The art of managing stress – effectiveness of creative arts interventions for stress reduction and stress management: a systematic review

Abstract

Background: Given the prevalence of stress-related disorders in contemporary societies and the associated burden on the health care systems, it is important to provide effective and feasible (preventive) interventions that can be delivered in various clinical and non-clinical contexts. The evidence base of creative arts therapies (CATs) in mental health research is developing rapidly. The current review provides an up-to-date overview of the effectiveness of creative arts interventions for stress prevention and stress management for individuals of all age groups across settings.
Methods: The methodology of a systematic review was used to synthesize the available published evidence on the effectiveness of creative arts intervention for stress prevention and management. In order to provide an overview of the current evidence on the subject of CATs and stress prevention/management and to extract all relevant studies in the period of 2016 to 2020, the following major databases for scientific publications in healthcare were searched: PubMed, Medline, PsycInfo, ERIC, SocIndex and Psyndex. The present work is an update of an existing systematic review which summarizes the existing evidence up to August 2016.
Results: Of the 2,036 studies reviewed, 52 studies were identified as meeting the inclusion criteria involving a total of 4,925 participants. 36 of the included studies (nearly 70%) were randomized controlled trials (RCT's). 40 of the 52 included studies (over 75%) found a significant improvement on one of the stress- or anxiety-related outcomes. In particular, nearly 90% of the interventions led by a licensed creative arts therapist resulted in a significant reduction of stress whereas mere arts interventions (led by a health or arts professional but not a licensed creative arts therapist) reduced stress in 70% of the studies.
Conclusion: The field of creative arts interventions can be described as rapidly growing. Moreover, creative arts interventions seem to have a positive effect on stress perception and stress management. They reduce the level of anxiety and enhance the subject's positive mood. Especially, when led by a licensed creative arts therapist.

Keywords: creative arts therapies (CATs), creative arts interventions, stress prevention, stress management, systematic review

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1 Background

> *Slowly, under our feet, beneath our consciousness,*
> *is forming that new philosophy,*
> *and it is in times of new philosophies that art,*
> *itself in essence always a discovery, must flourish.*
> *John Galsworthy (1911)*

1.1 Stress and mental health

Although to varying degrees, stress is a natural part of life, it is acknowledged as one of the strongest predisposing factors for physical and mental health problems and a major source of disability and mortality in industrialized societies worldwide [1], [2]. Stress figures prominent in recent conceptual models of the etiology and maintenance of psychopathological disorders including major depressive disorder, bipolar disorder, and posttraumatic stress disorder (PTSD) and a range of other mental health conditions [2], [3], [4], [5]. Stress can also negatively affect physical health and is an important risk factor for cardiovascular, musculoskeletal and immunological disorders and physical disability [6], [7]. Moreover, prenatal exposure to stressful conditions is associated with long-term

adverse developmental health outcomes on multiple molecular, cognitive, emotional, and behavioral levels [8].
While stress or actually stress response is typically viewed from a biological perspective as a subjective physiological reaction to the presence of an external condition [9], simple physiological definitions of stress are limited in explaining the concept in its psychological and psychopathological dimensions [10]. Rather, current research suggests that stress involves a complex, dynamic process which integrates aspects of mind and body; and that the stress response can be characterized as a negative emotional experience accompanied by biochemical, physiological, and behavioral changes that are relevant to adaptation [11], [12], [13].
A prototypic model that reflects this view is the recent embodied model of the *Preparatory Set*. This model describes stress as the preparation to act involving an organization of the five elements muscle tone, posture, breathing, autonomic functions, motivational/emotional state, attentional orientation, and expectations [10].
The perspective of an organism that organizes itself in order to adapt to environmental challenges [10] also implies that individuals differ in their stress vulnerability (i.e., sensitivity or reactivity) and coping strategies (i.e., capacity for "stress management") and thus in their individual risk for stress-related psychopathology, which has important implications for preventive measures.

1.2 Stress prevention and stress management in the spectrum of interventions

Stress-related disorders affecting mental health are highly prevalent and belong to the disorders with the highest burden to individuals and societies around the world [14]. Reducing the high social and economic burden due to stress-related mental, emotional and behavioral health such as depression, anxiety and other disorders through effective prevention and promotion strategies is therefore a public health priority [15]. Since stress is a relevant risk factor across a range of mental health disorders it is recognized as an important target within the spectrum of primary prevention measures provided within the health care system [16]. Preventive interventions in contrast to curative interventions foster the promotion of mental health and/or target the risk factors of a mental disorder, such as stress before the actual onset of the disorder (i.e., primary prevention, [16]).
Interventions in the health care sector are typically classified into three categories, according to the specific needs assigned to a population or population segment on the basis of their respective risk levels. *Universal interventions* are delivered to an entire population (such as the general public, college students, pregnant women etc.) regardless of the individual risk of a person in this population. These are differentiated form targeted intervention approaches that focus on individuals or groups of individuals known to be at elevated risk (*selective prevention*) for stress (such as people living with HIV or women with breast cancer) or those who already show early signs of subthreshold symptoms but do not fulfill a formal diagnosis of a disorder (*indicated prevention*) [17], [18].
Given the prevalence of stress-related disorders in society and the associated immense burden on the health care systems [19] it is important to provide effective and feasible prevention measures in a diverse conceptual spectrum that can be delivered in various clinical and non-clinical contexts [16].

1.3 Description and evidence base of creative arts interventions

Broadly, creative arts *interventions* support the clients to express themselves in a creative way and unite the artistic modalities of dance movement, drama, music, and arts. They include interventions conducted by creative arts therapists and by other therapists and health and arts professionals [20]. Creative arts interventions have been recommended by the World Health Organization (WHO) for their positive impact on health and well-being [21]. Latest trends in psychiatry towards a more holistic approach turned the attention to psychotherapeutic methods such as creative art therapy [22]. More specifically, creative arts *therapies* (CATs) are defined as "the creative use of the artistic media (art, music, drama and dance/movement) as vehicles for non-verbal and/or symbolic communication, within a holding environment, encouraged by a well-defined-client-therapist relationship, in order to achieve personal and/or social therapeutic goals appropriate for the individual" [23]. CATs often utilize psychoanalytic or psychodynamic principles, embedded in an evidence-based theoretical framework which differentiates them from pure artistic interventions. They are conducted by specialized and licensed therapists, who have a professional training in their specific modality of creative arts guided by ethical standards and can be used as a therapeutic and a diagnostic tool [24]. See chapter 1.3.1 for a detailed description of the different art-based intervention modalities.
Recently the scientific interest in art-based therapies as an innovative intervention approach for mental health has been growing. The evidence base in this research area is currently developing rapidly as indicated by the availability of several systematic reviews during the past two years. For example, Baker and colleagues [25] analyzed the evidence of the efficacy of creative arts therapies for the treatment of adults with PTSD; Dunphy and colleagues [20] summarized the evidence of creative arts therapies for older people diagnosed with depression. Taken together the existing research indicates that these interventions are associated with significant patient-related improvements.
Simultaneously, the evidence base within the separate modalities (i.e., art, music, dance, drama) is constantly growing. In their systematic review, Regev and colleagues [26] summarize the effectiveness of art therapy for adult

patients in the mental health spectrum. They conclude that art therapy can be an effective form of treatment and a promising method to alleviate problems such as stress and work-related burnout.

