Review article

Interventions for music performance anxiety: results from a systematic literature review

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Abstract

Background: Music performance anxiety (MPA) is characterised by fears related to performing music. It may result in damages to personal life and professional career, so treatment and prevention are very important. **Objective**: To undertake a systematic literature review on the effectiveness/efficacy of MPA interventions and to integrate these findings to those in the literature reviewed previously. **Methods**: We used PubMed, PsycINFO and SciELO databases and keywords *music*, performance anxiety, treatment, therapy* and *intervention* and manual research. We selected articles published between October-2002/July-2016. **Results**: Out of 97 articles, 23 were reviewed. Sixteen studies presented inter-group experimental design, and seven presented pre-post experimental design. The intervention modalities reviewed were cognitive behavioural therapy (CBT), virtual reality exposure, biofeedback, yoga, meditation, music therapy and the Alexander technique. Although the interventions presented some indicators of efficacy in the MPA outcomes and improvement in performance quality, important methodological limitations were observed: low number of individuals and non-specific criteria for their inclusion/exclusion. This reinforces previous findings regarding methodological fragilities associated with this context. **Discussion**: CBT is the most frequently studied modality and with the greatest number of effectiveness indicators. The remaining modalities indicate tendencies in positive outcomes that require further and efficient investigation in more rigorous studies with greater methodological control.

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Introduction

Music performance anxiety (MPA) is considered a subtype of social anxiety disorder. It is typified by the presence of specific fears related to performing music[1], and it can be related to both solo and group presentations, as well as to any instrument, including singing[2-4] MPA can impact not only the performance itself but also the musician's career and quality of life[5,6] therefore, representing a condition that requires the attention of clinicians in its recognition and treatment.

Although MPA has been a part of the human experience for a long time, it was not until the 1970s that medical and psychological treatment and intervention-related research started being conducted. Among these treatments and interventions, behavioural and cognitive behavioural therapies, pharmacological interventions (mainly beta blockers), biofeedback, meditation and music therapy all stand out. There has been a focus on adult musicians, as observed by two previous literature reviews, one of which was systematic[7] and the other was non-systematic[8].

The results of these reviews denote some evidence of effectiveness. When behavioural and cognitive behavioural therapies were considered, a reduction in MPA and improvement in music performance quality was found[7]. Combined interventions, such as cognitive behavioural therapy associated with biofeedback and progressive muscle relaxation, were also found to have positive effects on decreasing MPA, as did the use of beta blockers[7,8].

According to Kenny[7], an important factor to consider is the methodological fragility of the studies carried out in this context, particularly in terms of the low number of participants and of experimental inter-group crossover studies, the lack of rigour in the methods used and the non-standardisation of the instruments utilised in outcome assessment.

The aforementioned reviews concluded that this field has yet to be explored through new research, which should focus on the methodological refinements necessary in order to create stronger evidence on the efficacy of MPA-related treatments.

It is known that a) the results on the effectiveness of different interventions presented thus far have been inconclusive; b) the reviews published till date[7,8] did not include studies that assess children and adolescents (which seems important, as MPA may begin in infancy or adolescence, and as early interventions in this group may prevent suffering and negative effects on their musical careers as adults); and c) new studies are still being published. Given these factors, we propose this present study, the aim of which is to undertake a systematic literature review seeking a) to assess the efficacy and effectiveness of MPA treatments/interventions in children, adolescents and adults and b) to integrate the current findings into the body of knowledge from the previously reviewed literature.

Material and methods

This study was carried out in accordance with the guidelines set in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses[9] and in the Cochrane Handbook for Systematic Reviews of Interventions[10]. A systematic search was performed in the PsycINFO, PubMed and SciELO electronic databases, using the following keywords: (*Music* Performance Anxiety*) and (*treatment or therapy or intervention*). Articles published from October 2002 (the date of the latest article included in the systematic literature review conducted by Kenny in 2005[7] onwards were included, wherein the last search was performed in July 2016. The article inclusion and exclusion process followed the criteria shown in Figure 1.

As shown in Figure 1, 97 articles were found. After applying the inclusion and exclusion criteria, 19 articles were selected, which were independently evaluated in terms of their relevance by two

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professionals with experience in the field of anxiety. Out of the 19 articles, five were found to have been repeated, which result in a total of 14 articles. Thereafter, a search was performed in handbooks and periodicals specific to the music field (*Research in Musical Behaviour,* the *Journal of Research in Music Education, Medical Problems of Performing Artists, Psychology of Music and Music Education* and the *Journal of Music Therapy*), as well as in the bibliographical references of the articles selected, from which nine new articles were found. Therefore, a total of 23 articles were chosen to be analysed[11-33]. For studies that show crude numeric data, the size effect of significant differences was calculated. We used the Cohen statistics.

Results

Of the 23 studies analysed, most were conducted in the United States (n = 11) and in Australia (n = 4). The intervention modalities studied by the articles were, in descending order: cognitive behavioural therapy (n = 6), yoga (n = 4), meditation (n = 4), virtual reality exposure (n = 3), biofeedback (n = 3), music therapy (n = 2) and the Alexander technique (n = 1). It was found that none of the studies assessed combined interventions pertaining to different modalities and that the interventions assessed were not standardised in terms of duration, session frequency or technique utilised.

