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A Systematic Literature Review of The Impact of Art Therapy Upon Posttraumatic-Stress Disorder

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A Systematic Literature Review of The Impact of Art Therapy Upon Posttraumatic-Stress Disorder

Background: A case is made for art therapy and its contributions to the treatment of posttraumatic-stress disorder (PTSD). **Aims:** The current systematic literature review set out to critically review existing evidence of the impact of art therapy upon adults with a diagnosis of PTSD. Five online databases were searched for articles published in peer-reviewed journals exploring the effectiveness of art therapy in the treatment of PTSD. **Results:** The search yielded 449 papers. Following application of exclusion criteria 20 were included in the systematic review. **Conclusions:** Across the reviewed articles, four themes were identified: (1) impact on symptoms, (2) processing traumatic memories, (3) fostering a holistic view of self, and (4) increased well-being and more positive view of self. Overall methodological considerations included issues regarding study design, measures and analysis, researcher biases, sample size, and treatment received. **Implications:** Evidence suggested that some can benefit from the treatment with effects being shown in most symptom clusters of PTSD. Implications such as the need for more robust research in the field are discussed. Clinical recommendations include the suggestion to use art therapy when avoidance or feelings of guilt/shame make engaging in standard talking therapies difficult.
[word count Abstract: 193]

Keywords: systematic review; visual art therapy; effectiveness; PTSD; trauma

Summary:

Art therapy has a long history in the work with trauma-related difficulties including posttraumatic-stress disorder. The current literature review is the largest of its kind summarising 20 research papers on the impact of visual art therapy with adult trauma survivors. Themes identified across papers pertained to the impact on symptoms, processing traumatic memories, fostering holistic view of self, and increased well-being/improved self-image. The review showed that some can benefit from art therapy for PTSD with effects shown in most symptom clusters. However, the quality of reviewed articles was poor and the current paper makes recommendations for more rigorously designed research.

Introduction

In her seminal work *Trauma and Recovery,* Herman posited that trauma is an affliction of powerlessness. The victim of trauma is rendered helpless in the face of an overwhelming force that may be human or that of nature. As a result, the ordinary ways of making sense of the world are challenged or even overridden (1992). The exposure to actual or threatened death, serious injury, or violence either directly or as a witness is criterion A of PTSD in the latest edition of the Diagnostic Statistical Manual (DSM V; APA, 2013). For a diagnosis, survivors must also show at least one sign of persistent re-living (i.e., nightmares, flashbacks), avoidance of trauma-related stimuli, at least two signs of negative thoughts or feelings (e.g., exaggerated blame of self or others, inability to recall key features of trauma), as well as trauma-related arousal (e.g., hypervigilance, increased startle reaction).

Several theories have been proposed to explain the genesis of psychological trauma and it would go beyond the scope of this paper to summarise them here. The interested reader may refer to Brewin and Holmes (2003) or Gillihan, Cahill, and Foa (2014) for excellent summaries of psychological theories on trauma, their strengths, and shortcomings. Gillihan et al. (2014) proposed that Brewin and colleagues' dual-representation theory and its revision (1996, 2010) integrated existing scientific research best. According to the theory it is not simply the quality of trauma memories that distinguishes them from ordinary memories; they are processed and represented in distinct neurological networks of the brain. Contextual representations associated with the hippocampus can be communicated verbally and include a narrative of the events as well as any emotions experienced during the trauma. Conversely, non-verbal sensory-based representations associated with the amygdala and insula cannot be voluntarily recalled but are triggered by reminders of the trauma. Ordinary memories include both contextual and sensory-based representations and connections between them. In contrast, the extreme stress or terror during trauma leads to unusually strong sensory-based

representations (e.g., Rauch et al, 1996), a reduction in hippocampus volume (Logue et al., 2018), and weakened connections between the two systems (Brewin, Gregory, Lipton, & Burgess, 2010).

Art therapy has a long tradition as an intervention following traumatic events (Lobban, 2018). Systematic reviews concluded that this type of therapy continues to be used in a variety of settings and presentations including trauma (Potash, Mann, Martinez, Roach, & Wallace, 2016; Van Lith, 2016). The British Association of Art Therapists (BAAT) defines art therapy as a form of psychotherapy that uses art media as its primary mode of expression and communication. Within art therapy, "art is not used as a diagnostic tool but as medium to address emotional issues which may be confusing or distressing" (BAAT, 2017). Art therapy is used with people of all ages and across a wide range of difficulties. Although primarily influenced by psychodynamic concepts, art therapist have incorporated a host of other psychological approaches in their work such as attachment, mindfulness, compassion-focussed, cognitive-analytic, and to a lesser extent neuro-scientific findings. It is offered both as group and individual intervention. Art therapy practice is sensitive to cultural and social diversity (BAAT, 2017). Systematic reviews found that particularly traumatised children benefitted from art therapy (O'Brien, 2004; Malchiodi, 2012a, 2012b, 2015a, 2015b). In the work with adults, benefits of art therapy for non-psychotic disorders included the development of relationships to the therapist and group members, personal achievement, empowerment, and increased insight (Scope, Uttley, & Sutton, 2017).

Brewin et al.'s dual-representation theory (1996, 2010) may offer some insight into the mechanisms of art therapy for PTSD. The structure of art therapy plays to both representation systems in the brain. In the art-making phase, non-verbal memories are tapped into and explored (sensory-based representations). In the second phase, through verbal elaboration and interpretation those areas involved in contextual representations are engaged. The two

memory systems may subsequently reconnect (Gantt & Tinnin, 2009). Bolwerk, Mack-Andrick, Lang, Dörfler, and Maihöfner (2014) used brain imaging techniques to show an increase in functional connectivity between the posterior cingulate cortex and the frontal and parietal cortices in an art-making group compared to an art evaluation control group. Caveats of these studies were the use of a non-clinical sample and short follow-up period.

Psychological therapists may argue that there are already a number of well-researched treatment options available for PTSD. Meta-analyses and randomised controlled trials (RCT) have attested the usefulness of a number of these: Prolonged Exposure (PE) (e.g., Cusack et al., 2016; McLean & Foa, 2011; Powers et al., 2010), Cognitive Therapy for PTSD (CT-PTSD; e.g., Ehlers et al., 2003, 2005, 2014), Cognitive Processing Therapy (CPT; e.g., Resick et al, 2002; 2012), Eye Movement Desensitisation and Reprocessing therapy (EMDR; e.g., Lee & Cuijpers', 2013), and Narrative Exposure Therapy (NET; e.g., Cusack et al., 2016; Crumlish & O'Rourke, 2010; McPherson, 2012; Nickerson, Bryant, Silove, & Steel, 2011; Robjant & Fazel, 2010). Although largely understudied (Cloitre, 2009), psychodynamic interventions in treating PTSD appear to be used frequently in clinical practice (Schottenbauer, Arnkoff, Glass, & Gray, 2006) and some research has suggested beneficial effects (Brom, Kleber, & Defares, 1989).

Whilst comparative effectiveness has not be established to a satisfying degree (Cusack et al., 2016), the above cited literature highlights the broad landscape of available treatment options for trauma survivors. This may raise the question of why alternative approaches are needed or existing techniques should be modified. It is, however, clear that there is no therapy that yielded a perfect success rate and research has found up to 30% of service-users to be unresponsive to evidence-based treatments (Wisco, Marx, & Keane, 2012). Additionally, a recent meta-analysis yielded drop-out rates as high as 36% for PTSD psychotherapies (Goetter et al., 2015), suggesting that some could not benefit from or were not satisfied with the

treatment received. Furthermore, most people with PTSD have additional difficulties such as depression or substance abuse (e.g., Brown, Campbell, Lehman, Grisham, & Mancill, 2001). Those people are often excluded from clinical trials (Westen, Novotny, & Thompson-Brenner, 2004) thus not reflecting the population commonly seen in mental health services. Finally, whilst some therapies have been evaluated in non-Western cultures (NET: e.g., Hijazi et al., 2014; Zang, Hunt, & Cox, 2013; CT-PTSD: e.g., Bass et al., 2013) the majority of clinical trials have been conducted in Western developed countries. As many struggle to access traumatic memories verbally (Johnsen & Asbjørnsen, 2008) art therapy might offer a viable treatment option for some of those who are less able to benefit from commonly used interventions by offering a non-verbal route to explore aspects of or around traumatic experiences.