De Witte and colleagues [27] assessed in two systematic reviews each with multilevel meta-analyses the strength of the effects of music interventions on physiological and psychological stress-related outcomes. Overall the results of both reviews showed a significant reduction of physiological and stress-related outcomes. Umbrello et al. [28] reviewed the effectiveness of music therapy for stress and anxiety reduction in the clinical context of intensive care units and found favorable effects for critically ill adult patients.

A recent meta-analysis of dance movement therapy (DMT) indicates (among other outcomes) that DMT can be effective in decreasing clinical symptoms of anxiety [29]. Two further syntheses of evidence focus on clinical populations: In their systematic review Jimenez and colleagues [30] summarize the evidence for the effects of DMT for older adults with a psychiatric condition (mainly dementia) with limited clinical effects (although DMT increased quality of life and expressiveness). Karkou and colleagues [31], in their systematic review and meta-analysis, found DMT to be an effective intervention for adults with depression.

Compared to these creative art therapy modalities the evidence base for drama therapy is not as mature. However, a recent integrative systematic review in drama therapy intervention research [32] indicates that drama therapy research has produced promising results for various populations (i.e., adults and children with developmental disabilities and cognitive impairments).

While taken together the available research indicates positive effects of creative arts interventions, prevention studies are largely missing. Martin and colleagues [33] up to now provided the only available systematic review that addresses the effectiveness of CATs for prevention in the context of psychological health. In their systematic review they summarize the results from the published studies in the field of stress prevention and stress management (i.e., individual capacity to manage emotional and behavioral stress response), which is also the central focus and the basis of the present review.

Their review involved 37 empirical studies from 1980–2016 including 2,136 healthy individuals or people at risk for stress-related disorders between evidence level Ib and III, defined according to the Agency for Healthcare Research and Quality (AHRQ). 20 studies concerned the music modality, eleven the art modality and six the dance movement modality. In the drama modality no study met the inclusion criteria. Over 70% of all included studies were randomized controlled trials (RCT's), indicating a rather high quality of studies in the field. The authors report a significant stress reduction in 80% of all studies and found that interventions that were guided by a licensed creative therapist were even more effective (eleven of twelve studies, 92%).

Most of the studies (32 out of 37; 86%) were published after the year of 2000. This indicates the growing interest in this rapidly emerging field and highlights the importance for an update of the evidence base.

1.3.1 Description of the four modalities of creative arts interventions

In *art interventions* the clients use art media like painting (i.e. acrylic or oil paints, crayons, pastels, watercolours or aquarelle) or creating plastics and sculptures (i.e. clay, soapstone or wood) as a tool for symbolic and creative expression. The American Art Therapy Association (AATA) defines *art therapy* as "an integrative mental health and human services profession that enriches the lives of individuals, families, and communities through active art-making, creative process, applied psychological theory, and human experience within a psychotherapeutic relationship" [34]. The overall aim is not the piece of artwork itself but to enable the client to find a nonverbal expression for previous conscious or unconscious experiences through a process of creation in a safe and facilitating environment [35].

Within *music interventions* the client is encouraged to create music actively (i.e. singing, playing an instrument) or to listen to music receptively. The American Music Therapy Association (AMTA) defines *music therapy* as "the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program" [36]. In active music therapy interventions improvisation is applied. During active performance, the client's feelings can be mediated on a non-verbal level and made audible for the other person and oneself. Receptive music therapy focuses on actively listening to music and absorbing the vibrations. Therapeutic processes like upcoming feelings, bodily perceptions and pictorial ideas are initiated and can be verbalized [37].

Dance interventions use practices of various dance styles (e.g., ballroom dance, folk dance, contemporary dance), to move and express in an aesthetic creative way [29]. *Dance movement therapy* (DMT) is the psychotherapeutic use of movement, based on the assumption of the interconnection of body and mind, and the healing power of dance. Accordingly, DMT-interventions use bodily movements to explore and express emotions within groups or individuals [31]. The American Dance Therapy Association (ADTA) defines it as "the psychotherapeutic use of movement to promote emotional, social, cognitive, and physical integration of the individual, for the purpose of improving health and well-being" [38].

In *drama interventions* participants imagine, enact, and reflect experiences within an improvisational, non-exhibitional, process-centered form of drama [39]. *Drama therapy* can be defined as an active and experiential psychotherapy modality that involves the intentional and systematic use of drama/theater processes as primary

means to achieve psychological growth and change within a psychotherapeutic relationship [32].

1.4 How creative arts interventions might work

Creative arts interventions are characterized by substantial heterogeneity but they share a set of meta-processes or "common factors" [20]. According to Koch [40], general therapeutic factors known from psychotherapy research also apply to the arts therapies (e.g., therapeutic relationship, problem actualization, resource activation) [41]. However, while conventional forms of psychotherapy often focus on cognitive processes and determinants of behavior, CATs are an innovative and embodied approach that can be understood as holistic [33]. Moreover, Koch proposes a framework of specific factors as "mechanisms of action" that are specific to art-based therapies. The "Model of Embodied Aesthetics" identifies five factors of CATs: aesthetics, hedonism, nonverbal communication/metaphor, enactive transitional support and generativity [40]. Lange and colleagues [42] investigated the effect of "active creation" as an important part of creative arts interventions. Others emphasize the clinical usefulness of non-verbal, but body-centered approaches of creative arts interventions to explore the affective benefits of creative activities [43].

1.5 Why is it important to do this review

The present work is an update of the systematic review provided by Martin and colleagues [33] which summarizes the existing evidence up until August 2016. The aim of the present article is to review the progress in the field of creative arts interventions with regard to stress reduction and stress management during the last four years. Given the rapid development of creative arts interventions across the different modalities, four years seems to be a sufficient period to review progress, both in terms of the quantity and quality of the published studies in the field. We aim to provide up-to-date conclusions of the effectiveness of creative arts interventions for stress prevention and stress management for individuals of all age groups in all settings. Since the review addresses the context of prevention, both therapeutic and non-therapeutic creative arts interventions are considered. The study aims to contribute to the evidence base and a continued dialogue with health care practitioners and institutions about the potential of creative arts interventions for stress prevention and management.

1.6 Objectives

To assess the effects and summarize the scientific evidence of creative arts interventions for stress reduction across age groups and settings.

2 Methods

The methodology of a systematic review was used to synthesize the evidence on the effectiveness of creative arts interventions for stress management and prevention from published studies. To ensure a high scientific standard and reporting quality this systematic review was conducted according to the PRISMA Statement in its latest version [44] and the current Cochrane manual for the preparation of medical guidelines [45].

