

**The Effect of Drawing Lessons on Hyperarousal in Children who Experienced
the Canterbury Earthquakes**

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List of Abbreviations

ANS: Autonomic nervous system

BPI: Behaviour Problem Index

CBT: Cognitive Behaviour Therapy

PFC: Pre-frontal cortex

PTSD: Post-Traumatic Stress Disorder

PTSS: Post-traumatic Stress Symptoms

TF-CBT: Trauma Focused Cognitive Behaviour Therapy

T1: Time one

T2: Time two

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Abstract

Five years on from the 2010-2011 Canterbury earthquakes, research has shown an increase in hyperarousal symptoms in school children. While Cognitive Behaviour Therapy is currently the gold standard for treating Post-Traumatic Stress, there are insufficient clinicians to treat the high numbers of children in post-disaster communities. Alternative non-verbal interventions in school based settings that target the physiological basis of hyperarousal may be more effective for long term stress reduction in some young children. Neuroscience research suggests that drawing activates brain areas connected with the autonomic nervous system, resulting in relaxation and self-regulation. The aim of the current study was to determine whether a 20-minute drawing lesson during the afternoon of the school day would reduce stress in children with hyperarousal symptoms.

The study had a single subject ABA design. Four children participated, two of the children exhibited hyperarousal symptoms, and the other two did not, as determined by teacher and parent responses on the *Behaviour Problem Index (BPI)*. The children's self-reported stress (measured by the *Subjective Unit of Distress (SUD)* thermometer) and physiological stress (measured by finger temperature) were recorded at the start and end of each session during baseline, drawing lessons, and return to baseline phases.

The results of the study showed a general reduction in physiological stress during the drawing lessons for the children with hyperarousal symptoms. However, the results indicated some discrepancies between the children's physiological stress and perception of stress, which may suggest that the self-report measure was inappropriate for the children in this study. Overall, the study suggests that drawing lessons show promise as a school-based intervention for reducing stress in children with hyperarousal. More research is required to address the limitations of the present study, and before the study can be applied to the whole classroom as a positive strategy for managing stress at school.

Chapter One: Introduction

On the fourth of September in 2010, the Canterbury region of New Zealand was struck by an earthquake of a magnitude of 7.1 on the Richter scale. Damaging aftershocks followed the main event, with the strongest occurring on the 22nd of February 2011, 13th of June and the 23rd of December, all between 5.8 and 6.3. These earthquakes, and resulting aftershocks, caused widespread damage across Canterbury, including disruption to water, power and sewerage service and major damage to land buildings and infrastructure. They resulted in 6,600 injuries and the loss of 185 lives, in a population of 440,000. Today, Christchurch continues to experience ongoing stress from subsequent earthquakes and aftershocks, all the while continuing to rebuild the damaged city (Christchurch City Library, 2017).

Post-traumatic Stress Disorder (PTSD)

Natural disasters, like the Christchurch earthquakes, are considered traumatic experiences. Traumatic experiences are defined as events that threaten the physical integrity of an individual or others close to them with harm, injury or death (American Psychological Association, 2013). Children exposed to trauma tend to show short term signs of distress as they struggle to cope with the experience, for example, sadness, anger, anxiety, disengagement, poor concentration or sleep problems (Shaw, Espinel & Schultz, 2012). While most children eventually develop resiliency and return to normal functioning after a traumatic experience, other children experience long term psychological problems that persist into adolescence and adulthood (Masten & Narayan, 2012).

The most commonly studied psychological disorder during the aftermath of a disaster is Post-Traumatic Stress Disorder (PTSD) (Neria, Nandi, & Galea, 2008). Post-traumatic Stress Disorder was initially a diagnosis attributed to soldiers exhibiting long term

psychological problems due to the exposure to traumatic events during the Vietnam War (Groome & Soureti, 2004). Prior to the inclusion of PTSD into the American Psychiatric Association's third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-III; American Psychiatric Association, 1987) in 1980, terms such as "shellshock" and "combat fatigue" were used to describe the adverse reactions of soldiers negatively affected by their experiences of war (Franks, 2014). The inclusion of the diagnosis in the DSM-III not only reduced the stigma experienced by veterans of the war, but it also provided the opportunity for the construct to be applied to other members of society, including women and children. Over the years, the construct of PTSD has been extended to people who have experienced a wide range of traumatic events including natural and man-made disasters, physical or sexual abuse, violence to the self or others, exposure to suicidal acts, serious injury and life threatening illness (Franks, 2014).

The Fifth Edition *Diagnostic and Statistical Manual of Mental Disorders* (DSM-V; American Psychiatric Association, 2013) identifies the primary cause of developing PTSD as the "exposure to actual or threatened death, serious injury or sexual violation" (p. 271). According to the DSM-V, to meet requirements for a PTSD diagnosis "the individual must directly experience the traumatic event; witness the traumatic event in person; learn that the traumatic event occurred to a close family member or close friend (with the actual or threatened death being either violent or accidental); or experience first-hand repeated or extreme exposure to aversive details of the traumatic event (not through media, pictures, television or movies unless work-related)" (p. 271). In addition, the DSM-V states that "the disturbance, regardless of its trigger, must cause clinically significant distress or impairment in the individual's social interactions, capacity to work or other important areas of functioning, and furthermore, it cannot be the physiological result of another medical condition, medication, drugs or alcohol" (American Psychiatric Association, 2013, p. 272).

According to the DSM-V, for children (aged 6 years and above) and adults, PTSD is characterized by four distinct diagnostic clusters of symptoms: re-experiencing, avoidance, negative cognitions and mood, and hyperarousal. Re-experiencing symptoms include intrusive memories, flashbacks and reoccurring dreams related to the traumatic event, which cause intense and prolonged psychological distress. Avoidance symptoms include avoiding distressing memories, thoughts and feelings through emotional numbness, or by avoiding external reminders of the traumatic event such as people or places related to the event. Negative cognitions and mood refers to a range of distressing feelings, including a persistent and distorted sense of blame towards self or others, emotional withdrawal from others or noticeably reduced interest in pleasurable activities, and difficulty remembering key features of the traumatic event. Finally, hyperarousal symptoms include hypervigilance, sleep disturbances, difficulty concentrating, irritability and aggressive behaviour (American Psychiatric Association, 2013).

Earlier studies on PTSD focused mainly on adults, as there was previously little evidence confirming the existence of PTSD in children. Ironically, although infancy and childhood is a time when a person is most vulnerable to the effects of trauma, it was once commonly believed by adults that infants and children were resilient to trauma (Perry, Pollard, Blakley, Baker, & Vigilante, 1995). This is possibly due to earlier studies relying on parent and teacher reports of children's post-traumatic stress symptoms. Symptoms of PTSD are displayed differently in children as compared to adults, and it is likely that teachers and parents tended to underestimate the extent of stress experienced by children exposed to a traumatic event (Groome & Soureti, 2004). Recent studies using more appropriate measures of assessing PTSD in children have confirmed that the disorder is highly prevalent in children who have experienced trauma, and can have serious implications for their overall functioning and wellbeing (Gillies, et al., 2012).

Developmental factors can play a significant role in the presentation of PTSD symptoms, with children and adolescents displaying symptoms that are not seen in adults. These include behaviour problems, developmental regression, physical symptoms of stress (e.g. headaches and stomach aches) and more generalised fears (Gillies et al., 2012). While some children develop full DSM-V criteria for PTSD, many children exhibit only one or two symptoms and, therefore, do not meet full criteria. However, research shows that this partial response can still have a significant effect on children's emotional, academic and social functioning (Carrion, Garrett, Menon, Weems & Reiss, 2008). Furthermore, experiencing trauma in early childhood increases the risk of developing various psychiatric symptoms in adolescence and adulthood, such as depression and anxiety (Perry et al., 1995).

The likelihood that a child's exposure to a natural disaster will lead to the development of post-traumatic stress symptoms is influenced by many factors. Severity and proximity are important risk factors, as the greater the adversity and proximity of the natural disaster to the child, the greater the degree of post-traumatic stress symptoms. Another important risk factor is the quality of the parent-child relationship prior to the earthquake, as research has shown that those children who are not protected by a competent caregiver during a disaster may be particularly susceptible to disaster effects. In life-threatening circumstances, parents have an important role in protecting their children through the actions they take in terms of safeguarding and preparing their children, communicating to their children about safety or danger, giving directions to children on what to do, and role modelling adaptive behaviour (Masten & Osofsky, 2010). Parental support is particularly important for young children. Children who are younger tend to be more vulnerable to natural disasters as they have not had the opportunity to develop coping skills in comparison with older children, and they are likely to be more dependent on adults for support. Considering the amount of stress experienced by adults during a disaster situation, adults may not be as

available to help young children develop these coping skills, putting the children at greater risk for developing post-traumatic stress symptoms (Kronenberg, Hansel, Brennan, Osofsky, Osofsky & Lawrason, 2010).

The nature of the Christchurch earthquake has made young children particularly vulnerable to developing symptoms of PTSD. The Christchurch earthquakes, like all earthquakes, were unpredictable giving caregivers no time to prepare themselves or their children. They were severe with magnitudes reaching 7.1 causing significant damage and disruption to homes, schools and public domains, which has resulted in years of rebuild, causing many families having to change jobs, and move homes and schools (Potter, Becker, Johnston & Rossiter, 2015). With subsequent earthquakes and aftershocks, the Christchurch earthquakes provided multiple exposures to trauma (Liberty, Tarren-Sweeney, Macfarlane, Basu & Reid, 2016), potentially overwhelming young children's abilities to cope with the associated chronic stressors (Masten & Osofsky, 2010). In addition, the earthquakes resulted in death and injuries, and children may have experienced a significant injury themselves or witnessed the injury or death of a loved one (Christchurch City Library, 2017). Therefore, research on children exposed to the Canterbury earthquakes is important in determining how these children are coping growing up alongside chronic trauma.

How post-traumatic stress can affect children's ability to learn at school. A longitudinal study by Liberty et al. (2016) researched the effects of the Christchurch earthquakes on children's ability to settle in and learn at school. The study compared post-earthquake data with pre-earthquake data obtained from a previous study. In the pre-earthquake study, the researchers obtained data from a cohort of 297 five-year-old children collected from eight randomly selected schools in 2007-2008. The data came from teacher reports on the children's positive and problematic behaviour. Coincidentally, six of the schools were in neighbourhoods severely impacted by the earthquakes four years later. The

pre-earthquake data was compared with data on 212 children who were exposed to the earthquake and post-earthquake period. These children were entering five different schools in severely impacted neighbourhoods approximately 30 months after the earthquakes. Post-traumatic stress was estimated from scores on a 10-item behaviour scale reported by teachers during the children's first year of school (Liberty et al., 2016).

The results revealed that clinical post-traumatic stress symptoms were identified in more than twice as many of the earthquake exposed group as compared to the pre-earthquake group. This suggests that the extended exposure to earthquakes and post-traumatic stressors in early childhood had more than doubled the rate of clinically meaningful post-traumatic stress symptoms. This has important implications for school teachers in terms of their ability to cope with children with high stress symptoms persisting from the earthquakes (Liberty et al., 2016).

Research has shown that the symptoms of post-traumatic stress may interfere with a child's ability to succeed at school. Children who develop post-traumatic stress symptoms often manifest cognitive and behavioural symptoms, including poor executive function, significant deficits in response inhibition and attention, and physiological hyperarousal. These symptoms of post-traumatic stress may inhibit children's ability to process, store and retrieve verbal information, for example instructions given by their teachers (Carey, 2006). In addition, they may suffer from developmental delays that has a negative impact on their interpersonal and academic functioning (Carrion, Garrett, Menon, Weems, & Reiss, 2008). As a result, research has shown that children who are exposed to trauma are more likely to have poorer school performance, lower reading achievement, decreased verbal IQ, and more days of school absence (Carrion & Wong, 2012).

Current Interventions for Post-Traumatic Stress in Children

The Cochrane collaboration in 2013 reviewed the current psychological therapies for the treatment of PTSD in children and adolescents (Gillies et al., 2013). The reviewers searched for all randomised controlled trials comparing psychological therapies to a control, other psychological therapies or other therapies for the treatment of PTSD in children and adolescents aged 3-18 years. They identified 14 studies with a total of 758 participants, with most of the participants being clients of a trauma related support service. The types of trauma associated with the PTSD were sexual abuse, civil violence, natural disaster, domestic violence and motor vehicle accidents. The psychological therapies used in the studies were cognitive behavioural therapy (CBT), exposure-based therapy, psychodynamic therapy, narrative therapy, supportive counselling, and eye movement desensitisation and reprocessing (EMDR).

Overall, Gillies and colleagues (2013) found support for the utility of psychological therapies in reducing scores of PTSD symptoms, and decreasing the number of children and adolescents who continue to be diagnosed with PTSD. However, the effectiveness of these treatments were only evident for one month following treatment. Furthermore, when each of the psychological therapies were compared to a control, only cognitive behavioural therapy remained effective. There was greater improvement on PTSD scores for the CBT group compared to the control following treatment (Gillies et al., 2013).

Limitations of CBT. While CBT was determined as the most effective treatment for PTSD in the review by the Cochrane Collaboration (Gillies et al., 2013), there are some limitations that may be identified. Firstly, there was limited evidence to conclude that the benefits of CBT lasted beyond a month after treatment. The majority of studies only reported short-term outcomes (i.e. one month or less). For the few studies which did report longer term outcomes, the loss to follow-up was markedly increased over time. This means that while

CBT may be an effective short term solution, it is uncertain whether the children's PTSD symptoms returned post CBT intervention.

Secondly, the participants were grouped into a broad age range of 3-18 years of age, with no consideration of developmental differences. Therefore, it cannot be determined whether CBT was as effective with the younger children as it was with the older children and adolescents. There is strong evidence that suggests that CBT is not as effective with young children as it is with older children, due to their limited cognitive abilities (Grave & Blissett, 2004). The main assumption of CBT is that irrational or maladaptive thought patterns and processes influence problematic behaviour. The purpose of therapy is to first help the individual recognise their maladaptive thinking, and then to teach them how to challenge and replace irrational thoughts and beliefs with more rational thinking. For both adults and children, CBT is grounded in a rationalist paradigm, and therefore, requires logical analysis, rational disputation and abstract thinking. The cognitive abilities necessary to take part in this therapeutic approach include self-reflection, perspective taking, understanding new information, as well as linguistic ability and memory. There is evidence that the age of child and, therefore, the developmental level of the child play an important part in the effectiveness of CBT (Grave & Blissett, 2004).

Some meta-analyses have found evidence that older children benefit more than younger children from CBT. A meta-analysis by Durlak, Fuhrman and Lampman (1991) reported that the effect sizes for 11-13 year olds was almost twice that for younger children. Dush, Hirt and Schroeder (1989) had similar findings in their meta-analysis of 48 studies. They found that 5-7 years olds had an effect size of 0.25, whereas 8-10 year olds had an effect size of 0.39, and 11-13 year olds had an effect size of 0.61. This finding suggests that the older the child was, the more they benefited from a CBT approach. Furthermore, the

effect sizes for the two younger age groups were of marginal quality, suggesting that CBT was hardly a beneficial approach for young children.

Piaget's stage model of intellectual functioning (Piaget, 1972) provides an explanation for why CBT may be ineffective for younger children. According to Piaget, children aged 2-7 years are in the pre-operational developmental stage, which is described as a pre-logical period where thinking is dominated by perception. This is in contrast to the concrete operational period where children 7 years and older, can use logical thinking about concrete objects. This is followed by the formal operational period where 12-year-olds and older develop abstract and hypothetical thinking (Grave & Blissett, 2004). Piaget's theory may explain why CBT is less effective in young children, due to their lack of sophistication in their cognitive abilities.

In addition, CBT uses verbal communication and expression as an essential part of its procedure, which is limited in young children. This is particularly true for young children who have been exposed to early life stress (Pechtel & Pizzagalli, 2011.). Research on the impact of early life stress on the developing brain has found links between early life stress and the underdevelopment of various cognitive skills, including language (Carey, 2006).

Another significant limitation of the review was that the studies focused PTSD as a whole, rather than specific symptoms of post-traumatic stress. As previously stated, while many Christchurch children exhibit only one or two symptoms of post-traumatic stress, these can be debilitating for their emotional, social and academic development (Carrion et al., 2008; Liberty et al., 2016). In particular, the hyperarousal symptoms exhibited by children can be significantly disruptive to the classroom environment and prevent both the child and the other children in the class from learning (Bloom, 1995; Husain, 2012). In addition, attempting to engage children in CBT is likely to be unsuccessful with children when children are displaying hyperarousal symptoms (Kozłowska, & Hanney, 2001). According to

the Diagnostic Statistical Manual of Mental Disorders (DSM-V), symptoms of hyperarousal include “irritable behaviour and angry outbursts (with little or no provocation) typically expressed as verbal or physical aggression toward people or objects, reckless or destructive behaviour, hypervigilance, exaggerated startle response, problems with concentration and sleep disturbance” (American Psychiatric Association, 2013, p.272).

Hyperarousal symptoms are the most concerning symptoms of post-traumatic stress for teachers, as they create a significant disruption to the classroom. Not only do the symptoms impair the child’s own learning abilities, but they also prevent other children in the classroom from learning. This is because children with dysregulated arousal tend to interrupt others, demand attention from others, and are easily frustrated (Bloom, 1995). Furthermore, children with hyperarousal symptoms tend to have difficulty in regulating their affect and behaviour which prevents them from coping in a classroom environment where they are required to concentrate and remain on task (Carrion, et al., 2008).

Furthermore, a study by Schell, Marshall and Jaycox (2004) found that the level of hyperarousal was the main predictor of the severity of all other PTSD symptom clusters. Higher levels of hyperarousal were associated with more severe post-traumatic stress responses. In addition, individuals with high arousal symptoms, relative to other PTSD symptoms, had poorer outcomes 12 months later. These findings suggest that reducing hyperarousal symptoms through early intervention should be the first step after a traumatic event (Schell, Marshall & Jaycox, 2004). Therefore, interventions need to be developed to specifically target the symptoms of hyperarousal, due to their unique implications for children’s ability to learn at school, and their tendency to interfere with a typical CBT approach. In order to target the symptoms of hyperarousal, interventions need to be developed with consideration of the effects of early life stress on the autonomic nervous system.

The Impact of Early Life Stress on the Autonomic Nervous System

Early life stress is defined as “the exposure to a single event or multiple events during childhood that exceeds the child’s coping resources and leads to prolonged phases of stress” (Pechtel, & Pizzagalli, 2011, p.55). The experience of adverse events early on in life can create lifelong impairments in learning, behaviour, and both physical and mental health (Shonkoff et al., 2012). This is due to the neuroplasticity of the developing brain. Neuroplasticity means that the immature brain of an infant or young child is particularly sensitive to environmental conditions (Ogden, Goldstein & Fisher, 2013). The foundations of brain architecture are created in the early stages of life, through a series of complex interactions between genetic influences and environmental conditions and experiences (Fox, Levitt, & Nelson III, 2010). Therefore, the first few years of life is described as a sensitive period, and environmental factors tend to have a significant impact on certain areas of brain development during this time (Pechtel & Pizzagalli, 2011). The malleability of the brain decreases as the child gets older, making the timing of trauma a crucial factor to the development of the brain (Ogden, Goldstein & Fisher, 2013).

Exposure to stress early in life has been shown to change the size and neuronal structure of the amygdala, hippocampus and the prefrontal cortex, as well as lead to functional alterations in memory, learning, emotion regulation and executive functioning. The amygdala is the part of the brain which plays an important role in initiating children’s reactions to social and emotional cues in their environment, and is responsible for activating the physiological stress response and creating the emotional expression of fear and anxiety. From birth, it exists in its most basic function and form. It develops expeditiously during infancy, reaching its peak in volume at approximately age four. Not only is the amygdala functional at a very early age, it has also been shown to be more sensitive to stress in childhood than in adulthood (Pechtel & Pizzagalli, 2011). This early development and period

of high reactivity is indicative of a sensitive period in which early life stress can hinder development. The neuroplasticity of the foetal, infant and early childhood brain makes it particularly vulnerable to chemical influences, and an increasing amount of research is showing that incessantly high levels of stress hormones can hinder its development (Shonkoff et al., 2012).

When a situation is perceived to be threatening, the amygdala is activated, causing neurons in the hypothalamus to release corticotrophin-releasing hormone (CRH). CRH then signals the pituitary gland to release adrenocorticotrophic hormone, which in turn, stimulates the adrenal glands to increase the production of cortisol (Shonkoff et al., 2012). This biological reaction is characterized by a significant increase in sympathetic nervous system activity, resulting in increased blood pressure, heart rate, respiration, release of stored sugar, an increase in muscle tone, and a sense of hypervigilance. This is commonly described as the “fight or flight response”. In the face of danger, these activities prepare the body for defence, so that an individual can either fight with or escape from the perceived threat (Perry, 1995). However, major stress during early brain development can disrupt the development of the amygdala leading to a lowered threshold of emotional reactivity. This results in a chronically activated physiologic stress response, and children living their lives in a constant state of “flight and fight” (Shonkoff et al., 2012). Elevated cortisol levels not only alter the function of the amygdala, but also has been shown to increase its size. Several studies have shown an increase in both activation and volume of the amygdala in individuals who have experienced early life stress (e.g. Brotman et al., 2009; Chen et al., 2004; Weems, Scott, Russell, Reiss, & Carrión, 2013).

The role of the hippocampus is to “turn off” the production of cortisol. However, chronic stress weakens its ability to do so. In turn, exposure to high levels of cortisol inhibits neurogenesis in the hippocampus, which can lead to impairments in memory encoding and

contextual learning. This makes it difficult for the child to discriminate between conditions that signify danger and conditions that signify safety (Shonkoff et al., 2012). Like the amygdala, there is evidence for a sensitive period for hippocampus development. Studies have shown that experiences of trauma associated with sexual abuse between the ages of three and five years of age is related to smaller hippocampal volume (O'Doherty, Chitty, Saddiqui, Bennett & Lagopoulos, 2015; Pechtel & Pizzagalli, 2011).

Along with the amygdala and the hippocampus, brain regions with prolonged developmental trajectories, such as the pre-frontal cortex (PFC), are particularly susceptible to early life stress (Arnsten, 2009). The PFC controls complex, higher order cognitive functioning or executive functioning. Several studies have demonstrated that early life stress is related to global cognitive difficulties including; diminished intellectual performance, academic achievement, language skills, and aspects of executive functioning, such as inhibitory control and planning. Therefore, damage to the developing PFC may explain why many children who experience early life stress have associated cognitive deficits, including delayed language development (Pechtel & Pizzagalli, 2011).

The PFC also has an important role in the top-down regulation of the autonomic nervous system (Arnsten, 2009). The autonomic nervous system is the part of the body that is responsible for control of the bodily functions not consciously directed, such as breathing, the heart beat and digestive processes. It consists of two branches; the sympathetic and the parasympathetic. The sympathetic nervous system is considered the “flight or fight system” and activates physiological responses, in contrast, the parasympathetic nervous system is considered the “rest and digest system” and inhibits physiological responses. The PFC regulates autonomic activity by suppressing amygdala activity, which in turn inhibits sympathetic nervous system activity and allows for more adaptive reactions to potentially threatening or stressful experiences, as opposed to an automatic “flight or fight” response.

However, exposure to stress in combination with elevated cortisol results in considerable disruptions to the connectivity between the amygdala, hippocampus and PFC. This diminishes its ability to inhibit amygdala activity and, therefore, prevents adaptive responses to stress. In turn, this results in traumatized children appearing more reactive to events that may only be mildly aversive, and impairs their ability to effectively cope with future stress (Shonkoff et al., 2012).

In summary, early life stress is associated with hypertrophy and over activity in the amygdala, and loss of neurons and neuronal connections in the hippocampus and PFC. The functional consequences of these structural aberrations include; increased hyperarousal due to over activation of the amygdala, less top-down-control of the autonomic nervous system and emotion dysregulation due to PFC hypertrophy, and impaired memory as a consequence of hippocampal reduction. Therefore, it is not surprising that children who experienced the Canterbury earthquakes before the age of four years are showing signs of post-traumatic stress five years on from the start of the earthquake period (Liberty et al., 2016). These children would have been in a sensitive period of brain development during the earthquakes, which may have led to long term impairments in their emotional, behavioural and cognitive development.

While cognitive functioning has shown some level of recovery after removal from the stressful environment, deficits in affective functioning (e.g. emotion regulation) and the related brain areas (e.g. the amygdala) appear more resistant to recovery. This may explain the higher rates of anxiety and mood disorders seen in adults who have experienced early life stress (Pechtel & Pizzagalli, 2011). It is, therefore, unlikely that a cognitive based intervention will help these children recover from the stress they have experienced, and continue to experience. Instead, it is essential that an intervention targets their emotional wellbeing first and foremost.

As previously discussed, research suggests that the most effective therapy for post-traumatic stress symptoms is CBT. However, research has also suggested that the effectiveness of CBT depends on the cognitive capacity of the child being treated (Suveg, Comer, Furr & Kendall, 2006). CBT relies on procedures based on verbal reasoning and reflection on thoughts and feelings, which may be beyond the cognitive capacity of traumatized children, due to the potential impact of early life stress on areas of the brain responsible for language, concentration and emotion regulation. Trauma is now recognised in the literature as an autonomic, physiological and neurological reaction to immensely distressing events or experiences that creates a secondary psychological response (Perry & Malchiodi, 2014). This recognition suggests that interventions with traumatized children need to address their physiological symptoms of stress before working on their psychological symptoms. Therefore, non-verbal interventions that focuses on reducing the physiological experience of stress may be more effective with children with hyperarousal than verbal therapies aimed at altering the way children think and react to stress (Kozlowska & Hanney, 2001).