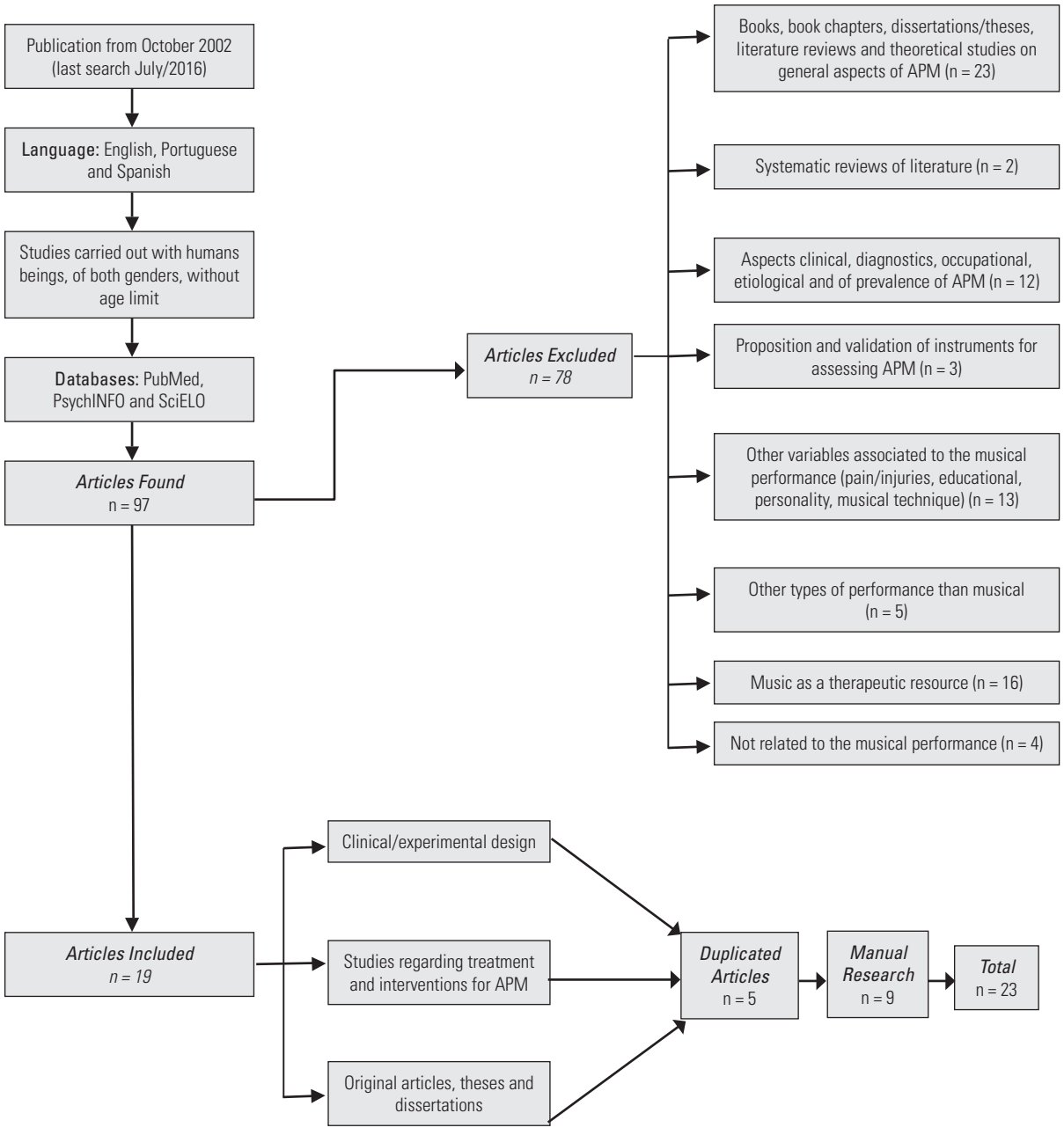

Figure 1. Flowchart regarding the inclusion/exclusion of articles of the review presented.

Concerning design, in accordance with the inclusion criteria adopted, all of the studies were clinical (experimental). Out of these studies, most (n = 16) employed the intergroup modality (case control), and less than half were randomised (n = 7). The remainder (n = 7) had a pre-experimental design (pre- and post-intervention assessment) with a single group.

The samples were composed of varying numbers of subjects, with a minimum of four and a maximum of 162 (experimental group: mean 21.8 and median 14; control group: mean 19.9 and median 9).

Most of the studies used both genders in their clinical samplings (n = 14); five studied only adolescents, and one studied only children. The remainder focused on young adults.

Most of the subjects had been recruited in music schools and courses, and most of them were music students (n = 19). No study assessed interventions using exclusively professional musicians. It was noted that the musical instruments played by the musicians varied, with a predominance of the piano (approximately 176 subjects), followed by wind instruments (approximately 119 subjects) and string instruments (approximately 103 subjects).

Few studies were clear as to the criteria adopted for the inclusion and exclusion of subjects (n = 2). Similarly, many studies failed to consider the level of MPA demonstrated by the subjects (whether pathological or considered within an acceptable level of normality).

In the 16 studies with an inter-group experimental design, the control groups were, in general, quite consistent with the socio-demographic characteristics of the experimental group in question, though, as mentioned, these studies often did not monitor the extent of MPA as a variable. The subjects in the control group were recruited from the same locations as those in the experimental groups, meaning they were also music students.

This information can be viewed in Table 1.

Table 1. Socio-demographic characterisation of the samples and methodological aspects used in the studies assessed in the present review

Number	Author/Year/ Country	Sample						Musician's Characteristics		Study Design	Intervention	Intervention Characteristics	Control Intervention
		Experimental Group			Control Group								
		n	Age	Education	n	Age	Education	Level	Instrument				
11	Osborne *et al.* (2007) Australia	6♂ 8♀	13,9 (1,22) Ad	ES	3♂ 6♀	13,9 (1,22) Ad	ES	S	8st, 5pi, 8w, 2 per	E inter-R	CBT	7ss (3Gr, 4I)	Behaviour Exposure Only
12	Bien Aime (2011) USA	4♀	25,0 A	U	–	–	–	S	1 v, 3pi	PE (PP)	CBT	3 ss	–
13	Clark and Williamon (2011) England	14♂♀	24,1 (7,47) A	U	9♂♀	22,9 (2,56) A	U	S	6pi, 5v, 7st, 5w	E inter	CBT	18ss (Gr+I) Weekly	None
14	Errico (2012) USA	41♂ 43♀	Ch	ES	37♂ 41♀	Ch	ES	S	NI	E inter	CBT	6ss Weekly	Training the performance material
15	Hoffman and Hanrahan (2012) Australia	15♂♀	42,1 (15,18) A	NI	18♂♀	42,1 (15,18) A	NI	S	17v, 16 (pi, st, w)	E inter-R	CBT	3ss Weekly	None
16	Braden *et al.* (2015) Australia	30♀	13,7 (0,87) Ad	JHS	32♀	13,8 (0,84) Ad	JHS	S	16 pi, 21 w, 14 st, 7 v, 3 per, 1 v+st	E inter	CBT	8ss (Gr) Weekly	None
17	Khalsa and Cope (2006) USA	5♂ 5♀	25,3 (3,1) A	NI	4♂ 4♀	13,8 (0,84) Ad	NI	S	4v, 9st, 1w, 3pi, 1per	E inter	Y	64ss (Gr) Daily	None
18	Khalsa *et al.* (2009) USA	EG1: 6♂ 9♀ EG2: 8♂ 7♀	EG1: 24,5 (2,4) A EG2: 25,4 (3,9) A	EG1: NI EG2: NI	6♂ 9♀	24,0 (1,6) A	NI	S	23st, 13w, 4pi, 5v	E inter	Y	G1: 24ss (Gr) 3/week + 2 days intensive + 6ss problem solving G2: 24ss (Gr) 3/week	None
19	Stern *et al.* (2012) USA	17♂♀	21,7 (3,1) A	U	–	–	–	S	v, inst	PE (PP)	Y	14ss 2/ week + homework	–
20	Khalsa *et al.* (2013) USA	30♂ 54♀	16,4 (0,9) Ad	U	29♂ 22♀	16,5 (1,5) Ad	U	S	NI	E inter	Y	6ss Weekly	None
21	Thurber (2006) USA	4♂ 3♀	23,42 A	NI	5♂ 2♀	23,42 A	NI	NI	3w, 3pi, 4v, 1per, 2st, 1comb	E inter	BF	4/5ss (I)	None
22	Silvana *et al.* (2008) Macedonia	3♂ 9♀ *	♂20,0 (0,00) A ♀20,9 (2,98) A	U	*	♂20,0 (0,00) A ♀20,9 (2,98) A	U	S	NI	E inter-R	BF	20ss (I)	Usual practice