2.1 Criteria for selecting studies

Eligibility criteria were defined by applying the PICOS acronym (population, intervention, comparison, outcome and study design) [44].

2.1.1 Population

Study participants eligible for this review were children, adolescents and adults. Because individuals of all ages and in all settings can potentially experience stress, no restrictions in these domains were applied.
Moreover, this review includes healthy participants as well as participants who may be at elevated risk to experience stress, for example people suffering from a serious illness such as HIV, cancer or pregnant women shortly before birth. Participants with a primarily stress associated medical condition such as patients with a PTSD were excluded as well as populations living in high risk circumstances for PTSD, such as veterans and refugees.
This approach follows the established classification used by the US American Institute of Medicine (IoM) [17] to differentiate universal from targeted (selective and indicated) preventive measures for different populations according to their risk levels and intervention needs.

2.1.2 Interventions

Studies were included that specifically apply CATs and in addition also studies which provide mere arts intervention for stress prevention and management. A *creative art therapy* session as opposed to a mere intervention session (led by a health or art professional) is facilitated by a qualified creative arts therapist in art, music, dance or drama. The heterogeneity of the intervention approaches in the scientific literature reflects the variability of creative arts interventions in practice. That is why the interventions did not have to be standardized to fulfill the eligibility criteria. Furthermore, the included studies differ in duration length of treatment period.

2.1.3 Comparators

Studies with all types of control groups were included:

1. No treatment or standard care (treatment-as-usual, TAU) or waiting list
2. Psychological therapies
3. Pharmacological therapies

4. Different types of creative arts interventions (i.e. dance vs music; coloring mandala vs. coloring triangles)
5. No comparator: in this review, similar in the review of Karkou et al. [31], studies without control groups were also included.

2.1.4 Outcomes

Primary outcomes:

1. Stress, measured by self-reports such as the Perceived Stress Scale (PSS [46]) and psychophysiological parameters such as heart rate (HR) and heart rate variability (HRV); cortisol level with saliva sample (pre/post ELISA kit method); mental distress for example measured by the Kessler Psychological Distress scale (K10 scale [47])
2. Anxiety, measured by a validated assessor-rating scales, such as the Hamilton Anxiety Scale (HAM-A; Hamilton 1959), or a self-rating scale, such as the Beck Anxiety Inventory (BAI; Beck 1988) or the State Scale of the Stait-Trait Anxiety Inventory (S-STAI [48])

Secondary outcomes:

1. Mood and affect for example measured by the Positive and Negative Affect Scale (PANAS [49])
2. Emotion Regulation for example measured by the Difficulties in Emotion Regulation Scale (DERS-SF [50])

All time frames of outcome assessments were included. If a study reported more than one time point within the considered time frame, the latest time point was chosen as the primary endpoint.

2.1.5 Study designs

Included were published RCT's (i.e., studies with a truly random allocation to at least two experimental conditions), controlled clinical trials (i.e., any studies including a control group with participants with comparable characteristics such as quasi-experimental studies as well as matching techniques), and uncontrolled studies (i.e., any other intervention study with a prospective design with available baseline values allowing for pre-post within-subject comparisons) in all languages.

2.2 Search strategy

2.2.1 Electronic database searches

The following relevant major databases for healthcare were included: PubMed, Medline, PsycInfo, ERIC, SocIndex and Psyndex. An additional hand search through scanning the references of the included studies was conducted.

2.2.2 Search string

We conceptualized the search string following the Cochrane Handbook for Systematic Reviews [51] to be focused, economical and adequately sensitive. The individual search terms were linked with the Boolean operators AND or OR. An asterisk (*) was added at the end of a term for the inclusion of singular and plural [52]. Table 1 provides an overview of the databases and search terms.

Table 1: Overview of databases and search terms

Databases
• Pubmed • Medline • PsycInfo • ERIC • SocIndex • Psyndex
Search terms
• creative arts therap* OR art therap* OR dance therap* OR DMT OR movement psychotherap* OR authentic movement OR music therap* OR drama therap* OR art* OR danc* OR movement* OR music* OR drama* • AND • stress OR stress prevention

2.2.3 Search time period

The present study chronologically continues a previous review [33], updates and extends it, for example, by including different databases. We searched for published studies between the publication dates of 2016 to April 30, 2020. The total search was performed and completed in April 2020.

2.3 Data extraction and data management

2.3.1 Study selection

To select the studies systematically and economically according to the eligibility criteria, we scanned the titles, then the abstracts and finally the full texts of the studies after removing the duplicates (see Figure 1).

2.3.2 Level of evidence

The systematic review focused on different types of evidence. Evidence levels were defined according to the Agency for Healthcare Research and quality [53]. We included studies of evidence levels Ia to III.

2.3.3 Data management and extraction

Searches were managed and saved using the reference manager "endnote". The details of research design, author and year, levels of evidence, object of investigation, sample size, short description of the intervention, data