Uttley et al. (2015) conducted an extensive systematic review of quantitative and qualitative studies. Out of 15 RCTs exploring the effectiveness of art therapy in a variety of health settings (i.e., depression, physical health, dementia) 10 reported positive changes in mental health symptoms compared to the control condition. Four studies reported a significant improvement from the baseline but no difference to the control group. One study favoured control. Some have attempted to review existing literature on art therapy for PTSD but it is argued here that those were not rigorously conducted and a gap in the literature persisted. Nanda et al. (2010) summarised the effects viewing artwork upon veterans with PTSD. However, their review was not on art therapy as such, it did not follow a systematic literature search process, and it remained unclear how studies as well as reported results were selected. Smith (2016) published a systematic review on therapeutic mechanism in art therapy for veterans with PTSD. Her scope was not on outcomes but on mechanisms of change. Additionally, the review was not found to be sufficiently robust as any art therapy research on veterans was included some of which did not present with trauma-related difficulties. Research with children and young people was also included in what appeared like

an attempt to increase the number of papers reviewed. However, this did not convince as an argument for their inclusion. Schouten et al. (2015) reviewed the effects of art therapy for PTSD. However, only six studies were identified, two of which were unpublished theses, one was published in Dutch, and the remaining three used mandala drawing rather than art therapy proper. Van Lith's (2016) review discussed four mental health areas in which art therapy is used including trauma. However, the impact of interventions was not systematically discussed. Ramirez' (2016) review helpfully summarised some effects of art therapy on PTSD, however, their literature search and inclusion criteria were questionable (e.g., only one data-base searched, other populations included such as cancer patients and refugees without confirmed PTSD diagnosis). Baker et al.'s (2018) systematic review was arguably the highest quality paper. Their inclusion criteria, however, appeared too broad in what seemed like an attempt to counterbalance the sparsity of art therapy literature. The focus of their publication was on creative art therapies. Music and drama therapy were included. It is likely that those types of therapies have different underlying mechanisms and thus result in different outcomes, putting their incorporation into one systematic review into question. Furthermore, out of four visual art therapy studies included by Baker et al. three used a non-clinical sample. These limitations confirm previously voiced concerns regarding the rigorousness of art therapy study design and evidence (Ebmeier, Donaghey, & Steele, 2006; Kimport & Robins, 2012; Rose, Aiken, & McColl, 2014). It can be argued that despite art therapy being used in the treatment of a range of psychological difficulties, its impact on adult trauma survivors has not been reviewed in a rigorous and systematic way. The current systematic review is therefore the largest of its kind with the most specific inclusion criteria. It aimed to explore the reported effects of art therapy upon adults with diagnoses of PTSD.

Methodology

A systematic literature review was undertaken to answer the above stated review question. It was decided to search five literature data bases namely PsychInfo, ASSIA, Medline, PILOTS, and ERIC. The search terms used were:

1. art therap* OR creative art* therap* OR art making OR art-making OR art-based therap* OR art based therap* OR drawing* OR painting* OR sculptur*

AND

2. posttraumatic stress* OR post-traumatic stress* OR post traumatic stress* OR PTSD OR acute stress* OR emotional trauma* OR combat stress

All English peer-reviewed papers exploring the effectiveness or efficacy of art therapy in the treatment of adults (aged 18 and above) with a formal diagnosis of PTSD were included. No date limitations were applied to the search. The main searches were completed by the first author between October 2016 and December 2017. Searches were updated in January 2020. Creative writing or drama therapy interventions were excluded to capture the non-verbal element of art therapy. Articles solely pertaining to theory without detailing either new research findings or systematic review of previous research were also excluded. As traumatic experiences in childhood or adolescence appear to have particular implications for complexity and severity of trauma symptoms in adulthood (Cloitre et al., 2009; Briere, Kaltman, & Green, 2008; Van der Kolk, Roth, Pelcovitz, Sundaz, & Spinazzola, 2005) art therapy interventions with adults whose index trauma occurred before reaching adulthood were excluded. It must be noted that some might have had a history of childhood trauma that was not investigated and/or reported by the authors. All authors decided on inclusion and exclusion criteria jointly prior to commencing searches. However, a review protocol was not registered in advance.

Yin's (2014) criteria were used to judge the quality of case-studies. Qualitative, cohort studies, and systematic reviews were assessed with the corresponding check-list by the Critical Appraisal Skills Programme (CASP, 2013a, 2013b, 2013c). CASP supports the user to evaluate the internal and external validity (or generalisability) of the findings. Pluye, Gagnon, Griffiths, and Johnson-Lafleur's (2009) quality framework was used to critique mixed methods research. This tool enables the user to assess the internal validity of the quantitative and qualitative elements of the study as well as their combination. To a lesser extent it helps to estimate the objectivity of reported results and whether sampling and researcher biases were sufficiently avoided.

Results

[Figure 1 about here]

Figure 1 outlines the systematic literature search process. The first author selected papers based on the in-/exclusion criteria. The final selection was discussed and agreed with the second author. A more rigorous selection was considered using PICOS or SPIDER search tool (Metheley et al., 2014) but this was felt to restrict the searches too much in light of the size of currently available research in this particular field.

Table 1 presents a summary of the papers included in the systematic review. The search yielded 20 eligible studies. Ten papers detailed case-studies, five of which were single case-studies. Four mixed methods articles were included, one of which included randomisation of participants. Three purely quantitative studies were found, two qualitative, and one systematic review. Of the papers describing original research five evaluated individual art therapy, two pertained to group art therapy, and five offered groups with some individual sessions as a supplement. Twelve studies explored interventions with veterans or active service members, four with members of the general public with PTSD, two with refugees/asylum seekers, and one with female prisoners.

[Table 1 about here]

To structure the findings, several outcomes across the reviewed papers were identified by the first author and confirmed by the other authors. To identify said themes, the first author summarised the outcomes reported in each included study and used thematic analysis to aggregate them.

Impact on Symptoms

Five of the identified case-studies presented anecdotal changes in PTSD symptomatology, particularly avoidance and social withdrawal. Fitzpatrick (2002) reported that her participants were better able to tolerate memories of and feelings associated with traumatic events. Similarly, a veteran in another case-study (Berkowitz, 1990) reported that he was more able to connect with his trauma and talk about his experiences rather than avoiding them. Moreover, prison staff experienced the female participants in Merriam's (1998) series of case-studies as less socially and emotionally withdrawn following their course of art therapy. Walker et al. (2016) reported their service user to open up and talk about his traumatic experiences as well as his recurring nightmares. Over time he reported a reduction in intrusive memories, nightmare, and flashback-like experiences. This was echoed in Jones, Drass, and Kaimal's (2019) series of three case-studies of military service men with PTSD and traumatic brain injury (TBI). Two participants described how they overcame avoidance of trauma memories. Lobban and Murphy (2017) presented a series of four veterans who received a short-stay group art therapy admission. Participants were found to be able to use the art therapy process to express and tolerate painful thoughts and emotions. It was positive that Lobban and Murphy used validated psychometrics for PTSD (PTSD Checklist, PCL-5), anxiety (Generalised Anxiety Disorder-7, GAD-7), low mood (Patient Health Questionnaire-9, PHG-9), and wellbeing (Warwick & Edinburgh Mental Wellbeing Scale, WEMWBS) to described their sample. Whilst the authors stated that measures were

repeated at the end of the interviews, only the scores on the avoidance subscale of the PCL-5 were reported. That said, predominately anecdotal findings were illustrated with artwork, therapist observations, and participants' quotes.