Recently, neuroscience research has found that artistic activities, such as drawing, painting and sculpting, activate areas of the brain linked to the autonomic nervous system. In particular, drawing has been shown to promote activity in the same brain areas activated when a person engages in meditation, and these neurological processes are associated with a reduction in physiological responses and an increase in relaxation and emotional self-regulation (Belkofer & Konopka, 2008; Belkofer, Van Hecke, & Konopka, 2014; Cahn & Polich, 2006). Therefore, an intervention based on drawing may reduce children's hyperarousal by reducing stress and improving emotional self-regulation at an autonomic, neurologic and physiological level.

The Effect of Drawing on the Brain and Autonomic Nervous System

Research on the neural processes involved in drawing suggests that a drawing intervention may help amend some of the early effects of trauma on the wiring and functioning of the brain (Ogden, Goldstein, & Fisher, 2013). Drawing is defined as “a form of purposeful and meaningful mark-making” (Hope, 2008, p. 2). Drawing an object is a complex visual-motor task involving various neural processes. Studies employing functional Magnetic Imagery (fMRI) have made it possible to determine the parts of the brain that are activated when participants are drawing. These studies have shown that drawing predominantly activates areas of the brain involved in visual-motor control and sensorimotor control, due to the eye-hand coordination involved (Schaer, Jahn & Lotze, 2012). Research suggests that “bottom up” interventions that work directly with movement, sensation, regulatory and sensory systems might address problems that originate in the mid brain and limbic systems, whereas “top down” verbal therapies (i.e. Trauma-Focused CBT) addresses problems in the cortex. In addressing trauma, research indicates that interventions should begin by focusing on the lower areas of the brain, such as the brainstem and diencephalon, which are associated with self-regulation, attention, arousal, and impulsivity, and then move subsequently up the brain as improvements in these areas are evident. Interventions that consist of patterned, repetitive and somatosensory activities, provide these brain areas with the neural activation necessary for reorganization (Ogden, Goldstein & Fisher, 2013). Based on neuroscience research, drawing is an activity which is shown to activate brain areas associated with movement, sensation, regulatory and sensory systems, and therefore may be an appropriate intervention for children who have experienced trauma (Schaer, Jahn and Lotze, 2012; Yuan & brown, 2014).

According to neuroscience research, copying an original object differs from drawing from memory, in terms of the visual processes involved (Schaer, Jahn and Lotze, 2012; Yuan & Brown, 2014). When the original object to be drawn is available, the eyes alternate between the original and the drawing to minimize memory demands. Brain pathways involved in vision are recruited to encode the visual elements and spatial relations of the object, and vision also guides and monitors the drawing movements of the hand and arm. Visual feedback involves gazing at the developing drawing as well as the location and movement of the hand and pencil. The eyes alternate rhythmically between the pencil and the corresponding segment of the object and the paper drawing. Brain areas involved in control of eye movements overlap with those controlling covert shifts in visual attention. These areas include the frontal eye field and the caudal superior frontal sulcus of the right hemisphere. Furthermore, the dorsal visual pathway and medial parietal cortex are essential for visual-motor control. The medial and ventral intraparietal sulcus is involved in visual control of reaching and pointing. The precuneus is involved in the planning of visually guided hand movements in correct spatial relations based on working memory. The right posterior parietal lobe and the dorsal premotor cortex support allocentric (space-referenced) movement. The right posterior parietal lobe is involved in planned movement, spatial reasoning and attention. The dorsal premotor cortex is involved in arm reaching, hand grasping and projects into the spinal cord, striatum and motor thalamus (Schaer, Jahn & Lotze, 2012; Yuan & Brown, 2014).

In conjunction with visually guided reaching, drawing entails the skilled handling of drawing tools by applying motor engrams. Motor engrams are representations of complex motor patterns. These movement patterns are located in the ventral pre-motor cortex and the inferior frontal gyrus (Harrington, Farias, Davis & Buonocore, 2007; Harrington, Farias, & Davis, 2009). These areas are important for the visualization and implementation of skilled

forelimb movements. The supplementary motor area is involved in selection and preparation of movement (Harrington, Farias, Davis & Buonocore, 2007). The execution of motor patterns is guided by visual, but also sensorimotor feedback. Precise feedback of motor performance is essential in drawing, and involves the right cerebellar lobe, the right anterior superior parietal lobule and the right cerebellum. These areas are activated in sensorimotor control of motor performance and somatosensory processing (Schaer, Jahn and Lotze, 2012; Yuan & brown, 2014). The inferior parietal cortex, the basal ganglia and the cerebellum in the left hemisphere are also activated by motor imagery tasks such as drawing. The basal ganglia are connected to the cerebral cortex, thalamus and brainstem, and controls voluntary movement (Harrington, Farias, & Davis, 2009). The inferior cortex is implicated in working memory, which there is a decreased demand for when drawing previously viewed objects. The cerebellum plays an important role in motor control (Harrington, Farias, Davis & Buonocore, 2007; Harrington, Farias, & Davis, 2009).

Neuroscience research suggests that both drawing and writing involve motor planning, visuospatial mapping, and language processing that strongly activate premotor, inferior frontal, posterior inferior temporal, and parietal areas. However, writing is strongly left lateralized, while drawing is bilaterally distributed and less lateralized, although it involves greater right hemisphere activation. When writing, activation occurs in the left posterior temporal cortex in relation to lexical-orthographic processing, and activation occurs in the left superior parietal and frontal premotor cortex in relation to graphic motor control. In contrast, drawing encompasses more detailed processing of the spatial feature of objects, which has been shown to activate a distributed network of cortical regions, including the posterior temporal cortex and inferior frontal cortex of the right hemisphere (Harrington, Farias, Davis & Buonocore, 2007; Harrington, Farias, & Davis, 2009).

The superior parietal cortex is activated in both drawing and writing. However, drawing produces significantly stronger and less lateralized activation in the superior parietal cortex compared to writing. The superior parietal cortex is part of the parietal cortex of the brain and is situated posterior to the primary somatosensory cortex, and superior to the occipital lobes. This region is believed to play a role in visuo-motor coordination. The greater activation and lateralization exhibited through drawing, is due to the increased imagery and spatial demands of drawing (Harrington, Farias, Davis & Buonocore, 2007; Harrington, Farias, & Davis, 2009).

The Brodmann's Area 37 is part of the temporal cortex which is bilaterally activated during drawing, but not during writing (Harrington, Farias, Davis & Buonocore, 2007; Harrington, Farias, & Davis, 2009). Activation of this region suggests an increased interaction between object features and semantic processing when drawing. The Brodmann's Area 37 is involved in the transformation of visual stimuli carrying semantic information into phonological representations, supporting the relationship between semantic-lexical integration and drawing. This has important implications for people who have left hemisphere damage, and as a result, have difficulty communicating verbally. Writing employs an exclusively lexical route to phonological output whereas drawing can utilize a lexical or non-lexical route (Harrington, Farias, & Davis, 2009). Therefore, drawing can be used as a modality for language impaired population or for children who are often more comfortable with right brain activities rather than verbal activities (McNamee, 2006).

Based on this research, children exposed to trauma during a critical period of brain development may benefit from drawing lessons. As previously mentioned, exposure to trauma during a sensitive period of development can result in significant impairments in the frontal and limbic areas of the brain, resulting in cognitive impairments and dysregulation of the autonomic nervous system. Furthermore, research has determined functional connectivity

within limbic-frontal circuitry as being important in emotion regulation (Banks, Eddy, Angstadt, Nathan & Phan, 2007). Therefore, interventions that improve frontal and limbic functions may be effective in reducing hyperarousal and improving emotion regulation in children, improving their ability to cope with stress in more adaptive ways (Carrion & Wong, 2012). As the previous studies provide neurological evidence that drawing recruits these brain areas, this is a promising area of research.

In addition, neuroscience studies using electroencephalograph have found that drawing can impact electrical activity in areas of the brain. Studies by Belkofer and Konopka, (2008) and Belkofer, Van Hecke and Konopka (2014) used electroencephalograph to study brain activity while participants were actively drawing. They analysed brain activity at rest and then again after 20-60 minutes of drawing, and found that drawing created observable shifts in patterns of brain activity in participants. In these studies, drawing promoted an increase in alpha waves. Higher frequencies of alpha waves are associated with lower cortical arousal, relaxation, self-regulation and a relief from anxiety and hypervigilance (Belkofer, Van Hecke, & Konopka, 2014). Research has also found an increase in alpha waves after mediation, an activity aimed at promoting relaxation and self-regulation (Cahn & Polich, 2006). Taken together, these findings suggest that drawing may also promote relaxation and self-regulation.

In post-earthquake Christchurch, many children are in need of an intervention to reduce their hyperarousal symptoms (Liberty et al., 2016). While CBT has been determined as the most effective intervention for post-traumatic stress, there is some uncertainty in terms of its effectiveness in targeting hyperarousal symptoms in young children (Kozłowska, & Hanney, 2001). This is due to their limited cognitive skills and verbal language skills, which is particularly limited in children who have experienced early life stress (Grave & Blissett, 2004). In addition, using a cognitive based verbal intervention with children with

hyperarousal symptoms may be particularly ineffective due to their difficulties in concentrating and regulating their emotions (Kozłowska, & Hanney, 2001). Children exposed to trauma during sensitive periods of brain development, tend to have an altered perception of threat and over-react to situations that other children may not perceive to be stressful (Shonkoff et al., 2012). In addition, there are insufficient clinicians to administer Trauma-Focused CBT to treat the high numbers of children in post-disaster communities. Therefore, alternative interventions need to be developed to help these children cope with stress in an adaptive way. Recent neuroscience research suggests that drawing is a “bottom up” activity that recruits’ areas of the brain involved in relaxation and self-regulation (Belkofer & Konopka, 2008; Belkofer, Van Hecke, Milwaukee & Konopka, 2014). Therefore, a drawing intervention may be effective in reducing stress in children with hyperarousal.

Chapter Two: Literature Review

The following review includes studies that investigate the effectiveness of fine arts (e.g. drawing, painting, sculpting etc.) in reducing symptoms of stress. Although drawing may have the potential to address hyperarousal symptoms in children who have experienced trauma, the literature in terms of using art to reduce stress in children is limited. Therefore, studies involving clinical and non-clinical adults and children have been included in this review, and a wide variety of fine art activities are included, although with a special focus on drawing. As there is general agreement in the literature that stress is manifested in multiple response domains, studies that measure physiological, subjective and behavioural stress responses were included in the review (Pechtel & Pizzagalli, 2011). In the reviewed studies, psychological measures of stress included self-report or parent/teacher report questionnaires measuring posttraumatic stress, general stress and/or anxiety. Physiological measures of stress included heart rate, blood pressure, cortisol levels, skin conductance and finger temperature. Behavioural observations by teachers and parents were also included as measures of stress, as the literature suggests that children often manifest stress through externalizing behaviours, such as irritability and aggression, or poor concentration and sleep disturbances (American Psychiatric Association (APA), 2013; Carrion et al., 2008).

The review is divided into two broad divisions: art therapy and art interventions. For the purpose of this review, art therapy is defined as a “form of therapy that focuses on the use of art materials for self-expression with the intention of resolving conflicts and problems, reducing stress, and achieving insight” (Pesso-Aviv, Regev, & Guttmann, 2014, p.293), and art interventions are defined as those which involve “the process of producing art through creative and physical manipulation of materials such as drawing, painting, and clay sculpting” (Abbot, Shanahan & Neufeld, 2013, p.71). Within each category, the studies were separated into studies with adults and studies with children. In addition, the art component of

the art therapies and interventions was carefully analysed to indicate the following elements: structured vs. unstructured; directive vs. non-directive; and clinical participants vs. non-clinical participants. It was important to make these distinctions in order to identify effective elements of the art therapy or intervention. Structured were defined as art therapies or interventions involving the interventionist choosing the art materials for the participants, whereas unstructured was defined as art therapies or interventions involving the interventionist providing participants with a choice over which art materials they used. Directive were defined involve the interventionists giving the participants instructions on how to use the art materials, whereas non-directive allowed participants to use the art materials however they wanted. Furthermore, due to the neuroscience research pertaining drawing's potential impact on the autonomic nervous system, each art therapy/intervention was categorised as including drawing or not.

Art Therapy

Art therapy is considered to be an alternative treatment approach to traditional verbal therapies, such as CBT, in the treatment of trauma (Malchiodi, 2011). According to Malchiodi (2003), "art therapy supports the belief that all individuals have the capacity to express themselves creatively and that the product is less important than the therapeutic process involved" (p.1). The aim of the therapeutic process is to reproduce the trauma symbolically, in order to help the individual express their experiences of the traumatic event, provide necessary details, and gain mastery over their feelings (Spiegel, Malchiodi, Backos, & Collie, 2006). It has been considered to be particularly useful in helping individuals recall, re-enact and integrate traumatic experiences and recover from emotional disturbances related to trauma (Spiegel, Malchiodi, Backos & Collie, 2006). The transformation of mental images of traumatic events into visual expression via drawing, painting or sculpting allows trauma

victims to communicate their inner pain nonverbally and less directly than using words (Morgan & Johnson, 1995).

According to Spiegel, Malchiodi, Backos and Collie (2006), a three step approach to art therapy is recommended for effective treatment of PTSD. The first step involves reducing arousal symptoms by creating art work which releases positive emotions and helps establish a safe environment for the client to engage with the art therapist. These initial sessions provide a solid basis for therapeutic work. The second step is to focus on processing traumatic memories and emotion through nonverbal expression and gradual visual exposure. During these sessions, the art therapist encourages the client to recall and express their traumatic memories and emotions through creating works of art. The final step is to help clients incorporate a new sense of understanding and insight into their lives. The art therapist's role here is to assist client's understanding of how trauma symptoms affects both emotions and physiology. Here the client learns how to use art therapy to problem solve and cope with their trauma symptoms in an adaptive way. This process of art therapy is said to help individuals recover from emotional disorders associated with trauma (Spiegel, Malchiodi, Backos & Collie, 2006).

Art therapy and adults. While CBT is considered the gold standard for treating trauma, an increasing amount of empirical research is yielding support for the use of art therapy in treating adults with PTSD. For example, a study by Johnson, Lubin, James and Hale (1997) found that art therapy was the most effective treatment approach for PTSD in war veterans in comparison with 14 other non-arts based treatment modalities. Another study by Morgan and Johnson (1995) found that art therapy was more effective than writing therapy in reducing a specific symptom of PTSD; sleep disturbance. In this study, two war veterans participated in four 3-week intervals devoted to drawing or writing in an alternating ABAB or BABA format. In the event of a nightmare, the war veterans were instructed to

write about the nightmare during the writing therapy phase and draw the nightmare during the drawing interval. Each week, the participant's rated the frequency of any recurrent nightmare, intensity of each nightmare, and startle upon waking on a 5-point Likert scale (0-4).

Difficulty going back to sleep (taking more than one hour) was reported by a yes/no response. The results indicated that both participants experienced fewer and less intense nightmares in the drawing condition compared to the writing condition. The drawing condition also showed a greater reduction in the startle response upon awakening, and the veterans were able to return to sleep more easily. The results of these studies support the main assumption of art therapy; visually expressing and processing trauma is more effective in reducing PTSD symptoms than language-based therapies (Morgan & Johnson, 1995).

However, in contrast to the findings of Morgan and Johnson (1995), two more recent studies by Chan and Horneffer (2006) and Pizarro (2004) did not find support for the psychological benefits of art therapy over writing therapy. In both studies, undergraduate students were randomly assigned to either the art therapy, writing therapy or a control group. In the art therapy group, participants were required to draw their most stressful or traumatic experience, in the writing therapy group, participants were asked to write about their most stressful or traumatic experience, and in the control group, participants were asked to draw a still life. In Pizzaro's (2004) study, participants were administered the *Global Measure of Perceived Stress (GMPS)* before and after the two 1-hour sessions, to assess stress. In Chan and Horneffer's (2000) study, participants were administered the *Symptom Checklist-90 Revised (SCL-90-R)*, before and after the two 15 minute sessions to assess various psychological symptoms including anxiety and hostility.

Pizarro (2004) reported no significant difference in stress levels between the art therapy, writing therapy or control conditions. This suggests that neither art therapy or writing therapy was effective in reducing the participants stress levels. However, participants

in the art therapy and art-control group enjoyed the sessions significantly more than the participants in the writing group. While the results suggest that creating art may be a more enjoyable experience than writing, they do not support the therapeutic quality of art therapy (Pizarro, 2004).

In contrast to the findings of Pizarro (2004), Chan and Horneffer (2006) found that participants in the writing therapy group had a significantly greater decrease in psychological symptoms, than those in the art therapy or control group. Writing was also found to be more beneficial for participants who initially had higher levels of psychological distress, which emphasizes its therapeutic potential for those individuals at high risk for emotional disturbance. However, in this study, 61% of participants indicated that they felt more comfortable with writing about their feelings, whereas 17% indicated that they felt more comfortable drawing their feelings. Therefore, participants level of comfort with the task may be an important consideration in determining effectiveness. A more detailed set of instructions or more guidance by the researcher may have been needed for those participants in the drawing group to experience therapeutic effects, due to their potential discomfort with the task (Chan & Horneffer, 2006).

However, the limitations of the studies by Pizarro (2004) and Chan and Horneffer (2006) may explain why their findings did not support the findings of Johnson and Morgan (1997). Firstly, while Pizarro (2004) and Chan and Horneffer (2006) included only two sessions in their study, Johnson and Morgan (1997) included 12 sessions. It is possible that a larger number of sessions is required for the therapeutic effects of art therapy to be evident. Secondly, in the studies by Pizarro (2004) and Chan and Horneffer (2006), the participants were undergraduate university students participating in the study for course credit, whereas, in the study by Morgan and Johnson (1997), participants were war veterans suffering from PTSD. Therefore, it is likely that the university students started the study with relatively low

stress in comparison to the war veterans with PTSD, which would explain why the therapeutic aspect of art making had no effect on the university students, but they were still able to enjoy the process.

A study by Henderson, Rosen and Mascaro (2007) also included university students, however, these students were pre-screened for both the experience of trauma and the severity of trauma symptoms. Thirty-six participants who reported experiencing one or more traumatic stressor(s) and who showed at least moderate levels of PTSD symptom on the *Post-Traumatic Symptom Severity Scale (PDS)* participated in the study. In contrast to the previous studies, this study investigated the effectiveness of a specific type of art therapy in reducing post-traumatic stress; mandala creation. The participants were randomly assigned to either the mandala creation group or control group. The mandala creation involved drawing a large circle and then filling the circle with visual representations of feelings or emotions related to their trauma using various symbols, patterns, designs and colours. In the control condition, participants were instructed to draw an object. Both conditions involved one 1-hour session over 3 days. To assess post-traumatic stress symptoms and anxiety, the participants were administered the *Post-Traumatic Symptom Severity Scale (PDS)* and the *State-Trait Anxiety Inventory (STAI)* at baseline (time 1), after the intervention (time 2) and at a one-month follow up (time 3). The results of this study yielded support for mandala creation as an effective type of art therapy in reducing the severity of post-traumatic stress. However, mandala creation provided no significant improvements for participant's anxiety (Henderson, Rosen & Mascaro, 2007).

Research has found that many individuals with cancer often experience a significant amount of anxiety and stress, from the moment they are diagnosed with cancer, and throughout the treatment process (Hobbie, et al., 2000; Kazak, 1998; Mehnert, Lehmann, Graefen, Huland & Koch, 2010; O'Connor, Christensen, Jensen, Møller & Zachariae, 2011).

Therefore, many individuals are interested in complementary treatments to supplement traditional medical approaches, in order to improve their mental health. Research by Nainis et al. (2006) and Thyme et al. (2009) provides support for art therapy as effective in reducing anxiety and stress in women with breast cancer. Nainis et al. (2006) study comprised of fifty cancer patients who participated in an hour long art therapy session involving free choice of activities including drawing, painting, sculpting, and craft activities. An art therapist guided the sessions and encouraged the participants to discuss how they were feeling at the end of the session. Thyme et al.'s (2009) study randomly assigned fourteen women with cancer to the art therapy group or the control group. The art therapy group participated in five art therapy sessions over five weeks. The sessions involved the art therapists guiding the participants through five different art activities which were designed to help the participants express their thoughts and feelings. Participants were given a range of art materials including; oil pastels, watercolours, lead pencils, charcoal, tape, scissors, paintbrushes, and sheets of paper. The control group participated in treatment as usual. Anxiety was assessed in both studies by self-report questionnaires; Nainis et al. (2006) used the state subscale of the *Spielberger State-Trait Anxiety Index (STAI-S)* and Edberg and Thyme (2009) used the *Symptom Checklist (SCL-90)*.

The results of both studies revealed a significant reduction in anxiety after the art therapy sessions. Furthermore, Thyme et al. (2009) addressed a limitation of Nainis et al. (2006) by having an RCT design, as this prevents the influence of extraneous variables. They found that the patients in the art therapy group showed a significant decrease in anxiety over time, whereas those participants in the control group did not. Thyme et al. (2009) also included more sessions. Art therapy was shown to not only provide short term relief from anxiety, but also long term relief up to 4 months later.

A study by Mercer, Warson and Zhao (2010) found art therapy to be effective in reducing stress and anxiety in medical students. The study employed a pre-test post-test design with an additional post-test follow-up, and ten medical students and staff members participated. During the art therapy session, participants were given a journal, a variety of art supplies, and were led through a guided imagery exercise. The visualization focused on the participants identifying their stress-producing emotions. They were then asked to draw the images of stress that they visualized in their journals. After this, the participants were given a series of exploratory questions designed to help them to identify and interpret their sources of stress. They were then led through another guided imagery exercise aimed to elicit positive images in terms of coping with their emotions, which the participants were asked to draw afterwards. The session ended with another list of self-exploratory questions. Over the next two weeks, the participants were encouraged to continue using their journals. Anxiety was assessed via the *State Trait Anxiety Inventory* (STAI) at the beginning and the end of the art therapy session, and at follow-up two weeks later.

The results revealed a non-significant decrease in participant's anxiety from pre-test to post-test, however, the participants were unable to sustain their lowered stress over the following two weeks. Whether or not the participants continued their visual journaling over the two-week follow-up period was not assessed in the study. Therefore, it is unclear whether the participants had continued with the visual journaling and its effectiveness in reducing anxiety had decreased over time, or whether the participants had failed to continue the visual journaling and their anxiety had increased as a result (Mercer, Warson & Zhao, 2010).

While the previous studies measured stress via self-report questionnaires, more recent studies have used physiological indicators of stress such as heart rate, blood pressure and cortisol levels, for a more objective assessment. For example, salivary cortisol was used in a study by Visnola, Sprūdža, Ārija Baķe and Piķe (2010) to assess the effectiveness of art

therapy in reducing stress and anxiety in health care employees. Sixty women working in healthcare participated in the randomized control trial, and were randomly assigned to either the art therapy group or the control group. The aim of the art therapy was to identify and express stressful emotions and situations, and to develop better strategies of coping with stress through various art activities. To do this, the first half an hour of the session was dedicated to a discussion about emotions, this was followed by an hour long art therapy session which involved drawing, painting, collage, clay and creative journaling, and the last half an hour was dedicated to reflection about art works produced, the emotions expressed and new ways of coping with stress. The control group did not receive treatment. Saliva samples were collected three times during the day: in the morning, at noon and in the afternoon. Anxiety was assessed by the self-report measure, the *State-Trait Anxiety Inventory (STAI)* (Visnola, Sprūdža, Ārija Baķe & Piķe, 2010).

The results indicated that art therapy had an impact on the autonomic nervous system. Cortisol levels in participants in the art therapy group were significantly decreased, whereas the cortisol levels in participants in the control group did not significantly decrease. Furthermore, the physiological results corresponded with the psychological results, in that the participants in the art therapy group reported a decrease in anxiety, whereas the participants in the control group did not. The correspondence between the psychological and physiological measures provides support for the relationship between the perception of stress and the physiological response of the autonomic nervous system (Visnola, Sprūdža, Ārija Baķe & Piķe, 2010).

In contrast, a study by Muthard and Gilbertson (2016) found a discrepancy between self-report measures of anxiety and physiological measures of anxiety. The study investigated the effectiveness of a combination of art therapy and mindfulness training on the anxiety levels of thirty-seven undergraduate students. The participants were randomly assigned to

either the mandala colouring and breathing exercises group, or the control group. During baseline, all participants completed the *State Trait Anxiety Inventory (STAI)* as a subjective measure of anxiety, and their blood pressure was taken as an objective measure of anxiety. For the complete duration of the study, participant's heart rate, pulse and electrodermal activity was also measured. After baseline, all of the participants underwent the "Trier Social Stress Test (TSST)" in order to induce anxiety. The TSST requires participants to give two impromptu speeches. After the speeches, participants either completed the mandala and breathing exercise for 7 minutes or they sat quietly if they were in the control group. The participants in the mandala group were instructed to colour a pre-drawn mandala while being led through a breathing exercise (Muthard & Gilbertson, 2016).