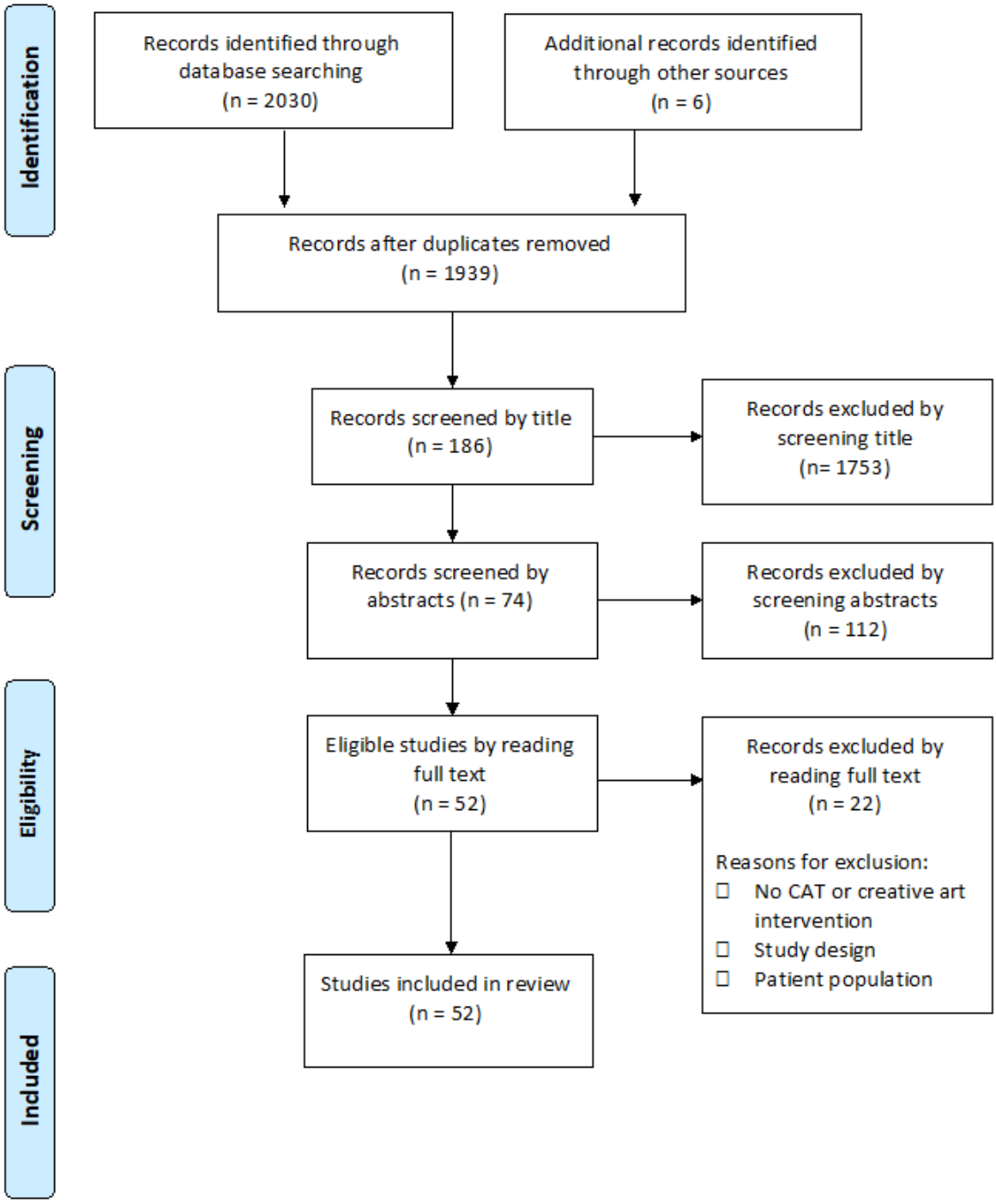

Figure 1: PRISMA flow diagram of the data base search on creative arts interventions for stress prevention [44]

collection, statistical analysis and central results were entered into an excel spreadsheet (see Attachment 1). The table in the previous review by Martin and colleagues was used as a template. For clinical outcome studies the mean scores and standard deviations were extracted alongside with the effect sizes and *P*-values for significance testing. Relationships between studies (i.e., whether one study referred to a secondary analysis of a sample that has already been included in the review) were explored and marked by text.

2.3.4 Dealing with missing full texts

Not all studies could be found in open-access journals. We contacted several authors via the online platform "ResearchGate" (https://www.researchgate.net). In the end, no full text was missing.

3 Results

3.1 Selection process

As the PRISMA diagram illustrates (see Figure 1) the database search identified 2,030 records and 6 additional records through other sources. After removing the duplicates 1,938 records left for the screening by title. 1,753 records were excluded, leaving 185 records for the screening at abstract level, of those were 112 excluded. From these, 73 records were examined by full text, excluding 22 to 52 eligible included studies which met the inclusion criteria and made up the final data set. One study [54] met all the inclusion criteria and was added due of its publication year in 2017, even though it was already included in the previous review by Martin and colleagues [33].

3.2 Study characteristics

3.2.1 Sample size

The total number of participants included in the 52 studies was N=4,925.
Three studies conducted a second data analysis of existing studies with sample sizes already documented in this review. These participants were not counted twice. The study of Ho [55] takes its sample from the previous study [56] as does Vrinceanu [57], [58], whose analysis refer to the study sample of Esmail [59].
Classified according to arts discipline the total number of participants in art interventions was 1,267, in music interventions 3,144, in dance interventions 501 and drama interventions 13 (see Table 2).

Table 2: Allocation of age in each modality

Arts modality	Mean age in years (M)
Art (N=1,267)	31.70
Music (N=3,144)	29.75
Dance (N=501)	36.90
Drama (N=13)	76.60
Total (N=4,925)	**34.23**

Sample sizes across studies varied from six participants [60] to 564 participants [61].

3.2.2 Setting

The 52 studies in the review were conducted over all continents in the world. 20 studies were conducted in North America, 16 of them in the United States ([62], [63], [64], [65], [66], [67], [68], [69], [60], [70], [71], [72], [73], [74], [75], [76]) and four studies in Canada ([77], [59], [57], [58]).
16 studies were conducted in Europe: Four studies took place in Spain ([78], [79], [80], [81]), four studies in Turkey ([82], [83], [84], [85]), four studies in Germany ([86], [87], [88], [54]), two studies in Italy ([89], [90]) and one study each in the Netherlands [91], the United Kingdom ([61] and in Sweden [92].
Ten trials were conducted in Asia. Five studies in China ([56], [55], [93], [94], [95]), two studies in Korea [96], [97], one study in India ([98] and [31]), one in Thailand [99] and one in Taiwan [100].
Three studies were conducted in Oceania, two of them in New Zealand ([101], [102] and one in Australia [103]. One study was done in South America [104].

3.2.3 Study design

36 of the included studies were RCT's, this represents 68% of the reviewed studies, seven studies were controlled trials without randomization, seven studies were quasi-experimental and two studies without control group. Table 3 summarizes the various study designs by arts modality, year of publication and level of evidence.

3.2.4 Participants

Gender

There were 467 male, one diverse and 4,042 female participants, thus 82% of the total participants were female. 16 studies recruited only female participants: [91], [98] and [31], [61], [63], [85], [101], [65], [80], [66], [56], [55], [99], [93], [71], [83], [97].
Several studies did not display the demographic data of their samples in detail and were omitted in the calculations. For 415 participants gender was not reported, for example in some parent-child-dyads where each dyad was counted as one participant, unless it was specified separately like in [73] and [98], [31]. A detailed description for the allocation of gender per modality can be found in Table 4.

Table 4: Allocation of gender in each modality

Arts modality	*Feminine*	*Masculine*	*Diverse*	Not displayed
Art	1,137	57	–	73
Music	2,457	344	1	342
Dance	439	62	–	–
Drama	9	4	–	–
Total	**4,042**	**467**	**1**	**415**

Age

Age of participants was heterogeneous among the included studies. In particular, three studies [97], [92], [76] focused on children, three studies recruited only adolescents ([63], [103], [95]) and three studies included a geriatric population [68], [59], [74] . Furthermore, three studies consisted of parent-child dyads [90], [73], [75]. 47% of all included studies involved adults. 13 studies were omitted in the calculation of participants' mean age:

Table 3: Study designs by arts modality (therapy or mere intervention), year of publication and level of evidence [33]

	Time of Publication						Evidence Level			
Arts Modality	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**	**Ib**	**IIa**	**IIb**	**III**
Art therapy/art interventions	2 (0/2)	4 (2/2)	5 (1/4)	4 (2/2)	0 (0/0)	**15 (5/10)**	7 (2/5)	2 (1/1)	4 (2/2)	2 (0/2)
Music therapy/music interventions	8 (2/6)	5 (0/5)	5 (1/4)	7 (1/6)	1 (1/0)	**26 (5/21)**	21 (3/18)	3 (2/1)	2 (0/2)	0 (0/0)
Dance movement therapy/dance interventions	2 (1/1)	3 (2/1)	2 (1/1)	3 (3/0)	0 (0/0)	**10 (7/3)**	6 (6/1)	2 (1/1)	1 (0/1)	0 (0/0)
Drama therapy/drama interventions	0 (0/1)	0 (0/0)	0 (0/0)	0 (0/0)	0 (0/0)	**1 (0/1)**	1 (0/1)	0 (0/0)	0 (0/0)	0 (0/0)
Total	13 (3/10)	12 (4/8)	12 (3/9)	14 (6/8)	1 (1/0)	**52 (17/35)**	36 (11/25)	7 (4/3)	7 (2/5)	2 (0/2)

ten studies did not report the age of the participants and three studies were secondary analyses [55], [57], [58]. The mean age of all participants in the review was 34.23 years. The mean age of the modality *Drama* was relatively high (see Table 2) since it referred to only one study focusing on older adults.

