated, the difficulty of estimating a sample, the non-randomized model emerging as an important factor in the engagement of the researched population, the diversity of approaches to the expected results, the cultural and epidemiological diversities of the research locations and the low number of studies on the state of the art of this scenario. Therefore, new pilot projects and more research in the area are necessary so that the methodological doubts are resolved and the benefits of yoga on the mental health of school adolescents can be more clearly delineated.

The present review has limitations related to the integrative method itself, as it does not address a systematic analysis of the data and instead presents a synthesis of mental health indicators obtained through repetition and interpretation by the researchers. There are limitations in the discussion and comparison of the yoga methods used, as well as in the evaluation tools used. The limitations found in the studies relate to the applicability of research and theorizing methods, such as the type of technique used according to the research motivation, the number of participants, and tools to be used. In addition to the research biases given the complexity of the subjective analysis of emotions, there is a sociocultural and epidemiological influence on the sample and scarcity of studies in this area for comparison purposes. For methodological purposes, it is recommended not to randomize samples due to the adolescents' motivation towards the practices and to develop techniques for linking and encouraging adolescents limiting the age range to the early years of adolescence, to develop a case-control study in practical activities such as physical education and apply follow-up and, whether possible, to develop qualitative and quantitative research in order to present statistical indicators and assess participants' self-perception of their health process.

CONCLUSION

The effects of yoga on the mental and emotional health of adolescents, according to the literature investigated in this review, were related to the reduction of anxiety and attitudes of aggression or violence. Those who had contact with the practice of yoga showed improvements in the development of emotional skills and experienced feelings of happiness, mood, self-esteem, self-control, well-being, quality of life, in addition to controlling emotions and behaviors.

ACKNOWLEDGMENTS AND CONFLICTS OF INTEREST

We thank the Office of the Dean for Research and Graduate Studies at the Federal University of Sergipe (*Universidade Federal de Sergipe*) for granting scientific initiation scholarships.

There are no conflicts of interest to declare.

CONTRIBUTIONS

Thaynan Faria Barros and **Geissiane Felizardo Vivian** contributed to the conception and design of the study; the acquisition, analysis and interpretation of data and the writing and revision of the manuscript. **Anny Giselly Milhome da Costa Farre** contributed to the conception and design of the study and the acquisition, analysis and interpretation of data. **Priscilla Daisy Cardoso Batista** contributed to the revision of the manuscript. All authors approved the version of the article to be published and are responsible for its content and integrity.

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Mailing address:
Thaynan Faria Barros
Universidade Federal de Sergipe - Campus de Lagarto
Av. Governador Marcelo Déda, s/n
Bairro: São José
CEP: 49400-000 - Lagarto - SE - Brasil
E-mail: thaynan.fb@hotmail.com

How to cite: Barros TF, Vivian GF, Farre AGMC, Batista PDC. Effects of yoga practices on adolescents' mental health: an integrative review. Rev Bras Promoç Saúde. 2022;34:11742.