The results showed a discrepancy between the psychological and physiological measures of anxiety. While there was a significantly greater reduction in self-reported anxiety in the mandala colouring group than in the control group, the physiological measures did not demonstrate any differences between the two groups. The researchers explained this discrepancy by referring to a common model of affect, the three-way systems model (Lang, 1978) which states that affect functions on a three-way systems model that comprises of physiological, behavioural and cognitive components. Each component has a different system to respond to a stressor, therefore, reflecting a possible disconnect between self-reported measures of anxiety and physiological measures of anxiety. Another theory called the Cannon-Bard Theory of Emotion (Cannon, 1949) could also explain the discrepancy in findings, due to its proposal that autonomic arousal and conscious emotions are separate systems that do not result from one another.

Alternatively, the limitations of the study may explain the discrepancy in findings. For example, the social desirability effect may explain why significant results were found for the self-reported measurements but not the physiological measurements. It is possible that the

participants had worked out the purpose of the study, and were reporting feeling less anxious as they believed that this is what the researcher wanted them to report. On the other hand, the art therapy session may have been too short to have an effect on the student's physiology. An art therapy session longer than seven minutes may have been needed to have an effect on the participant's physiological stress response.

Overall, the 10 art therapy studies with adults indicated that art therapy has the potential to reduce symptoms of stress and anxiety in a range of clinical and non-clinical participants. The art therapy methodologies were diverse, with the art therapies varying in length and number of sessions, as well as the art materials used and instructions provided. Most of the studies used psychological measures of stress in the form of psychometric questionnaires, while a small number of studies used physiological measure of stress. However, despite the methodological differences, the common theme of the studies was that art was an effective medium for expressing and processing feelings of stress and anxiety.

Art therapy with children. Similar to the art therapy research with adults, there is limited empirical research evaluating the efficacy of art therapy in reducing PTSD symptoms in children. Eaton, Doherty and Widrick (2007) reviewed the research and methods used to establish art therapy as an effective treatment approach for children affected by trauma. They reported that the traumatic events covered by the literature were childhood physical and sexual abuse, exposure to the violence of war, the World Trade Centre 9-11 terrorist attacks, exposure to gun violence within a community, and grief following the loss of a loved one. Children ranged from 4 to 19 years of age, and 17 % of the children in the studies had a diagnosis of PTSD. Overall, the meta-analysis found that art therapy was used successfully as a treatment procedure for children who have experienced trauma across a range of contexts.

However, Eaton and colleague's (2007) meta-analysis mentioned a number of limitations with the included studies. Firstly, many researchers provided limited information

regarding the method of art therapy chosen, the degree of formal structure used, and the length of therapy provided. This lack of method specificity restricts the generalizability of the studies reported, and prevents replication of the treatment for the benefit of other individuals. However, Eaton et al., (2007) acknowledged that it is the nature of art therapy for the method to be unstructured and unconstrained, in order to give time for the individual to self-actualize and grow spiritually and emotionally. The duration of this process is likely to vary across individuals and may not fit into a controlled, time-constrained experimental design (Eaton, Doherty & Widrick, 2007).

Secondly, most of the studies did not employ empirical research designs. For example, many of the studies were case studies which did not specify or attempt to quantify outcome variables, instead relied on narrative or description as a way of conveying their findings. Furthermore, none of the studies included control groups, thus, limiting the ability to draw inferences regarding the cause of improvement. Without a control group or a control condition such as baseline, it is uncertain whether the children's symptoms reduced due to the art therapy or due to some other unrelated variables occurring at the same time. However, ethical issues arise when the children assigned to the experimental group receive therapy, while the children assigned to the control group miss out. Eaton, Doherty and Widrick (2007) suggested that future research should employ a two-treatment group design, which children are assigned to either the art therapy group or a group given another form of therapy. Another option is waitlist control; whereby waitlisted children receive the treatment after the experimental group. Either way, in order to determine the efficacy of art therapy as a treatment method for children, it is important that a more empirical approach is taken for art therapy research (Eaton, Doherty & Widrick, 2007).

However, two studies by Pifalo (2002; 2006) did employ an empirical research approach. The aim of these studies was to investigate the effectiveness of art therapy in

reducing post-traumatic stress symptoms in children who had experienced sexual abuse. Pifalo (2002; 2006) designed a 10-week art therapy session which combined the techniques of art therapy and CBT. The type of art therapy included in this study involved various CT techniques based on various verbalizing their traumatic experiences and developing new ways to cope with emotions. The studies had pre-test post-test designs, and post-traumatic stress was measured at the beginning and end of the 10 weeks, by using the *Trauma Symptom Checklist for children (TSCC)*. In both studies, the participants were female, between the age of 8-17, and were split into groups according to their age (8-10 years; 11-13 years; 14-17 years). Each art therapy session was one and a half hours long, and involved a variety of arts and crafts activities which were designed to help the children express and process their trauma related emotions, and uncover new ways of coping. The results of both studies indicated that art therapy was effective in reducing post-traumatic stress symptoms in children who had experienced sexual abuse (Pifalo, 2002; 2006).

Children and adolescents who experience traumatic events can react so severely that they are admitted to inpatient facilities. In these facilities, they are typically treated with cognitive behavioural therapy (CBT) by clinical psychologists. However, there has become an increasing interest in alternative therapies to CBT, such as Art Therapy for inpatient treatment. Chapman, Morabito, Ladakakos, Schreier and Knudson (2001) and Lyshak-Stelzer, Singer, Patricia and Chemtob (2007) assessed post-traumatic stress symptoms by using self-report questionnaires based on the DSM-IV criteria for PTSD. Lyshak-Stelzer et al. (2007) measured post-traumatic stress symptoms before and after the 16 sessions using the *UCLA PTSD Reaction Index for DSM-IV, Child Version* (Rodriguez, Steinberg, & Pynoos, 1999). Chapman et al. (2001) assessed post-traumatic stress symptoms via child and parent versions of the *Children's Post Traumatic Stress Disorder Index (PTSD-I)* at 1 week, 1 month and 6 months after discharge from the hospital.

Twenty-nine adolescents aged between 13-18 years old diagnosed with PTSD participated in the study by Lyshak-Stelzer et al. (2007), and were randomly assigned to either the art therapy condition or the arts and crafts condition. The art therapy condition consisted of 16 sessions in which the participants completed 13 drawings which were then compiled in a hand-made book format to express a visual account of his or her “life story”. Before working on their visual journals, the session began by discussing the topic of the session. The art and crafts group consisted of two sessions making various arts and crafts creations, such as cards, jewellery and decorations (Lyshak-Stelzer et al., 2007).

Lyshak-Stelzer et al. (2007) reported that both the art therapy and the arts and crafts group were effective in reducing post-traumatic stress symptoms. However, there was a greater decrease in post-traumatic stress symptoms in the art therapy group, in comparison with the arts and crafts group. These findings provided support for one of the key principles of art therapy; the utility in expressing and processing trauma through art, as opposed to engaging in art for art’s sake. In addition, participation in art therapy did not result in more behaviour problems, which was a concern of the study as the art therapy required the processing of difficult and often painful thoughts and feelings. This suggests that art therapy may have a cathartic effect on adolescents who have experienced trauma (Lyshak-Stelzer et al., 2007).

Chapman et al. (2001) investigated the effect of art therapy on the posttraumatic stress symptoms of 58 children aged 7-17 years who had been admitted to a trauma unit for head injuries. Thirty-one children received art therapy and twenty-seven received hospital care. The art therapy was designed by the researcher to facilitate the expression and exploration of traumatic imagery as it arises from memory. It involved a 1-hour one-on-one session that took place at the child’s bedside in the hospital room, and involved drawing. The art therapy session was designed in consideration of the effects of trauma on the brain. The drawing

exercise aimed to activate both the left and right hemisphere of the brain through recruited both visual and verbal processes. The children began the session by simply drawing “scribbles”, as a way of stimulating the cerebellum and motor response. According to Chapman et al. (2001) rhythm and motion releases tension and promotes relaxation. Next, the children were guided through creating a visual representation of their trauma story. To do this, the therapist used words to prompt the child. After completing the drawing, the child was encouraged to provide a verbal narrative of the event (using the drawings to illustrate their narrative) and to mention the use of adaptive coping mechanisms (Chapman et al., 2001).

The results indicated that there was not a significant difference in the reduction in post-traumatic symptoms between the art therapy group and control groups. However, when the researchers analysed individual symptom clusters (i.e. re-experiencing, avoidance, negative affect and hyperarousal), the art therapy produced a reduction in all avoidance symptoms from time 1 (after 1 week) to time 2 (after 1 month). This may suggest that the art therapy intervention was effective only in reducing avoidance symptoms. Therefore, the art therapy aided the children’s ability to express and process their trauma experiences and related emotions, but did not provide evidence of reduced symptoms of re-experiencing, negative affect or hyperarousal (Chapman et al., 2001).

The contrasting findings of Lyshak-Stelzer et al. (2007) and Chapman (2001) may be reflective of treatment intensity. While Lyshak-Stelzer et al. (2007) included 16 art therapy sessions, Chapman et al. (2001) only had one session. It is possible that a number of art therapy sessions are required in order for a significant reduction in post-traumatic stress symptoms to occur.

The symptoms of post-traumatic stress are often manifested as problem behaviour in children (American Psychological Association, 2013). Children display behavioural

symptoms such as aggression, impulsivity, hyperactivity, inattention and inability to concentrate. Studies by Freilich and Shechtman (2010); Saunders and Saunders (2000); Sitzer & Stockwell, 2015; Mousavi and Sohrabi (2014) and Rosal (1993) have investigated the effectiveness of art therapy with children with behaviour problems.

Freilich and Shechtman (2010) conducted a study investigated the effectiveness of art therapy in reducing internalizing and externalizing behaviour problems in children with a learning disability. Ninety-three children from a learning disabilities treatment centre participated in the study. Children were randomly assigned to either one hour of art therapy and two hours of learning assistance a week, or three hours learning assistance and no art therapy. The art therapy sessions involved the child selecting art materials for a project of interest, and the art therapist guiding the child towards completion of the project. During the sessions, the art therapist encouraged the child to express feelings and concerns, to explore them, and to reflect on them, with the assumption that reflection leads to insight and motivation for behavioural change. The children's internalizing and externalizing behaviour was assessed before and after the 22-week study by using the *Child Behaviour Checklist (CBCL)* completed by the children's caregivers and the *Teacher Report Form (TRF)* completed by the children's teacher.

The results showed a decrease in teacher reported internalizing and externalizing problems for the art therapy group. However, as there were no changes on the CBCL, this improvement in emotional and behavioural problems was only evident at school. As the art therapy was conducted at school, this suggests that the effect of the art therapy had not been transferred to the home setting. There were no significant changes in scores on the CBCL or TRF for the control group. This suggested that art therapy was more effective in reducing emotional and behaviour problems in children with learning disabilities than an extra hour of academic assistance. This finding provides support for an important assumption of art

therapy; expressing and processing feelings and emotions through art can lead to better adjustment (Freilich & Shechtman, 2010).

A study by Saunders and Saunders (2000) also found evidence for art therapy's effectiveness in reducing behavioural problems in children. They collected pre- and post-behavioural data over a three-year period for 94 children aged 2-16 years attending an art therapy programme (once a week) at a non-profit human service agency. The children displayed various problematic behaviours including nightmares, fighting, fearfulness, poor concentration, sexually acting out, defiance, bedwetting, withdrawnness, hyperactivity, over eating and poor motivation. The severity and frequency of these problems for each individual child was reported by caregivers at the start and end of the 3-year period of art therapy. The relationship between the art therapist and the child was also evaluated. Art therapy was shown to be effective in building a relationship between the art therapist and the child, as the results revealed that children were more engaged with the therapist at the end of the art therapy programme, in comparison with the initial session. In addition, the frequency and severity of children's behaviour problems were significantly decreased. The study provides support for another important assumption of art therapy; art can help children communicate their feelings instead of internalizing them in unhealthy ways or acting out in destructive ways (Saunders & Saunders, 2000).

Mousavi and Sohrabi (2014) found that art therapy was an effective way of reducing aggressive behaviour in children. They conducted a pre-test post-test study investigating the effectiveness of art therapy in reducing anger in children aged 7-11 years old referred to a mental health centre for severe aggressive behaviour. Thirty children participated in the study, and were randomly assigned to an art therapy group or a control group. The intervention was conducted once a week over 10 weeks. Anger was measured at the beginning and the end of the ten weeks, using the *Nelson and Finch (2000) Child Inventory*

of Anger (ChIA). The aim of each art therapy session was to help the children learn to express their anger and aggression in more adaptive ways, and also to develop prosocial behaviour. The results of the study showed a significant pre-test post-test reduction of anger in the children in the art therapy group. This finding suggests that art therapy may reduce anger in aggressive children (Mousavi & Sohrabi, 2014).

While the previous studies suggest that art therapy is effective in reducing emotional and behavioural problems in children, Sitzler and Stockwell (2015) aimed to establish art therapy as a potential preventative therapy for those children at risk for such problems. In their study, 42 elementary students aged 9-12 years participated in a ten-week art therapy programme. The study had a pre-test post-test design, and children's emotional, behavioural and social functioning was assessed before and after the programme. The session was an hour long and the first half was spent on the chosen art activity, and the second half was spent processing the art activity verbally with the group. The results indicated that there were significant improvements for the total sample in social and emotional functioning. The researchers interpreted this result as indicating that the combination of artistic creation and verbal processing provided optimal conditions to improving children's emotional and behavioural problems.

Taken together, the findings of the previous studies provide support for the effectiveness of art therapy in reducing emotional and behavioural problems in children. However, the art therapies included in these studies employed a variety of psychotherapy techniques along with the art making process. For example, CBT based techniques were used in combination with the art making process, such as relaxation and breathing exercises, challenging negative thoughts and beliefs, and developing adaptive coping strategies. Therefore, it is difficult to determine what aspect of the art therapy process is producing the beneficial effect on the children's behaviour.

A study by Rosal (1993) aimed to distinguish between the effectiveness of the CBT component of art therapy and the art making component of art therapy in reducing behaviour problems in children. Thirty-six primary school children (aged nine and ten years) identified as having moderate or severe behaviour problems at school were randomly assigned to the CBT art therapy group, the art making group and the control group. The CBT art therapy group involved creating an artwork in conjunction with various techniques used in psychotherapy and behavioural treatment. The art making group was unstructured and involved a variety of art materials including paints, drawing pencils, clay and collage materials. Children had free choice over art materials and were encouraged to be creative. Each treatment group was seen twice a week for fifty minutes over a ten-week period. The control group received no treatment. Two weeks prior and two weeks after the intervention all children were administered the *Teacher Rating Scale (TRS)* to assess and monitor children's behaviour and the *Personal Construct Drawing Interview (PCDI)* to assess the children's attitudes about themselves in relation to school, peers and authority figures.

The results of the study showed that both CBT art therapy and art making were equally effective in improving children's behaviour, as rated by their teachers on the TRF. Furthermore, both treatment groups showed significantly greater improvement than the control group. In addition, children in the treatment group showed a significant increase in positive attitudes about themselves and school, whereas the control group showed no major changes. These findings suggest that simply making art can be just as effective in reducing behaviour problems as art therapy. Therefore, the art making component of art therapy is an essential part of the process, and may even be the key element for improving emotional and behavioural problems in children (Rosal, 1993).

Summary of art therapy studies. Study methodologies have been categorized according to participant status (i.e., adult or child), the design of the study (i.e., RCT, pre-

post-test or single subject), the degree of structure and direction involved in the art interventions, and the type of art materials used. Refer to Tables A-1-A-4, p.108-196.

Summary of art therapy studies with adults. Of the 19 art therapies reviewed, 10 of art therapies included adult participants (Table A-1, p.108). Healthy adults from university or work settings participated in five studies (Chan and Horneffer, 2006; Mercer, Warson & Zhao, 2010; Muthard & Gilbertson, 2016; Pizarro, 2004; Visnola, Sprūdža, Ārija Baķe & Piķe, 2010); adults who had cancer participated in two studies (Edberg & Thyme, 2009; Nainis, et al., 2006); and adults who had experienced trauma participated in three studies (Henderson, Rosen & Mascaro, 2007; Johnson, Lubin, James & Hale, 1997; Morgan & Johnson, 1995).

The studies had mainly quantitative designs, with eight studies using a Randomized Control Trial and two studies employing pre-test post-test designs (Johnson, Lubin, James & Hale, 1997; Nainis et al., 2006). Most of these studies measured stress, anxiety and/or mood using self-report questionnaires. The most commonly used measure was the *State-Trait Anxiety Inventory (STAI)* which was used in five studies (Henderson, Rosen & Mascaro, 2007; Mercer, Warson & Zhao, 2010; Muthard & Gilbertson, 2016; Nainis et al., 2006; Visnola, Bake & Pike, 2010). Measures directly related to post-traumatic stress were used in two studies, including the *Psychological State Questionnaire (PSQ)* and the *Post-Traumatic Symptom Severity Scale (PDS)* (Johnson, Lubin, James & Hale, 1997; Henderson, Rosen & Mascaro, 2007). Other measures used included the *Global Measure of Perceived Stress (GMPS)*, the *Symptoms Checklist*, the *Subjective Units of Discomfort Scale (SUDS)* and the *Profile of Moods (POMS)*. While most of the studies relied on one measure, three studies used two measures, one of which included two self-reports (Henderson, Rosen & Mascaro, 2007). The other two studies used both psychological and physiological measures to assess

stress and anxiety; these studies measured self-reported stress and anxiety and cortisol levels (Muthard & Gilbertson, 2016; Visnola, Sprūdža, Ārija Baķe & Piķe, 2010).

In three of the studies, participants were randomly assigned to the art therapy treatment group or a contrast group. Pizarro (2004) had two contrast groups; one involved writing about a stressful event and the other involved still life drawing. Henderson, Rosen and Mascaro (2007) had one contrast group which also involved still life drawing. Ando and Ito (2014) had a contrast group which involved creating art either by drawing, sculpting or painting. In three other studies, participants were randomly assigned to the art therapy treatment group or a control group (Muthard & Gilbertson, 2016; Thyme et al., 2009; Visnola, Sprūdža, Ārija Baķe & Piķe, 2010). Participants in the control group did not participate in the art therapy, and had treatment as usual.

One study employed a single subject research design, with an alternating ABAB or BABA format (Morgan & Johnson, 1995). The study had two treatment conditions; art therapy and writing therapy. A Likert scale was created by the researchers to measure changes in the frequency, intensity and severity of nightmares each week, over the course of the twelve-week intervention.

Most of the art therapies used in the studies were structured and directive (Chan and Horneffer, 2006; Henderson et al., 2007; Johnson, Lubin, James & Hale, 1997; Morgan & Johnson, 1995; Pizarro, 2004). Two of them were unstructured and directive (Nainis, et al., 2006; Edberg & Thyme, 2009). Drawing was included in six of the art therapies; four of which were only drawing based (Chan and Horneffer, 2006; Henderson et al., 2007; Morgan & Johnson, 1995; Pizarro, 2004). The other therapies involved mandala colouring, painting, clay sculpting and visual journaling. One of the studies did not provide enough information to determine the structure and direction of the art therapy sessions, or what art materials were included (Johnson, Lubin, James & Hale, 1997).

Summary of art therapy studies with children. Of the 18 art therapies reviewed, 9 studies involved child participants. Children exposed to trauma took part in four studies (Chapman et al., 2001; Lyshak-Stelzer et al, 2007; Pifalo, 2002; 2006); children with emotional and behavioural problems took part in four studies (Saunders & Saunders, 2000; Mousavi and Sohrabi, 2014; Sitzler & Stockwell, 2015; Rosal, 1993) and children with learning and behavioural difficulties took part in one study (Freilich & Shechtman, 2010).

The studies all employed quantitative research designs, with most studies employing pre-test post-test designs, except for two studies which employed RCT designs (Freilich & Shechtman, 2010; Rosal, 1993). All of these studies used psychometrics to measure outcome variables. Eight studies used self-report questionnaires. Of this studies, four studies used measures directly related to post-traumatic stress, including the *Trauma Symptom Checklist for children (TSCC)*; the *UCLA Post-traumatic stress disorder Reaction Index for DSM-IV, Child Version*; the *Children's Post Traumatic Stress Disorder Index (PTSD-I)* and the *UCLA Post-Traumatic Stress Disorder (UCLA)* (Chapman et al., 2001; Lyshak-Stelzer et al, 2007; Pifalo, 2002; Pifalo, 2006). One study used a self-report measure about emotional and behavioural wellbeing, which was the *Wellbeing Scale* (Sitzler & Stockwell, 2015). Two studies used self-report measures related to anger and aggression including the *Nelson and Finch (2000) Child Inventory of Anger (ChIA)* and the *Personal Construct Drawing Interview (PCDI)* (Mousavi and Soharb, 2014; Rosal, 1993). Two studies used parent or teacher-reported questionnaires on child behaviour including the *Child Behaviour Checklist (CBCL)* and the *Teacher Rating Scale (TRS)* (Freilich & Shechtman, 2010; Rosal, 1993). One study had its own parent-report and art therapist report questionnaire constructed to measure the child's behaviour (Saunders & Saunders, 2000).

In two of the studies, participants were randomly assigned to the art therapy treatment group or the contrast group (Freilich & Shechtman, 2010; Rosal, 1993). Freilich and

Shechtman (2010) had one contrast group, which involved three hours of learning assistance a week, and no art therapy. Rosal (1993) also had one contrast group, which involved children simply making art work with no added therapeutic elements. The children had free choice over a range of art materials including paints, drawing pencils, clay and collage materials.

The art therapies used with children were mainly structured and directive, like the art therapies used with adults, except for one art therapy which was unstructured and directive (Freilich & Shechtman, 2010). All of the art therapies incorporated drawing, and four art therapies only involved drawing. The rest of the studies included a variety of other art materials including collage, painting, and sculpting with clay.

Effectiveness of art therapy. The effectiveness of the art therapy studies has been reported by the researchers, and these interpretations have been summarised; refer to Table A-2 and A-4, p. 185 and 196. The reported effectiveness of art therapy with adults are summarised first, and then the reported effectiveness of art therapy with children are summarised.

Reported effectiveness with adults. The ten art therapy studies with adult participants represented a mixture of positive and negative results. Three of the ten studies involved adults with psychological problems, and reported significant reductions in measures of post-traumatic stress symptoms (Henderson, Rosen & Mascaro, 2007; Johnson, Lubin, James & Hale, 1997; Morgan & Johnson, 1995). Morgan and Johnson (1995) found that art therapy was more effective than writing therapy in reducing sleep disturbance, a specific symptom of PTSD. Henderson, Rosen and Mascaro (2007) reported that participating in art therapy resulted in a greater reduction in post-traumatic stress symptoms than simply making a work of art.

For adults with cancer, both studies reported significant reductions in measures of anxiety and stress (Thyme et al., 2009; Nainis, et al, 2006). The two studies provided empirical support for the effectiveness of art therapy in reducing stress and anxiety in cancer sufferers. The researchers concurred that art therapy provided a new way of expressing and processing the difficult thoughts and emotions associated with cancer.

For healthy adults, the four studies reported a mixture of positive and negative results (Chan & Horneffer, 2006; Mercer, Warson & Zhao, 2010; Muthard & Gilbertson, 2016; Pizarro, 2004; Visnola, et al., 2010). Mercer, Warson and Zhao (2010) reported a significant reduction in self-reported anxiety in medical student's students after art therapy. The researchers determined art therapy as an effective approach to reducing stress in these student over the examination period. Visnola et al. (2010) also found positive results for art therapy and stress reduction. They aimed to determine whether art therapy was effective in reducing stress and anxiety in employees at a healthcare centre. The study yielded positive results, showing a reduction in both self-reported anxiety and cortisol levels post-art therapy. The researchers determined the effectiveness of art therapy to be due to helping workers transform their images of stress in workplace into something more positive, which in turn helps them problem solve and cope better with work place stressors (Visnola et al., 2010).

However, studies by Chan and Horneffer (2006) and Pizarro (2004) found no reduction in stress after art therapy with healthy adults. In their studies, the university students did not experience a reduction in stress after the art therapy session. Furthermore, Chan and Horneffer (2006) found that writing therapy was more effective in reducing stress than art therapy. Chan and Horneffer (2006) also found that the majority of preferred writing to drawing, so the level of comfort one has with drawing may be an important consideration when providing art therapy. In addition, a certain threshold of stress may be required for the

therapeutic benefits of art therapy to be apparent, which may not have been evident in university students.

Similar to Visnola et al. (2010), Muthard and Gilbertson (2016) also used a self-report questionnaire and cortisol levels to measure stress in university students. However, contrary to the findings of Visnola et al. (2010), Muthard and Gilbertson (2016) did not find a convergence between the psychological and physiological measures of stress. While a significant reduction in self-reported anxiety was reported, there was no difference in the participant's cortisol levels. In their discussion, the researchers explained that this may be due to a possible disconnect between psychological and physiological indicators of stress. Alternatively, the finding may reflect the limitations of using subjective measures such as self-report questionnaires, including possible social desirability effects (Muthard & Gilbertson, 2016).

Most of the studies described the effectiveness of art therapy being due to its combination of art with various techniques of CBT. Art therapy was described by researchers as being an effective alternative to purely verbal therapies for participants who are unable or unwilling to process difficult emotions or traumatic experiences purely through verbal means. It was also determined in one study as a more enjoyable activity to language based therapy (Pizarro, 2004). Another study suggested that its effectiveness may rest on whether the participants are comfortable with working with art's materials (Chan & Horneffer, 2006). If a participant is not comfortable with an art material, this may create additional stress, preventing the therapeutic effect of art therapy to take place. Therefore, the art therapist may play an important role in guiding participants through the task, and helping them feel at comfortable when using unfamiliar art materials (Chan & Horneffer, 2006).