Clinical and nonclinical population

The proportion of clinical and nonclinical populations was also heterogeneous among the included studies. 32 studies (60%) referred to a nonclinical healthy population, including three studies in the context of pregnancy (i.e. pre- or postpartum; [61], [85], [80]). 15 studies (29%) included a clinical population (i.e. participants with a non-primarily stress associated medical condition, as discussed in the method section above). Included were patients with anxiety disorder [91], participants in treatment for cancer [67], [90], [72], [75], [56], [55], people living with HIV [64], clients with subjective cognitive decline [68] and patients scheduled for a surgery or another clinical intervention [105], [99], [100], [73], [104], [84], [92].

3.2.5 Interventions

As already illustrated (see Table 3) 17 studies investigated CATs (performed by a licensed creative arts therapist) and 35 studies investigated mere arts interventions (led by a health or art professional). The duration of the interventions varied from single sessions to weekly sessions over four months or daily sessions for one week. The total number of sessions ranged from one to 16 sessions. The duration of each session also varied from ten minutes to 2.5 hours. An exception to this was the study of Hides et al. [103], who investigated the effect of a music-based emotion regulation mobile app in distressed adolescents over 6 months without defining sessions. The specific arts-based intervention models were heterogeneous across the included studies.

Art therapy

Twelve of all 15 studies in the art modality sessions were conducted in a group setting. Three studies [61], [101], [66] provided individual sessions. In five studies a trained art therapist offered the interventions [91], [62], [69], [93], [72].
In twelve studies, researchers adopted mere art interventions using artistic media such as drawing or coloring [85], [77], [101], [67], [69], [93], [94], [60], anthroposophic art therapy [91], expressive writing [61], textile art making [65], clay-based art [62] and guided imagery [66].
Three interventions applied a combination of mindfulness and art called Mindfulness-based art therapy (MBAT) [62], [63], [72].

Music therapy

Seven out of the 25 studies of the music modality were explicitly labeled as group interventions. Five studies were guided by a licensed music therapist [90], [95], [75], [92], [76]. In five studies, researchers adopted an active music therapy method. In the study of Litchke [70] facilitators used drumming as the main intervention and Robb [75] applied a parent delivered "Active Music Engagement" (AME, an interactive, music-based play intervention) accompanied by a music therapist. In Giodarno [90] and Millet [73] the music interventions were not described in detail. In the study of Uggla [92] it was not clear whether the intervention was active or receptive.
20 studies (80%) were based on receptive techniques. Five studies took into consideration a combination of Reiki with music [64], music with mindfulness based stress reduction (MBSR) [95], music with progressive muscle relaxation (PMR) [83], depth relaxation music therapy (DRMT) with hypno-music therapy (HMT) [88] and music with aromatherapy [97].

Dance therapy

All ten studies in the dance modality were conducted in a group setting. Seven studies were dance therapy ses-

sions and guided by a trained dance therapist. Ho [55], Vrinceneau [57], [58] were secondary analyses of the two previous studies of Ho [56] and Esmail [59].
Four studies describe the applied interventions: Kuroda [102] analyzed Japanese traditional Nihonbuyo and New Zealand's Haka, Lopez [81] applied "biodanza" sessions, Mama [71] applied Latin dance and Wiedenhofer [54] applied improvisational dance. In six studies the dance therapy intervention was not described in detail.

Drama therapy

In the drama modality, one study met the inclusion criteria [74]. The study was conducted in a group setting, guided by a professional actor and consisted of drama exercises and self-exploration, and a final performance of sections of the play "An Accident" by Lydia Stryk.

Comparator interventions

39 studies had one control group (74%). Six studies included three treatment arms with two control groups, and one study had three control groups [94].
In particular, eleven studies compared creative arts interventions versus treatment as usual (TAU) or no treatment [80], [90], [105], [99], [93], [100], [95], [104], [84], [89], [76]. Eight studies were waitlist controlled ([91], [66], [103], [92], [98], [31], [56], [55], [81]). 22 studies were controlled by an active group control ([62], [64], [85], [78], [79], [77], [101], [65], [68], [69], [86], [106], [102], [96], [71], [73], [74], [83], [88], [75], [97], [54]).
In detail, eleven studies used different types of creative arts interventions in the control group, such as Beerse [62], who employed a neutral clay-manipulation, Bremner [64] music only, Eaton [77] forced choice of coloring of a precolored image, Innes [68] music listening, Kaimal [69] coloring without interaction with an art therapist, Kim [86] receptive music therapy with fixed tempo of 70 beats per minute, Kuroda [102] New Zealand dance Haka, Lee [94] coloring a rectangular grid with preset colors, Millet [73] receptive music therapy, Son [97] unspecified music therapy and Wiedenhofer [54] goal directed movement. Three arm-controlled studies with an active and a waitlist group were Ayers [61], Esmail [59], Vrinceneau [57], [58]. Six studies used no comparator interventions and were based on a single treatment arm ([63], [67], [60], [70], [82], [72]).

3.2.6 Types of outcome measures

Primary outcomes

Stress

All studies assessed stress using different stress scales. Stress was measured through the Perceived Stress Scale, PSS [63], [101], [66], [56], [68], [69], [70], [81], [83], [97], subjective ratings (Visual Analog Scale, VAS) [63], the Parenting Stress Scale, PSI [98], [31], [93], the Depression Anxiety Stress Scale, DASS [60], the Events Scale-Revised, IES-R [75], the Child-Adult Medical Procedure Interaction Scale-Revised, CAMPIS-R [76], the Tension and Effort Stress Inventory, TESI [102], the Weekly Stress Inventory, WSI [71], the Kessler-10 Psychological Distress Scale [103] and the Perceived Stress Questionnaire, PSQ30 [54]. Six studies measured stress through psychophysiological parameters [91], [79], [105], [106], [96], [89] and three through cortisol level from a saliva sample [55], [57], [58].
Three studies used combinations of outcome measures: Beerse [62] considered PSS and Saliva sample and Kim [86] measured with VAS combined with measures of two parameters of cardiovascular autonomous nervous system (ANS) reactivity: pulse rate (PR) and blood volume pulse amplitude (BVP-A). De la Torre-Luque [78] used a combination of heartrate variability, HRV, the Positive Symptom Distress Index, PSDI and the Brief Symptom Inventory (BSI). Two Studies used a self-reported stress scale [61], [67]. Robb observationally measured children and emotional distress through facial expressions in a behavioral coding form [107].