Additionally, two case-studies reported quantitative data. Morgan and Johnson's (1995) study suggested fewer and less intense nightmares as well as less sleep difficulty and reduced startle reflex. These improvements were found in a drawing but not in the writing condition. Unusual for a case-study, the researchers conducted a 2-factor ANOVA (analysis of variance). Analysis yielded a significant main effect of experimental condition. The interaction term, however, did not reach statistical significance. The analysis was, however, underpowered with a sample of n=2.

The only case-study using standardised tests found decreased avoidance and social withdrawal (Hass-Cohen et al., 2014). However, the paper failed to support their claims statistically. Hass-Cohen and colleagues omitted to report the pre- and post-scores on Beck Anxiety Index (Beck, Epstein, Brown, & Steer, 1988) and Centrality of Event Scale (Berntsen & Rubin, 2006) as well as whether or not the change was greater than the reliable change index of the measures.

Mims (2015) evaluated in her mixed methods pre-/post study the effects of a six-week visual journaling art therapy group with veterans. No change in mean Clinical Outcomes in Routine Evaluation – Outcome Measure (CORE-OM; Barkham et al., 2010) scores could be statistically supported. It must, however, be noted that the sample of two participants was far too small to establish any statistically significant group differences. CORE-OM can furthermore be interpreted in terms of reliable change; however, the researcher failed to do so.

Another study explored the impact of a 10-week integrative group intervention for female survivors of domestic violence with PTSD (Allen & Wozniak, 2011). The

effectiveness of the programme was tested in two multi-site groups of eleven women altogether. A significant decrease in PTSD checklist (Weathers, Litz, Herman, & Keane, 1994) scores over the course of treatment was found on 8 of 17 items. It was unclear why the researchers chose to analyse the outcome measure by item rather than total score or symptom cluster level. As part of the qualitative component of their study, Allen and Wozniak identified a theme of 're-joining the community' as a requisite for healing. Participants indicated that the group enabled them to break their social isolation and withdrawal. It is important to note that the impact of the treatment package as a whole was investigated. Consequently, it was impossible to attribute any achieved change to individual components of the programme.

Kaimal et al. (2019) used a mixed methods approach to evaluate the impact of art therapy as offered to military personnel with co-morbid traumatic brain injury (TBI). Art therapy was part of a person-centred multi-disciplinary treatment package. Researchers collected data at four stages using open and closed surveys. Change on the most common PTSD symptoms was measured using self-report on a 5-point Likert scale from 'significant negative' to 'significant positive change'. At the end of their treatment, participants detected most positive changes on symptoms in terms of sense of self, interest in activities, anger, depressed mood, ability to experience positive emotions, and feelings of guilt. All changes reported appear to affect classic PTSD symptoms summarised in criterion D of DSM V (APA, 2013) negative cognitions and mood. Interestingly, participants stated that sleep difficulties initially became worse over the course of their treatment. Moreover, response rates to surveys at time points three and four were very low remaining just below one third. The authors failed to offer any hypotheses about the low percentage of completed surveys. Of note, the results section of this paper was not presented clearly and it was difficult to

delineate which findings came from quantitative questionnaires as opposed to the open surveys.

Campbell et al. (2016) conducted an RCT with quantitative and qualitative analyses. The researchers investigated whether a combination of art therapy and CPT yielded better treatment results than CPT on its own in a sample of veterans. Both groups improved in terms of posttraumatic-stress and depression. However, no between group differences were found. This might have been due to the small sample sizes in the experimental (n=5) and in the control condition (n=10). Between group differences in terms of depression came close to the significance level and a small effect size was reported. This might suggest that the difference between control and experimental conditions would have been statistically significant in a larger sample. In their content analysis of semi-structured interview data Campbell et al. (2016) reported a positive impact of art therapy upon veterans through decreasing avoidance due to the non-verbal nature of the therapy.

Moreover, Lobban (2012) reported the theme of 'opening-up'. Veterans attending group art therapy talked about exploring (aspects of) traumatic events on the surface of artwork. This was found to be spontaneous, somewhat distant, and non-threatening thus bypassing a need to control and avoid feelings. In addition, 'feeling connected' both to their own experiences and each other was identified as a beneficial impact of art therapy counteracting feelings of isolation.

A similar theme was reported in the only reviewed study out of Asia by Kalmanowitz and Ho (2016). They investigated the effects of combined art therapy and mindfulness for survivors of political violence. Interpretative phenomenological analysis (IPA; e.g., Smith & Osborn, 2008) yielded a theme of memory and participants described how through art making they were able to face trauma memories that they previously avoided.

Two cohort studies were identified. Johnson et al. (1997) compared the single session effectiveness of 15 treatment components of a 16-week multi-disciplinary admission for veterans with PTSD. A purposely designed tool measuring current PTSD symptoms was administered before and after sessions. Improvements were third greatest following art therapy. It was, however, unclear why the researchers developed their own measures rather than to rely on standardised and validated tools. Reference to how the measures were developed and copies of the questionnaires would have been helpful. Another important caveat was that due to complexity of the model, researchers were unable to compare the effects of the interventions. Instead it was necessary to create categories. Categories were described but the authors omitted to state in which category each intervention fell. Interestingly, contrary to the other interventions, 2-factor ANOVAs showed greater improvement in those with a higher level of difficulties following art therapy. A medium effect size was reported. This suggested that art therapy may be particularly helpful for those with the most severe difficulties. All findings were replicated in a second cohort.

Furthermore, Gantt and Tinnin (2007) explored the effects of a 1-2 week intensive outpatient treatment for people with trauma-related disorders. A significant reduction in symptoms of PTSD, dissociation, and alexithymia was reported using a battery of standardised and purpose-developed tests. The study, however, had a number of methodological flaws. Most importantly, the lack of control group and use of other interventions made it impossible to attribute changes to the art therapy component of the treatment package.

Schouten et al.'s (2015) review was the only included systematic review. They set out to determine the effectiveness of art therapy in controlled studies. Significant decrease in symptoms of trauma was reported in 50% of included studies. One paper additionally reported positive impact on symptoms of depression compared to controls. It must, however,

be noted that only six studies were found with medium quality ratings, two of which were unpublished theses. Furthermore, Schouten's definition of art therapy can only be described as broad as half of the papers used mandala drawing. Mandala drawing does not fit the definition of art therapy by BAAT (see above) adopted here. Experts from BAAT confirmed that mandalas are ill-suited to express and address emotional issues (Huet, private communication). It should be noted that mandalas can be used in some specific circumstances (e.g., resilience building) but do not form a standard part of art therapy practice. None of the studies included in the review were considered here as the remaining study was published in Dutch. Of note, the above mentioned review by Baker et al. (2018) was not include here as other types of therapies were summarised alongside art therapy. Only one of their reviewed studies met the inclusion criteria of the current review and is discussed here (i.e., Campbell et al., 2016).

Processing Traumatic Memories

It has been hypothesised that art therapy may help in processing memories (Langer, 2011; Talwar, 2007). For the purpose of this review, 'processing traumatic memories' subsumes the retrieval of aspects of trauma memory that had been blocked (i.e., specific details, emotional reaction during the events) as well as working through residual feelings survivors were left with and being able to file the traumatic experience in the past.