continuation

Number	Author/Year/ Country	Sample						Musician's Characteristics		Study Design	Intervention	Intervention Characteristics	Control Intervention
		Experimental Group			Control Group								
		n	Age	Education	n	Age	Education	Level	Instrument				
23	Wells *et al.* (2012) Australia	22♂ 24♀ *	30,4 (11,98) A	NI	*	30,4 (11,98) A	NI	NI	30w, 11v, 5st	E inter-R	BF	1ss	Breathing techniques or Reading their preferred material
24	Chang *et al.* (2003) USA	2♂ 7♀	26,6 (6,8) A	U	3♂ 7♀	26,5 (6,6) A	U	S	12pi, 3st, 3v, 1ot	E inter-R	Me	8ss (Gr) Weekly + home practice	None
25	Lin *et al.* (2008) USA	5♂ 14♀ *	25,1 (6,7) A	U	*	25,1 (6,7) A	U	S	12pi, 2ot, 3v, 2st	E inter-R	Me	8ss (Gr) Weekly + home practice	None
26	Su *et al.* (2010) Taiwan	26♂ 33♀	NI	ES	–	–	–	S	46pi, 13st	PE (PP)	Me	16ss 2/ week	–
27	Sousa *et al.* (2012) Portugal	1♂ 7♀	11,5 (0,7) Ad	NI	2♂ 6♀	12 (0) Ad	NI	S	16w	E inter	Me	14ss 2/ week + Home practice	None
28	Orman (2003) USA	5♂ 3♀	20,6 A	U	–	–	–	S	6w, 2 (w+pi)	PE (PP)	VE	12ss (VE) Weekly + 3ss (live exposure)	–
29	Bissonnette *et al.* (2011) Canada	9♂♀	21,8 (5,2) A	NI	8♂♀	21,8 (5,2) A	NI	NI	pi, st	E inter-R	VE	6ss Weekly	None
30	Conklin (2011) USA	12♂♀	NI	U	–	–	–	S	12pi	PE (PP)	VE	5 ss	–
31	Kim (2005) South Korea	6♀	25,0 (2,2) A	U	–	–	–	NI	6pi	PE (PP)	MT	6ss Weekly	–
32	Kim (2008) South Korea	GE1 15♀ GE2 15♀	20,0 A	U	–	–	–	S	30pi	PE (PP)	MT	GE1: 6ss weekly GE2: 6ss weekly	–
33	Hoberg (2008) South Africa	6♀	12,8 Ad	NI	6 (NI)	11-18 Ad	NI	S	12w	E inter	AT	12 ss	None

A: adult; Ad: adolescent; AT: Alexander Technique; BF: Biofeedback; CBT: Cognitive Behavioural Therapy; Ch: Child; comb: combination of two kinds of instruments; E: experimental; ES: elementary school; G: group; Gr: group; HS: High School; I: Individual; inter: inter-groups; inst: instrument; JHS: junior high school; Is: lessons; Me: Meditation; MT: Music Therapy; NI: not informed; ot: others; P: professional; per: percussion; pi: pianist; PE (PP): pre and post intervention; R: randomized; S: student; ss: session; st: strings; U: university students; USA: United States of America; v: voice; VE: Virtual Exposure; w: wind; Y: yoga. * article does not discriminate the number of subjects on the basis of experimental and control groups. ♀: females; ♂: males.

The effectiveness of the interventions analysed was also considered. The results are summarised in Tables 2 and 3. This data can also be seen in more detail in the Supplementary Material.

The effectiveness of cognitive behavioural therapy (Table 2) was evaluated based on 10 different outcomes. In two studies, a decrease in MPA was found, as were improvements in performance (N = 2), self-efficacy (N = 2) and self-confidence (N = 2), with effect size evaluated as medium-very large. It is important to indicate that one of the studies which showed a decrease in MPA was conducted on adolescents[16]. However, these findings are not unanimous among the studies, as around half did not find changes to these variables following the cognitive behavioural therapy intervention. This evidence was found to be more present in pre-experimental studies (pre- and post-intervention). It was also found that there was a relative variability in the instruments utilised to assess the different outcomes.

Virtual reality exposure was also considered. Table 2 shows that the main positive results point to decreases in MPA, discomfort, confidence and heart rate; however, these outcomes were evaluated in three different studies[28-30] with a pre-experimental design and a restricted number of subjects. These results, despite showing robust effects sizes, do not allow conclusions, only point to possible trends.

When the biofeedback intervention was considered, no alterations were found in the outcomes for subjective anxiety, whether general or performance-related (Table 2). Two experimental-type studies[21,22] showed improvements in different neurophysiological variables.

Table 2. Results of Cognitive Behavioural Therapy, Virtual Reality Exposure and Biofeedback interventions on different outcome variables

	Outcome Measures	Instrument*	Results*	Effect size (♦)
Cognitive Behavioural Therapy 6 studies	Anxiety – Trait	STAI-T[13-15]	EG = CC[13-15] $EG_b = EG_a$[13,15]	
	Anxiety – State	STAI-S[11]	EG = CG[11]	
	Cognitive Anxiety	CSAI-2R[13]	EG = CG[13]	
	Somatic Anxiety	CSAI-2R[13]	EG = CG[13]	
	Musical Performance Anxiety – self evaluation	NVI [12] MPAI-A[11,16] PAI[15]	EG < CG[16] EG = CG[11,15] $EG_b > EG_a$[15,16] $EG_b = EG_a$[12]	0.41 to 0.93 = medium/large
	Musical Performance Quality – self evaluation	NVI[12] MSS[13]	EG = CG[13] $EG_b < EG_a$[12,13] $EG_b = EG_a$ [12]	0.54 to 0.79 = large
	Musical Performance Quality – hetero evaluation	PQ[15,16]	EG = CG[15,16] $EG_b < EG_a$[15] $EG_b = EG_a$[16]	0.39 = medium
	Self-efficacy/Self-confidence	NVI [12] SEMPQ[13] (efficacy) CSAI-2R [13] (confidence) SRLIS [13] (self learning)	EG > CG[13] (efficacy, self learning) $EG_b < EG_a$[12,13] $EG_b = EG_a$ [13] (confidence) EG = CG[13] (confidence)	0.46 = medium 1.05 to 3.90 = very large
	Heart Rate	–	EG = CG[11,15] $EG_b = EG_a$[15]	
	Frontalis Muscle Movement	–	EG = CG[11]	
Virtual Reality Exposure 3 studies	Anxiety – State	STAI-T[29]	$EG_b = EG_a$[29]	
	Confidence	PRCP[29]	$EG_b > EG_a$[29]	2.66 = very large
	Musical Performance Anxiety – self evaluation	CPAI virtual[30] CPAI live[30]	$EG_b > EG_a$[30] $EG_b > EG_a$[30]	0.74 = large 0.91 = large
	Discomfort	SUDS[28,29]	$EG_b = EG_a$[29] 3 subj – M 1 > M 2 > M 3[28#] 3 subj – M 1 < M 2 > M 3 [28#] 1 subj – M 1 < M 2 < M 3[28#] 1 subj – M 1 = M 2 > M 3[28#]	
	Heart Frequency	–	$EG_b = EG_a$[29] * 1 subj – M 1 > M 2 > M 3[28#] * 2 subj – M 1 > M2 < M 3[28#] * 5 subj – M 1 < M 2 > M 3[28#]	
Biofeedback 3 studies	Anxiety – Trait	STAI-T[21,22]	EG = CG[21,22]	
	Anxiety – State	STAI-S[21-23]	EG = CG[21-23]	
	Music Performance Anxiety – self evaluation	PAI[21]	EG = CG[21]	
	Music Performance Quality – hetero evaluation	FSS[21] NVI[22]	EG = CG [21] EG> CG [22]	
	Heart Frequency	–	EG = CG[21]	
	Heart Rate Variability	–	EG = CG[21]	
	Alpha Power	–	EG > CG[22]	
	Integrated EMG Power	–	EG > CG[22]	
	Alpha Suppression	–	EG < CG[22]	
	Alpha Peak Frequency	–	EG < CG[22]	
	Individual Alpha Band Width	–	EG < CG[22]	
	Vagal Tone	–	$EG_b < EG_a$[23]	

CG: Control Group; CPAI: Conklin Performance Anxiety Index; CSAI-2R: Revised Competitive State Anxiety Inventory 2; EG: Experimental Group; FSS: Flow State Scale; NVI: Not Validated Instrument; M: moment; MPA: Music Performance Anxiety; MPAI-A: Music Performance Anxiety Inventory for Adolescents; MSS: Music Skills Survey; PAI: Personal Anxiety Inventory; PQ: Performance Quality; PRCP: Personal Report of Confidence as a Performance scale; STAI-S: State Anxiety Inventory; STAI-T: State-Trait Anxiety Inventory-Trait; SRLIS: Self-Regulated Learning Interview Schedule; SUDS: Subjective Units of Distress Scale; $_a$. After Intervention; $_b$: Before Intervention; *: article number, according to Table 1; #: statistical analysis not performed; (♦) effect size: range of variation – calculated only for the study had a mean value and standard deviation, as supplementary material.