Anxiety

21 studies assessed anxiety. De la Torre-Luque [79], Eaton [77], Esmail [59], Garcia [80], Kongsawatvorakul [99], Lee [100], Millet [73], Osmanoglu [82], Öztürk [84] and Son [97] used the State Scale of State–Trait Anxiety Inventory, SSTAI. Flett [101], Litchke [70] and Liu [95] measured anxiety due the Hospital Anxiety and Depression Scale–Anxiety Subscale, HADS-A. Beerse [62] used the GAD-7 self-report, Giordano [90] and Millet [73] a modified version of Yale Pre-operative Anxiety Scale, m-YPAS. Koelsch[106] measured assessed anxiety with the Profile of Mood States, POMS. Lee [93] used the Brief Symptoms Inventory, BSI and Meghani [72] employed the Edmonton Symptom Assessment Scale-R, ESAS-R.
Ortega [104] and Lee [94] used a combination of physiological variables (blood pressure, pulse and heart rate) and State Scale of State-Trait Anxiety Inventory, SSTAI. Bremner [64] used a mixed methods approach with a combination of physiological measures, the State Trait Anxiety Inventory and a self-report via qualitative, semi-structured interviews.

Secondary outcomes

Mood and affect

Ayers [61] measured mood and affect using the UWIST Mood Adjective Checklist, UMACL and Eaton [77], Futterman [65], Kaimal [69] employed the Positive and Negative Affect Scale, PANAS. Robb [75] used the Profile of Mood States, POMS and Moore [74] the Geriatric Depression Scale, GDS. Lee [93] used a self-developed questionnaire to measure parental mood and related areas.

Emotion regulation

Hides [103] measured emotion regulation by using the Difficulties in Emotion Regulation Scale, (DERS).

3.2.7 Effects of interventions

In order to deal with the heterogeneity of the results, effects are firstly roughly summarized and secondly reported in detail, broken down by artistic modality and the various different instruments below.

Primary outcomes

In total, stress and anxiety were significantly reduced ($p \leq .05$) in 40 of the 52 included studies (76.5%) with 24 of the studies referring to differences between groups and 16 to pre/post differences within groups. 15 out of 17 studies in CATs (88%) and 25 out of 35 studies in arts interventions (70.6%) found a significant reduction in stress and anxiety.

Art modality

Five of 15 studies (33.3%) in the art modality reported a significant reduction in stress and anxiety compared to a control group. Eaton [77] (free choice coloring vs forced choice coloring) found a marginally significant reduction in anxiety using a short form of the State Scale of the State–Trait Anxiety Inventory (S-STAI). Flett [101] (coloring pictures vs solving riddles) reported a significant decrease in stress and anxiety measured with the Perceived Stress Scale (PSS) and the Anxiety Subscale of the Hospital and Depression Scale (HADS-AS-7). Glinzak [67] found a significant decrease in stress via a self-report distress thermometer in the open studio condition and Sezen [85] (group art therapy vs psychoeducation) a significant reduction in anxiety using the Beck Anxiety Inventory (BAI). Abbing [91], Ayers [61], Björling [63], Giacobbi [66] and Lee [93] found no significant effects in their analysis. Beerse [62], Lindsey [60] and Meghani [72] reported no between group effect because of the single-arm study design.
Eight studies reported a significant reduction of stress and anxiety within group [61], [62], [63], [77], [67], [60], [72].

Music modality

14 of 26 studies (53.8%) in the music modality reported a significant reduction of stress and anxiety compared to a control group. Bremner [64] (reiki combined with music vs music only) reported a significant reduction of stress and anxiety using a Visual Analog Scale (VAS) for stress, the State Trait Anxiety Inventory (STAI-Y) for anxiety and qualitative findings from of a semi-structured interview. Garcia [80] (music stimulation vs no music stimulation during NST) found a significant reduction in anxiety measured with the State Trait Anxiety Inventory (S-STAI). Giordano [90] (music therapy vs TAU) also reported a significant reduction in anxiety using a modified Yale Preoperative Anxiety Scale (m-YPAS). Hides [103] (using Music eScape App vs waitlist) reported a nonsignificant effect for stress in general but found a significant effect in stress reduction for women. Kahlouhl [105] (listening to music during surgery vs TAU) found a significant effect for stress in the stability for blood pressure and calm recovery. Kim [86] (entrained- tempo condition vs fixed tempo condition) found a significantly stronger increase in peripheral blood flow ($p<.01$). Koelsch [106] (musical stimulus vs control stimulus) reported a significant effect on stress on the recovery of cortisol level and found out that mood played a causal role in the responses to acute stress. Lee [100] (listening to meditative music vs TAU during PET scanning) found a significant reduction of anxiety measured with the State Trait Anxiety Inventory (STAI-S-20). Liu [95] (MBSR with music therapy vs TAU) reported a significant decrease in anxiety using the Hamilton Anxiety Rating Scale (HAM-A). Ortega [104] (listening to music vs TAU) used a combination of the State Trait Anxiety Inventory (S-STAI) and physiological measurement (blood pressure) and found a significant reduction of anxiety. Öztürk [84] (listening to music vs TAU) reported a significant reduction of anxiety measured with the State Trait Anxiety Inventory (S-STAI) and the Beck Anxiety Inventory (BAI). Robb [75] (parent delivered music-based intervention vs reading audio-story books) found a significant reduction of stress for children via positive facial affect expressions in a behavioral coding form [107] and Rossi [89] (listening to music vs TAU) by physiological measurements (heartrate, oxygen saturation level). Yinger [76] (listening to music vs TAU) reported a significant reduction in distress behaviors and coping by using the Child-Adult Medical Procedure Interaction Scale-Revised (CAMPIS-R).
Ten Studies did not find a significant reduction in stress or anxiety [78], [79], [68], [99], [96], [73], [82], [88], [97], [92]. The studies of Osmanoglu [82] and Litchke [70] used a single-arm study design without between-group effects.
Eight studies reported a significant reduction of stress and anxiety within-group [78], [68], [96], [73], [82], [88], [97], [92]. Litchke [70] reported no significance in overall stress reduction but pointed out a significant reduction on two subscales of the PSS: “handling unexpected events” and “controlling important life experiences”.