Five case-studies detailed an impact of art therapy upon trauma memories. Merriam (1998) observed one of the female prisoners to gain knowledge about the traumatic events that had been inaccessible before. She graphically depicted images of the events that she could not remember and felt disconnected to. Over time she was able to assimilate those buried memories. In Berkowitz' (1990) case example a Vietnam veteran reported the retrieval of missions during his deployment as well as situations with a friend who had died in the war which he claimed to have forgotten. Whilst this was mirrored in Avrahami's (2005) sample,

evidence appeared somewhat more compelling as newly surfaced material was shown both in various artworks and highlighted with quotes from participants. Both cases reported not only to remember certain situational details of the traumatic event but also emotional content. The latter finding was also discussed by Lamont et al. (2009) whose participant reported to be able to connect with feelings of fear, anger, and humiliation experienced at the time of the trauma. In another case-study a war refugee experienced a "flood of memories" (Fitzpatrick, 2002, p. 156) during an art therapy session some of which had been inaccessible previously. However, it must be noted that the reported effects were merely anecdotal. No systematic qualitative methods appeared to have been used.

Lobban (2012) used thematic analysis to analyse a focus group of five completers of a residential treatment including art therapy. Amongst other beneficial effects, the veterans talked about the art-making process triggering a chain reaction in which details of the trauma were uncovered, new ways of articulating and thinking about the events explored, and new meaning/understanding was developed. This process was reported to be carried over beyond the art therapy session into veterans' private life.

The qualitative component of Campbell et al.'s (2016) mixed methods study suggested that participants in the CPT plus art therapy condition were supported in recovering previously blocked memories by art-making. This finding should, however, be interpreted with caution as only those in the experimental condition were interviewed. It is possible that veterans receiving CPT only also recovered blocked memories.

Military personnel in Kaimal et al.'s (2019) study reported positive change in terms of reduced guilt about traumatic event. In addition, an increased ability to recall details of the events was found. The self-reported change was greatest in those who completed most AT sessions.

Fostering a Holistic View of Self

Art therapy was furthermore reported to foster a more holistic view of the self enabling the acknowledgement and integration of aspects of the self that may be hidden or avoided. The Bosnian refugee who worked with Fitzpatrick (2002) was reported to have developed an enhanced sense of identity over the course of the art therapy intervention. Avrahami's (2005) service-users seemed to undergo an integration process wherein elements of the inner world surfaced as part of the artwork. Through the interpretative part of art therapy both participants were able to link symbols to their lives. In doing so, service-users managed to reconstruct their biographical sequence and re-evaluate their aspirations and meaningful relationships.

Merriam (1998) discussed these processes in the richest detail. On one hand, it was found that the above described retrieval of buried memories aided a better understanding of the present self. On the other hand, service-users were able to experience a direct and rich encounter with their inner worlds particularly their emotions by means of art-making. Participants learned to access their own feelings, acknowledge, and begin to accept them thus strengthening the newly developed understanding of the self further. Keeping the above mentioned methodological short-comings in mind, Hass-Cohen et al. (2014) reported increased insight and positive shifts on self-knowledge on the Centrality of Event Scale.

Mims (2015) identified the theme of 'increased self-knowledge' in the qualitative part of her study. For her participants this meant a better understanding of their own emotional reactions as well as their own strengths and resources. Additionally, Lobban (2012) produced a theme of 'connectedness' from her data. Veterans talked about translating their feelings and bodily sensations into words via art-making. In doing so, they reported to be able to make sense of their experiences and to find new meanings.

Walker et al., (2017) described how masks can be used in the treatment of military personnel with PTSD and TBI. Their study was primarily concerned with the investigation

into the visual self-representations on the surface of masks rather than treatment effects. That said, anecdotally the authors reported that participants gained a greater understanding of their experiences and themselves in the process of mask-making. It must be highlighted here that participants had dual diagnoses. It is likely that TBI has an independent effect on service users' ability to benefit from treatment. Generalisation to other people with PTSD and without TBI may be difficult. Moreover, there was a question whether grounded theory was the most appropriate analytic methodology as the authors' research question was concerning the visual representations of the self on the surface of masks. The final results failed to convince as a grounded theory as no links were built between categories. Perhaps thematic analysis or IPA would have been better placed to answer the research question.

Allen and Wozniak (2011) reported the theme of 'reclamation of self' in their grounded theory. The investigated treatment package enabled the survivors of domestic violence to integrate their past and present, re-discover neglected skills and hobbies, and to view themselves as more than simply in the context of trauma.

Similar findings were reported by Kalmanowitz and Ho (2016). Their participants were helped to imagine a new identity enabling them to adapt to a new reality in a new country following their traumatic experiences. Jones et al. (2019) illustrated how on one hand, participants were enabled to acknowledge some of their difficulties and problematic behaviours. On the other hand, art therapy supported them in cultivating an identity outside the military. One service-user for example, went on to become a working artist exhibiting his artwork in various museums. It was unclear whether the participant exhibited artwork produced as part of art therapy which could potentially be problematic as they are generally considered confidential and not suitable for exhibiting.

Increasing Well-being and More Positive View of Self

Fitzpatrick (2002) reported that her intervention fostered a sense of control over memories, emotions, and her participant's life. The therapist observed the refugee's overall well-being and self-efficacy to improve over time. Similarly, autonomy and self-esteem was observed to be strengthened in Merriam's (1998) sample. Military service-men in Jones et al.'s (2019) study reported an increased sense of control over their lives and their symptomatology ultimately impacted positively on their quality of live. The artwork of Lamont et al.'s (2009) client suggested that she was better able to distract away from intense feelings. Staff reported her to engage in more non-confrontational interactions. Walker et al.'s (2016) participant found art-making therapeutic; an experience he was able to transfer outside the art therapy room. Hass-Cohen et al. (2014) reported an improvement in terms of optimism and hope for the future on the Centrality of Event Scale post-treatment.

Arguably, the calming effect reported by Mims (2015) was likely to have had beneficial impact on participants' well-being. Most of the themes identified by Allen and Wozniak (2011) could be categorised as increased well-being and improved self-image. Interview and focus group participants talked about 'creating a safe place' in their homes, a new found 'pride in appearance', as well as 'developing inner peace and serenity'.

Kalmanowitz and Ho's (2016) participants found most themes connected to increased well-being and improved view of self. Service users talked about learning to regulate their emotions and physiological reactions through a combination of art therapy and mindfulness. They were enabled to communicate their trauma which was experienced as cathartic. Finally, it was felt that the intervention improved their resilience and that it was empowering.

Discussion

Overall Methodological Considerations

Overall the quality of studies was poor as measured by the appropriate critical appraisal tools. The majority of identified papers detailed case-studies which are generally considered the least robust research design. Case-studies are useful in the early stages of research as they have the potential to generate hypotheses. However, external validity is low. Yin (2014) proposed the use of *a priori* designed comprehensive study protocols and case-study data-bases to increase generalisability and reliability. Only Hass-Cohen et al. (2011) and Lamont et al. (2009) took some steps towards achieving this. Additionally, only Campbell et al. (2016) and Morgan and Johnson (1995) included control conditions in their study. In the other reviewed papers it remained unclear whether observed changes were due to art therapy or rather to spontaneous recovery or expectancy effects (Lambert & Barley, 2001). Moreover, none of the reviewed studies reported a reasonable follow-up period. It is therefore unclear whether art therapy had any lasting impact on participants.

Issues also arose from the type of evidence reported. The majority of the reviewed case-studies relied upon unmeasured anecdotal evidence rather than on standardised tools. Only Hass-Cohen et al. (2014) used outcome tools and interpreted changes in a meaningful way by referring to the clinical cut-off. A comparison of the achieved shift in scores to the measures' reliable change indexes would have made for even more robust evidence (e.g., Christensen & Mendoza, 1986). In doing so, the reader would have been able to ascertain whether any changes went beyond the measurement error of psychometrics. Moreover, where authors decided against standardised tools it would have been prudent to use formal qualitative methodology such as thematic or interpretative phenomenological analysis to structure their findings and reduce biases.