Yoga was also used as an intervention technique. Table 3 shows that, unlike the others, this group of studies tended to use the same instruments to evaluate outcomes, a factor which is considered positive. Although they all reported improved MPA indicators in one way or another, only two of the experimental studies[17,20] truly presented efficacy indicators on this level (one of these studies was conducted on adolescents), with medium effects sizes. There was no evidence of changes to the indicators of general mood, stress, disposition, sleep or musculoskeletal disorders except in one study[20], in which the severity levels of these disorders decreased. However the effect size is little (d = 0.02).

Meditation was also used as an intervention. Table 3 shows that limited evidence on effectiveness was found, with the exception of MPA and heart rate outcomes, in which positive alterations were

found in isolated form in the studies[24,25,27]. It is important to note that the study[27] involved adolescents and, though experimental, had quite a small sample size (n < 19).

Table 3 also shows that with regards to music therapy, the only two studies which were assessed reported positive evidence only in terms of the decrease in state anxiety (effect size: 0.72-1.14). Concerning the remaining variables, Kim's study[32] indicates improved MPA, stress and tension; however, it was a pre-experimental study which only assessed 20 subjects.

Finally, it is important to note that only one study evaluated the Alexander technique. This study reported improvements in anxiety, physiological symptoms and musculoskeletal symptoms. The significance of these improvements was not assessed from a static perspective in this study.

In an attempt to integrate the findings of this current review with those from previous reviews, we have grouped together the different interventions and the main evidence on effectiveness by the outcome assessed. This data can be seen in Table 4.

The principal intervention modality, which was found to produce positive results for the treatment of MPA in both the previous and current reviews, was behavioural and/or cognitive therapies. It is also important to note that the main effect shown was the reduction in MPA (10 out of 19 studies). The current review has also found evidence of a positive effect on this outcome, as well as on performance quality, self-efficacy and trait anxiety levels, an observation which supports the previous findings, with medium effects size. Nonetheless, it must be noted that the positive findings were not unanimous in any of the reviews, as some of the studies did not show favourable results.

The current review found that other intervention modalities have been attracting a greater interest from researchers, with some signs/tendencies of effectiveness in MPA treatment. These interventions include yoga, virtual reality exposure, biofeedback and music therapy. It is in this way that new tendencies in interventions are revealed; these interventions need to be systematically assessed to determine their efficacy in the treatment of MPA.

Table 3. Results of Yoga, Meditation, Music Therapy and Alexander technique interventions on different outcome variables

	Outcome Measure	Instrument*	Result*	Effect size (♦)
Yoga 4 studies	Anxiety – Trait	STAI-T[19,20]	EG < CG[20] EG_b > EG_a [19,20]	0.34 = medium 0.85 to 0.90 = large
	Anxiety – State	STAI-S[20]	EG = CG[20]	
	Music Performance Anxiety – self evaluation	MPAI-A[20] KMPAI[19]	EG < CG[20] EG_b > EG_a[19]	0.31 to 0.40 = medium 0.65 = large
		PAQ group[17-20]	EG < CG[20] EG = CG[17] EG_b > EG_a [17-19]	0.45 = medium 0.51 = large
		PAQ practice[17-20]	EG = CG[17,20] EG_b = EG_a[19] EG_b > EG_a [17,18]	
		PAQ solo[17-20]	EG < CG[17,20] EG_b > EG_a [17-19]	0.26 = medium 0.35 = medium
	Humour	POMS[17-19]	EG = CG[17,18] EG_b = EG_a [17-19]	
	Disposition	DFS-2[17]	EG = CG[17] EG_b = EG_a[17]	
	Sleep	PSQUI[18]	EG = CG[18]	
	Stress	PSS[18]	EG = CG[18]	
	Skeletal Muscle Disorder	PRMD-Q[17,18]	EG = CG[17,18] EG_b = EG_a[17]	
		PRMD-Q frequency[20]	EG = CG[20]	
		PRMD-Q severity[20]	EG < CG[20]	0.02 = small
Meditation 4 studies	Anxiety – State	EADS-C[27]	EG = CG[27] EG_b = EG_a[27]	
	Musical Performance Anxiety – self evaluation	PAI[24,25] MPAI-A[26]	EG = CG[24] EG < CG[25] EG_b > EG_a [24] EG_b = EG_a[26]	0.02 = small
	Musical Performance Quality – hetero evaluation	MPQRF[25]	EG = CG[25]	
	Cognitive Interference	CIQ cognitive aspects[24] CIQ mind wandering[24] CIQ intrusive thoughts[24]	EG = CG[24] EG = CG[24] EG = CG[24]	
	Salivary Cortisol	–	EG = CG[27] EG_b = EG_a[27]	
	Blood Pressure	–	EG = CG[27] EG_b = EG_a[27]	
	Heart Rate	–	EG < CG[27] EG_b > EG_a[27]	0.70 = large 0.54 = large

continuation

	Outcome Measure	Instrument*	Result*	Effect size (♦)
Music Therapy 2 studies	Anxiety – Trait	STAI-T[31]	$EG_b = EG_a$[31]	
	Anxiety – State	STAI-S[31,32]	$EG_b > EG_a$[31] $EG_b > EG_a$[32]	0.72 = large 0.76 to 0.1.15 = large
	Music Performance Anxiety – self evaluation	LAS[31] PARQ[31] VAS mpa[32] MPAQ[32]	$EG_b > EG_a$[31] $EG_b = EG_a$[31] $EG_b > EG_a$[32]	0.95 = large 0.19 to 0.87 = small/large
	Stress/Tension	VAS-stress[32]	$EG_b > EG_a$[32]	0.66 = large
		VAS-tension[32]	$EG_b > EG_a$[32]	0.75 to 1.14 – large/very large
		VAS-comfort[32]	$EG_b > EG_a$[32]	0.62 = large
	Finger Temperature	–	$EG\text{-}1_b < EG\text{-}1_a$[32]	0.75 = large
Alexander Technique 1 study	Nervousness	NVI[33]	$EG_b < EG_a$[33#] EG < CG[33#]	
	Skeletal Muscle Disorder	NVI[33]	$EG_b < EG_a$[33#] EG < CG[33#]	
	Somatic Symptoms (trembling/ dizziness)	NVI[33]	$EG_b < EG_a$[33#] EG < CG[33#]	