Reported effectiveness with children. The eight art therapy studies with child participants reported a mixture of positive and negative results. For the children with

psychological problems, four studies reported significant improvements in PTSD symptoms. For children who had experienced trauma in the form of sexual abuse, two of the four studies showed that art therapy was effective in significantly reducing their PTSD symptoms (Pifalo, 2002; 2006). The same improvements were found for children with severe PTSD in inpatient facilities who had experienced a range of trauma (Chapman et al., 2001; Lyshak-Stelzer, 2007).

For children with emotional and behavioural problems, five of the nine studies reported significant improvements in their behaviour (Freilich & Shechtman, 2010; Mousavi, & Sohrabi, 2014; Saunders & Saunders, 2000; Sitzler, & Stockwell, 2015; Rosal, 1993). One study found that participants who received only academic assistance had improved learning experiences, but those children who received both academic assistance and art therapy experienced emotional exploration and insight development, which in turn, reduced their emotional and behavioural problems (Freilich & Shechtman, 2010). Another study found that in addition to improvements in behaviour problems, the children's relationship with the therapist improved through the art therapy process. This suggests that art helps children feel more relaxed and comfortable in communicating their feelings to others (Saunders & Saunders, 2000).

A common theme in the researchers' discussions was that art therapy provided a helpful alternative to talking therapies. As previously discussed, children who have experienced trauma often find it difficult to talk about their experiences and emotions with others. According to the authors, creating images that represents the trauma and associated emotions they have experienced, provides a less threatening way of sharing these experiences than directly talking about them. The researchers of the studies with children with disabilities or behavioural problems discussed the same point. Children with disabilities and behaviour problems have difficulty controlling their behaviours and communicating their emotions

constructively. Therefore, these children are often unable to engage in verbal therapies.

According to the researchers, creating art aids the children's communication skills and helps them to express their thoughts and feelings in a constructive way.

The researchers also discussed how creating art is an enjoyable process that tends to appeal to children. According to the researchers, an art therapy session creates a safe environment that helps relax the child. In addition, many of the studies used relaxation techniques alongside the art making. However, this does make it difficult to determine whether it was the art making process or the therapeutic techniques that provided the benefits seen in these studies.

Two studies aimed to determine whether it is the process of expressing and processing difficult thoughts and emotions or simply the process of making art that reduce emotional and behavioural problems in children. While Rosal (1993) found that art therapy and art making was equally effective in reducing behaviour problems, Lyshak-Stelzer (2007) found art therapy to be more effective than art making in reducing PTSD symptoms. This may suggest that for children diagnosed of PTSD, the process of expressing difficult thoughts and emotions through art is more beneficial than simply making art. Whereas for children without a PTSD diagnosis but with significant emotional and behaviour problems, simply making art may be a sufficient approach in helping these children calm down.

Art Interventions

There is some debate in the literature in regards to whether the healing properties of art therapy are due to the therapeutic relationship or the art activity itself (Waller, 2003). As previously mentioned, art therapy is led by an art therapist who often incorporates elements of CBT into the sessions. Recently, more research has separated the art from therapy, in order to determine whether simply creating a work of art is beneficial for people's psychological wellbeing. For the purposes of this literature review, art interventions are defined as those

which involve “the process of producing art through creative and physical manipulation of materials such as drawing, painting, and clay sculpting” (Abbot, Shanahan & Neufeld, 2013, p.71). Therefore, art interventions do not involve fixing, curing, changing or interpreting, in contrast to art therapy (Howells & Zelnik, 2009).

A common supposition is that art making has stress reducing and relaxing effects (Bell & Robbins, 2007). Research by neurophysiologists has found that art, meditation and healing are all associated with similar brainwave patterns and mind-body changes (Lane, 2005). These changes are initiated by the parasympathetic nervous system which stimulates the relaxation response; heartbeat slows, blood pressure drops, breathing slows, blood goes to the intestines and the body shifts into deep relaxation (Lane, 2005).

Other research has found that creating art induces a sense of “Flow”. Flow is a concept created by Csikszentmihalyi (1997; 2002) which is defined as a psychological state characterised by intense concentration and full involvement in an activity. Such concentrated attention is said to be beneficial in reducing negative feelings about the self or one’s situation. Intrinsic interest in the activity provides a distraction from every day preoccupations and stressors and helps block out environmental disruptions, therefore creating a sense of relaxation. Flow is associated with optimal psychological wellbeing as it encourages the development of skills and promotes a firm sense of accomplishment, confidence and control (Reynolds & Prior, 2006). During art making, the artistic product is less important than the process of creating the work itself. Individuals may enter a trance-like state characteristic of “flow”, due to the tactile and visual experience as well as the repetitive muscular activity inherent in art making. Research by Benson (1975) on the mind/body connection has found a link between repetitive activity involved in drawing and the state of relaxation (Jacobs, 2001). Art making has also been described as a means for reducing stress and anxiety through providing a temporary escape from reality (Sandmire, Gorham, Rankin & Grimm, 2012).

Furthermore, art is an inherently pleasurable activity that children, in particular, tend to enjoy. Children often use art materials instinctively and spontaneously through play (Kozłowska & Hanney, 2001). Children tend to draw positive things for recreational purposes, unrelated to any fears or stressors they may be currently expressing. As such, drawing may provide children with a way of distracting themselves from any negative or stressful feelings, through a positive and productive activity (Drake & Winner, 2013). Therefore, art interventions have the potential to reduce stress and improve mood in children. Art therapy for treatment of post-traumatic stress symptoms can be an expensive and specialist treatment. Alternatively, art interventions which are less expensive and may not require specialists, show promise in treating post-traumatic stress, anxiety and low mood in children in post-disaster communities.

Art interventions with adults. The effect of art making on stress and anxiety has recently become a growing area of research. A number of recent studies have recruited university students to evaluate the use of art making in reducing stress and anxiety. For example, a study by Abbot, Shanahan and Neufeld (2013) found that artistic activities were more effective than non-artistic activities in reducing stress in adults. The study had a between groups experimental design with 52 university students randomly assigned to one of four conditions: active artistic, passive artistic, active non-artistic, and passive non-artistic. The active artistic group involved drawing whatever they liked with their choice of materials, the passive artistic group involved coming up with adjectives to describe a piece of art, the active non-artistic group involved assembling a puzzle, and the passive non-artistic group involved deciphering a map. The participants stress levels were measured before and after undergoing a stress inducing task and then again after their designated task by self-report questionnaires; the *Subjective Stress Scale (SSS)* and the *Stress Adjective Checklist (SAC)*. Results indicated that all tasks reduced average stress levels, however, the artistic tasks

yielded significantly greater stress reduction than non-artistic tasks. Furthermore, the active artistic task of drawing was significantly more effective than the passive artistic task of viewing art.

Bell and Robbins (2007) provided further support for the effectiveness of drawing as a stress reducer using a Randomized Control Trial to investigate whether making art or viewing art would lower stress following induced negative mood. Fifty university students were asked to write down their most pressing concerns and worries, in order to induce a negative mood. Randomly assigned participants in the art making condition were instructed to draw whatever they wanted on a piece of white paper for 20 minutes, using their choice of crayons, coloured pencils, charcoal pencils, or oil pastels. Participants in the art viewing group were instructed to view and sort sixty art prints into groups based on their pictorial content. Participants stress was assessed using the *Profile of Mood States (POMS)* and the *State Trait Anxiety Inventory (STAI)*, before and after the negative mood induction and after their designated task. The results revealed that participants in the art production group had significantly lower scores on the *POMS* and *STAI* after twenty minutes of drawing, in comparison to the art viewing group.

A study by Boothby and Robbins (2011) failed to replicate the study by Bell and Robbins (2007). Boothby and Robbins (2011) found no significant effects of art making in comparison to art viewing in their sample of 60 university students. Furthermore, listening to music significantly reduced negative mood and anxiety compared to the no-music sessions. This suggests that listening to music while creating or viewing art is more relaxing than simply creating or viewing art. However, the inconsistent findings may be explained by the differing length of sessions. In the study by Bell and Robbins (2007), the art sessions were 20 minutes long, whereas in this study, art sessions were only ten minutes long. It is possible that art interventions require more time to induce relaxation. In addition, the participants in

Bell and Robbins (2007) study had higher starting levels of anxiety on the *POMS* and the *STAI* than participants in this study. In order for a significant change in stress to occur, participants may need to display a certain level of anxiety or stress to begin with.

Sandmire, Gorham, Rankin and Grimm (2012) evaluated the effectiveness of art making during a time which is often particularly stressful for university students; exam time. One week prior to final examinations, 57 undergraduate students agreed to participate in the study, and were randomly assigned to either the art making group or the control group. Participants in the art making group were instructed to choose one of five art activities (still life drawing, colouring mandalas, painting, collage making and modelling with clay) and follow the simple instructions that went with them for 30 minutes. At the same time, participants in the control group sat in comfortable chairs in the other room for 30 minutes. The *State Anxiety Inventory* was administered to all participants before and after the 30 minutes, in order to assess their current levels of anxiety. The results indicated that participants in the art making group had a greater reduction in anxiety, in comparison to the control group.

A study by Chang (2005) investigated the effectiveness of an art intervention in reducing stress and anxiety in nursing students. The study had a pre-test post-test design, and 36 nursing students participated. Participants were randomly assigned to the experimental group or the comparison group. In the experimental group, participants engaged in four different art activities including; making greeting cards, creating mandalas, creating a self-portrait or creating a silk wall hanging. In the comparison group, participants attended regular class. Participant's stress and anxiety levels were measured before and after the art intervention or regular class by using the following self-report questionnaires; the *mini-Profile of Mood States (POMS)*, the *Beck's Anxiety Inventory (BAI)*, and the *Affects Balance Scale (ABS)*. The results indicated a significant reduction in scores on the mini-POMS the BAI and the ABS,

compared to the comparison group. Therefore, the study provided support for the effectiveness of an art intervention in lowering stress and anxiety in nursing students.

While Chang (2005) and Sandmire, Rankin and Grimm (2012) included many different art activities, research by Curry and Kasser (2005) and van der Venet and Serice (2012) investigated the effectiveness of a specific kind of art activity in reducing anxiety; colouring. In the study by Curry and Kasser (2005), 84 undergraduate students were randomly assigned to colour a mandala, to colour a plaid form or to colour on a blank piece of paper. All participants completed the *State Anxiety Inventory (SAI)*, in order to assess their current level of anxiety. After completing the questionnaire, participants went through an anxiety induction, which required the participants to think about a time they felt most fearful and write about it for four minutes. The SAI was administered again after the anxiety induction and then after the colouring activity.

The results indicated that both the mandala and the plaid-colouring groups experienced a greater reduction in anxiety than the unstructured colouring group. The researchers interpreted these findings to mean that colouring geometric shapes is relaxing because it induces a meditative state of “flow” in individuals. Furthermore, van der Venet and Serice (2012) partially replicated these findings, reporting colouring a mandala reduced anxiety to a significantly greater degree than colouring a blank piece of paper. In both studies, the researchers observed that participants in the free colouring group tended to pause often and seemed uncertain about what to colour next. These findings suggest that in order for art interventions to reduce anxiety, they need to have some structure and direction, to allow a “flow like” experience to take place. However, in contrast to Curry and Kasser’s (2005) finding, colouring a mandala reduced anxiety to a significantly greater degree than colouring a plaid design, despite both the mandala and plaid designs being similarly complex. van der Venet and Serice (2012) interpreted this finding as supporting Curry and Kasser’s (2005)

original hypothesis based on the theory of Carl Jung (1954;1985) who suggested that the circular form of the mandala is inherently meditative and helps centre individuals when they are feeling anxious or stressed.

Kimport and Robbins (2012) aimed to investigate the potentially calming influence of clay on university students. The study was a Randomized Control Trial and healthy adults (N=102) were randomly assigned to one of four conditions after a negative mood induction exercise: handling clay with instructions to create a pinch pot; handling clay with instructions to manipulate it freely; handling a soft stress ball with instructions to toss the ball up in a structured manner; or handling a soft stress ball with instructions to manipulate it freely. The participant's mood and anxiety was measured before and after the mood induction exercise, and after the five-minute intervention. Mood was measured via the *Profile of Mood State (POMS)* and the State subscale of the *State Trait Anxiety Inventory (STAI-S)*. The results indicated that the participants in both of the clay groups, experienced greater improvements in mood than those in the stress ball groups. This finding supports the idea that clay work provides an effective outlet for emotional expression and regulation that is unique to art making, as opposed to simple physical manipulation of an object.

While the previous studies involved university students, a study by Laurer and van der Venet (2015), investigated the effectiveness of art making in reducing anxiety in substance abusers. Like the previous studies, Laurer van der Venet (2015) aimed to determine whether producing art or viewing art would be more effective in reducing anxiety. Twenty-eight adults with substance use disorders participated in the study, and were randomly assigned to either the art production group or the art viewing group. At the start of the session, both groups were required to write a 10-item to do list of their most pressing concerns or worries, in order to induce anxiety. Participants then completed the *Profile of Mood States (POMS)* and the *State Trait Anxiety Inventory (STAI)* to assess their level of anxiety. For the next

twenty minutes, participants in the art production group were instructed to draw whatever they liked, whereas the participants in the art viewing group were instructed to view and sort 60 classical art prints. At the end of the 20 minutes, participant's anxiety was measured again.

Initially, the results supported the findings of Bell and Robbins (2007), in that art production produced a greater improvement in anxiety and mood than viewing art. However, the results were not fully supported by statistical analyses, which suggests that reductions in negative mood and anxiety were due to the amount of time elapsed. This contrasting finding may be because Bell and Robbins (2007) study involved undergraduate students, as compared to participants with a clinical condition. It is possible that the anxiety inducing activity may have been more appropriate for undergraduate students in inducing anxiety, as opposed to individuals with substance abuse disorder. Simply creating a ten item to do list may have not produce high enough baseline measures of anxiety for these individuals.

de Morais et al. (2014) also aimed to determine the effectiveness of art making in reducing anxiety in a clinical sample. The clinical sample included 24 participants with various diagnoses including depression, schizophrenia, bipolar disorder, anxiety disorder, mild mental retardation, dementia, and psychosis. The participants were randomly assigned to the experimental group who completed eight sessions of clay work or the control group, who did not participate in clay work. The participant's anxiety was assessed via the *State-Trait Anxiety Inventory (STAI)* after the eight sessions. The scores of the experimental group and the control group were compared. The result indicated that the experimental group experienced a greater reduction in anxiety than the control group. Therefore, working with clay had a calming effect on individuals with psychological problems.

As the previous studies provided support for the stress reducing effect of art making in adults, a number of recent studies have investigated the mechanism behind art's stress reducing effect (De Petrillo, & Winner, 2005; Drake, Coleman & Winner, 2011; Drake &

Hodge, 2015; Drake & Winner, 2012; Dalebroux, A., Goldstein, & Winner, 2008; Smolarski, Leone & Robbins, 2015). These studies aimed to determine whether the stress reducing properties of art are a result of venting (emotion expression) or distraction (distracting oneself from their current negative feelings by reorienting their focus to something positive). Some researchers believe that art has stress reducing properties because it allows participants to express their thoughts and feelings through drawings, symbols and colours (“venting”). Other researchers believe that creating art is an engaging task that might improve mood by distracting the person from their negative thoughts and feelings (“distraction”).

Two experiments by De Petrillo and Winner (2006) investigated the underlying properties of art that make it an effective activity for reducing stress. The first experiment involved forty-two undergraduate art majors or non-majors randomly assigned to either the art condition or the control condition. In the art condition, participants were required to make a drawing based on their feelings, and in the control condition participants were required to copy geometric shapes. Participants in each condition underwent a brief anxiety induction, which involved viewing a series of photos depicting tragedy (illness, death and poverty) and watching a 5-minute video also containing images of tragic events. After this, they were administered the Affect Grid in order to assess valence (positive vs. negative feelings). This was administered again after the group completed their art making or control task. Experiment 2 was identical to experiment 1, except new participants were recruited (22 undergraduate students) and instead of copying shapes in the control group, participants completed a word find or a crossword puzzle.

The results indicated that art improved mood through venting for some individuals, and distraction for others. This was evident for both art majors and non-art majors, which suggests that even for individuals with no interest in art or limited artistic ability, art making can significantly improve their mood. Some participants reported that producing negative

images of tragedy had a cathartic effect, as it helped them to release negative feelings. Other participants reported that producing drawing with pleasant or neutral content made them feel better, as it served as a way of distracting themselves from negative feelings, and prevented rumination. Regardless of the images participants drew, participants who created art showed a greater improvement in mood, in comparison to the participants that copied shapes or completed a puzzle. This finding suggests that art making is effective not because it is an enjoyable activity or because it involves visual-motor activity, but because it allows individuals to express something meaningful (De Petrillo and Winner, 2006).

In contrast to the findings of De Petrillo and Winner (2006), more recent studies have found that distraction is significantly more effective in reducing stress than venting. A study by Drake, Coleman and Winner (2011) involved 40 university students who were randomly assigned to one of two groups; writing or art. Depending on which condition they were assigned, participants were instructed to either write or draw whatever they liked for ten minutes. Prior to the study, the participants watched a sad movie clip aimed at inducing a negative mood. Participants mood was assessed using the *Affect Grid*, as in De Petrillo and Winner (2006). After the writing/drawing intervention, participants self-reported whether the writing/drawing task helped them express their feelings (venting) or helped them think about things other than the movie clip (distraction). The results showed that participants mood was significantly more positive in the drawing than the writing group, and when participants used the task to distract themselves, as opposed to venting. A similar study by Drake and Winner (2012) found further support for the benefits of art over writing in improving mood. In addition, they added another condition “sitting” (e.g. simply sitting in comfortable chairs in a room separate to the art intervention) which allowed the researchers to investigate the influence of time. The results showed that participants in the distraction condition had a significantly greater improvement in mood than participants in the venting or sitting

conditions. These results suggest that art is more effective than writing in improving mood, and it is through distraction that art aids emotion regulation.

A study by Drake and Hodge (2015) built on the previous findings by investigating whether one's preference for drawing or writing influences mood improvement. They also investigated whether participants used drawing or writing as a form of distraction or expression. Eighty university students participated in the study, and were asked whether they preferred drawing or writing. Half of the participants were assigned to their preferred activity, and half were assigned to their non-preferred activity. All participants experienced the same mood induction as in Drake, Coleman and Winner (2011). Mood was assessed before and after the mood induction, and after the drawing/writing intervention using the *Positive and Negative Affect Scale (PANAS)*. Consistent with the findings of Drake, Coleman and Winner (2011), the results showed a greater reduction in negative mood for participants in the drawing condition as opposed to the writing condition, even for the participants who stated that they preferred to write. In addition, the results showed that participants were more likely to use drawing to distract themselves, as opposed to vent. However, in contrast to Drake, Coleman and Winner's (2011) findings, participants in the writing condition were more likely to use writing to vent. These results suggest that individuals tend to use drawing to distract themselves from negative feelings, and this is more effective in improving mood than venting through writing, even if writing is their preferred activity.

Distraction may be an effective emotion regulation strategy by reorienting individuals focus away from negative thoughts and feelings and towards more positive thoughts and feelings. Two studies aimed to investigate this concept, one involved 75 university students (Dalebroux, Goldstein & Winner, 2008) and the other involved 45 university students (Smolarski, Leone & Robbins, 2015). Both studies randomly assigned participants to three conditions; creating a drawing expressing their current stress (venting), creating a drawing

portraying something happy (positive emotion), or a distraction activity which involved tracing objects in one study or searching for symbols on a piece of paper in the other study. Dalebroux, Goldstein and Winner (2008) used the *Affect Grid*, while Smolarski, Leone, and Robbins (2015) used the *Profile of Moods State (POMS)*. Both studies found that mood became more positive in all three conditions, but the greatest improvement occurred after the positive drawing intervention.

A study by Curl and Forks (2008) provided further support for the concept that art making is more effective in reducing stress when it is used to induce positive thoughts and feelings. Forty undergraduate students participated in the study, and were randomly assigned to one of four treatment groups; collage and positive focus group, drawing and positive focus group, collage and negative focus group, and drawing and negative focus group. Participants in the negative focus groups were asked to focus on a personally stressful situation while they created their art work, and participants in the positive focus groups were required to focus on a positive situation. The aim was to determine which cognitive focus and which art activity (collage or drawing) would produce a greater reduction in stress. Participants were given twenty-five minutes to complete their art works. Prior to and after the art making session, the *State Trait Anxiety Inventory (STAI)* was administered, and participant's heart rate was recorded in order to assess stress levels. Therefore, in contrast to the previous studies, both a subjective and an objective measure of stress was used.

The results revealed a discordance between participants self-reported stress and physiological stress. In terms of self-reported stress, the results indicated that participants in the positive-focus condition experienced a significant reduction in stress, regardless of the art activity they engaged in. However, the physiological measures indicated no change in stress levels for participants in any one of the groups. Despite this discrepancy, the researchers focused on interpreting the change in self-reported stress. According to the researchers, the

release of positive emotions combined with the satisfaction of creating something artistic, may have induced a “creative high” in the participants, which lead to their reported reduction in stress. In contrast, participants in the negative group showed a slight increase in stress following the period of artistic activity. The slight increase in self-reported stress may have resulted from the focus on stress, leading to greater short term self-reported rumination and activation of stressful feelings (Curl & Forks, 2008).

Schrade, Tronsky and Kaiser (2011) also used physiological measures to investigate whether art making would help reduce stress. Nineteen individuals with intellectual disability participated in an art intervention to help them cope with daily stressors. Participants engaged in three activities, serving as their own controls: mandala making, free drawing and a control condition (which involved playing a table game, such as a puzzle). In order to assess the participants stress levels, their blood pressure and pulse was recorded before and after each half hour session. The results revealed no significant difference in blood pressure and pulse between the three groups, and all groups displayed a slight reduction in physiological stress. This suggests that free drawing and playing a game can be equally beneficial in reducing stress for a sample of individuals with intellectual disability (Schrade, Tronsky & Kaiser, 2011).

Kaimal, Ray & Muniz (2016) assessed stress in healthy adults after a 45-minute art making session by measuring cortisol levels in saliva. Cortisol is a hormone released when one encounters a stressful situation, and as such, provides an objective indicator of stress (Kaimal, Ray & Muniz, 2016). Thirty-nine participants took part in the study, which involved providing samples of saliva before and after an art making session, and providing written responses on their experiences. During the art making sessions, the participants were instructed to create any kind of imagery using the three media choices (collage making, clay sculpting, and/or markers) individually or in combination. The art making did not involve

directions from the researchers, however, the researcher was available to help if requested (Kaimal, Ray & Muniz, 2016).

The results indicated that the type of art materials selected or prior experience with art materials did not have an effect on cortisol reduction. In addition, seven themes emerged from analysis of participant's responses to art making; these included feeling relaxed, feeling pleasure/enjoyment learning something new about one's self; feeling free from constraints; experiencing an evolving process of change in art making from initial struggle to later resolution; feeling a sense of flow/losing themselves in the work; and having a desire to make art in the future. This finding suggests that any kind of art intervention is effective in reducing stress, and it does not matter whether or not participants are comfortable with making art prior to the intervention (Kaimal, Ray & Muniz, 2016).

Cortisol was also measured in a study by Walsh, Radcliffe, Castillo, Kumar and Broschard (2007) to investigate the effectiveness of art making on reducing stress and anxiety. Caregivers of children with cancer participated in the art intervention, with the aim of helping them cope with the stress and anxiety that may arise from having a seriously ill child. A previous study by Walsh, Martin and Schmidt in 2004, found that one hour of art making by caregivers at the bedside of their child was effective in reducing stress, as measured by the self-report measures; the *Profile of Moods State (POMS)*, the *Beck's Anxiety Inventory (BAI)* and the *Derogatis Affects Balance Scale (DABS)*. Walsh et al. (2007) aimed to replicate this study with sixty-nine family caregivers from a residential facility, using both a subjective and objective measure of stress. Before and after the two-hour art making session, participants completed the *Beck's Anxiety Inventory (BAI)* questionnaire and provided samples of saliva to assess cortisol levels. The art making session involved the participants choosing an art activity, and then being instructed how to complete the activity. The activity included decorated jewellery boxes, mono-prints, watercolour paintings, silk

scarves or wall hangings, mandala creations, mosaic tile trays and ribbon gems. The results indicated that the art activities provided short term stress reduction for the caregivers. Scores on the *BAI* and cortisol levels were significantly reduced in participants after the art making intervention.

However, the studies by Walsh et al. (2007) and Kaimal, Ray and Muniz (2016) have a number of limitations that require consideration. Firstly, it is uncertain whether outside variables had an impact on the outcomes, due to the studies pre-test post-test designs and lack of control groups. For example, the reduction in stress and anxiety may have been a result of attention from the interventionist, rather than the art making. In addition, there were many different activities included in both studies, and it is uncertain which art activity was the most frequently selected and which was the most effective in reducing anxiety. An additional limitation of the study by Walsh et al. (2007) is that many of the participants did not consent to providing a saliva sample. The researchers acknowledged that salivary cortisol was an expensive method of assessing stress, and was also viewed by participants as a threatening and invasive procedure. Hence, they recommended that future research used a less invasive physiological measure of stress, such as heart rate.