In all studies the author(s) of the papers were part of the intervention. Confirmation bias and researcher allegiance effects are therefore important limitations that must be considered. This is particularly crucial in light of the predominance of anecdotal evidence as opposed to objective measures. Whilst Jones et al. (2019) did well in highlighting the role of the art therapist in the treatment process as well as offering helpful comments on the importance of therapist's wellbeing and the danger of vicarious trauma, they failed to consider the impact of the lack of separation between therapist and primary researcher upon their reported findings. Qualitative methodology generally invites the researcher to consider their impact upon responses given by participants and overall results (Willig, 2001). It was unclear whether the authors of qualitative studies (Allen & Wozniak, 2011; Kalmanowitz & Ho, 2016; Lobban, 2012; Mims, 2015; Walker et al., 2017) heeded this advice.

Sample sizes of most qualitative, quantitative, and mixed methods studies were small. Mims (2015) had the smallest sample size with two interviewees. Unsurprisingly, no change in outcomes was found due to lack of statistical power (e.g., Field, 2009). The largest quantitative study was Gantt and Tinnin's (2007) with n=78. Unfortunately, akin to Johnson et al. (1997) the researchers omitted a power calculation as well as effect sizes. However, it must be noted that Gantt and Tinnin (2007) reported the proportions of participants who were recovered as defined by the outcome measures used. This was a good indicator for clinically meaningful treatment effects as opposed to observed statistical change which is heavily influenced by sample size (Field, 2009). Walker et al. (2017) reported the largest qualitative study with n=370 which constitutes an impressive size for a grounded theory methodology (Corbin & Strauss, 2015). However, the results section of their paper was not written clearly and it was not clear how researchers reached the reported categories. Furthermore, despite using grounded theory they did not actually develop a theory but rather simple and unconnected themes.

Finally, issues around generalisability also resulted from the treatment offered to study participants. In most reviewed papers service-users received a treatment package with a variety of interventions along with art therapy including medication and psychological therapies using other modalities. Only Avarahami (2005), Fitzpatrick (2002), Hass-Cohen et al. (2014), Lobban and Murphy (2017), and Merriam (1998) offered art therapy only. Any reported change can therefore not be easily attributed to art therapy. Even Johnson and colleagues' (1997) attempt to evaluate their treatment components separately was not unproblematic. Interventions were offered throughout the day and in quick succession. It is possible that individual effects materialised with a delay thus impacting on the observed changes following another intervention. Kaimal et al. (2019) was the only paper that attempted to delineate the different effects of the components of the offered treatment package by asking their participants about the perceived value of art therapy. Unfortunately, researchers did not elaborate sufficiently on their findings and merely stated that 'responses were positive' (p.32). Reference to their identified themes alongside quotes would have made for more convincing evidence. It would be interesting to aggregate and compare outcomes between those who received art therapy only and those who received a care package. Unfortunately, this was beyond the scope of the current review but it may be a important direction for future systematic reviews.

Synthesis of Findings

In light of the methodological critique presented it was difficult to draw clear conclusions and to answer the research question. The reviewed literature suggested that at least some might benefit from art therapy by reducing PTSD symptoms (Allen & Wozniak, 2011; Campbell et al., 2016; Gannt & Tinnin, 2007; Hass-Cohen et al., 2014; Johnson et al., 1997; Schouten et al., 2015; Walker et al., 2016), particularly avoidance (Lobban & Murphy, 2017), aiding trauma memory processing (Campbell et al., 2016; Kalmanowitz & Ho, 2016;

Lobban, 2012), fostering a more holistic view of self (Allen & Wozniak, 2011; Jones et al., 2019; Kalmanowitz & Ho, 2016; Mims, 2015; Walker et al., 2017), and enhancing general well-being (Kalmanowitz & Ho, 2016; Lobban, 2012). The current review suggests that treatment effects may be greatest for those with the most severe difficulties (Johnson et al., 1997). Finally, the body of identified research suggested that art therapy is most commonly used for military-related PTSD. Twelve out of twenty papers described the work with active or ex-service members. Previous narrative reviews on art therapy for military-related PTSD only such as Nanda et al. (2010), and Smith (2016) may attest to this. In addition, Lobban and Murphy (2019) have recently summarised the research coming out of a UK treatment centre for veterans and compiled a set of treatment and ethical guidelines for art therapy with this client group.

The sceptical reader might argue that due to methodological flaws no conclusions can be drawn. Whilst there are doubts about the validity of findings, themes identified across more and less rigorously designed studies suggest their legitimacy. Those who remain sceptical shall be invited to note that if nothing else, the reviewed literature highlighted the currently existing gap between art therapy practice and its evidence-base.

Critiquing the identified literature highlighted a number of potential avenues for future research. Firstly, proposed treatment effects of art therapy for people with PTSD presented above should be investigated in a more rigorous way. Methodological robustness could be achieved by increasing the number of participants, clearly defining treatment success at the beginning of interventions, use of standardised psychometric tools corresponding to *a priori* defined treatment success, and administration of such tools pre- and post-therapy. Where small scale research is necessary, researches should use reliable change indexes as a comparison to ensure change above and beyond measurement errors. Ultimately, it would be helpful to aim for the design of RCTs exploring the effectiveness and efficacy of art therapy

compared to a control condition. Moreover, studies should include a reasonable follow-up period to rule out any transient treatment effects.

Secondly, papers presented were exclusively naturalistic. This indicated that art therapy is by and large offered as part of treatment programmes also using other interventions. It would therefore be helpful to attempt to disentangle the effects of each element in the system. This could be achieved by careful selection of outcome measures corresponding to the targets of the individual treatment elements as well as delivery of therapy elements in different stages. Doing so could help to maximise the effectiveness of each component and treatment programmes as a whole.

Due to methodological flaws implications for clinical practice are limited. Research presented suggests that art therapy may be a helpful adjunct to treatment of PTSD particularly for the most distressed. It appeared that art therapy helped to overcome prevalent avoidance of trauma memories. Once avoidance is lifted trauma survivors may be better able to engage in evidence-based talking therapies such as TF-CBT, NET, CPT, and to a lesser extent EMDR (i.e., in some instances EMDR can be facilitated non-verbally). Moreover, research suggested that art therapy may aid the recovery and/or elaboration of trauma memories. This may be a necessary initial step in order for trauma work using other modalities to be facilitated.

Feelings of shame and/or guilt are common in survivors of trauma (Hendin & Hass, 1991; Herman, 1992). Such adverse emotional experiences might be a barrier to engaging in talking therapies. Art therapy has a clear advantage in that respect as service-users are not required to explicitly talk about their traumatic experiences. This has been suggested to create a certain (and helpful) distance (Berkowitz, 1990) thus containing strong feelings (Avrahami, 2005; Kalmanowitz & Ho, 2016) and to allow for gentle and safe trauma-work (Allen & Wozniak, 2011; Avrahami, 2005; Berkowitz, 1990; Campbell et al., 2016; Kaimal et al.,

2019; Lobban, 2012; Lobban & Murphy, 2017; Merriam, 1998; Walker et al., 2016). Survivors of trauma who may be less able to benefit from therapies that require recounting of traumatic experiences due to associated shame and/or guilt, may find the gentler approach of art therapy more tolerable and ultimately more beneficial. This might underlie the finding that treatment effects were greater in those with a higher level of difficulties.

The current systematic review of research on the effectiveness of art therapy in the treatment of adult posttraumatic-stress disorder suggested that some can benefit from the treatment. It appeared that art therapy can impact on various symptom clusters of PTSD. The discussed methodological flaws in the design of to-date published papers highlighted a need for more robust research. Further research is needed to establish whether less convincing findings discussed here can be replicated in more rigorously designed projects.