CG: Control Group; CIQ: Cognitive Interference Questionnaire; CSAI-2R: Revised Competitive State Anxiety Inventory 2; DFS-2: Dispositional Flow Scale; EADS-C: Anxiety, Depression, and Stress Scale for Children; EG: Experimental Group; FSS: Flow State Scale; KMPAI: Kenny Music Performance Anxiety Inventory; LAS: Likert Anxiety Scale; NVI: Not Validated Instrument; MPAI-A: Music Performance Anxiety Inventory for Adolescents; MPAQ: Music Performance Anxiety Questionnaire; MPQRF: Music Performance Quality Rating Form; MSS: Music Skills Survey; PAI: Personal Anxiety Inventory; PAQ: Performance Anxiety Questionnaire; PARQ: Performance Anxiety Response Questionnaire; POMS: Profile of Mood States; PSQI: *Pittsburgh Sleep Quality Index;* PSS: Perceived Stress Scale; PRMD-Q: Performance Related Musculoskeletal Disorder Questionnaire; STAI-S: State Anxiety Inventory; STAI-T: Trait Anxiety Inventory; VAS: Visual Analogue Scale; $_a$: After Intervention; $_b$: Before Intervention. *: article number, according to Table 1; #: statistical analysis not performed; (♦) effect size: range of variation – calculated only for the study had a mean value and standard deviation, as supplementary material.

Table 4. Comparative analyses of the studies included in three reviews of the literature on the effectiveness of MPA interventions, in terms of the different outcome variables analysed (categories are non-exclusive)

Intervention	Outcome variable	Kenny (2005) (n = 33)	Brugues (2011)[A] (n = 13)	Burin and Osório (2015) (n = 23)
BT / CBT / C (n = 19) (10+3+6)[(A)]	Music Performance Anxiety	*****	***	**
	Heart Rate	**	*	
	Performance Quality	**		**
	Self-Efficacy	***		**
	Self-Confidence			
	Anxiety – State	***		
	Anxiety – Trait			**
	General Anxiety	***	**	
	Teacher Anxiety Ratings	*		
Virtual Reality Exposure (n = 3) (0+0+3)	MPA			*
	Confidence			*
	Discomfort			*
	Heart Rate			*
Biofeedback (n = 4) (1+0+3)	Music Performance Anxiety	*		
	Neurophysiological Measures			**
	Performance Quality			*
Meditation (n = 7) (1+2+4)	Music Performance Anxiety		*	**
	Heart Rate			*
Music Therapy (n = 3) (1+0+2)	Music Performance Anxiety			*
	Confidence	*		
	Musical Skills	*		
	Stress/Tension	*		**
	Self-involved	*		
	State Anxiety			**
Hypnotherapy (n = 1) (1+0+0)	Music Performance Anxiety	*		
Alexander Technique (n = 3) (1+1+1)	Musical Skills	*		
	Active and warm hearted scales of Nowlis	*		
	General Anxiety	*		
	Positive attitude in relation to the performance	*		

continuation

Intervention	Outcome variable	Kenny (2005) (n = 33)	Brugues (2011)[A] (n = 13)	Burin and Osório (2015) (n = 23)
Ericksonian (n = 1) (1+0+0)	Anxiety – State	*		
	Confidence	*		
Pharmacological (n = 10) (0+10+0)	Performance Quality		*****	
	Music Performance Anxiety		**	
	Heart Rate		**	
	Stress-related tachycardia		**	
	Shaking hands		*	
	Coordination and judgment		*	
Physical and Vocal Practice (n = 1) (0+1+0)	General Anxiety		*	
Anxiety Workshop (n = 1) (0+1+0)	Stress		*	
Yoga (n = 4) (0+0+4)	Anxiety – Trait			**
	Music Performance Anxiety			****
	Performance-Related Musculoskeletal Disorder – severity			*
Combined Intervention (n = 7) (6+1+0)	General Health	*		
	Anxiety	*		
	Anxiety-Trait	**		
	Music Performance Anxiety	**		
	Stress	*		
	Humour	*		
	Confidence	*		
	Music Performance	*		

BT: Behavioural Therapy; C: Cognitive; CBT: Cognitive Behavioural Therapy. *: number of studies with evidence of positive effectiveness. [A]: only studies not included in the review by Kenny (2005). [#]: case report. [(A)] the number in the first parentheses refer to the total number of the studies, and the number in the second parentheses refer to number of the studies in each revision.

Discussion

The impact of MPA on musicians is a frequently referred topic in literature worldwide[5,6,34] as is the need for studies which assess ways to treat and minimise this type of anxiety[35]. Thus, a relatively low number of studies performed thus far have aimed to assess the effectiveness of interventions to combat MPA, particularly if one considers the diversity of interventions and outcomes analysed and the limited number of subjects exposed to the interventions. This is strongly reflected in the quality and level of evidence observed and compiled by the reviews.

It is also important to point out that different fields of research outside health/medicine are increasingly considering this topic. These new approaches deserve attention, since MPA isa largely pathological condition associated with anxiety disorders. In the same vein, it is important to note that, to our knowledge, no study has been developed over the last 13 years with the aim of testing psychotropic drugs for MPA treatment.

Most of the studies have been published in periodicals in the music field or in the form of theses and dissertations, and that does not always guarantee a critical peer review. Furthermore, it is worth mentioning that the studies analysed continue to present important methodological weaknesses, as was mentioned by the previous reviews[7,8].

Thus, a large portion of the evidence presented herein requires careful interpretation, as it is not associated with experimental studies with inter-group comparisons. It is also important to note that most of the studies offer no information on the MPA levels experienced by the subjects, especially whether these levels were pathological. This information is essential for coming to conclusions on the success of the interventions analysed. Further limitations at this level are the low number of subjects studied, samples restricted mainly to young adults and music students, the lack of or failure to use subject randomisation, the lack of standardisation in the techniques used and in the duration of each intervention, the use of some non-validated instruments for outcome assessment and the presence of descriptive and non-statistical analyses of the results.

Another point to be considered involves the wide variety of instruments used to gauge the same outcome variables. An attempt to standardise the instruments used may be promising in that it will aid in the comparison of the evidence found, particularly in cases of meta-analyses.

Once these important methodological considerations are applied, one is able to focus on specific results regarding the interventions, which include more traditional and well-established interventions for different anxiety disorders, such as the cognitive behavioural therapy[36] and virtual reality exposure[37], as well as interventions that have not been fully endorsed in the literature for use in health care, such as meditation, music therapy, biofeedback, yoga and the Alexander technique.

With respect to the cognitive behavioural interventions, the results from the studies analysed partially support the positive findings previously indicated by earlier reviews, particularly in terms of the reductionsin MPA and trait anxiety rates and improvements in performance quality and self-efficacy.

Cognitive behavioural interventions are psychotherapy modalities comprising different cognitive restructuring techniques which aim to alter thought patterns which are considered dysfunctional[38]. These thought patterns are common to individuals with anxiety[39] and are particularly common among musicians with MPA[6]. Another aim of these interventions is to improve social and assertiveness abilities, which are usually limited in these clinical groups[40]. Other resources are also used, such as mental rehearsal techniques and strategies for anxiety coping and relaxation, which favour management and better control over anxiety symptoms. Such interventions are recognised as one of the gold standards for anxiety disorder treatment[41].