Dance modality

Five of ten studies in the dance modality reported a significant reduction of stress and anxiety compared to a control group. Aithal [98] and Karkou [31] (DMT vs waitlist) found a significant reduction of stress by using the Parenting Stress Index-Short Form (PSI-SF). Ho [56] (DMT vs Aerobic training vs passive waitlist) reported a significant reduction of stress on the Perceived Stress Scale (PSS-10). Their secondary data analysis [55] showed that the perceived stress at baseline, significantly moderated the intervention effect, which she called a “moderated mediation effect” [56]. Lopez [81] (Biodanza vs waitlist) and Wiedenhofer [54] (non-goal-directed movement vs goal-directed movement) found a significant reduction in stress, measured with the Perceived Stress Scale (PSS). Mama [71] (Latin dance vs internet-based education) reported a reduction in stress by using the Weekly Stress Inventory (WSI). In contrast to these results Kuroda [102]

reported a significant increase in stress in the Haka condition. Four studies did not find a significant reduction in stress and anxiety [59], [55], [57], [58]. Three studies found a significant reduction in stress and anxiety within-group [59], [57], [58].

Drama modality
The study in the drama modality reported no significant reduction of anxiety compared to a control group [74]. Moreover, Moore and colleagues found a significant increase in anxiety and a significant decrease in happiness relative to the control group but increases in self-esteem in the follow-up analysis of the within-group effects.

Secondary outcomes

In total, eight studies reported a significant difference in mood changes with four studies referring to differences between groups and four to pre/post differences within groups. Two of the eight studies employed creative arts therapies interventions [69], [72] and five studies employed arts interventions [79], [65], [68], [105], [106], [82].
Additionally, there was one study [103], which analyzed the additional secondary outcome *Emotion Regulation*, and found a nonsignificant between-group difference on the DERS-SF Emotion Regulation Scale.

Art modality
Two studies in the art modality reported a significant change in mood compared to a control-group. Futterman [65] (textile art making vs quit ego contemplation vs writing to negative mood) found a significant increase in positive mood and a significant decrease in negative mood using the Positive and Negative Affect Scale (PANAS). Kaimal [69] (art therapy vs mere art intervention) reported a significant increase in positive affect, also measured with the Positive and Negative Affect Scale (PANAS). Ayers [61] and Lee [93] did not find a significant change in mood. Meghani [72] found a significant within-group increases in different aspects of cancer patients' spirituality (peace, faith, meaning).

Music modality
Two studies in the music modality reported a significant change in mood. Kahlouhl [105] (listening to music vs TAU) found a significant increase satisfaction on the Evaluation du Vécu de l'Anesthésie Générale (EVAN-G scale) and Koelsch [106] (musical vs control stimulus) found a significant increase in positive mood measured with Profile of Mood States (POMS). Innes [68] (Kirtan Kriya meditation vs listening to music) did not find a significant change in mood. Significant within-group changes were reported in the studies of de la Torre-Luque [79], Innes [68] and Osmanoglu [82].
Dance modality
No study in the dance modality reported a significant change in mood.

Drama modality
The study in the drama modality reported no significant change in mood compared to a control group [74]. Moore and colleagues found a significant decrease in happiness compared to the control group (they also found increases in self-esteem in the within-group follow-up analysis).

3.3 Summary of effects on stress reduction and management with creative arts interventions

Attachment 1provides an overview of all included studies. The central information in each study was sorted by author and year of publication, level of evidence, object of investigation, sample size, study design, a description of the intervention, data collection, statistical analysis and central results. The results presented in Attachment 1are considered to continue the table in the systematic review of Martin and colleagues [33]. Evidence levels are defined according to the Agency for Healthcare Research and Quality (AHRQ); creative arts therapies are demarcated from mere arts interventions by green text color: Creative arts therapies (guided by a licensed creative arts therapist) appear in green, mere arts interventions (led by an art or health professional) in black text.

4 Discussion

4.1 Summary of results

In this systematic review, the effectiveness of creative arts interventions on stress reduction for participants across cultures and age-groups was investigated. 52 intervention studies published between 2016 and end of April 2020 with a total *N* of 4,925 participants were included. Over 80% of the participants were female. The number of studies varied between the four creative modalities. 50% of the included studies were studies on music interventions (*N*=26), 15 studies in the art modality, ten studies on dance interventions and one study in the drama modality. This indicates a need for more research in the modalities of art, dance and especially in drama, which are under-represented in the literature particularly with regards to their effectiveness for stress reduction.
The distribution of the study numbers by arts modality corresponds to the findings of Dunphy and colleagues [20], with higher numbers of studies on music interventions than in any of the other modalities in the context of depression. 36 studies, nearly 70% of the 52 included studies were RCT's with high associated evidence levels (level I). This is in line with the previous review of Martin and colleagues [33] on stress reduction, where 75% of the included studies were associated with evidence level I. Most of the RCT's were found in the music modality (21 of 36 RCT's), which reflects the high quality of evidence-based studies in music therapy [22]. Over all modalities,

however, only 17 studies (30% of all interventions) were led by a creative arts therapist, which appears to be a rather small proportion which may have influenced the corresponding effects sizes in the summarized studies. Nevertheless, in the present review, over 75% of the included studies found a significant improvement on at least one of the stress or anxiety-related outcomes. These findings again confirm the results of Martin and colleagues [33] where a significant reduction of stress in over 80% of the included studies was observed. In particular, nearly 90% of the interventions led by a creative arts therapist resulted in a significant reduction of stress which is also in line with the review of Martin and colleagues [33]; mere arts interventions (guided by an art or health professional) reduced stress in only 70% of the cases. The following sections discuss some of the key findings for each modality.

4.1.1 Art modality

The quality of evidence of the included studies in the art modality was mixed, with ratings evenly distributed from the lowest to the highest level of evidence. In line with Dunphy and colleagues [20], studies with expressive writing were included and assigned to the art modality. In terms of how creative arts interventions can be specifically anchored in stress prevention, a trend seems to emerge in the art modality: three studies investigated the effects of art interventions in combination with mindfulness-based therapy [62], [63], [72], all with a significant decrease in one of the stress- or anxiety-related outcomes. The so-called Mindfulness-Based Art Therapy (MBAT) integrates art exercises with mindfulness skills training from the Mindfulness-Based Stress reduction (MBSR) by Jon Kabat-Zinn ([108], [109]). This trend could be an interesting anchor point to establish a manualized program for MBAT similar to MBSR or MBCT (Mindfulness Based Cognitive Therapy) which are established in the clinical guidelines for prevention. Newland and Bettencourt [110] analyzed in their systematic review and meta-analysis the effects of MBAT and found significant improvements in psychological and physical symptoms of anxiety, depression, and fatigue with an aggregated medium effect size. But only 14 studies met the inclusion criteria. More high-quality research would be of great importance here.