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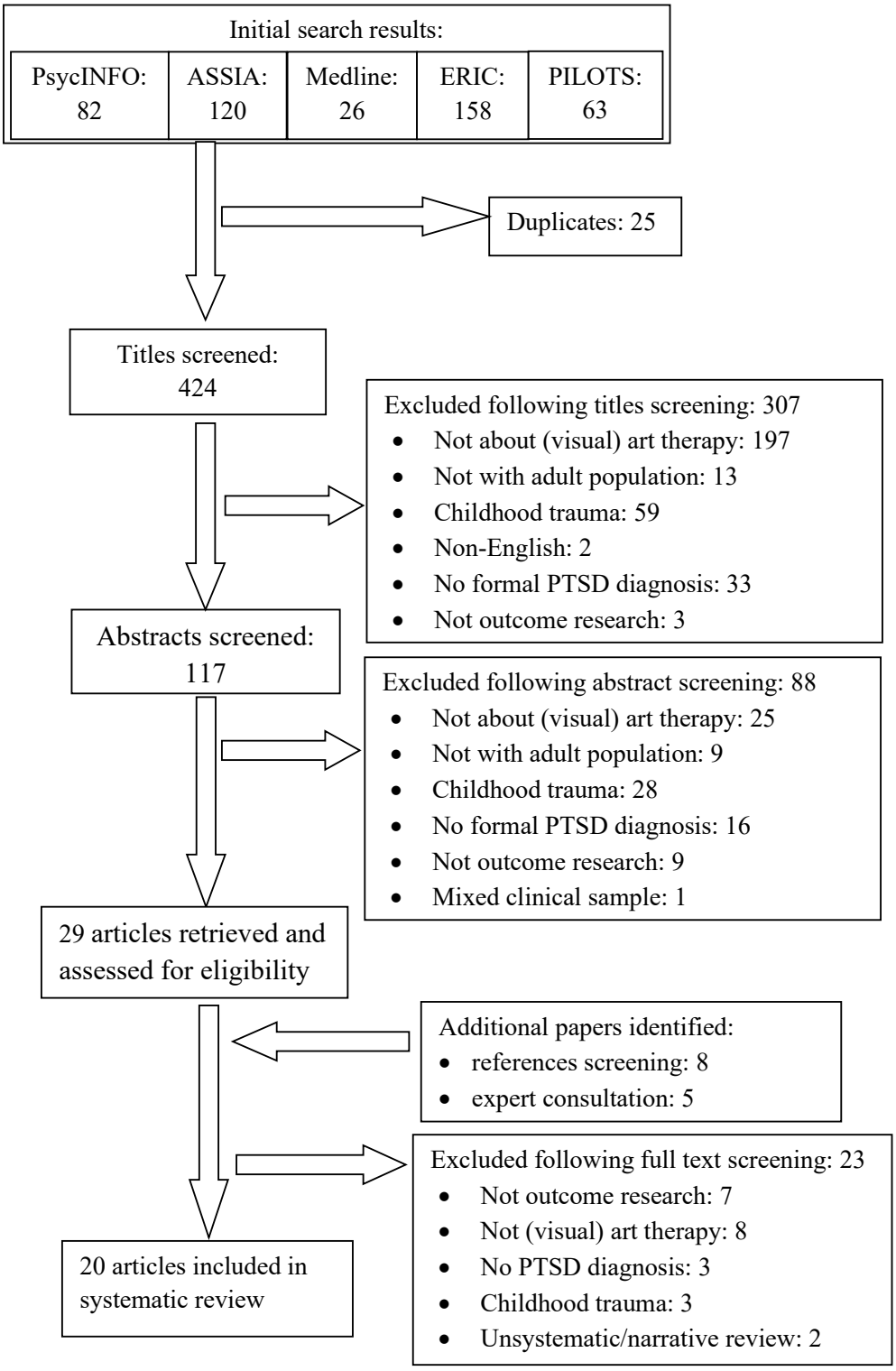

Figure 1. Flow-chart of the systematic literature search process (based on PRISMA diagram, Moher et al., 2009)

Table 1.
Summary of identified papers. Those papers that are discussed together in the main body are presented together in this table.

Study	Design	Participant(s)	Intervention	Outcomes	Quality
Avrahami (2005)	2 case-studies	1: 65 yr old male veteran 2: 58 yr old male veteran	Israel; weekly individual AT for 6 months	Anecdotal: 1: filling gaps in trauma memories; building confidence to talk about trauma; fostering hope; integration and empowerment; more healthy aspects of personality (humour, joy, colourfulness) to come back to the fore; address feelings of (dis-) trust in transference; re-connecting with feelings; 2: processing trauma memories; expression of emotions connected to trauma (depression, sorrow, anger, confusion, missing out); created distance to trauma by use of different perspectives; brought forth positive life memories; integration of trauma into narrative	3 out of 11
Berkowitz (1990)	Single case-study	41 yr old African American veteran with PTSD and diagnosis of schizophrenia	USA; individual AT for over 1 year	Anecdotal: helped client to talk about difficulties; enabled connecting with trauma instead of 'avoidance'; development of more holistic view of self and own past; verbalising feelings about the past	0 / 11
Fitzpatrick (2002)	Single case-study	38 yr old female Bosnian refugee	Australia; 4 individual AT sessions	Anecdotal: reconstruction of lost trauma memories; sense of control over the past; increased ability to tolerate trauma memories; enhanced well-being (i.e. sense of identity, self-efficacy, courage)	3 / 11
Hass-Cohen, Findlay, Carr, & Vanderlan (2014)	Single case-study	Female witness of 9/11 terror attack	USA; individual protocol-based AT in 5 stages	Quantitative: BAI dropped below clinical level; on CES increased insight and decreased avoidance, optimism, hope for future amongst others Anecdotal: feeling more present; more attuned to child and husband; improved communication; trauma less frequently part of outlook on future; support in symbolising memory	5 / 11
Jones, Drass, & Kaimal (2019)	3 case-studies	3 male active military service members 1: 23 yr old with PTSD and mild TBI 2: 32 yr old with PTSD and mild TBI 3: 31 yr old with PTSD and mild TBI	USA; individualised treatment packages with AT groups, individual AT, and community pottery groups alongside other multi-disciplinary interventions; treatment	Anecdotal: developed better insight into own symptoms; improvement of communication skills; opening up about traumatic experiences; decreased avoidance of trauma memories; connecting with others through shared AT experience; regulate emotions such as frustration/anger; identify and cultivate self-care activities; support in identifying problems; develop identity outside military;	2 / 11

			lasted between 15 months and 4 yrs		
Lamont, Brunero, & Sutton (2009)	Single case-study	46 yr old female with borderline PD and PTSD	Australia; 11 sessions of AT as part of inpatient admission; psychopharmacological treatment alongside	Anecdotal: relief of previous traumatic events; externalising thoughts and feelings; explore thoughts + feelings in structured non-blaming way; development of ability to distract from intense feelings; engagement with staff in non-confrontational way	5 / 11
Lobban & Murphy (2017)	4 case-studies	4 male veterans 1: in 50s with 23 yrs of active service 2: in 60s with 15 yrs of active service 3: in 50s with 10 yrs of active service 4. in 60s with 8 yrs of active service, historic alcohol dependence	UK; 2 pilot groups; 2-week admission with 6 2h long AT groups; 4 1h long individual sessions; 2 half-day gallery visits	Anecdotal: concept of changing viewpoints explored in groups; supporting each other to go to busy gallery despite PTSD symptoms; revealing incrementally more of themselves, own difficulties, traumatic experiences; AT as container for anxiety; articulation becoming easier and less emotional; greater ability to tolerate distressed experienced during art-making; for 3 out of 4 veterans admission as stepping stone for further work that previously not prepared for Quantitative: mean score on avoidance sub-scale of PCL-5 decreased from 2.9 to 2	5 / 11
Merriam (1998)	4 case-studies	4 female prisoners: 1: 19 yr old Native American with PTSD, schizophrenia, PD, and substance abuse 2: 24 yr old with PTSD and PD 3: 24 yr old with PTSD and eating disorder 4: 22 yr old with PTSD	Canada; individual AT in prison; amount of sessions and length of intervention not specified	Anecdotal: women were provided with encounter of inner experience; more complete understanding of themselves was reached without feeling exposed; artwork acted as ‘container’ for powerful and potentially destructive emotions	2 / 11
Morgan & Johnson (1995)	2 case studies	42 and 44 yr old Vietnam veteran with PTSD and combat nightmares	USA; residential 16-week PTSD programme; 4 3-week intervals of either drawing of or writing about nightmares if and when they occurred; 2 permutations (ABAB, BABA)	Quantitative: nightmare frequency and intensity decreases in drawing but not in writing task; more sleep problems and startle in writing condition; finding consistent in both permutations; no difference between participants but significant difference in mean scores between conditions	6 / 11