Considering the fact that MPA is a subtype of social anxiety disorder[1], the findings on this specific condition are backed by

this wider context. However, when the three reviews on the topic were compared, what stands out is that the new studies are more contradictory in their findings; they lack evidence on this intervention in 50% of the results. A possible explanation for this discrepancy maybe based on the sample makeup of the studies: the studies are not clear on the criteria for subject inclusion and exclusion and the extent of MPA experienced, especially because every individual, without exception, was recruited from music learning/education centres and not in psychiatric and mental health specialised services. It is assumed that the response of symptomatic subjects to the interventions may differ from that of individuals who present 'normal' levels of MPA, which is considered common in the music profession. Two other points that may also explain this divergence is the technique utilised for each study, as well as the diversity in the number of sessions[3-18].

The use of virtual reality exposure for treating MPA has resulted in positive outcome tendencies, including reduced MPA, an improvement in self-confidence and decreases in discomfort and heart rate, although only one experimental study with inter-group design has been undertaken with this type of intervention. Considering the fact that virtual reality offers a safe and non-evaluative environment for the confrontation, training and management of anxious experiences, its use for this specific group may, in fact, be promising, especially because it involves habituation and desensitisation processes. Previous studies[37,42] also indicate positive results with the use of this intervention modality for other phobic-anxious disorders. Therefore, virtual reality is considered an intervention modality which requires studies with a greater methodological refinement and a larger sampling number so that its effectiveness may be proven.

Regarding the use of yoga, its relative efficacy for emotional symptoms has been studied in other contexts involving clinical aspects such as on cancer patients[43], with chronic obstructive pulmonary disease[44], and on cases of arterial hypertension[45]. It has also been used in studies involving psychiatric aspects, such as post-partum depression[46] and anxiety disorders[47]. The results of these studies are promising and suggest positive effects on mental and physical awareness and well-being[43] as well as increases in lung capacity[44] significant decreases in systolic and diastolic blood pressure in hypertensive patients, decreases in depression and anxiety-related symptoms[46] and decreases in anxiety levels[47]. Despite the aforementioned methodological limitations, the results on MPA management are favourable. It is possible that aspects such as breathing training and meditation techniques are related to the effects observed on the anxiety symptoms, which deserve more refined investigation.

Regarding the findings on meditation, the results tend to reflect a decrease in MPA but are still quite weak and limited. Similar to yoga, meditation, which is often part of the yoga intervention, has been gaining ground in the field of mental health. This is especially true for mindfulness meditation[48]. For example, this intervention has had positive results in ruminations, which are repetitive thoughts on negative emotional experiences and worries in patients with anxiety and depression[49]. Positive results were also found regarding levels of anxiety and depression among cancer patients[50].

Meanwhile, the two studies that assessed the effectiveness of music therapy showed that this intervention modality may lead to decreases in MPA and stress symptoms, but these results still lack new studies with a greater methodological refinement. It is believed that the effectiveness of this intervention modality is associated with the techniques used, which include breathing exercises, improvisation and relaxation, as well as musical stimuli which may induce physical and emotional changes[51]. The effects of music therapy for the reduction of anxiety and depression symptoms are also being investigated in individuals with other medical conditions, such as Alzheimer's[52] and terminal illnesses[53].

Studies on biofeedback have shown that this technique is being tested as a treatment for other psychiatric conditions, such as anxiety disorders, depression, eating disorders and schizophrenia[54]. This is a method in which instrumentals are used with a focus on the processes of muscle relaxation, breathing techniques, awareness techniques and cognitive aspects, all of which result in easing the body's self-regulatory process[55]. Such aspects of biofeedback may be related to the alterations observed in the different physiological parameters analysed in the studies[21,22]. However, the findings are still quite speculative and do not allow for greater conclusions.

It has been observed that studies involving the Alexander technique continue to be conducted as of late; however, they have been focused on the outcome variables associated with musculoskeletal conditions because the technique aims to release muscular tension and to re-educate unbeneficial movement patterns[56]. Despite signalling evidence of effectiveness for treating MPA, the study analysed herein presents important limitations as it has not been analysed statistically.

Finally, it is worth noting that, regardless of the intervention modality utilised, studies involving children and adolescents are necessary since the number of studies for this age group are quite limited. This fact reflects a well-known bias in the studies on social and performance anxiety, which is linked to the absence of early attention, diagnosis and treatment of the symptoms because they are considered common or of little relevance[57].

This perception is stronger in the musical contexts experiencing apprehension and anxiety when facing performances is considered a part of a musician's routine. This prevents the recognition of its seriousness and the damages associated with MPA. Thus, diagnosis and, more importantly, interventions for musicians at early ages can prevent them from starting a career in music with the disadvantage brought by managing the symptoms of a clinical condition.

Few studies are based on professional musicians, perhaps due to the difficulty involved in recruiting them for experimental studies. Nonetheless, it is believed that this more select group (relative to music students) deserves special and specific attention, as many of them end up creating their own coping strategies, which often include the indiscriminate use of drugs with no medical supervision[58].

Conclusions

Research on the treatment and intervention of MPA has been a focus for researchers in the last decade; however, a limited number of studies have been performed outside the medical/health care fields. The number of interventions and outcome variables analysed is extensive, and the positive results are notably centred around a decrease in states of anxiety. Among the interventions analysed, CBT still offers greater evidence of effectiveness. However, due to the many methodological weaknesses and the limited number of studies on a single intervention and outcome, the results require careful interpretation and do not allow for conclusions regarding intervention efficacy.

These aspects have been pointed[7] and are still an important limitation for the field and support her statements that this body of knowledge is still inconsistent, inconclusive and methodologically fragile.

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Supplementary Material: Main results from the studies included in the present review, according to the different outcome variables

Study/Intervention	General Anxiety	Performance Anxiety (self/hetero evaluation)	Performance Evaluation (self/hetero evaluation)	Self-Efficacy/Confidence/Humour/ Stress/Cognitive Aspects	Physiological parameters Musculoskeletal disorders
11. Osborne *et al.* (2007) **CBT**	**STAI-S (self)** EG = CG -4,2 (8,1) 5,1 (14,3)	**MPAI-A (self)** EG = CG -18,1 (13,4) -13,2 (14,7)	–	–	**HR** EG = CG **Frontal Muscular Movement** EG = CG
12. Bien Aime (2011) **CBT**	–	**NVI (self)** EG_b = EG_a 4,09 (3,43) 4,75 (0,50)	**NVI (self)** EG_b = EG_a 4,87 (2,78) 48,25 (0,50)	**NVI-confidence (self)** EG_b < EG_a 5,5 (1,29) 9,62 (0,75)	–
13. Clark and Williamon 2011 **CBT**	**STAI-T (self)** EG_b = EG_a 45,64 (9,12) 41,43 (7,65) EG = CG 43,43 (7,65) 43,44 (7,92) **CSAI-2R (cognitive anxiety)** EG = CG **CSAI-2R (somatic anxiety)** EG = CG	–	**MSS (self) (amount of practice)** EG_b < EG_a 4,57 (1,16) 5,36 (0,63) EG = CG 5,36 (0,63) 4,63 (0,52) **MSS (self) (technical proficiency)** EG_b < EG_a 4,71 (0,61) 5,07 (0,73) EG = CG 5,07 (0,73) 4,88 (0,83)	**SEMPQ (efficacy) (self)** EG_b < EG_a 41,21 (4,64) 46,29 (5,03) EG > CG 46,29 (5,03) 43,78 (6,24) **CSAI-2R – self-confidence (self)** EG_b = EG_a 12,36 (2,71) 13,21 (2,79) EG = CG 13,21 (2,79) 11,33 (2,35) **SRLIS – (self-learning) (self)** EG > CG	–
14. Errico (2012) **CBT**	**STAI-T(self)** EG = CG 27,33 (6,51) 27,42 (4,86)	–	–	–	–
15. Hoffman and Hanrahan (2012) **CBT**	**STAI-T (self)** EG_b = EG_a 39,13 (8,37) 39,00 (8,38) EG = CG 39,00 (8,38) 41,61 (11,44)	**PAI (self)** EG_b > EG_a 54,47 (12,06) 50,07 (9,00) EG = CG 50,07 (9,00) 53,94 (11,65)	**PQ (hetero)** EG_b < EG_a 54,13 (16,10) 59,50 (11,05) EG = CG 59,50 (11,05) 50,89 (11,12)	–	**HR** EG_b = EG_a 90,26 (15,62) 84,88 (11,48) EG = CG 84,88 (11,48) 89,38 (12,02)
16. Braden *et al.* (2015) **CBT**	–	**MPAI-A modified (self)** EG_b > EG_a 27,39 (9,8) 18,90 (8,44) EG < CG 18,90 (8,44) 26,00 (?) **MPA Judge-rated (hetero)** **Judge 1** EG_b = EG_a 1,77 2,22 **Judge 2** EG_b < EG_a 0,44 0,75 **Judge 1 + Judge 2** EG = CG 1,49 1,16	**Performance Quality (hetero)** **Judge 1)** EG_b = EG_a 2,33 2,44 **Judge 2** EG_b = EG_a 2,5 2,18 **Judge 1 + Judge 2** EG = CG 2,31 2,61	–	–