4.1.2 Music modality

16 of 25 studies demonstrated significant findings in the reduction of stress or anxiety and change in mood. Almost 85% of the included studies in the music modality were based on receptive techniques which occurred possibly due to mild inclusion criteria. In five studies a licensed music therapist led the session with three studies applying active music therapy interventions. Robb investigate in a parent delivered interactive (i.e., active) music-based play intervention accompanied by a music therapist; in the study of Giordano and colleagues [90] and of Uggla and colleagues [92] the experimental interventions were not described in detail. Two further studies included active music interventions, Litchke [70] used drumming as the main medium and in Millet and colleagues [73] the activity was not mentioned in detail. Koelsch and colleagues [106] found out that mood plays a causal role in the modulation of responses to acute stress, which can generally be interpreted as a relevant finding for stress prevention. Because of missing transparency concerning the content of the interventions it is not possible to know if the studies involve the specific creative arts element of active creation [42]. Moreover, this finding indicates a lack of consensus about what interventions in music therapy actually are. A major problem is the challenge that the term “music therapy” is not yet protected or standardized and that even “music listening” without any reference to music therapy methods is sometimes called “music therapy”. It is essential to more precisely define music therapeutical intervention approaches in future research. As Dunphy and colleagues [20] mentioned, the application of manualized interventions or descriptions of clear intervention protocols may contribute to better practice in this respect. Correspondingly, in further systematic reviews in the field of creative arts interventions it may be feasible to define stricter inclusion criteria than in the present review and the review of Martin and colleagues [4].

4.1.3 Dance modality

Eight of ten studies with dance interventions demonstrated significant findings in the reduction of stress or anxiety. All interventions in the dance modality were group interventions. Six of seven studies were guided by a licensed dance movement therapist and found a significant reduction in one of the stress or anxiety-related outcomes. While in 60% of the studies the applied techniques were labeled as “dance movement therapy” and were not described in detail. Study interventions spanned a broad range of techniques including Japanese traditional Nihonbuyo, New Zealand’s Haka, Biodanza, Latin dance and directional or non-directional improvisational dance.

4.1.4 Drama modality

The inclusion of just one study implies that more research is needed to assess the evidence of drama interventions in the context of stress prevention and stress management.

4.2 Methodological issues

The summarized evidence in this review helps to clarify the benefit of creative arts interventions and can be considered an important step for a broader implementation in health care practice in the future. Unfortunately, across different health care sectors it is common that empirically proven intervention approaches are not sufficiently transferred to broad practical application (e.g.

[11], [111]). Therefore, the need for systematic knowledge on transferability and implementability and the question of effective methods to transfer scientific findings into health care practice is increasingly considered important in research and research funding [112]. Particularly in the context of prevention, it can be observed that although many evidence-based programs are developed, only a few of them are transferred to routine practice after the development phase [11], [113]. Particular to creative arts interventions, the great scope for creative approaches in practice, the diversity of procedures, methods and interventions can be considered an asset; however, this diversity and lack of standardized procedures limits their transfer to the health-care system.
This challenge also became apparent when conducting this systematic review. It was methodologically challenging to summarize the great variety among the various interventions, durations of interventions, the number of participants and statistical methods from the four modalities into superordinate categories, so that the summary of evidence appears to be rather small-scale.
Another relevant issue is the differentiation of CATs and mere creative arts interventions. As discussed in the introduction, it may not be as relevant to make this distinction in the field of prevention, as it would be in the field of therapy (i.e., interventions with actual patients). However, it is important for creative arts therapists to distinguish themselves from purely creative practitioners. The definitions of the various creative therapeutic professional associations for the individual disciplines confirm this by emphasizing the crucial role of quality standards of the therapist and the therapeutic work within the field of creative intervention. The results of the study confirm this notion by showing the great benefit in terms of effectiveness when sessions are conducted by licensed therapists. The present review provides evidence that quality standards in the qualification of creative arts therapists are essential and contribute to the effectiveness of interventions in the field.

4.3 Limitations

There are several limitations to the present review that need to be addressed. First and foremost, the review includes a very heterogeneous set of studies and applied interventions. Since the focus of the review was creative arts interventions and not a specific modality within that category, the resulting heterogeneity was – however – inevitable. Moreover, the aim of the present review was to provide an update of a previous evidence synthesis which was similar in its scope ([33], [29]). The wide variety of types of interventions within the four modalities, even within one modality, however complicated the task of summarizing and interpreting the evidence [114], [29].
Another point is that the interventions are often not well described which makes replications difficult. Moreover, in some studies it was difficult to determine whether the experimental intervention could actually be considered a creative art-based intervention. The rational we applied in the present review was to examine that the central mechanism of action refers to one of the factors of the "Model of Embodied Aesthetics" proposed by Koch and colleagues [40]. Future research, however, should be more specific about the concrete applied intervention models and techniques.
Also the interventions varied substantially in terms of group size and length of duration which makes them difficult to compare. As a consequence of the rather broad inclusion criteria applied in this review, a wide spectrum of intervention approaches has been assessed including studies with small samples, individual and group sessions etc.
Furthermore, the studies indicate a substantial gender imbalance. A large proportion of the study participants (over 80%) were female. This reflects the results of Martin and colleagues [33]. However, from this review there is no indication for a differential effectiveness concerning gender or any other participant characteristics. This is in line with the sensitivity analyses of Koch and colleagues [29] within their meta-analysis on the effects of CATs on health-related psychological outcomes. Future research should however systematically address the issue of differential effectiveness to determine what works for whom in creative art-based interventions. One way to approach this is the identification of participant characteristics that may be associated with differential effectiveness using moderator analyses [115]. Moderators are variables that influence the direction or strength of the association between two variables [116]. Moderator analyses can provide an indication of what treatment is effective for whom which is a critical next step with regards to creative arts intervention research, which to date has focused on establishing a "first-generation" evidence base for effectiveness.

4.4 Implications for practice

Given the findings that interventions led by certified creative arts therapists resulted in more significant improvements of stress-related outcomes than interventions led by other professionals, we recommend that interventions for stress reduction should be provided by certified creative arts therapists. For more transparency and for the replicability, future applied research should describe the examined interventions more precisely in form of clear intervention protocols and manuals.

5 Conclusion

The field of creative arts interventions can be described as highly emerging. The finding of 52 peer reviewed studies in the last four years confirms the growth of creative arts interventions as an innovative approach in psychotherapy and research on psychosocial preventive interventions. Moreover, interventions in creative arts seem to have a positive effect on stress prevention and stress management. They reduce the level of anxiety and en-

hance the subject's mood. Especially, when led by a licensed creative arts therapist.
The flourishing of art (as quoted in the beginning), shown in the marked benefit of creative arts interventions speaks to continuation in the attempt of balancing the practice of creative arts therapies and evidence-based science. As the physician and physiologist Emil du Bois-Reymond highlighted:

> *But surely,*
> *the human spirit shines brightest*
> *where the brightness of art*
> *is united*
> *with the brightness of sciences.*
> *Emil du Bois-Reymond (1890)*

Notes

Author contribution

All authors have made a substantial, direct and intellectual contribution to the work, and approved it for publication. All authors contributed to manuscript revision and read and approved the submitted version.

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Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Attachments

Available from https://doi.org/10.3205/jat000025

1. Attachment 1_jat000025.pdf (195 KB)
   Overview of the detected effectiveness studies on stress prevention and stress management with creative arts interventions

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