Walker, Kaimal, Koffman, DeGraba (2016)	Single case-study	Senior military service member with PTSD and moderate TBI	USA; 4-week intensive multi-disciplinary treatment with 2 group AT sessions; individual AT afterwards for 2 yrs treatment (15 sessions)	Anecdotal: opening up about traumatic events; alleviation of persistent visual flashbacks; art making experienced as therapeutic; participant began to work through feelings of 'survivor's guilt'	5 / 11
Allen & Wozniak (2011)	Mixed methods uncontrolled pre-/post study	11 female survivors of domestic violence; 2 groups facilitated at 2 treatment centres; mean age: 35	USA; 10-week eclectic treatment package including AT, yoga, mindfulness/ meditation, psycho-education	Quantitative: significant reduction in PTSD checklist scores pre- to post on 8 out of 11 items; Qualitative: 6 themes found in grounded theory: creating safe place, establishing autonomy, pride in appearance, reclaiming self, developing inner peace and serenity, re-joining community	7 / 12
Campbell, Decker, Kruk, & Deaver (2016)	Mixed methods randomised controlled	15 male veterans (5 in experimental, 10 in control condition)	USA; residential programme; intervention: 6 sessions of AT and CPT; control: CPT only	Quantitative: significant improvement on PCL-M in both groups (no between group differences); significant improvement in BDI scores (no between group differences) Content analysis: (1) AT helps working through avoidance (2) AT provides positive form of expression of painful emotions (3) AT assisted in understanding traumatic experiences (4) high degree of satisfaction with AT	8 / 12
Kaimal, Jones, Dieterich-Hartwell, Acharya, & Wang (2019)	Mixed methods uncontrolled pre-/post study	204 active service members with PTSD and TBI; mean age and gender not reported	USA; long-term AT programme in outpatient treatment centre; participants received individualised inter-disciplinary treatment package; mode: AT groups with some limited individual sessions	main areas addressed in first stage were identity and self-expression; later-on trauma processing, grief/loss, personal insight; at the end: most change experienced in sense of self, interest in activities, anger, depression, guilt; sleep difficulties became worse at first, then improved; long-term treatment resulted in higher satisfaction	7 / 12
Mims (2015)	Mixed methods pre-/post study	1: 50 yr old male homeless African American veteran with PTSD, anxiety, depression 2: 25 yr old female homeless veteran of mixed White and Latin America background.	USA; 6 weeks of group visual journaling AT	Quantitative: no change in CORE-OM scores over course of treatment Thematic analysis: 1) increased self-knowledge 2) therapist qualities 3) group vs individual therapy 4) art making benefits 5) art communicates the "real" me	8 / 12

		Diagnoses of PTSD, anxiety, depression			
Kalmanowitz & Ho (2016)	Qualitative study using focus group, questionnaires, and interviews	12 refugees/asylum seekers from 7 different countries; 25% male; age range: 18-45 yrs	Hong Kong; 4 full days over period of 9 days including homework; AT combined with mindfulness	IPA: (1) memory, (2) identity, (3) mediating aspects including, a) self-regulation, b) communication, c) imagination, (4) resilience, (5) worldview	7 / 10
Lobban (2012)	Qualitative study using focus group	5 veterans	UK; 2 weeks admission with group AT as component of treatment package	Thematic analysis: (1) problem areas of a) disconnection, b) control and avoidance, c) false self, d) stuckness in traumatic memories; (2) during AT participants a) felt connected, b) worked spontaneously, c) opened up, d) processed material	2 / 10
Walker et al. (2017)	Qualitative study	370 active service members with PTSD and TBI; 97.4% male; mean age: 36.2 yrs	USA; 4-week intensive and multi-disciplinary outpatient programme; mask-making as part of package of 17 interventions	Grounded theory: masks were utilised to visually represent (1) self as individual, (2) self in relationships, (3) self in community, (4) self in society, (5) self over time, and (6) conflicted or split sense of self	7 / 10
Gantt & Tinnin (2007)	Uncontrolled pre-/post study	72 participants; 77% female; mean age 38	USA; intensive outpatient programme for 1-2 weeks; 7 hours of therapy a day; treatment package with psycho-education, narrative trauma processing, AT; group and individual sessions	Quantitative: significant improvement on IES, SCL-45, DES, and TAS over course of treatment	7 / 11
Johnson, Lubin, James, & Hale (1997)	Naturalistic cohort study	Two cohorts of 12 and 13 Vietnam veterans; 100% male; mean age 40.2 yrs	USA; 16-week residential treatment programme; comparison of single session effects of 15 treatment components	Quantitative: correlation between PTSD symptom severity and achieved change (but not with state PTSD pre or post) with higher scores generally resulting in less change; paired samples t-tests showed significant improvement following 3 out of 15 components (AT being one of them); two-factor ANOVAs with high and low PTSD score at admission and current experience of PTSD symptoms at two time points (before and after the session) showed significant interaction term with only AT showing the opposite direction (i.e., higher severity larger change)	9 /11

Schouten, Gerrit, Knipscheer, Kleber, & Hutschemaekers (2015)	Systematic review	6 controlled studies with adult participants included (total intervention group n= 102; total control group n=120)	2 studies AT in combination with other therapies; 4 studies AT only; 3 studies on mandala drawing; 3 studies on group AT	50% of studies found improvement in utilised trauma measures; 1 study found decrease in depression	2 / 8

Notes. AT=art therapy. ANOVA=analysis of variance. BAI=Becks Anxiety Inventory. BDI= Becks Depression Inventory. CES=centrality of event scale. CORE-OM=clinical outcomes in routine evaluation-outcome measure. CPT=cognitive processing therapy. DES= dissociative experience scale. IES= impact of event scale. IPA=interpretative phenomenological analysis. PCL-5= PTSD checklist. PCL-M= PTSD checklist-military version. PD=personality disorder. PTSD=posttraumatic-stress disorder. SCL-45= symptom check list-45. TAS= Toronto alexithymia scale.