continuation

Study/Intervention	General Anxiety	Performance Anxiety (self/hetero evaluation)	Performance Evaluation (self/hetero evaluation)	Self-Efficacy/Confidence/Humour/ Stress/Cognitive Aspects	Physiological parameters Musculoskeletal disorders
17. Khalsa and Cope (2006) **Yoga**	–	**PAQ-practice (self)** EG_b > EG_a 45,00 40,00 EG = CG 40,00 38,40 **PAQ-group (self)** EG_b > EG_a 55,80 49,10 EG = CG 49,10 49,50 **PAQ-solo (self)** EG_b > EG_a 59,10 50,80 EG < CG 50,80 58,30	–	**POMS – Humour (self)** EG_b = EG_a 45,2 (32,1) 64,6 (6,7) EG = CG 64,6 (6,7) 67,4 (18,0) **DFS-2 – Disposition (self)** EG_b = EG_a 119,8 (13,9) 128,7 (18,7) EG = CG 128,7 (18,7) 129,3 (24,9)	**PRMD-Q (self)** $EG_b = EG_a$ EG = CG
18. Khalsa *et al.* (2009) **Yoga**	–	**PAQ-practice (self)** GYL_b = GYL_a GYO_b > GYO_a **PAQ-group (self)** GYL_b > GYL_a GYO_b > GYO_a **PAQ-solo (self)** GYL_b > GYL_a GYO_b > GYO_a	–	**PSS – Stress (self)** GYL = GYO = GC **PSQUI – Sleep (self)** GYL = GYO = GC **POMS – total – Humour (self)** GYL = GC GYO = GC GYL + GYO = G **POMS – anxiety (self)** GYL < GC GYO = GC GYL + GYO < G **POMS – depression (self)** GYL = GC GYO = GC GYL + GYO = G **POMS – anger (auto)** GYL = GC GYO < GC GYL + GYO < G	**PRMD-Q (self)** EG = CG

continuation

Study/Intervention	General Anxiety	Performance Anxiety (self/hetero evaluation)	Performance Evaluation (self/hetero evaluation)	Self-Efficacy/Confidence/Humour/ Stress/Cognitive Aspects	Physiological parameters Musculoskeletal disorders
19. Stern *et al.* (2012) **Yoga**	**STAI-T (self)** EG_b > EG_a 42,47 (7,95) 36,24 (6,6)	**KMPAI (self)** EG_b > EG_a 57,25 (21,28) 45,06 (15,69) **PAQ-practice (self)** EG_b = EG_a 39,63 (11,46) 36,00 (9,28) **PAQ – group (self)** EG_b > EG_a 49,27 (15,12) 42,87 (9,64) **PAQ – solo (self)** EG_b > EG_a 60,60 (14,87) 51,40 (14,54)	–	**POMS – total (self)** EG_b = EG_a 14,56 (14,25) 12,25 (10,52) **POMS – tension anxiety (self)** EG_b = EG_a 7,00 (4,00) 4,54 (3,5)	–
20. Khalsa *et al.* (2013) **Yoga**	**STAI-S (self)** EG = CG 35,58 (10,31) 37,76 (11,49) **STAI-T (self)** EG_b > EG_a 47,66 (11,66) 38,11 (9,36) EG < CG 38,11 (9,36) 41,50 (10,88)	**MPAI-A-total (self)** EG < CG 40,66 (15,99) 45,70 (16,27) **MPAI-A somative/cognitive (self)** EG < CG 24,46 (9,89) 27,91 (11,25) **MPAI-A performance context (self)** EG = CG 7,44 (4,33) 7,41 (4,23) **MPAI-A performance evaluation (self)** EG < CG 8,76 (4,02) 10,39 (4,05) **PAQ-practice (self)** EG = CG 33,65 (9,49) 35,07 (8,89) **PAQ-group** EG < CG 40,98 (10,55) 46,09 (12,41) **PAQ-solo (self)** EG < CG 53,92 (12,72) 57,39 (14,85)	–	–	**PRMD-Q frequency (self)** EG = CG 21,67 (22,61) 22,84 (25,20) **PRMD-Q severity (self)** EG < CG 18,16 (18,63) 18,58 (24,31)

continuation

Study/Intervention	General Anxiety	Performance Anxiety (self/hetero evaluation)	Performance Evaluation (self/hetero evaluation)	Self-Efficacy/Confidence/Humour/ Stress/Cognitive Aspects	Physiological parameters Musculoskeletal disorders
21. Thurber (2006) **Biofeedback**	**STAI-S (self)** EG = CG 35,57 (9,86) 38,14 (12,53) **STAI-T (self)** EG = CG 31,85 (7,75) 39,14 (6,46)	**PAI (self)** EG = CG 44,42 (15,61) 30,85 (8,09)	**FSS – (self)** EG = CG	–	**HRV** EG = CG 4,28 (8,05) 53,52 (23,35) **HR** EG = CG 75 (4,43) 84,28 (12,47)
22. Silvana *et al.* (2008) **Biofeedback**	**STAI-S (self)** EG = CG **STAI-T (self)** EG = CG	–	**Judge Hetero** EG > CG	–	**AP** – EG > CG **IABW** – EG < CG **IEMGP** – EG > CG **AS** – EG < CG **APF** – EG < CG
23. Wells *et al.* (2012) **Biofeedback**	**STAI-S (self)** GEbf = GC GEr = GC	–	–	–	**Vagal Tone** $EG_b < EG_a$
24. Chang *et al.* (2003) **Meditation**	–	**PAI (self)** $EG_b > EG_a$ EG = CG	–	**CIQ (cognitive aspects) (self)** EG = CG **CIQ – (mind wandering) (self)** EG = CG 3,07 (2,07) 4,13 (1,63) **CIQ – (intrusive thoughts) (self)** EG = CG 39,28 (20,02) 6,78 (9,98)	–
25. Lin *et al.* (2008) **Meditation**	–	**PAI (self)** EG < CG 41,6 (14,5) 41,4 (6,42)	**MPQRF (hetero)** EG = CG	–	–
26. Su *et al.* (2010) **Meditation**	–	MPAI-I (self) $EG_b = EG_a$ 39,49 39,53	–	–	–
27. Sousa *et al.* (2012) **Meditation**	**EADS-C – state anxiety (self)** $EG_b = EG_a$ 11,6 (8,0) 7,8 (6,2) EG = CG 7,8 (6,2) 14,0 (14,2)	–	–	–	**Cortisol (Salivary)** $EG_b = EG_a$ 5,46 (1,51) 2,82 (1,58) EG = CG 2,82 (1,58) 3,21 (3,91) **Blood Pressure** $EG_b = EG_a$ 92 (8,7) 86 (6,4) EG = CG 86 (6,4) 79 (6,2) **HR** $EG_b > EG_a$ 107 (21,8) 96 (18,9) EG < CG 86 (7,2) 96 (18,9)