Similar to Walsh et al. (2007), Lawson et al. (2012) used the *State Trait Anxiety Inventory (STAI)* and salivary cortisol to assess the effect of art making on stress in cancer patients. Twenty patients receiving treatment at an outpatient clinic participated in the study. The study had a crossover design to increase the potential for detecting treatment effects in a small sample, which means the participants served as their own controls. The art making session was 40-60 minutes long and involved painting tiles. The *State Trait Anxiety Inventory (STAI)* and salivary cortisol was used to assess anxiety and stress, before and after the art session. Interestingly, while there was no significant difference in pre- and post-test scores on the *State Trait Anxiety Inventory (STAI)*, there was a significant reduction in cortisol levels.

This result suggests that while the participants were physiologically calmer, they did not perceive themselves to be calmer. The researchers suggested that this discrepancy between measures may be due to patients using the art making session as an opportunity to express their thoughts and feelings about their cancer diagnosis or treatment. It is possible that this heightened awareness of their thoughts and feelings may have increased their self-reported anxiety, but the process of creating an art work reduced the physiological indicators of anxiety (Lawson et al., 2012).

A study by Sandmire et al. (2016) also aimed to determine whether art making could reduce stress and anxiety using both subjective and objective measures of anxiety. Prior to their final examinations, 50 undergraduate students participated in the study which involved three 30-minute sessions of art making and one 30-minute session of non-art making (control). The three sessions varied in the degree of structure and direction; colouring mandalas (greater degree), modelling with clay (medium degree) and free-form painting (lesser degree). The *State Trait Anxiety Inventory (STAI)* was administered before and after each session as a subjective measure of anxiety, and heart rate variability was measured as an objective indicator of anxiety. The results revealed a significantly greater reduction in anxiety for all three types of art-making than for the control, as measured objectively. However, when measured subjectively, only free-form painting yielded a significant reduction in anxiety in comparison to the control session. The researchers explained this discrepancy by reflecting on the limitations of self-report, in that it is susceptible to personal bias. As painting is more likely to be perceived as a calming activity, it is possible that participants reported feeling less stressed, purely based on this belief (Sandmire et al., 2016).

While art is intuitively thought to be a calming activity, only recently have art interventions been empirically researched as a potential strategy for reducing stress and anxiety in adults. Overall, the research suggests that engaging in an art activity is an effective

way of reducing anxiety and stress in adults from a range of backgrounds. Unlike art therapy, art interventions do not require an art therapist or the additional elements of CBT to induce change in the participants. Furthermore, the studies suggest that only one session of art making is required to have a positive effect on stress, and studies including follow-up have shown that this positive effect is maintained over time. While earlier studies relied purely on individuals self-reported stress, more recent studies are including physiological measures of stress, which has occasionally resulted in discordant findings. This discrepancy may be explained by the limitations of self-report questionnaires, and as such, reflects the need for both physiological and psychological measures to be included in studies assessing the effect of art interventions on stress and anxiety.

Art interventions and children. Carsley, Heath and Fajnerova (2015) aimed to determine whether a colouring activity would reduce test anxiety in children. Fifty-two children in grades 5-6 were randomly assigned to either a structured mandala or free colouring condition. The children were administered the *State-Trait Anxiety Inventory* (STAI-C) for children, before and after the colouring session, and immediately before a spelling test. Participants in both colouring sessions were given 15 minutes to colour. Based on previous adult research on art interventions and anxiety (e.g. Curry & Kasser, 2005; van der Venet & Serice, 2012) it was predicted that a structured colouring task would be more effective in reducing anxiety than a free colouring task. However, children in both the mandala colouring group and the free colouring group showed a significant decrease in anxiety. Therefore, these findings suggest that regardless of the structure of the task, a brief colouring session is effective in reducing anxiety in children.

Another study by Zarezadeh Kheibari et al. (2014) provides further support for the effectiveness of art making in reducing anxiety in children. This study aimed to reduce anxiety in orphaned children in Iraq through various art activities including painting or

colouring predesigned mandalas, free-form painting, collage making, still life drawing, and modelling with clay. Twenty-six female children participated in this RCT, and were randomly assigned to the art making or control group. The researchers instructed the children in the art making group to choose one of five art making activities, read the simple instructions to help guide them and then to begin the activity, which took 90 minutes. At the same time, the children in the control group were instructed to sit in comfortable chairs in another room for 90 minutes. The children's anxiety was measured before and after the session via the *State Trait Anxiety Inventory for children (STAI-C)*. The results suggested a significant decrease in both state and trait anxiety after the art activity, whereas there was no difference found in the control group. These findings suggest that a 90-minute period of art making significantly reduced children's anxiety (Zarezadeh Kheibari et al., 2014).

A limitation of the study was that there were unequal numbers of participants for each art medium, so it was not possible to assess the differential effects of specific types of art activities on reducing anxiety. Twelve participants chose to paint or colour a pre-designed mandala, eight participants chose to create a clay object, three participants chose collage making and only one chose still-life drawing. Additionally, along with the difference in the number of children in the groups, the participants had varying degrees of interaction with one another. This could have affected the level of anxiety felt by the participant's over the course of the intervention. Therefore, having an equal number of participants per group and limiting social interaction would serve to isolate art making as the only independent variable on which the level of anxiety reduction depends (Zarezadeh et al., 2014).

Often when children are anxious, they lack the self-control to cope with these feelings appropriately, and can display aggressive behaviour (Pesso-Aviv, Regev & Guttman, 2014). A study by Pesso-Aviv, Regev and Guttman (2014) aimed to investigate whether art was effective in reducing anxiety and aggression and increasing self-control in children.

Furthermore, they aimed to compare the effectiveness of three different art media; gouache paints, oil chalks or pencils. Forty-one children between the ages of 7 and 9 years, who were on summer camp, were randomly assigned to either the gouache paint, oil chalk or pencil conditions. The participant's levels of aggression, anxiety and self-control was measured before and after the 10 art sessions. To measure aggression, *Buss and Perry's questionnaire on the expression of aggression* was used, to measure anxiety, the *State Trait Anxiety Inventory (STAI)* for children was used and to measure self-control the *Self Control Questionnaire for children*, was used. In addition, the *Session Evaluation Questionnaire* was administered after each session to examine the way the children engaged with the art materials. The first scale examined the 'depth' of the session or the sense of value in the session, the second scale examined the 'smoothness' of the session or the sense of flow, the third scale examined the sense of positivity during the session, and the final scale examined how calm the participant felt (Pesso-Aviv, Regev & Guttman, 2014).

The results indicated that the different art materials used in this study had different effects on children's aggression levels. A greater reduction in aggression was observed for the pencil group, suggesting that pencil may be a more effective media for reducing aggression in children, as compared to paint or chalk. In terms of session evaluation, participants in the gouache paint group initially provided the highest rating, but as the sessions progressed, their ratings lowered. In contrast, participants in the pencil group initially provided the lowest ratings, until the third and sixth session where ratings rose and became higher than all of the groups. The participants in the chalk group had ratings between the paint and pencil groups and remained steady. This result may be explained by pencils being more commonly used by children at home, in comparison to gouache paints, due to the prior organization involved with setting up gouache paints and then cleaning up afterwards. This may have made gouache paints initially more appealing. However, pencil mistakes can be

erased, whereas paint cannot, which may explain why children using pencils displayed less aggression and rated the sessions more highly than children using paint (Pesso-Aviv, Regev, & Guttman, 2014).

None of the groups showed any change in anxiety measured before and after the art intervention. Furthermore, none of the groups showed any changes in self-control levels before or after the art intervention. However, one potential explanation for these findings was that the post-test measurements were administered on the last day of the summer camp. The researcher suggested that the last day of summer camp may be anxiety provoking, as the children are facing saying goodbye to friends they have made at summer camp, and are about to return to normal life, which may be more structured and less fun than summer camp. The last day of summer camp, is also likely to be a busy and eventful day, making it more difficult for children to maintain their self-control (Pesso-Aviv, Regev & Guttman, 2014).

School is an environment where children's ability to maintain self-control may be challenged, therefore, Cortina and Fazel (2015) aimed to evaluate the effectiveness of a school-based group intervention for students with emotional and behavioural problems. These students typically attended the *Art Room* for approximately 10 weeks. Each session was between one and two hours long. Questionnaires were completed by teachers and students before students participated in the *Art Room* and upon completion. Teachers filled out the *Strength and Difficulties Questionnaire (SDQ)*, which is a 25 item questionnaire, based on children's emotional and behavioural problems, and the students filled out the *Mood and Feelings Questionnaire-Short Form (sMFQ)* which consists of 13 questions asking about how children have been feeling or acting over the past two weeks.

Pre and post data were available for 169 students, and was statistically analysed. Teachers reported a significant reduction in emotional and behavioural problems on the SDQ, and a significant reduction in children meeting clinical criteria. In addition, there was a

significant improvement in the student's mood and feelings as self-reported on the sMFQ. While these results are promising, the study is limited due to its pre-test post-test design with a lack of comparison group and follow up measurements. In addition, the details of what the art intervention entailed are sparse. The study does not describe the art materials used, whether or not there was a choice of art materials or not and whether or not the children were directed on how to use these materials. This prevents replication of the study both in future research and in real world application. However, the study does imply support for an art intervention in schools to help reduce emotional and behavioural problems in children.

Smitherman-Brown and Church (1996) and Kearns (2004) also provide support for the benefits of art interventions in school for children with behavioural problems. Smitherman-Brown and Church (2006) employed a single-subject, multiple-baseline research design with 12 participants aged 10-13 years attending a school for children with severe emotional and developmental issues. Eight children were in the mandala drawing group, while four children were in the control group. The mandala drawing group involved creating a free-choice circular drawing for five minutes at the beginning of the 30-minute session. After this, children were given free choice of artwork and art materials for the remainder of the session. Those children in the control condition did not begin the session with a circular drawing, but went straight into the free choice art session. Baseline data of the children's behaviour was provided by teacher response on the *Child Behaviour Checklist (CBCL)*, and direct observation of the child's behaviour was recorded over the following sessions. The results of Smitherman-Brown and Church (1996) indicated that participants who drew mandala designs at the beginning of the session showed a greater increase in attention span and decrease in impulsive behaviours over the course of the study, in comparison with participants in the control group. However, a notable limitation of the study was that it did not specify how many sessions each participant participated in. This prevents the replication

of the study in future research. Furthermore, there was an uneven number of participants in treatment and control groups (Smitherman-Brown & Church, 1996).

The study by Kearns (2004) also had a single subject design, but with one participant. The participant was a 5-year-old boy with ADHD. Michael frequently displayed problematic classroom behaviours, including tantrums, screaming, hiding under tables, hitting his head on the wall, and aggression towards peers. The art intervention took place in the morning before school and aimed to increase Michael's ability to focus and conform to classroom expectations. The study had an ABAB design, with "A" representing the baseline condition and "B" representing the art intervention. The study consisted of 12 baseline sessions, 10 easel-painting sessions, 9 clay sessions, and 8 finger-painting sessions. The sessions were each 20 minutes long, and spanned over 10 weeks. Michael's behaviour was monitored by his teacher who subjectively rated each 30-minute block of time each day Michael attended school during the study period. A time block was rated as positive if Michael's behaviour was approximately what would be expected of kindergarten students. A time block was rated negative when the problematic behaviours, as described previously, dominated that period. His teacher was unaware of which days an art activity was utilized during the morning session and which days were controls when no art was done (Kearns, 2004).

The results of Kearns (2004) indicated that when Michael had an art intervention before school, his teacher rated his behaviour as more positive for more blocks of the day, on average. Furthermore, on art intervention days, the average first instance of a negatively rated block occurred later in Michael's day. There was also a difference in the effectiveness of the different art materials used. Easel painting was found to have the greatest benefits on Michael's behaviour in comparison to clay activities and finger painting. On the days Michael engaged in easel painting, he was able to maintain positive behaviours more than 20 minutes longer than clay activities. The effectiveness of finger painting fell in between easel painting

and clay activities. Overall, the studies by Smitherman-Brown and Church (1996) and Kearns (2004) both suggest that art activities that require fine motor control, such as easel painting and mandala drawing, are effective in improving positive behaviour and reducing negative behaviour in children with ADHD.

Only three studies have investigated the effect of art making on children's stress levels (Yount, Rachlin & Siegel, 2013; Zhu et al., 2014; Ziff, Ivers & Shaw, 2016). Ziff, Ivers and Shaw (2016) investigated the effectiveness of a school based art intervention in reducing stress in children with emotional and behavioural problems. The intervention was called *Art Break*, and was facilitated by the school counsellor. The programme is based on the idea that positive experiences, such as art making, in the midst of stress can allow a child to take a break, recover and return to a stressful environment able to cope. The programme has a small group format aimed at relaxing the children and assisting in the development of social and emotional skills. The study had 149 children (age range of 5-12 years) participating in 25 small groups for five years in two elementary schools. There were 6-8 children in each group, and groups were mixed ages and meet for 40 minutes once a week. Children were referred by teachers, families, school based intervention team and community mental health practitioners or through self-referral. The sessions involved a range of art activities such as painting, drawing, finger painting, collage and craft work (Ziff, Ivers & Shaw, 2016).

To assess whether the *ArtBreak* intervention alleviated stress, Thirty-nine children provided finger temperature measurements prior to and after the art intervention. According to the researcher, finger temperature is a reliable biomarker of stress level. A reduction in temperature reflects an increase in stress, whereas an increase in temperature indicated a decrease in stress. The results indicated a significant difference between the pre-intervention and post-intervention fingertip temperature reading, with children's post-intervention fingertip temperature reading increasing on average, 4.6 degrees (with a range of -5.3 to 13.3)

compared to pre-intervention temperature readings. In addition to the physiological measures, the researchers asked the children's teachers to provide their perceptions of the extent to which the child had made improvements in regards to their social and emotional behaviour. Approximately seven out of ten students were considered to be making progress. Comments from the teachers included that they noticed students seemed more confident and relaxed in the classroom, and exhibited improved social skills. The children were also asked what they had learned from the sessions; most of the children responded by saying that they enjoyed the sessions, had fun, made new friends, learned how to use new tools, enhance their thinking skills and regulate their emotions through calming down when mad. Overall, the results suggest that the school based art intervention *ArtBreak* was effective in reducing stress and improving emotional and social skills in school children (Ziff, Ivers & Shaw, 2016).).

Yount, Rachlin and Siegel (2013) investigated the effect of art making on children's stress levels in hospital, using a Randomized Control Trial. Twenty-three children between the ages of 4 to 16 were randomly assigned to either the treatment condition, which involved making a healing sock creature, or the waitlist condition, which did not receive treatment during the study. The 90-minute process of creating the healing sock creature was predicted to reduce stress in the children. This was measured by the children's level of cortisol in their saliva. This result supported this hypothesis, as the treatment group had a greater reduction of salivary cortisol than the control group. However, a limitation of this study is that it is unknown whether the children were actually experiencing current significant stress while being in the hospital. Children's experiences of being in hospital and the causes of their hospitalization differ, and some children may not be feeling stressed about it. The study did show that, overall, participants had low levels of cortisol at the start of the intervention. The fact that there was a significant reduction in these levels post-intervention is commendable,

but these effects may not be apparent in more severely traumatised children (Yount, Rachlin & Siegel, 2013).

Zhu et al. (2014) investigated the effect of art making on the hyperarousal symptoms of children aged 9 to 11 years who survived the Wenchuan People's Republic of China earthquake in 2008. The art intervention was teaching the children calligraphy, and the lessons were introduced one year after the earthquake. Chinese calligraphy is regarded as an art in China. In contrast to normal handwriting, it uses brush strokes through the traditional Chinese brush and ink method. Furthermore, it focuses on the aesthetic qualities of the characters rather than creating language. According to Zhu et al. (2014) previous research has reported that calligraphy has therapeutic effects on certain diseases, and might have a relaxation effect, including a study by Yang, Li, Hong and Kao (2010) who found Chinese calligraphy training reduced stress in adult cancer patients. They measured stress by pre- and post-treatment differences of heart rate, blood pressure and respiration rate. Zhu et al. (2014) also used a physiological measure of stress by measuring the cortisol levels in the children's saliva. In addition, they assessed behavioural effects by administering *The Children's Revised Impact of Events Scale*. In their study, children were randomly assigned to either the calligraphy instruction or to the control group. Children in the control group carried out their usual school activities. The calligraphy sessions occurred for one hour a day, five days a week over a 30-day period. The results indicated that those children in the calligraphy group showed a significant decrease in arousal symptoms and salivary cortisol levels. Whereas, in the control group, there was not a significant decrease in arousal symptoms and salivary cortisol levels. This suggests that calligraphy therapy was effective in reducing hyperarousal symptoms among child earthquake survivors (Zhu et al., 2014).

Following the Christchurch earthquakes, Savage and Leonard (2015) created a programme which provided an opportunity for primary school children to help them express

themselves in a way that created confidence and boosted resilience. An art specialist facilitated the art sessions with small groups of up to 10 children (age not specified). The aim of the art sessions was to encourage the children to interact through art, in order to assist in the development of social inclusion, cooperation and pro-social skills. For the research purposes, three students were selected to be part of the study for a year, in order to evaluate the effectiveness of the art programme (Savage & Leonard, 2015).

Although the researchers did not report the number or duration of the sessions, they concluded that both the process of art making and the outcome of producing a piece of art had a positive impact on the three children who were the focus of the study. Over the course of the year, the children had shown improvements in their behaviour and social skills. They were also reported as displaying more positive emotions, such as sense of pride and enjoyment in completing art projects. The process of art making was determined by the researcher as an excellent medium to develop pro-social skills (Savage & Leonard, 2015).

While there is limited research on the effect of drawing on children's stress, Drake and Winner (2013) conducted two studies to determine whether the effectiveness of drawing was due to "distraction" (expressing something unrelated to the negative feeling) or "venting" (expressing negative feelings). Furthermore, they sought to determine whether developmental level was a factor. In study one, 43 healthy children aged 6-8 years and 40 healthy children aged 10-12 years participated. To induce a negative mood, the children were asked to think of a time they felt really upset and disappointed. They were given a minute to think about this event and were then asked to describe the event to the researcher. Children then engaged in the drawing activity. Those children assigned to the "vent" condition were given 5 minutes to draw the event they had thought of, and those children in the "distraction" condition were given 5 minutes to draw a house. The children's mood was assessed before and after the mood induction and again after the art activity. Children self-reported by being presented

with five schematic faces ranging from very sad to very happy. Children were asked to select the face that represented how they were feeling. The results indicated that drawing improved mood in both 6- to 8 year olds and 10 to 12 year olds (Drake & Winner, 2013).

In study two, Drake and Winner (2013) aimed to determine whether the effect of drawing on mood was due to the creation of one's own drawing to distract oneself, or whether copying an image would have the same effects. Fifty-eight children aged between 6-8 and 65 children aged between 10 and 12 who had not participated in study 1 participated in the second study. The procedure was the same as the first study, except along with the "vent" and "distraction" conditions, a "copying" condition was added. Participants assigned to this condition were instructed to copy drawings of common objects (e.g. tea pot, toaster) for 5 minutes. The results of this study replicated the first study by demonstrating that drawing improves mood in the short term in children when the activity is used to distract rather than vent. In addition, the results indicated that there was greater mood reduction when children were able to create their own house drawing, as opposed to copying images of household objects. Furthermore, mood improved more for younger children than for older children, and younger children felt more competent (Drake & Winner, 2013).

While these findings may suggest that creating their own drawing is more effective in improving mood than copying, it may also suggest that the nature of the images copied were not appealing for young children. More child appropriate images such as copying a picture of a puppy or a sunflower or their favourite cartoon character, may evoke more positive feelings, than household objects. Furthermore, the participants in the study were healthy children, who underwent a brief mood induction to create negative emotion. Therefore, it is possible that these findings would replicate with a sample of children with more genuine distress, such as fear or anxiety.

Summary of art intervention studies. For summary purposes, study methodologies were categorized according to participant status (i.e., adult or child), the design of the study (i.e., RCT, pre-post-test or single subject), the degree of structure and direction involved in the art interventions, and the type of art materials used. Refer to Tables A-5-A-7, p. 201- 217.

Summary of art interventions with adults. Of the 44 art intervention studies reviewed (see tables A-5 to A-8, p. 201-245), 27 art intervention studies involved adult participants (see tables A-5, p.201). Healthy adults from university settings participated in most of the studies (See table A-5, p.201); individuals recovering from substance abuse participated in one study (Laurer & van der Vennet, 2015); adults with disabilities participated in one study (Schrade, Tronsky & Kaiser, 2011); individuals in inpatient mental health facilities participated in one study (de Morais et al., 2014) and two studies had caregivers of cancer patients participating (Walsh, Martin, & Schmidt, 2004; Walsh, Radcliffe, Castillo, Kumar & Broschard, 2007) and two studies had cancer patients participating (Lawson et al., 2012; Lang, Li, Hong & Kao, 2010).

The studies employed various research designs. While most of the studies employed pre-test post-test designs (twelve studies, see Table A-5, p. 208), three studies employed RCT designs (Bell & Robbins, 2007; De Morais et al., 2014; Sandmire, Gorham, Rankin & Grimm, 2012); and two studies employed repeated measure designs (Schrade, Tronsky & Kaiser, 2011; Lawson and colleagues, 2012). Ten studies used self-report questionnaires to measure outcome variables (See Table A-5, p.208). The most common self-report questionnaire used was *the State-Trait Anxiety Inventory (STAI)* and the *State Anxiety Inventory (SAI)* which was used in nine of the studies (Bells & Robbins, 2007; Boothby & Robbins, 2011; Curl and Forks, 2008; Curry, Kasser, 2005; De Morais et al., 2014; Sandmire, et al; 2015; Sandmire, Gorham, Rankin & Grimm, 2012; Laurer and van der Vennet, 2015; Vander Vennet & Serice, 2012). The *Profile of Moods State (POMS)* and the mini version

(*mini-POMS*) was used in four studies (Bell and Robbins, 2007; Boothby & Robbins, 2011; Laurer & van der Venet, 2015; Chang, 2005). Other measures included the the Subjective Stress Scale (SSS), the Stress Adjective Checklist (SAC), *Beck's Anxiety Inventory (BAI)*, the *Affects Balance Scale (ABS)* and the *Affect Grid*. Seven of the studies used physiological indicators to measure outcome variables. Three studies used salivary cortisol to measure stress and anxiety (Walsh et al., 2007; Lawson et al., 2012; Kaimal, Ray & Muniz, 2016). Heart rate was used in two studies (Curl et al., 2008; Sandmire et al., 2015), and one study used both heart rate and blood pressure (Schrade, Tronsky & Kaiser, 2011), and one study measured heart rate, blood pressure and respiration rate (Yang, Li, Hong & Kao, 2010).

Some of the art intervention studies included more than one art intervention. Therefore, there were 41 art interventions with adults. Overall, out of the 41 art interventions with adults included, 22 were structured and directive, eight were structured and nondirective, seven were unstructured and nondirective, and four was unstructured and directive. Drawing was included in 12 studies. The other art interventions included clay sculpting, painting, colouring, collage making and various craft activities.

Summary of art interventions with children. Of the 44 art intervention studies reviewed, 14 art intervention studies included child participants (see tables A-7, p.233). Healthy children participated in three studies (Carsley, Heath & Fajnerova, 2015; Drake & Winner, 2013; Pessó-Aviv, Regev, & Guttman, 2014); children with ADHD participated in two studies (Kearns, 2004; Rosal, 1993; Smitherman-Brown and Church, 1996); children with emotional and behavioural problems participated in four studies (Cortina and Fazel, 2015; Pessó-Aviv, Regev, and Guttman, 2014; Ziff, Ivers & Shaw, 2016); children who had experienced trauma participated in four studies (Lyshak-Stelzer et al., 2007, group 2; Savage & Leonard, 2015; Zarezadeh Kheibari et al., 2014; Zhu, et al., 2014) and hospitalized children participated in one study (Yount, Rachlin, & Siegel, 2013).

Most of the studies employed pre-test post-test designs. Many of these studies used self-report questionnaires to measure outcome variables. The *State-Trait Anxiety Inventory for children (STAI)* was used in three studies (Carsley, Heath and Fajnerova, 2015; Pessoa-Aviv, Regev, and Guttman, 2014; Zarezadeh Kheibari et al., 2014), the *Buss and Perry's questionnaire on the expression of aggression* which was used in two studies (Carsley, Heath and Fajnerova, 2015; Pessoa-Aviv, Regev, and Guttman, 2014); the *Self Control Questionnaire for children* and the *Session Evaluation Questionnaire* were both include in a single study (Pessoa-Aviv, Regev, & Guttman, 2014). Five schematic faces ranging from very happy to very sad was used to assess self-reported mood in one study (Drake & Winner, 2013). One study included the *Strength and Difficulties Questionnaire (SDQ)* in conjunction with the *Mood and Feelings Questionnaire-Short Form* in order to get teacher and child's perceptions of behaviour (Cortina & Fazel (2015). Another study used a combination of teacher and self-reports by using the *Children's Nowicki Strickland Internal-External Locus of Control (CNS-IE)*, *Teacher Rating Scale (TRS)*, and a *personal construct drawing interview (PCDI)* (Rosal, 1993). Two studies assessed symptoms related to trauma via the *UCLA PTSD Reaction Index for DSM-IV, Child Version* (Lyshak-Stelzer, 2007), and the *Children's Revised Impact of Event Scale CRIES* (Zhu et al., 2014). Three studies used physiological measures to assess stress; one used cortisol (Yount, , 2013 & Zhu et al., 2014) and one used finger temperature (Ziff, Ivers & Shaw, 2016).