Appendix A: Quality Assessment Tables

Table A-1.
Quality appraisal of identified case-studies (Yin, 2014)

Author (year)	Construct validity (max. 3 points)	Internal validity (max. 5 points)	External validity	Reliability (max. 2 points)	Total score
Avrahami (2005)	a) Multiple sources of evidence: Yes b) Chain of evidence: No c) Informants reviewed draft: Unclear	a) Pattern matching: Yes b) Explanation building: No c) Rival explanations: No d) Use of logic models: No e) Replication logic used (in multiple case studies): Yes	Theory used (in single case studies): N/A	a) Use of case study protocol: No b) Case study data-base developed: No	3
Berkowitz (1990)	a) Multiple sources of evidence: No b) Chain of evidence: No c) Informants reviewed draft: Unclear	a) Pattern matching: No b) Explanation building: No c) Rival explanations: No (some mentioned in discussion but not investigated) d) Use of logic models: No e) Replication logic used (in multiple case studies): N/A	Theory used (in single case studies): No	a) Use of case study protocol: No b) Case study data-base developed: No	0
Fitzpatrick (2002)	a) Multiple sources of evidence: Yes b) Chain of evidence: No c) Informants reviewed draft: Unclear	a) Pattern matching: Yes b) Explanation building: No c) Rival explanations: No d) Use of logic models: No e) Replication logic used (in multiple case studies): N/A	Theory used (in single case studies): Yes	a) Use of case study protocol: No b) Case study data-base developed: No	3
Jones et al. (2019)	a) Multiple sources of evidence: Yes b) Chain of evidence: No c) Informants reviewed draft: Yes	a) Pattern matching: No b) Explanation building: No c) Rival explanations: No d) Use of logic models: No e) Replication logic used (in multiple case studies): No	Theory used (only for single case studies): N/A	a) Use of case study protocol: No b) Case study data-base developed: No	2

Hass-Cohen et al. (2014)	a) Multiple sources of evidence: Yes b) Chain of evidence: Yes c) Informants reviewed draft: Unclear	a) Pattern matching: Yes b) Explanation building: No c) Rival explanations: No d) Use of logic models: No e) Replication logic used (in multiple case studies): N/A	Theory used (in single case studies): Yes	a) Use of case study protocol: Yes b) Case study database developed: No	5
Lamont (2009)	a) Multiple sources of evidence: Yes b) Chain of evidence: Yes c) Informants reviewed draft: No	a) Pattern matching: Yes b) Explanation building: No c) Rival explanations: Yes d) Use of logic models: No e) Replication logic used (only for multiple case studies): N/A	Theory used (in single case studies): Yes	a) Use of case study protocol: No b) Case study database developed: No	5
Lobban & Murphy (2017)	a) Multiple sources of evidence: Yes b) Chain of evidence: Yes c) Informants reviewed draft: Unclear	a) Pattern matching: Yes b) Explanation building: No c) Rival explanations: No d) Use of logic models: No e) Replication logic used (in multiple case studies): N/A	Theory used (in single case studies): Yes	a) Use of case study protocol: Yes b) Case study database developed: No	5
Merriam (1998)	a) Multiple sources of evidence: No b) Chain of evidence: No c) Informants reviewed draft: Unclear	a) Pattern matching: Yes b) Explanation building: No c) Rival explanations: No d) Use of logic models: No e) Replication logic used: Yes	Theory used (only for single case studies): N/A	a) Use of case study protocol: No b) Case study database developed: No	2
Walker et al. (2016)	a) Multiple sources of evidence: Yes b) Chain of evidence: Yes c) Informants reviewed draft: Yes	a) Pattern matching: No b) Explanation building: No c) Rival explanations: Yes d) Use of logic models: No e) Replication logic used (only for multiple case studies): N/A	Theory used (in single case studies): Yes	a) Use of case study protocol: Can't tell b) Case study database developed: No	5

Table A-2.

Quality appraisal of identified qualitative studies (CASP, 2013b)

Author (year)	(A) Validity of results (max. 7 points)	(B) Results (max. 2 points)	(C) Generalisability	Score
Kalmanowitz & Ho (2016)	1. Statement of aims? Yes 2. Qualitative method appropriate? Yes 3. Design appropriate to address aims? Yes 4. Recruitment appropriate to address aims? Can't tell 5. Data collection consistent with research question? Yes 6. Relationship between researcher and participant considered? No 7. Ethical issues considered/taken into account? Can't tell	8. Analysis rigorous? Yes 9. Clear statement of findings? Yes	10. Findings valuable? Yes	7
Lobban (2012)	1. Statement of aims? No 2. Qualitative method appropriate? Can't tell 3. Design appropriate to address aims? Can't tell 4. Recruitment appropriate to address aims? No 5. Data collection consistent with research question? No 6. Relationship between researcher and participant considered? No 7. Ethical issues considered/taken into account? Yes	8. Analysis rigorous? No 9. Clear statement of findings? No	10. Findings valuable? Yes	2
Walker et al. (2017)	1. Statement of aims? Yes 2. Qualitative method appropriate? Yes 3. Design appropriate to address aims? No 4. Recruitment appropriate to address aims? Can't tell 5. Data collection consistent with research question? Yes 6. Relationship between researcher and participant considered? No 7. Ethical issues considered/taken into account? Yes	8. Analysis rigorous? Yes 9. Clear statement of findings? Yes	10. Findings valuable? Yes	7

Note. In terms of the reported scores, only meeting the criteria fully was rewarded a point.

Table A-3.

Quality appraisal of identified mixed methods studies (Pluye et al., 2009)

Author (year)	1. Qualitative (max. 6 points)						Score
Allen & Wozniak (2011)	1a. Qualitative objective/question Yes	1b. Appropriate qualitative approach/design/method Yes	1c. Description of context Yes	1d. Description of participants and justification of sampling No	1e. Description of qualitative data collection/analysis Yes	1f. Discussion of researchers' reflexivity No	7
	2. Quantitative experimental (max. 3 points)						
	2a. Appropriate sequence generation and/or randomisation Yes	2b. Allocation concealment/blinding No	2c. Attrition Yes				
	3. Mixed Methods (max. 3 points)						
	3a. Mixed methods justified Yes	3b.Combination of qualitative and quantitative data collection/analysis/procedures No	3c. Integration of qualitative and quantitative data/results No				
Campbell et al. (2016)	1a. Yes 2a. Yes 3a. Yes	1b. Yes 2b. No 3b. Yes	1c. Yes 2c. No 3c. Yes	1d. Partly	1e. Partly	1f. Yes	8
Mims (2015)	1a. Yes	1b. Yes	1c. Yes	1d. Partly	1e. Yes	1f. No	8
	2. Quantitative observational						
	2a. Appropriate sampling and sample No	2b. Justification of measures Yes	2c. Control of confounding variables No				
	3a. Yes	3b. Yes	3c. Yes				

Note. In terms of the reported scores, only meeting the criteria fully was awarded a point.

Table A-4.

Quality appraisal of identified cohort studies (CASP, 2013a)

Author (year)	(A) Validity of results (max. 8 points)	(B) Results	(C) Generalisability (max. 2 points)	Score
Gantt & Tinnin (2007)	1. Clearly focussed? Yes 2. Cohort recruited in acceptable way? Yes 3. Exposure accurately measures (biases minimised)? Yes 4. Outcome accurately measured (biases minimised)? Yes 5a. Sufficient confounding variables identified? No 5b. Confounding variables taken into account? No 6a. Complete enough follow-up? Yes 6b. Long enough follow-up? No	9. Believable results? No	10. Applicable to local population? Yes 11. Results fit with other evidence? Yes	7
Johnson et al. (1997)	1. Clearly focussed? Yes 2. Cohort recruited in acceptable way? Yes 3. Exposure accurately measures (biases minimised)? Yes 4. Outcome accurately measured (biases minimised)? No 5a. Sufficient confounding variables identified? No 5b. Confounding variables taken into account? Yes 6a. Complete enough follow-up? Yes 6b. Long enough follow-up? Yes	9. Believable results? Yes	10. Applicable to local population? Yes 11. Results fit with other evidence? Yes	9

Note. In terms of the reported scores, only meeting the criteria fully was rewarded a point. Only those items that can be scored are reported here.

Table A-5.

Quality appraisal of identified systematic reviews (CASP, 2013c)

Author (year)	(A) Validity of results (max. 5 points)	(C) Generalisability (max. 3 points)	Score
Schouten et al. (2015)	1. Clearly focussed? Yes 2. Right type of papers included? Yes 3. All important/relevant studies included? No 4. Quality rigorously assessed? No 5. Results combined (where indicated)? Not indicated	8. Applicable to local population? No 9. All important outcomes considered? No 10. Benefits outweigh harm/cost? Can't tell	2

Note. In terms of the reported scores, only meeting the criteria fully was rewarded a point. Only those items that can be scored are reported here.