continuation

Study/Intervention	General Anxiety	Performance Anxiety (self/hetero evaluation)	Performance Evaluation (self/hetero evaluation)	Self-Efficacy/Confidence/Humour/ Stress/Cognitive Aspects	Physiological parameters Musculoskeletal disorders
28. Orman (2003) **Virtual Reality Exposure**	–	–	–	**SUDS* (discomfort) (self)** 3 suj: M 1 > 2 > 3 3 suj: M 1 < 2 > 3 1 suj: M 1 < 2 < 3 1 suj: M 1 = 2 > t3	**HR*** 1 suj: M 1> 2 > 3 2 suj: M 1 > 2 < 3 5 suj: M 1 < 2 > 3
29. Bissonnette *et al.* (2011) **Virtual Reality Exposure**	**STAI-S(self)** EG_b = EG_a 50,56 (4,49) 43,33 (2,90)	–	–	**SUDS (discomfort) (self)** EG_b = EG_a 6,00 (0,66) 5,28 (0,66) **PRCP – confidence (self)** EG_b > EG_a 17,33 (1,96) 12,11 (1,96)	**Pulse Rate** EG_b = EG_a 89,61 (5,61) 85,27 (5,61)
30. Conklin (2011) **Virtual Reality Exposure**	–	**CPAI (self)** Virtual EG_b > EG_a 45,73 (9,84) 38,45 (9,82) Live EG_b > EG_a 59,36 (12,30) 47,09 (14,59)	–	–	–
31. Kim (2005) **Music Therapy**	**STAI-S (self)** EG_b > EG_a 61,17 (15,08) 50,67 (14,11) **STAI-T (self)** EG_b = EG_a 36,67 (8,91) 36,17 (7,83)	**PARQ (self)** EG_b = EG_a 78,5 (15,2) 74,67 (12,18) **LAS (self)** EG_b > EG_a 7,33 (2,16) 5,33 (2,07)	–	–	–
32. Kim (2008) **Music Therapy**	**STAI – S (self)** $EG\text{-}1_b$ > $EG\text{-}1_a$ 56,00 (9,51) 50,73 (9,9) $EG\text{-}2_b$ > $EG\text{-}2_a$ 54,73 (8,65) 45,07 (8,15)	**VAS MPA (self)** $EG\text{-}1_b$ = $EG\text{-}1_a$ 8,23 (2,74) 7,07 (3,35) $EG\text{-}2_b$ > $EG\text{-}2_a$ 7,52 (3,07) 4,87 (3,01) **MPAQ (self)** $EG\text{-}1_b$ = $EG\text{-}1_a$ -4,67 (6,44) 57,33 (7,13) $EG\text{-}2_b$ > $EG\text{-}2_a$ 58,20 (6,44) 51,13 (4,84)	–	**VAS Stress (self)** $EG\text{-}1_b$ > $EG\text{-}1_a$ 8,88 (2,55) 7,07 (2,93) $EG\text{-}2_b$ = $EG\text{-}2_a$ 12,56 (25,87) 5,50 (4,09) **VAS Tension (self)** $EG\text{-}1_b$ > $EG\text{-}1_a$ 9,11 (3,63) 6,73 (2,67) $EG\text{-}2_b$ > $EG\text{-}2_a$ 9,05 (3,33) 5,23 (3,39) **VAS Comfort(self)** $EG\text{-}1_b$ = $EG\text{-}1_a$ 7,47 (3,39) 7,43 (3,35) $EG\text{-}2_b$ > $EG\text{-}2_a$ 7,59 (3,06) 5,36 (4,04)	**Finger Temperature** $EG\text{-}1_b$ < $EG\text{-}1_a$ 84,8 (5,65) 88,73 (4,80)

continuation

Study/Intervention	General Anxiety	Performance Anxiety (self/hetero evaluation)	Performance Evaluation (self/hetero evaluation)	Self-Efficacy/Confidence/Humour/ Stress/Cognitive Aspects	Physiological parameters Musculoskeletal disorders
33. Hoberg (2008) **Alexander Technique**	EG_b < EG_a 83% 100% EG < EC 83% 100%				**Trembling – NVI*** EG_b < EG_a 67% 83% EG < EC 67% 83% **Dizziness – NVI*** EG_b < EG_a 0% 50% EG < EC 0% 50% **Tight Shoulders – NVI*** EG_b < EG_a 33% 67% EG < EC 33% 67% **Stiff back – NVI*** EG_b < EG_a 33% 67% EG < EC 33% 83%

AP: Alpha Power; APF: Alpha Peak Frequency; AS: Alpha Suppression; CG: Control Group; CIQ: Cognitive Interference Questionnaire; CPAI: Conklin Performance Anxiety Index; CSAI-2R: Revised Competitive State Anxiety Inventory 2; EADS-C: Anxiety, Depression and Stress Scale for Children; DFS-2: Dispositional Flow Scale; EG: Experimental Group; EG-D: Desensitisation Group; EG-RI: Relaxation and Imagery Group; FSS: Flow State Scale; GYL: Group Yoga Lifestyle; GYO: Group Yoga Only; hetero: hetero evaluation; HR: Heart Rate; HRV: Heart Rate Variability; IABW: Individual Alpha Band Width; IEMGP: Integrated EMG Power; KMPAI: Kenny Music Performance Anxiety Inventory; LAS: Likert Anxiety Scale; NVI: Not Validated Instrument; MPA: Music Performance Anxiety; MPAI-A: Music Performance Anxiety Inventory for Adolescents; MPAQ: Music Performance Anxiety Questionnaire; MPQRF: Music Performance Quality Rating Form; MSS: Music Skills Survey; PAI: Personal Anxiety Inventory; PAQ: Performance Anxiety Questionnaire; PARQ: Performance Anxiety Response Questionnaire; POMS: Profile of Mood States; PQ: Performance Quality; PSQI: *Pittsburgh Sleep Quality Index;* PSS: Perceived Stress Scale; PRMD-Q: Performance Related Musculoskeletal Disorder Questionnaire; PRCP: Personal Report of Confidence as a Performance scale; self: self-evaluation; STAI-S: State-Trait Anxiety Inventory-State; STAI-T: State-Trait Anxiety Inventory-Trait; SEMPQ: Self-Efficacy for Musical Performing Questionnaire; SRLIS: Self-regulated Learning Interview Schedule; SUDS: Subjective Units of Distress scale; Suj: Subject; VAS: Visual Analogue Scale; $_a$: After Intervention; $_b$: Before Intervention. * Data originated from non-statistical analysis.