Two of the studies employed single subject designs, one with a ABAB format (Kearns, 2004) and one with a multiple baseline format (Smitherman-Brown and Church, 1996). These studies used teacher observation ratings to measure outcome variables. In the study by Kearns (2004), the child's behaviour was monitored by his teacher, who rated each 30-minute interval for every day. Smitherman-Brown and Church (1996) used the *Child-Behaviour Checklist Teacher Report Form (CBCL-TRF)* in order to measure baseline

behaviour, and then direct observation of the children's behaviour was recorded during the intervention.

One study had a qualitative design, and assessed outcomes variables through qualitative analysis (Savage & Leonard, 2015). The classroom teachers interviewed students and the researcher conducted phone interviews with the student's parents. Classroom teachers responded to the researcher's questions via email. The interviews were based targeted the children's socio-emotional functioning and the effectiveness of the art intervention in improving this.

Some of the art intervention studies included more than one art intervention. Therefore, there were 17 art interventions with children. Overall, of the 17 art interventions with children, 12 were structured and directive, four was unstructured and non-directive, one was structured and non-directive. Five art interventions involved drawing. The other art interventions included mandala colouring, painting, sculpting with clay and making a sock puppet.

Effectiveness of art interventions. The effectiveness of the art intervention studies has been reported by the researchers, and these interpretations have been summarised. Refer to Table A-6, p. 217 and Table A-8, p. 245.

Reported effectiveness with adults. In terms of the reported effectiveness of art interventions for adults, the studies represented mainly positive findings. The majority of studies involved university students, and most of these studies found a significant improvement in self-reported mood and stress for these students after participating in an art intervention. Two studies found that art interventions were effective in reducing stress and anxiety in students over their exam period, which is a particularly stressful time for students (Chang, 2005; Sandmire, Gorham, Rankin & Grimm, 2012). One study found that the process

of creating a work of art was more effective in improving mood than simply viewing an artwork, suggesting that the process is more important than the end product (Bell & Robbins, 2007). Another study found artistic activities yielded significantly greater stress reduction than non-artistic tasks which were matched for mental and physical activity and time (Abbott, Shanahan & Neufeld, 2013). Furthermore, two studies found that engaging in drawing was a more effective art form for mood improvement than writing (Drake et al., 2011; Drake & Hodge, 2015). Taken together, these studies suggest that the process of art making has a unique therapeutic quality that is effective in reducing stress and anxiety in university students.

In their discussions, some researchers explained these positive results by referring to art making as an “active coping strategy” for stress. Art making is termed an active coping strategy, as it involves both creativity and kinaesthetic manipulation to produce a piece of artwork (Abbott, Shanahan & Neufeld, 2013). According to these researchers, stress is associated with excess emotions and energy, and art making provides a way of expending emotions and energy. The physical manipulation of materials has been shown to be helpful in reducing stress, as it reduces motor symptoms of anxiety, such as restlessness, by “occupying one’s hands”. However, other studies have found that the effectiveness of art cannot simply be explained by the physical manipulation of art materials. One study found that free drawing improved mood, whereas, drawing geometric shapes or completing a puzzle did not (De Petrillo & Winner, 2005). The researchers interpreted this result as meaning that the effectiveness of art making may lie in the process of creating something meaningful.

However, one study provided contrasting findings to the previous studies (Boothby & Robbins, 2011). This study compared the effectiveness of music versus art in reducing stress, and found an improvement in stress levels in the music condition, but no change in stress levels for the art condition. The researchers explained the contrasting finding by comparing

the study's methodology to previous studies which had positive results. This study consisted of one seven-minute art intervention sessions whereas other studies included more than one session or longer sessions, which may suggest that the art intervention needed to be longer for effects to be shown.

Based on the previous findings, a number of studies have aimed to uncover the mechanisms underlying art's effectiveness in improving mood and reducing stress. A couple of studies aimed to determine whether the degree of structure and direction involved in the art intervention had an effect on its effectiveness (Curry & Kasser, 2005; Van der Venet & Serice, 2012). The findings of these studies suggested that structured and directive art interventions (e.g. colouring pre-drawn mandalas) were more effective in reducing stress than unstructured and non-directive art interventions (e.g. free colouring). The researchers in these studies noticed that the participants in the free colouring group would stop colouring and look around often, as though they needed some guidance on what to colour next. Therefore, it is possible that a structured and directive art activity is needed to allow participants to become absorbed in the activity and experience a reduction in anxiety.

Other studies have investigated whether art interventions improve mood via venting (i.e. expressing negative feelings) or distraction (i.e. distracting oneself from negative feelings). An underlying assumption of art therapy is that releasing negative emotions and feelings through art is therapeutic, and leads to better mental wellbeing (Smolarski, Leone & Robbins, 2015). In contrast to this assumption, most of the art intervention studies found that art improved mood via distraction as opposed to venting (Drake, Coleman & Winner, 2011; Drake & Winner, 2012). More recent research has found that art making may not only distract individuals from their current feelings of stress or low mood by reorienting them to something positive. In their discussions, the researchers explained this finding by drawing on previous research on the physical and psychological benefits of positive emotions, including

helping people cope with stressors. They also discussed the “creative high” that individuals may experience through the release of positive emotions when creating an art work which is based on happy thoughts and feelings (Abbot, Shanahan & Neufeld, 2013; Curl, 2008; Dalebroux, Goldstein & Winner, 2008; Smolarski, Leone & Robbins, 2015).

A common theme in the researchers’ discussions was that most of the art intervention research involves healthy adults from university settings. Therefore, the researchers suggested that their findings may not generalise to clinical populations or to individuals experiencing a significant amount of stress or trauma. However, a few studies provided support to the effectiveness of art interventions with clinical samples of adults. For example, art interventions were shown to be effective in reducing stress and anxiety in adults with substance abuse disorder (Laurer & van der Venet, 2015); adults in inpatient mental health facilities (De Morais et al., 2014); adults with intellectual disabilities (Schrade, Tronsky & Kaiser, 2011), and adults suffering from cancer (Lawson et al., 2012; Yang, Li, Hong, & Kao, 2010). Furthermore, a couple of studies have found that art interventions are effective in reducing stress and anxiety in caregivers of cancer patients, a population of individuals likely to be under considerable stress (Walsh, Martin & Schmidt, 2004; Walsh, Radcliffe, Castillo, Kumar & Broschard, 2007).

Another common theme in the researchers’ discussions was the limitations of the self-report measures used to measure stress, anxiety and mood in most of the studies. For example, there is the likelihood of people responding to questionnaires in a socially desirable manner, as well as the potentially high degree of response variance inherent in self-reporting. One study suggested that using more than one measure is a way of improving reliability when assessing stress, mood and anxiety (Sandmire, et al., 2015). For example, using a psychological measure (e.g. a self-report questionnaire) in conjunction with a physiological measure of stress (e.g. cortisol, heart rate, pulse etc.).

Eight studies included physiological measures of stress, as a more objective way in evaluating the effect of art interventions on stress. These studies predicted that art would have a direct impact on the autonomic nervous system by regulating sympathetic and parasympathetic arousal, creating a calming effect. Most of these studies used both a self-report measure and a physiological measure to assess stress and anxiety, in order to triangulate data. However, while all studies showed a physiological reduction in stress after an art intervention, several studies found a discrepancy between the results of the psychological and physiological measures of stress (Curl & Forks, 2008; Lawson et al., 2012; Sandmire et al., 2015). Some researchers explained this discrepancy by describing the limitations of self-report, as previously mentioned. Other researchers explained that some individuals used the art intervention to express negative thoughts and feelings, which may have increased their awareness of these emotions, and promoted them to report feeling more stressed or anxious (Lawson et al., 2012). The contrasting physiological response may reflect that although these individuals may be experiencing negative thoughts and feelings, making art is an activity that regulates the autonomic nervous system and promotes calmness.

Reported effectiveness of art interventions with children. In regards to the reported effectiveness of art interventions for children, the studies represented a mixture of positive and negative results. For healthy children, significant improvements in mood and aggression were shown after an art intervention in three studies (Drake & Winner, 2013; Carsley, Heath & Fajnerova, 2015; Pessó-Aviv, Regev & Guttman, 2014). Furthermore, one of the studies determined that drawing improved mood via distraction as opposed to venting, and creating their own drawing of a house was more effective in improving the children's mood than drawing household objects (Drake & Winner, 2013). Another one of the studies compared the effect of different art activities on aggression, and found a greater reduction in aggression for pencil and gouache paint interventions, than for the oil pastels intervention (Pessó-Aviv,

Regev & Guttman, 2014). However, while one of the studies found a significant reduction in children's anxiety (Carsley, Heath & Fajnerova, 2015), another study did not (Pesso-Aviv, Regev & Guttman, 2014). Pesso-Aviv, Regev and Guttman (2014) gave a potential explanation for this finding by suggesting that the timing of the second measurement may have influenced the outcome. The second measurement was on the last day of the children's summer camp, so it is possible that the children were feeling anxious about saying goodbye to their friends and going back to their usual home and school routines.

For children with emotional and behavioural difficulties, all three studies reported positive results. Significant improvements in children's emotional and behaviour problems was evident after participation in an art intervention. One study found significant improvements in emotional and behavioural problems as reported by the teachers, and the children self-reported significant improvements in mood and feelings (Cortina & Fazel, 2015). Two studies found significant improvements in behaviour for children with ADHD, as assessed by direct observation by teachers (Kearns, 2004; Smitherman-Brown & Church, 1996).

For children who have experienced stress or trauma, two out of three studies found positive results in reducing children's stress responses. One study evaluated the effectiveness of art interventions in reducing stress in children in hospital. This study did not show a significant reduction in children's stress levels, as measured physiologically through salivary cortisol (Yount, Rachlin & Siegel 2013). However, the researchers argued that a measurable trend of reduced salivary cortisol was detected following the art intervention, and it is likely that the small sample size prevented the finding reaching significance. The other two studies investigated the effect of an art intervention on children who had experienced an earthquake (Savage & Leonard, 2015; Zhu et al., 2014). One of the studies found improvements in children's prosocial behaviour after the art intervention, as determined by qualitative analysis

(Savage & Leonard, 2015). The other found a significant reduction in hyperarousal symptoms after an art intervention, as measured by cortisol and self-report. This study is currently the only study to isolate one significant aspect of PTSD; hyperarousal. This study was also the only study to use a combination of psychological and physiological measures to assess outcome variables.

A common theme in the researchers' discussions was that art can be an effective emotion regulator for children. Consistent with previous studies with adults, drawing was shown to be effective in distracting children from their negative thoughts and feelings through engagement in the pleasurable activity of art making. Some of the researchers suggested that drawing's effectiveness was not the result of the motor aspect of making marks on paper, but rather the imaginative act of producing an image and then reproducing that image on paper. However, this research was with healthy children. For children who had experienced a traumatic event, researchers suggested that the visual-motor activity involved in copying images (i.e. copying calligraphy figures) activates area of the brain associated with relaxation and self-regulation, resulting in a reduction in physiological stress.

For children with problems regulating their emotions, researchers suggested that creating art can help centre and calm children. A couple of studies suggested that art sessions should be incorporated into the classroom, in order to increase children's concentration and decrease their impulsivity at school. Children who have emotional and behavioural problems often have learning difficulties, due to an inability to focus at school. By making children more relaxed and focused, art interventions have the potential to not only assist with children's emotional wellbeing, but also their ability to learn.

Another discussion point mentioned by the researchers was the need to determine what kind of art activities are most effective in regulating children's emotions. One study compared a structured activity (mandala colouring) with an unstructured activity (free

colouring) (Carsley, Heath & Fajnerova, 2015). In contrast to previous studies with adults (Curry & Kasser, 2005; Van der Venet & Serice, 2007), both art condition equally reduced anxiety in the children. However, a gender by condition interaction effect occurred which showed boys to have a greater reduction in anxiety in the free colouring condition than the mandala colouring activity, whereas the mandala colouring condition was more beneficial for girls. Developmental differences may account for the divergence between the two populations. Boys tend to have slower development of fine motor skills, which may explain why boys benefitted more with free colouring. A qualitative examination of the data found that 45% of the mandala group coloured over the shapes indicating that the intricate mandala colouring task may have caused frustration for these boys, whereas 100% of the girls coloured within the lines. It is also possible that boys in general benefit more from a less structured art activity than girls (Carsley, Heath & Fajnerova, 2015).

Another study compared pencil drawing, chalk pastels and gouache paints in reducing aggression in children (Pesso-Aviv, Regev & Guttman, 2014). They categorized pencil drawing as a ‘controlled’ activity, gouache paint as a ‘regressive’ activity, and chalk pastels as in between the two categories. Controlled activities are dry materials that are assumed to be easier to control, and therefore, tend to reduce less anxiety and aggression than wet materials that are more difficult to control. The researchers drew on research with hyperactive children which showed that using controlled art materials made for a more structured experience that, therefore, produced less anxiety in these children. When creating an art intervention, it is therefore important to consider what art activities will be included. Controlled art materials, such as pencils, may be more effective in reducing anxiety and increasing self-control, whereas more regressive art materials such as paint, may be more effective when self-expression and breaking down defences is the goal.

Analysis of Art Therapy and Art Intervention Studies

In order to consider the effectiveness of the art therapy and art interventions independently from the researchers' interpretation, the results of the studies were classified according to the quality of their effects (Liberty & Miller, 2003). Results of quantitative measures were assigned effects following calculation of Cohen's d as follows: "poor quality effects" (i.e., $d = 0.00 - 0.24$), 'marginal quality effects' (i.e., $d = 0.25 - 0.49$), 'good quality effects' (i.e., $d = 0.50$ to 0.74), 'beneficial quality effects' (i.e., $d = 0.75$ to 0.99), and 'highest calibre effects' (i.e., $d \geq 1.00$). Evidence from qualitative studies was assigned effect categories as follows (Liberty & Miller, 2003): 'highest calibre' (i.e., all of the following components need to be evident; substantive evidence, for example, in the form of quotations, related to study question, disconfirming evidence discussed, interpretations clearly derived from the evidence, an accurate summary related to the research question); 'good quality' (i.e., two of the following components need to be evident; substantive evidence, interpretations clearly derived, and accurate summary), or 'poor quality' (i.e., insufficient evidence related to research question and evidence or interpretation not clear or able to be understood). Calculated d 's and calibre of effects for both quantitative and qualitative results are shown (See Tables A2 & A6).

The first comparison of effectiveness was between all of the art therapies ($N=19$) and all of the art interventions ($N=59$) to determine overall effectiveness (Table 1). This include 51 therapies/interventions with adults and 25 therapies/interventions with children. The analysis of each study was shown in Appendix F, Table A2, A4, A6 and A8.

Table 1.

Overall Analysis of Effectiveness of Art Therapy v. Art Interventions

	Art Therapy	Art Interventions
Adult studies	<ul style="list-style-type: none"> • N =10 • number of therapies with good, beneficial or high effect = 5 (50%) 	<ul style="list-style-type: none"> • N = 41 • number of interventions with good, beneficial or high effect = 28 (68.3%)
Child studies	<ul style="list-style-type: none"> • N = 9 • number of therapies with good, beneficial or high effect = 6 (66.7%) 	<ul style="list-style-type: none"> • N=17 • number of interventions with good, beneficial or high effect = 13 (77%)
Total	<ul style="list-style-type: none"> • 11 of 19 therapies were effective (57.8%) 	<ul style="list-style-type: none"> • 41 of 58 interventions were effective (71%)

Overall, out of the 77 therapies/interventions, 51 art therapies and interventions had good, beneficial or high calibre effect sizes. These included 57.8% of the art therapies and 71% of the art interventions. This suggests that art interventions were, in general, more effective than art therapies, and this was evident for both adults and children.

Next, the relative effectiveness of structured versus unstructured approaches to the art component were investigated (Table 2). For adults, this included 38 structured therapies/interventions and 14 unstructured therapies/interventions. For children, this included 20 structured therapies/interventions and 5 unstructured therapies/interventions.

Table 2.

Overall Analysis of Effectiveness of Structured vs. Unstructured

	Structured	Unstructured
Adult studies	<ul style="list-style-type: none"> • number of interventions/therapies = 37 • number with good, beneficial or high effect = 26 (70.2%) 	<ul style="list-style-type: none"> • number of interventions/therapies = 14 • number of good, beneficial or high effect = 7 (50%)
Child studies	<ul style="list-style-type: none"> • number of interventions/therapies = 20 • number with good, beneficial or high effect = 17 (84%) 	<ul style="list-style-type: none"> • number of interventions/therapies = 6 • number with good, beneficial or high effect = 3 (50%)
Total	<ul style="list-style-type: none"> • 43 of 57 (75.4%) number with good, beneficial or high effect 	<ul style="list-style-type: none"> • 10 of 20 number with good, beneficial or high effect. (50%)

Overall, 56 interventions/therapies were structured and 20 interventions/therapies were unstructured. Of the 57 structured interventions/therapies, 75 % had good, beneficial or high calibre. Of the 20 unstructured interventions/therapies, 50% had good, beneficial or high calibre. For both children and adults, a structured approach was more common, and this was shown to be more effective than an unstructured approach. This was particularly evident for children.

Next, the relative effectiveness of directive versus non-directive approaches to the art component were investigated (Table 3). For adults, this included 35 directive interventions/therapies and 17 non-directive interventions/therapies. For children, this included 20 directive interventions/therapies and 5 non-directive interventions/therapies.

Table 3.

Overall Analysis of Effectiveness of Directive vs. Non-directive

	Directive	Non-Directive
Adult studies	<ul style="list-style-type: none"> • number of studies =32 • number of studies with good, beneficial or high effect = 21 (66%) 	<ul style="list-style-type: none"> • number of studies =19 • number of studies with good, beneficial or high effect = 12 (63.2%)
Child studies	<ul style="list-style-type: none"> • number of studies = 21 • number of studies with good, beneficial or high effect =17 (81%) 	<ul style="list-style-type: none"> • number of studies =5 • number of studies with good, beneficial or high effect =3 (60%)
Total	<ul style="list-style-type: none"> • 38 of 53 (72%) studies with good, beneficial or high effect 	<ul style="list-style-type: none"> • 15 of 24 (62.3%) studies with good, beneficial or high effect.

Overall, 53 interventions/therapies were directive and 24 interventions/therapies were non-directive. Of the 53 structured interventions/therapies, 71.2% had good, beneficial or high calibre. Of the 24 studies which were non-directive art interventions/therapies, 62.3% had good, beneficial or high calibre. For both children and adults, a directive approach was more common, and this was shown to be more effective than an unstructured approach. This was particularly evident for children.

Next, the relative effectiveness of drawing versus other fine arts were investigated (Table 3). For adults, this included 19 interventions/therapies involving drawing and 33 interventions/therapies involving other fine arts. For children, this included 10 interventions/therapies involving drawing and 15 non-directive interventions/therapies involving other fine arts.

Table 4.

Overall Analysis of Effectiveness of Drawing vs. Non-drawing

	Drawing	Non-Drawing
Adult studies	<ul style="list-style-type: none"> • number of studies = 18 • number of studies with good, beneficial or high effect = 11 (61%) 	<ul style="list-style-type: none"> • number of studies = 33 • number of studies with good, beneficial or high effect = 23 (69.6%)
Child studies	<ul style="list-style-type: none"> • number of studies = 10 • number of studies with good, beneficial or high effect = 8 (80%) 	<ul style="list-style-type: none"> • number of studies = 16 • number of studies with good, beneficial or high effect = 10 (62.5%)
Total	<ul style="list-style-type: none"> • 19 of 28 (67.8%) studies with good, beneficial or high effect 	<ul style="list-style-type: none"> • 33 of 49 (67.3%) studies with good, beneficial or high effect.

Overall, 29 interventions/therapies involved drawing and 48 interventions/therapies involved another form of fine arts. Of the 29 drawing interventions/therapies, 67.8% had good, beneficial or high calibre effect sizes. Of the 48 non-drawing interventions/therapies, 67.3% had good, beneficial or high calibre. For both children and adults, art activities involving painting, colouring, sculpting etc., were more commonly used in interventions/therapies than drawing. For adults, interventions/therapies which did not involve drawing produced greater effect sizes than interventions/therapies which involved drawing. In contrast, for children, interventions/therapies which involved drawing produced greater effect sizes than interventions/therapies which did not involve drawing.

Next, the relative effectiveness of art interventions/therapies with healthy participants versus participants with psychological problems were investigated (Table 5). For adults, 39 art interventions/therapies involved healthy participants, and 12 art interventions/therapies involved participants with psychological problems. For children, 13 art

interventions/therapies involved healthy participants, and 12 art interventions/therapies involved participants with psychological problems.

Table 5.

Overall Analysis of Effectiveness with individuals with psychological problems v. healthy

	Healthy	Psychological problems
Adult studies	<ul style="list-style-type: none"> • number of studies = 39 • number of studies with good, beneficial or high effect = 24 (61.5%) 	<ul style="list-style-type: none"> • number of studies = 12 • number of studies with good, beneficial or high effect = 6 (50%)
Child studies	<ul style="list-style-type: none"> • number of studies = 13 • number of studies with good, beneficial or high effect = 11 (85%) 	<ul style="list-style-type: none"> • number of studies = 13 • number of studies with good, beneficial or high effect = 8 (61.5%)
Total	<ul style="list-style-type: none"> • 35 of 52 (67.3%) studies with good, beneficial or high effect 	<ul style="list-style-type: none"> • 14 of 25 (56%) studies with good, beneficial or high effect.

Overall, 52 art interventions/therapies involved healthy participants and 25 art interventions/therapies involved participants with psychological problems. Of the 52 art interventions/therapies which involved healthy participants, 67.3% had good, beneficial or high calibre effect sizes. Of the 25 art interventions/therapies which involved participants with psychological problems, 56% had good, beneficial or high calibre effect sizes. For both adults and children, it was more common for healthy participants to participate, and art interventions/therapies were more effective for healthy participants.

Taken together, the analysis of overall effectiveness suggests that art interventions are more effective than art therapies in reducing stress in adults and children. In particular, art interventions which are structured (i.e. involve only one type of art media) and directive (i.e.

provide the children direction in terms of how to use the art media) are more effective than unstructured and non-directive art interventions. For children, art interventions which involve drawing are more effective than art interventions which involve another kind of art activity (e.g. painting, sculpting, colouring etc.). Furthermore, art interventions are more effective with healthy children (i.e. school children without a psychological diagnosis) than with children with diagnosed psychological problems.

Research Aim and Rationale

The aim of the present study is to investigate the effectiveness of drawing lessons in reducing stress in school children exposed to the Canterbury earthquakes. Following the Canterbury earthquakes, many children are exhibiting hyperarousal symptoms which make it difficult for them to cope with everyday stress at school (Liberty et al., 2016). The present study will add to the limited research on the effectiveness of art interventions in reducing hyperarousal in children exposed to a trauma. Drawing is the chosen art activity for the study, due to the neuroscience research which suggests that drawing activates brain areas connected with the autonomic nervous system, resulting in relaxation and self-regulation. In order to prevent any stress associated with not knowing how to draw, the emphasis of this study is on teaching the children how to draw, and the children will be provided with erasers to allow for mistakes. The drawing lessons will be structured and directive, as the previous analysis of art intervention research determined these elements to be most effective in reducing stress in children. Furthermore, the drawing lessons will be designed in accordance to the children's skill level to prevent any additional stress, and to allow the beneficial effects of drawing to take place. It is hypothesized that the drawing lessons intervention will reduce stress levels in children, and help children learn how to regulate their emotions.

Chapter Three: Method

Design

The study used a single-subject ABC design, consisting of baseline (Phase A1), drawing lessons (Phase B) and return to baseline (Phase A2) with four children, in order to assess individual changes in stress over the study phases. A single subject design was chosen for this study as it provides the basis for examination of the individual behaviour changes produced by an intervention (Bailey & Burch, 2002). The *Behaviour Problems Index (BPI)* was used as a screening measure, and also used for pre-test post-test comparisons of the children's behaviour. During baseline, the children's stress levels were measured twice during each session, at the beginning (Time point 1) and thirty minutes later at the end (Time point 2). The children engaged in class as usual for the thirty minutes in between the two time points for the baseline phase. In single-subject research, the baseline phase is considered the control (Bailey & Burch, 2002). Baseline consisted of five sessions.

The intervention phase consisted of nine drawing lessons delivered to children in pairs. The children were organized into pairs based on the screening results; each pair consisted of one child who had high levels of behaviour problems, and one child who had low levels. This was to aid the implementation of the drawing lesson, as the well-regulated child had the potential to model on-task behaviour for the child with dysregulation. During the drawing lesson phase, the children's stress levels were measured at the same time points as in baseline. Instead of the usual classroom activities, children participated in a structured drawing lesson for 20 minutes.

During follow up, the children's stress levels were measured at the same time points as in the baseline and intervention phase. The children engaged in their usual school activities for the 20 minutes in between the two time points for the follow up phase. This

design can provide evidence that the intervention is associated with behaviour change, if the onset of the intervention is followed by the onset of behaviour change. In this instance, if the intervention is effective, we would expect a reduction in children's stress levels from time 1 (prior to the intervention) to time 2 (after the intervention). Furthermore, the return to baseline phase determines whether the intervention has been successful in teaching the children how to be calm. If the intervention is successful, the children's stress levels at time 1 (T1) and time 2 (T2) will not return to baseline levels, and their calmness will be maintained.

Ethical approval

This study received ethical approval by the University of Canterbury Educational Research Human Ethics Committee (2016/56/ERHEC, see Appendix A, p. 156). The study school was a school situated in an area severely impacted by the Christchurch earthquakes. This school was chosen due to its participation in the study by Liberty et al. (2016). As previously mentioned, this study found an increase in hyperarousal symptoms in children attending the participating schools. The principal of the study school was approached by the researcher prior to the study. Written consent was obtained from the school principal, teacher, parents and children to participate and follow the approved procedures (see Appendix B, p.166-172). Behavioural assent was obtained from the children at the start of each experimental session.

Recruitment

The study included four school children, aged eight years old. The school teachers from the participating school were asked to nominate four eight-year-olds in their class. Two of these children were nominated due to their difficulty in remaining calm at school and their potential interest in taking part in free drawing lessons. The other two children were nominated due to their calm and well-regulated behaviour at school and also their potential

interest in taking part in free drawing lessons. The teachers were provided with a blank copy of the screening form in order to reach a decision regarding nomination. The parents of the nominated children received a letter requesting their consent for a. their child to be part of the study; b. their child to be screened to determine eligibility for the study; c. whether they would be willing to complete a questionnaire on their child's behaviour, before and after the study. The children received a letter that explained in simple language what their participation in the study will involve. Upon receipt of the signed parental and child consent forms, the nominated children were screened for behaviour problems indicative of hyperarousal.

Screening

Children were screened for hyperarousal symptoms via teacher and parent self-reports on the *Behaviour Problem Index (BPI)* (Peterson & Zill, 1986). Upon receiving the children's parental consent forms, the children's teachers and parents were asked to complete the *BPI*, based on the child's behaviour. Two of the children meet the criteria for hyperarousal symptoms, which required more than one hyperarousal symptom to be rated as "often true" over the past month. These children were identified as Stressed Child One (SC1) and Stressed Child Two (SC2). Two of the children did not meet the criteria for hyperarousal symptoms; and these children were identified as Calm Child One (CC1) and Calm Child Two (CC2). The children were organized into pairs based on the screening results; each pair consisted of one child who had hyperarousal symptoms, and one child who did not. As SC1 and CC1 were in the same class they were paired together to form dyad one, and as SC2 and CC2 were in the same class so they were paired together to form dyad two.

Participants

Stressed Child One (SC1). SC1 was an 8 year old girl. According to her teacher and mother, SC1 was a sensitive child who tended to engage in negative self-talk and was easily upset. Her teacher and mother's responses on the BPI indicated that over the past month, SC1 displayed a high level of behaviour problems at home and school (mother and teacher's total score on BPI was 26 out of 52). Furthermore, her teacher and mother's responses indicated that SC1's exhibited symptoms of post-traumatic stress. Both at home and school, SC1's parents and teachers reported that SC1 was stubborn, sullen or irritable, easily confused and seemed to be in a fog, had a strong temper and lost it easily and had difficulty concentrating and paying attention, which are categorised as hyperarousal symptoms (DSM-V; American Psychiatric Association, 2013). In addition, SC1's mother reported that SC1 had eating problems, woke up in the night and experienced headaches, which are somatic symptoms also associated with hyperarousal (DSM-V; American Psychiatric Association, 2013). SC1's teacher and mother reported that SC1 clung to adults, was too dependent on others and too fearful and anxious, had sudden changes in mood or feeling and difficulty getting her mind off certain thoughts, which are categorised as re-experiencing symptoms (DSM-V; American Psychiatric Association, 2013). SC1's teacher and mother reported that SC1 was sometimes unhappy, sad and depressed, which are categorised as avoidance symptoms (DSM-V; American Psychiatric Association, 2013). For purposes of this study, SC1 was characterised as a 'stress sensitive' student, and was paired with Calm Child 1 (CC1) for the intervention.

Calm Child One (CC1). Calm Child 1 (CC1) was an eight-year-old girl. According to her teacher, CC1 was a highly able girl who loved challenges and learning new things, as she was very inquisitive. Due to a death in CC1's family, the *BPI* was not completed by CC1's caregiver prior to the study commencing. Her teacher's responses on the *BPI* indicated that CC1 had a low level of behaviour problems, with total score of 1. CC1's teacher reported that CC1 sometimes clung to adults. For the purpose of this study, CC1 was characterised as

a “calm child” as she did not have hyperarousal symptoms, and was paired with SC1 for the intervention.

Stressed Child Two (SC2). SC2 was an 8.3-year-old boy. His teacher and mother reported that SC2 had a diagnosis of ADHD. According to his teacher, when on his medication he could be quite compliant, but he still had underlying anxiety and lack of confidence. His teacher and mother’s responses on the BPI indicated that over the past month, SC2 displayed a high level of behaviour problems at home and school (mother and teacher’s total score on BPI was 32 out of 52). Furthermore, his teacher and mother’s responses indicated that SC2’s exhibited symptoms of post-traumatic stress. Both at home and school, SC2 was reported as being disobedient, stubborn, sullen, irritable, high strung tense and nervous, argued too much, had difficulty concentrating and paying attention, a very strong temper and lost it easily, and was easily confused and seemed to be in a fog, which are categorised as hyperarousal symptoms (DSM-V; American Psychiatric Association, 2013). His teacher and mother also reported that SC2 had sudden changes in mood or feeling, had difficulty getting his mind off certain thoughts, would cling to adults, was too dependent on others, and was too fearful or anxious, which are categorised as re-experiencing symptoms (DSM-V; American Psychiatric Association, 2013). Furthermore, his teacher and mother reported that SC2 was often withdrawn, did not get involved with others, and was sometimes unhappy, sad or depressed, which are categorised as avoidance symptoms (DSM-V; American Psychiatric Association, 2013). For the purpose of this study, SC2 was characterised as a “stress sensitive child” as he had hyperarousal symptoms, and was paired with Calm Child Two (CC2) for the intervention.

Calm Child Two. CC2 was a girl aged 8.2 years old. According to her teacher and mother, was a very bubbly, sociable and helpful child. His teacher and mother’s responses on the BPI indicated that over the past month, CC2 displayed no behaviour problems at school,

with a total score of 0 on the BPI, and low levels of behaviour problems at home, with a total score of 3 on the BPI. At home, CC2 sometimes had sudden changes in mood or feeling, cheated or told lies and demanded a lot of attention. For purpose of this study, CC2 was characterised as a “calm child” as she did not have hyperarousal symptoms, and was paired with SC2 for the intervention.

Setting

The intervention sessions were set in a primary school located in an eastern suburb of Christchurch, an area that was significantly impacted by the earthquakes. The study was conducted during the fourth school term, mainly in the music room but occasionally the resource room, depending on which room was empty and quiet at the time. Both rooms were small and contained a table and chairs. The first pair of children participated in baseline, drawing lessons, and follow up at 1.30-2.00pm. The second pair of children participated in baseline, drawing lessons, and follow up at 2.00-2.30pm.

Measures

The present study involved a pre-test post-test measure prior to baseline and following the drawing lessons, and repeated measures during the baseline, drawing lessons intervention and follow-up sessions.

Pre-post measures

Teacher and parent-reported child behaviour problems. The *Behaviour Problem Index (BPI)* was used as a screening/pre-test measure and a post-test measure of the children’s behaviour problems and post-traumatic stress symptoms. The BPI is a 26-item rating scale of child behaviour (age 4-17 years), developed by Zill and Peterson (1986), based on earlier work by Thomas Achenbach (Achenbach and Edelbrock, 1981). The questionnaire was selected in the current study as children tend to exhibit symptoms of PTSD

behaviourally, and 15 of the items are post-traumatic stress symptoms (DSM-5, American Psychiatric Association; Liberty et al., 2016). The items indicating hyperarousal included being high strung, tense and nervous, arguing too much, having difficulty concentrating, being disobedient, having a very strong temper, and being restless, overactive and unable to sit still. The items indicating re-experiencing symptoms included having sudden changes in mood or feeling, being too fearful or anxious, having trouble getting his/her mind off certain thoughts, clings to adults and is too dependent on others. The items indicating avoidance symptoms included being unhappy, sad or depressed and being withdrawn and uninvolved with others. The remaining items indicate general behaviour problems, for example cheating, telling lies, bullying, complaining that no one loves him/her, having trouble getting along with others, demanding too much attention and crying too much. The BPI asked parents/teachers to rate statements about the child's behaviour over the past month on a 3-point scale; 0 being often true, 1 being sometimes true, or 2 being not true (appendix. items a-z). A total BPI score was calculated (range 0-52). A higher score on the BPI reflects more disruptive behaviour. The parent's questionnaire had an additional eight items to assess somatic stress symptoms indicative of hyperarousal (see appendix E, items aa-gg).

In the present study, the children's teachers and parent/s or guardian/s were asked to fill out the BPI prior to beginning baseline and at the end of the drawing lessons intervention. The post-test measure asked the same questions, except specifying over the past two weeks (the duration of the drawing lessons). This measure had been used with Christchurch children in the previously mentioned study by Liberty, et al. (2016).

Repeated measures

Child self-reported stress. Children were asked to self-report their stress levels at the start (T1) and end (T2) of each baseline and drawing time point. The researcher

presented an image of a thermometer on an A4 piece of paper to the children individually, and directed to “point to the number on the thermometer that best describes how you are feeling right at this moment.” The paper thermometer used was based on the *Subjective Units of Discomfort Thermometer (SUDT)* (Figure 1). The current study used a scale of 0-10, as opposed to 0-100, as recommended by Kendall et al. (2006) to help aid children’s decision making. Children were told that 0 represented feeling perfectly calm and relaxed, whereas 10 represented feeling extremely stressed or angry. According to Carr (2004), the SUDT can be used to assess hyperarousal symptoms in children. Higher scores reflect greater levels of stress and arousal. A visual analogue scale, such as the “feelings thermometer”, can facilitate children’s understanding of SUD ratings (Kendall et al., 2006). The SUDT was used by DiBartolo and Grills (2006) to assess the level of anxiety and stress in children aged 8-11 years old, and by O’Neil, Crawley, Benjamin, et al. (2010) for 7-14 year olds.

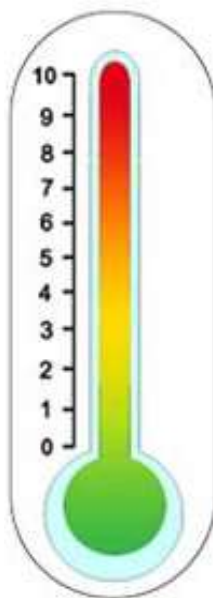


Figure 1. (colour) The Subjective Units of Discomfort Thermometer (SUDT) was used to assess children’s stress level through self-report.

Child finger temperatures. A digital biofeedback thermometer (Dr. Lowenstein’s Stress Thermometer, Bio-Medical Instruments, Inc.) was used to measure the temperature of

the child's finger and thumb at T1 and T2 (figure 2). Skin temperature of the finger provides a physiological indicator of stress (Kistler, Mariauzouls & von Berlepsch, 1998). Decreases in fingertip temperature are indicative of changes in sympathetic nervous system activity in response to stress (Kistler, Mariauzouls & von Berlepsch, 1998). Skin temperature sensors were used to measure physiological arousal and distress in children aged 6-11 years in a study which combined art and counselling in an intervention to mitigate stress (Ziff, Ivers & Shaw, 2016). The child was asked to hold the sensor between their first finger and thumb for 20 seconds, and their skin temperature was recorded from the monitor screen in Fahrenheit at T1 and T2. This was to assess for changes in physiological stress levels in the children. Fahrenheit was used as it was likely to be a less familiar form of measurement to the children than Celsius. As the temperature of the classroom can be a confounder of skin temperature measurement, the temperature of the classroom was also recorded using the digital feedback thermometer. This was possible as there was both a body temperature and room temperature option, which could be changed through flicking a switch on the digital feedback thermometer.



Figure 2. The Stress Thermometer provided a reading of skin temperature (°F) when the sensor was held between the children's finger and thumb.

Procedures

Pre-test. The teacher and parent reported BPI used to screen participants served as the pre-test. In addition, the participating child's drawing level was individually assessed. Upon parental consent and participant assent, the participating children's drawing level was assessed. This occurred during school time in the empty music room, before the baseline phase. The children were asked to draw a picture of a person standing outside a house. This helped determine an appropriate drawing lesson plan for the children. It was important that the drawing lessons were matched to the children's abilities, to prevent stress and anxiety occurring over difficult drawing lessons. The children were given 20-30 minutes to draw their picture, and were provided with a soft lead pencil, an eraser and a sheet of A4 paper.

Baseline. During the baseline period, the children's stress levels was measured in the classroom using the Stress Thermometer and the SUDs thermometer at the start (T1) and end (T 2) of each session. The children engaged in their normal school routines in between the two measurements. These time points were arranged in accordance with the school. Dyad one was assessed first at 1.30pm for T1 and 2pm for T2. Dyad two was assessed straight after at 2pm for T1 and 2.30pm for T2. The baseline period occurred over five sessions.

Drawing lessons. The intervention consisted of nine drawing lessons based on the lesson plans in Mona Brookes (1996) book, *Drawing with Children*. The sessions were thirty minutes long, and took place in the same music or resource room as in baseline, depending on which one was empty and quiet. Group one participated in the drawing lessons first at 1.30pm (T1) to 2pm (T2). Group two participated in the drawing lessons straight after at 2pm (T1) to 2.30pm (T2). The children were provided with blank pieces of A4 paper, soft lead pencils and erasers. Each session involved the researcher coaching the children how to draw a different object each session, via modelling. The coaching style was positive and encouraging. The objects the children drew included a sunflower, a bird in a tree, owls on a

branch, a space ship, a train, a cow, a puppy, a fruit bowl and a monkey. Children were encouraged to erase any line they perceived as a mistake, to reduce any potential source of stress. The children took their drawings home in a folder after the last drawing session. Consistent with the baseline phase, the children's stress levels were measured in the classroom using the Stress thermometer and the *SUDs thermometer* at T1 and T2 of each session during the intervention phase.



Michelle Walker—age 7

FIG. 1.12 Two different versions of the same instructions. Follow them and watch your own version unfold.



Ali Herred—age 6

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draw. You will draw in regular solid lines. As you go to the next instruction, the prior dotted line will convert to a solid one.

Use a black small-tipped marker to draw the entire bird; then you can color it in any way you want when you are finished.

1. *The eye.* Make a *dot* for the center of the eye, anywhere you want on your paper, leaving room for the body, tail, and legs. Draw a *circle* around the eye to make the outside rim.

2. *The beak.* Make a small *angle line* in front of the eye, leaving a space between the eye and the beak, with the point of the angle going toward the eye. Draw a *straight line* for the middle of the beak, going away from the eye, as long as you want your beak to be. (It will look like an arrow.) To make a sharp point on your beak, start at the tip of the beak and draw a *straight line* from the tip across the top. Do the same for the bottom of the beak.

3. *The head.* Draw a *curved line* over the top of the head, until it comes down the back of the head and stops somewhere below the beak. Draw a *curved line* from the bottom of the

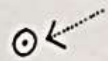


Figure 3. Example of a drawing lesson from Mona Brooke's "Drawing with Children"

(Brookes, 1996, p.77).



beak downward to the same length as the back of the head. Draw a *straight line* across the bottom of the head and across the paper until it is as long as you want your bird's body to be.



4. *The body.* Draw a *curved line* from the bottom of the head to make a chest; curve it under to go across for the stomach, and then curve it up to the straight line you made to the end of the body.



5. *The wing.* Make an *angle line* from the back of the bird to the length you want your wing to be. Make feathers on it in any design you want.



6. *The back, other wing, and tail.* Since everybody's bird is a different size and shape, add any lines you need to close the spaces between the wing and the body to show the back of the bird. Add the other wing if you wish, coming out from behind the bird. Add long *U-shaped curved lines* out of the back of the body for the tail, and decorate the feathers any way you want.



7. *The legs and feet.* Make *single or double straight lines* to create your legs where you want, and add three *single or double curved lines* for the toes.



8. *The branches and berries.* Take a brown broad-tipped marker and make a *straight or curved* branch that comes from the edge of the paper and through the feet of the bird. Yours may have to take a totally different shape than the one in this sample, due to differences in the placement of your bird and its size and shape. Add more branches, wherever you want them to be. Take a fine-tipped dark-colored marker and make leaves by drawing a *straight line* for the middle of the leaf and a *curved line* on either side that goes from tip to tip. Add any design or veins on your leaves that you wish. Then take a broad-tipped colored marker and make *dots* for berries wherever you want them.

9. *Finishing up.* Color your bird as you wish, but use at least three colors for variety. Look outside at a tree and notice how the leaves are never all the same exact color. Pick several colors for your leaves. Add anything else you want to your

Figure 4. Example of a drawing lesson from Mona Brooke's "Drawing with Children"

(Brookes, 1996, p.78).

Post-test. After the nine weekly drawing sessions, the children's parents and teacher were asked to fill out the *BPI* for a second time. This was completed during the Baseline 2 phase.

Baseline 2. During the return to baseline phase, children did not have drawing lessons. The children's stress levels were measured at T1 and T2, as during the first baseline. The return to baseline phase took place over five sessions.

Data Analysis

The repeated measures data was summarized through visual presentation by creating line graphs, and the data was analysed via visual analysis (Riley-Tillman & Burns, 2009). Line graphs were used as they are the most effective and efficient means of presentation, by providing a simple way to review data collected over time. Once the data was summarized via line graphs, the data was analysed, in order to determine firstly, to what degree was there a change in the target behaviour when the intervention was implemented, and secondly, whether the intervention caused the observed change. In order to do this, the data was examined in terms of variability, level and trend. In terms of variability, the amount of variation in range and/or consistency in a phase was examined. In terms of level, a comparison was made between the level of data during the baseline phase, the level of data in the intervention phase, and the level of data during the return to baseline phase. Lastly, in terms of trend, the rate of change within a phase was evaluated, in order to determine whether outcome data was increasing, decreasing, or remaining stable over time (Riley-Tillman & Burns, 2009).

Chapter Four: Results

The study took place from November to December, term four of the school year. Due to time constraints and a low number of parental consent forms returned to the researcher, only four children were screened in the study; three girls and one boy. The data collection was completed during the last term of school for the year and, therefore, usual class activities were sometimes replaced with special activities, such as field trips, assemblies and sports days. This meant that the study sessions were not always able to be implemented on the day originally planned. This also meant that it was not possible to make up any missed sessions, as the study had to be completed before the summer holidays. Unfortunately, shortly after the screening procedure, CC2 was absent from school over the baseline period, due to a family event. Therefore, a parent report was not provided for this child. Due to time restraints and a lack of response from other parents, this child was included in the study. One of the children considered to be “stressed” (SC2) had a diagnosis of ADHD. This child was included in the study, as the symptoms of ADHD overlap with hyperarousal symptoms, for example, difficulty concentrating, dysregulated affect, irritability, and high arousal. Therefore, children with PTSD are often misdiagnosed with ADHD (Szymanski, Sapanski, & Conway, 2011).

There were nineteen planned sessions for each child. Of these, nineteen sessions were completed for SC1, fifteen sessions were completed for CC1 and SC2, and sixteen sessions were completed by CC2. CC2 missed the first four sessions of the study due being out of town for a family event. Due to illness, SC2 missed two drawing sessions and two return to baseline sessions, and CC2 missed one drawing session and two return to baseline sessions.

Room Temperature

The results of the recording of room temperature are shown in Table 5.

Table 5.

Mean (SD) Room Temperatures During the Three Study Conditions for Dyad 1 and Dyad 2.

	Baseline (A1)		Drawing Lessons (B)		Baseline (A2)	
Dyad 1	T1	T2	T1	T2	T1	T2
Mean(SD)	71.28(3.17)	70.87(2.84)	71.28(3.30)	72.28(3.35)	72.89(4.47)	71.63(2.85)
Range	66.4-74	66.1-74.2	67.1-78.1	67.1-78.8	68.2-79	68.6-75.8
Dyad 2	T1	T2	T1	T2	T1	T2
Mean(SD)	70.71(2.35)	71.03(2.26)	72.17(3.49)	73.04(3.26)	72.4(2.51)	72.15(2.70)
Range	66.4-74	67.5-74.3	67.1-78.4	68.6-78.7	69.1-75.1	68.6-75.1

Dyad One

The first measure was the children's self-reported stress as recorded by the Subjective Unit of Distress Thermometer (see figure 1). On the SUD thermometer, high scores indicated high stress, and low scores indicated low stress. The upper band on the thermometer was red and represented high stress, the lower band was green to represent low stress and the middle band was yellow. Children's self-reported stress at T1 and T2 was graphed and visually analysed (see Figure 4a and 4b). During baseline (A1), SC1's self-reported stress at T1 was within the middle band. During the drawing lessons (B), SC1's self-reported stress at T1 varied from low stress to high stress and showed an accelerating trend, indicating that she was becoming more stressed during class time, and her last 3 scores were within the high stress band. During the return to baseline phase (A2), SC1's self-reported stress remained high over the first two sessions, and then showed a decelerating trend. For CC1, the one self-reported stress score was within the medium band (figure 4 b). During the drawing lesson phase (B), CC1's self-reported stress varied from low stress to medium stress and showed an accelerating trend. This was similar to, but at a lower level of stress than, SC1, as would be expected for the calmer child in this dyad. During return to baseline (A2), her T1 stress levels remained at the same level as during the drawing lessons.

In order to visually display the differences between the self-reported stress at T1 and T2, the difference score was graphed (Figure 4C and D). A difference score ($T2-T1$) of 0 indicated scores at T1 and T2 were the same, a positive difference score indicated an increase in stress (i.e., T2 score was higher than T1 score), and a negative score indicated a decrease in stress (i.e., T2 score lower than T1 score). During baseline, SC1's difference in self-reported stress was about zero, indicating no change in stress. During the drawing lessons, SC1's difference score showed a trend indicating reduction. During return to baseline, SC1's self-reported stress was similar to baseline, except for a slight increase in stress in the middle of the phase. For CC1, the one self-reported stress score at baseline indicated no difference. During the drawing lessons, CC1's difference score showed reduced stress, stable at about a difference of -2. During return to baseline, CC1's difference score was similar to that during the drawing lessons, except for a slight increase in stress, similar to SC1.

Self-reported Stress for Dyad One

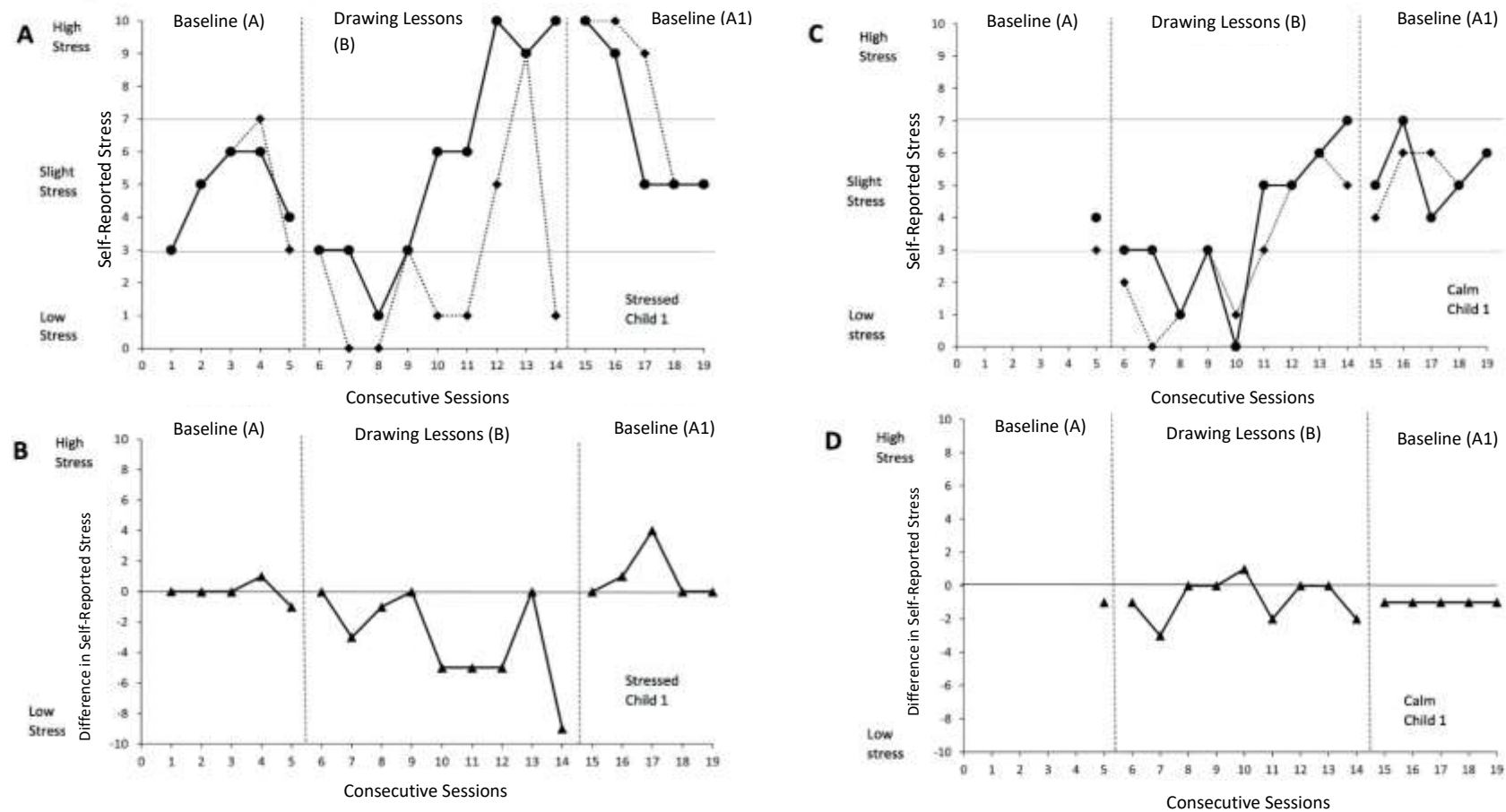


Figure 4. Graphs A and C represent self-reported stress at T1 (circle) and T2 (diamond), and Graphs B and D represent difference in self-reported stress between T1 and T2.

Finger Temperature for Dyad One

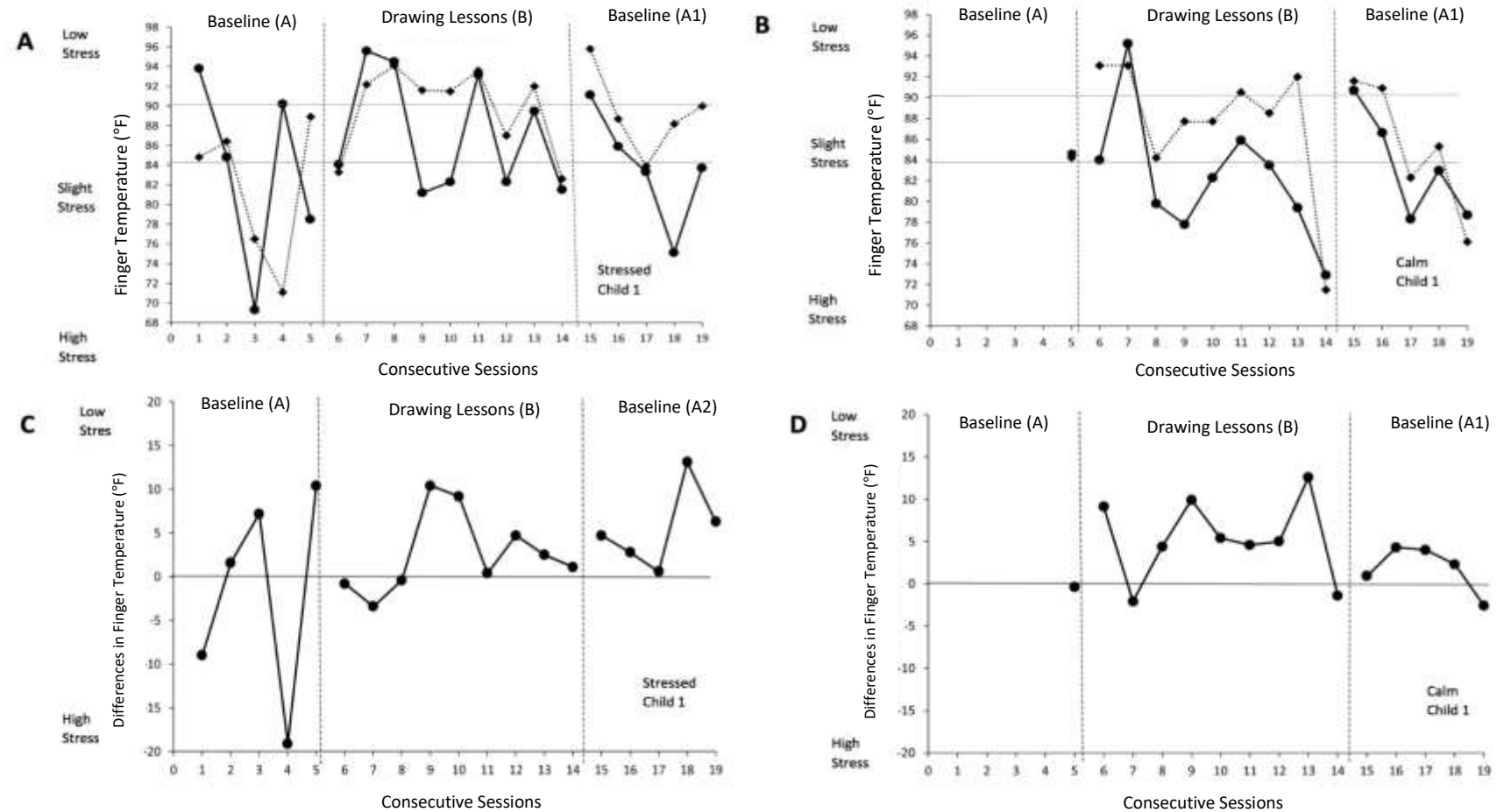


Figure 5. Graphs A and C represent finger temperature at T1 (circle) and T2 (diamond), and Graphs B and D represent difference in finger temperature between T1 and T2.

The second measure was the children's finger temperature. A finger temperature of 78°F or below indicates high stress, a finger temperature of 78-84°F indicates slight tension and a finger temperature of 84°F and above indicates calm. Children's finger temperatures at T1 and T2 was graphed and visually analysed (see Figure 5a and 5b). During baseline, SC1's stress at T1 showed high variability from high stress to calm, and a trend could not be reliability identified. SC1's stress also showed high variability at T1 when the drawing lessons followed T1, but these temperatures did not reach the high stress band. When the drawing lessons ended, SC1's stress showed a decelerating trend of increasing stress. For CC1, the one finger temperature measurement in baseline indicated that CC1 was calm (Figure 5 b), as would be expected for the calm child in this dyad. At T1 of the drawing lessons phase, CC1's stress was initially low and then showed a decelerating trend of increasing stress, which reached the high stress band. Upon removal of the drawing lessons, CC1's finger temperatures at T1 showed a similar pattern as that of the drawing lessons; initially low and then showing a decelerating trend of increasing stress, reaching the high stress band.

The differences in finger temperatures between T1 and T2 were calculated and displayed in graphs (Figure 5C and D). A temperature difference ($T2 - T1$) of 0 indicates that temperatures at T1 and T2 were the same, a positive temperature difference indicates a decrease in stress (i.e., T2 temperature was higher than T1 temperature), and a negative temperature difference indicates an increase in stress (i.e., T2 temperature lower than T1 temperature). During baseline, SC1's temperature differences showed high variability from increased stress to decreased stress, and therefore, no trend could be reliably discerned. Upon introduction of the drawing lessons, the majority of SC1's temperature differences indicated a decrease in stress after each lesson, with a slight improving trend. After the removal of the drawing lessons, SC1's temperature differences all showed a decrease in stress. For CC1, the

one temperature difference at baseline indicated no difference. During the drawing lessons, CC1's temperature differences mainly showed a decrease in stress, and showed a stable trend. When the drawing lessons ended, CC1's temperature differences showed a slightly decreasing trend, indicating that unlike SC1.

The first dyad, overall, showed a general reduction in stress during the drawing lessons intervention phase, as measured by self-reported stress and finger temperature. However, the reduction in stress was more apparent for the stressed child in comparison with the calm child. The stressed child's self-reported stress and finger temperatures were congruent in indicating an improvement in stress during the drawing lessons. For the calm child, there was discordance between self-reported stress and finger temperature, in that her finger temperature indicated an improvement in stress during the drawing lessons, whereas her self-reported stress did not indicate any significant improvements. When the drawing lessons were removed, the stressed child's improvement in finger temperature was maintained, but her self-reported stress did not show improvement, similar to baseline. For the calm child, her improvement in finger temperature during the drawing lesson was not maintained, and her self-reported stress was consistent in showing no significant improvements. Therefore, both children showed a physiological reduction in stress during the drawing lessons, but only the stressed child maintained this improvement in physiological stress once the drawing lessons were removed. In addition, the stressed child perceived a greater reduction in stress in herself during the drawing lessons, in comparison with the calm child, although this was not maintained once the drawing lessons were removed. This suggests that the drawing lessons were more effective in reducing stress for the stressed child than the calm child.

Dyad Two

As with dyad one, the first measure was the children's self-reported stress as recorded by the Subjective Unit of Distress Thermometer. On the SUD thermometer, high scores indicated high stress, and low scores indicated low stress. The upper band on the thermometer was red and represented high stress, the lower band was green to represent low stress and the middle band was yellow. Children's self-reported stress at T1 and T2 was graphed and visually analysed (see Figure 6a and 6b). During baseline (A), SC2's self-reported stress at T1 varied between the upper extremes of high stress and low stress. SC2's self-reported stress was consistently 0 at T1 of the drawing lessons (B), indicating the lowest possible stress. When the drawing lessons ended (A2), SC2's self-reported stress remained 0, indicating that SC2's low stress at T1 was maintained. For CC2, her self-reported stress at T1 of baseline was mainly within the low stress band, except for one score within the middle band. During the drawing lessons, CC2's self-reported stress at T1 remained in the low stress band, as would be expected for the calm child in dyad 2. Upon removal of the drawing lessons, CC1's stress remained within the low stress band.

The differences in self-reported stress between T1 and T2 were calculated and graphed (Figure 6C and D). A difference score ($T2 - T1$) of 0 indicated scores at T1 and T2 were the same, a positive difference score indicated an increase in stress (i.e., T2 score was higher than T1 score), and a negative score indicated a decrease in stress (i.e., T2 score lower than T1 score). SC2's differences in self-reported stress during baseline, drawing lessons, and return to baseline were consistently 0, indicating no difference in stress throughout the study. CC2's difference in self-reported stress during baseline were varied, and showed increases and decreases in stress or difference. During the drawing lessons, CC2's difference scores mainly showed no change or a decrease in stress, except for one session which showed an

increase. Upon removal of the drawing lessons, CC2's difference scores showed either no change or an increase in stress.

As with dyad one, the second measure was the children's finger temperature as recorded by the Stress thermometer. A finger temperature of 78°F or below indicated high stress, a finger temperature of 78-84°F indicated slight tension, a finger temperature of 84-90°F indicated calm, and a finger temperature of above 90°F indicated deep relaxation. Children's finger temperature at T1 and T2 was graphed and visually analysed (see Figure 5a and 5b). During baseline, SC2's finger temperature at T1, varied from calm to high stress. When the drawing lessons were introduced, SC2's finger temperature at T1 varied from slight tension to calm and showed a trend of increasing stress. Upon removal of the drawing lessons, SC2's stress at T1 varied from calm to high stress, and showed a trend of increasing stress. For CC1, her finger temperatures at T1 of baseline indicated that CC1 varied from calm to high stress (figure 6 b). During the drawing lessons, CC1's stress had a trend of increasing stress. When the drawing lessons ended, CC1's finger temperatures were within the calm band and should a table trend.

Self-reported Stress for Dyad Two

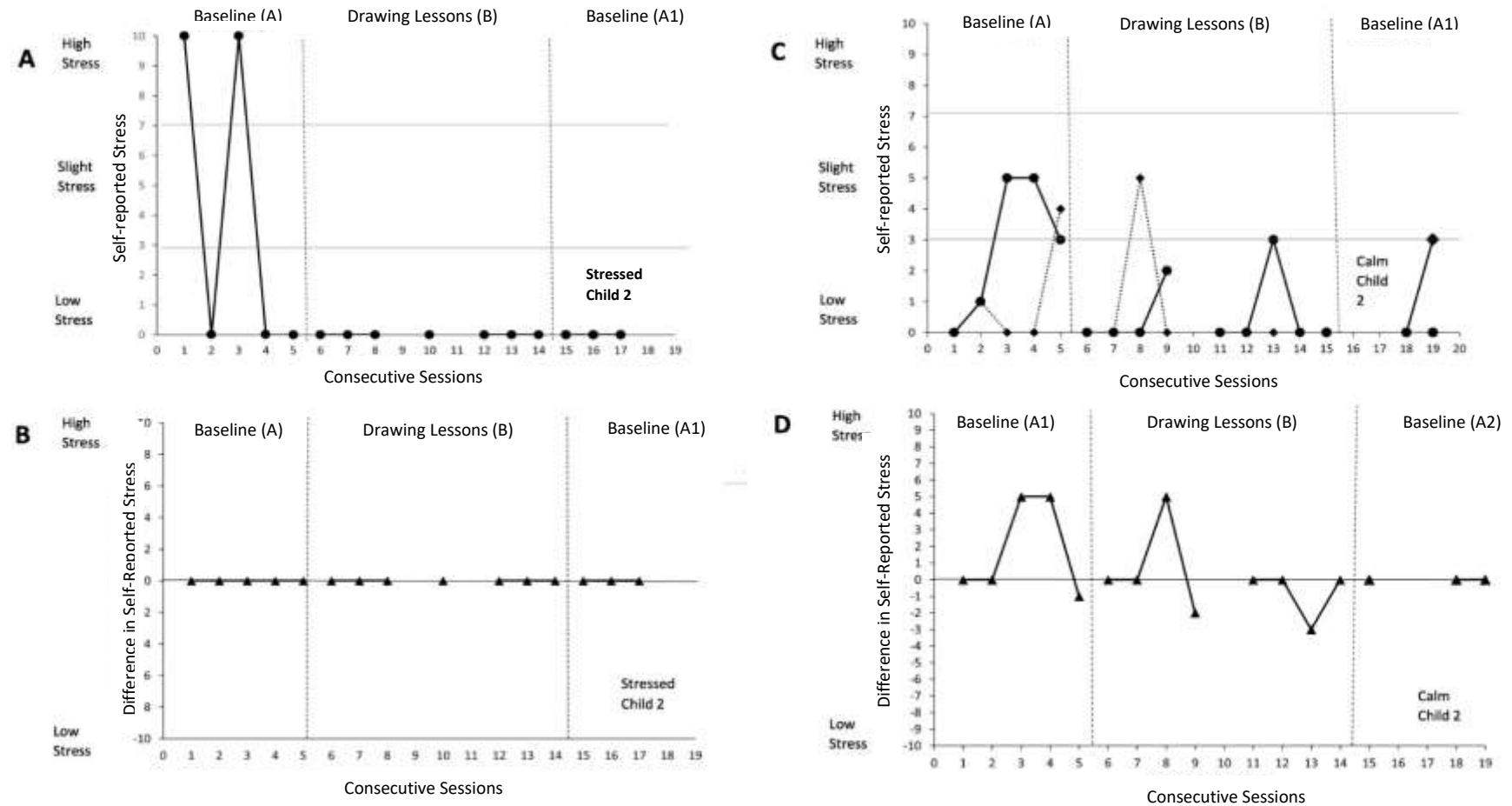


Figure 6. Graphs A and C represent self-reported stress at T1 (circle) and T2 (diamond), and Graphs B and D represent difference in self-reported stress between T1 and T2.

Finger Temperature for Dyad Two

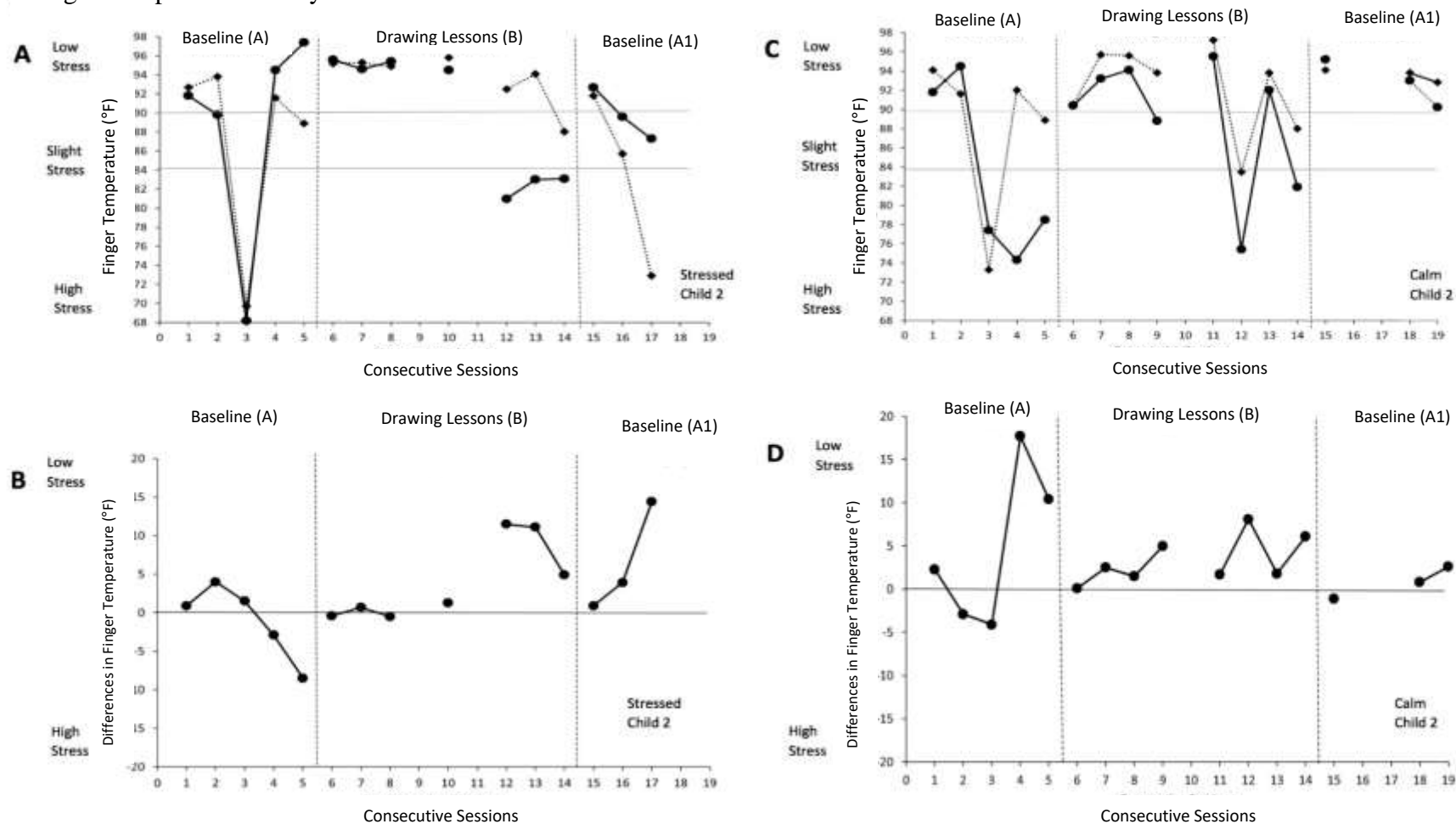


Figure 7. Graphs A and C represent finger temperature at T1 (circle) and T2 (diamond), and Graphs B and D represent difference in finger temperature between T1 and T2.

The differences between T1 and T2 were calculated and graphed, as with dyad one (Figure 5C and D). A temperature difference score ($T2-T1$) of 0 indicated scores at T1 and T2 were the same, a positive score indicated a decrease in stress (i.e., T2 score was higher than T1 score), and a negative score indicated an increase in stress (i.e., T2 score lower than T1 score). During baseline, SC2's temperature difference showed a trend of increasing stress. After the drawing lessons were introduced, SC2's temperature differences initially showed no difference, and then a trend of improving stress. During return to baseline, the same pattern was shown as that of the drawing lessons; SC2's temperature differences initially showed no difference and then a trend of improving stress. For CC1, her temperature difference at baseline showed a trend of improving stress. During the drawing lessons, CC2's temperature difference mainly showed a decrease in stress, and showed a stable trend. During return to baseline, CC2's temperature difference was stable around zero, indicating little difference in stress from T1 to T2.

Overall, the stressed child in the second dyad showed a general reduction in physiological stress during the drawing lessons, whereas the calm child showed minimal change. However, both children in dyad 2 showed no change or minimal change in self-reported stress. There was discordance between the stressed child's self-reported stress and finger temperature, in that his finger temperature indicated a general reduction in stress after the drawing lessons, whereas, his self-reported stress showed no change in stress. When the drawing lessons were removed, the stressed child's improvement in finger temperature was maintained, whereas his self-reported stress remained unchanged. For the calm child, self-reported stress and finger temperatures were, in general, congruent in showing minimal change in stress during the drawing lessons. However, when focusing on individual sessions, there was some discrepancy shown between the measures, in that the calm child would report feeling calm, but her finger temperature would indicate high stress. It appears that the

children's perception of their own stress and their physiological stress were sometimes at odds, although this was more apparent for the stressed child. Nonetheless, the stressed child showed a greater reduction in physiological stress during the drawing lessons than the calm child, and he was also able to maintain this improvement in stress once the drawing lessons had removed. This suggest that, as shown with dyad one, the drawing lessons were showed to be more effective for the stressed child than the calm child.

The results of the study showed a general reduction in physiological stress during the drawing lessons for the stressed children in both dyads. Furthermore, one of the calm children also showed a reduction in physiological stress after the drawing lessons, whereas the other calm child showed minimal change. However, there was some discordance between the children's physiological stress and their perception of stress. The stressed child in dyad one and the calm child in dyad two showed consistency in their self-reported and physiological stress; with the stressed child consistently showing a reduction in stress, and the calm child consistently showing minimal change in stress. However, the stressed child in dyad two and the calm child in dyad one showed a discrepancy between their self-report and finger temperature with both children reporting minimal change, despite their physiology indicating significant improvement in stress. As physiological stress provides a more reliable indicator of stress than self-report, the changes in finger temperature are the most important findings of the study. Therefore, in regards to physiological stress, the drawing lessons were shown to be effective in reducing stress in children, or maintaining the children's already calm state.

Chapter Five: Discussion

The results of the study showed a general reduction in physiological stress after the drawing lessons for the stressed children in both dyads. Furthermore, one of the calm children also showed a reduction in physiological stress after the drawing lessons, whereas the other calm child showed minimal change. However, there was some discordance between the children's physiological stress and their perception of stress. The stressed child in dyad one and the calm child in dyad two showed consistency in their self-reported and physiological stress; with the stressed child consistently showing a reduction in stress, and the calm child consistently showing minimal change in stress. The stressed child in dyad two and the calm child in dyad one showed discrepancy between their self-reported and physiological stress, with both children reporting minimal change in stress despite their physiology indicating a significant improvement in stress.

This discrepancy between psychological and physiological measures of stress has been shown in other studies. Art intervention studies with adults have shown that findings based on self-report questionnaires are occasionally in discordance with findings based on the physiological indicators of stress, such as heart rate and cortisol levels (e.g. Curl et al., 2008; Lawson et al., 2012; Sandmire et al., 2015; Walsh et al., 2007). This discrepancy was explained in these studies by reflecting on the limitations of self-report questionnaires. For example, self-report questionnaires have the potential for response bias, since participants may answer the questionnaires based on what would be socially acceptable or expected rather than how they are actually feeling. Furthermore, there tends to be a high degree of response variance in self-report measures, which reflects the inherent subjectivity of the measures (Sandmire, et al., 2015). Some research has also suggested that the self-report questionnaires used in these studies may not be appropriate parallels for the chosen biomarker, and further

research is required to determine psychological measures of stress which are more closely related to changes in physiological parameters (Walsh et al., 2007).

For children, research has shown that visual analogues, such as the SUD thermometer used in the current study, aids children's ability to self-report how they are feeling (Kendall, et al., 2006). However, this method still encompasses the same limitations of self-report questionnaires, as it not only relies on children's subjective interpretation of the visual analogue, but also, the child's willingness or ability to provide an accurate account of how they are feeling at one precise moment in time. Young children can find this difficult (Chambers & Johnston, 2002), which may explain the discrepancy found in the current study between the self-reported stress and physiological stress for the children.

For a young child with posttraumatic stress symptoms, this discrepancy may be even more apparent. The PTSD literature explains that dissociation may cause the common discrepancy between traumatized individuals self-reported stress and physiological indicators of stress. Dissociation is when an individual reports relatively little distress on self-report rating scales, despite showing pronounced elevated distress on measures of autonomic arousal (Bonanno, 2004). It is a form of repressive coping, in that the individual modulates their negative affect following the evaluation of threat (Newton & Contrada, 1992). In general, this is considered a maladaptive coping strategy, which may have detrimental long term health-related consequences (Bonanno, 2004). Emotional dissociation is a common reaction in PTSD (Lanius et al., 2010), and may explain the discrepancy evident in the current study between the self-reported stress and physiological stress of the stressed child in dyad two. SC2 exhibited high Post-Traumatic Stress symptoms at the pre-test as measured by the BPI, and this included high avoidance symptoms, which may be reflective of emotional dissociation, not addressed by a short drawing intervention.

In order to address the limitations of self-report measures with children with post-traumatic stress symptoms, physiological indicators of stress can be used to provide a more objective measure of stress (Goyal, Singh, Vir & Pershad, 2016). Physiological indicators, such as heart rate, cortisol, and finger temperature, are objective measures of stress as they provide a representation of autonomic activity which is not under conscious control of an individual (El-Sheikh, Erath, Buckhalt, Granger & Mize, 2008). Consequently, objective measures rule out the possibility of self-deception, falsification, fabrication, attention and recall bias, which are often present in subjective measures (Goyal, Singh, Vir & Pershad, 2016). Based on this research, the changes in children's finger temperature are the most reliable findings of the current study. Therefore, in regards to physiological stress, the drawing lessons were shown to be effective in reducing stress in children or maintaining the children's already calm state.

Overall, the findings of the current study were consistent with previous research which determined art interventions as effective in reducing stress and improving hyperarousal symptoms. In particular, the current findings support the unique contribution of drawing in helping children self-regulate their stress. Similar to the current study, the first study in Drake and Winner's (2013) research investigated whether drawing would improve the mood of children aged 6-8 years of age. They found that after ten minutes of drawing a house, the children's self-reported mood improved from a mean of 2.4 to 4.3 on a scale of five faces ranging from very sad to very happy. The current study supports these findings, by showing a general reduction in stress during the drawing lessons from high stress to low stress on a 10-point scale. Drake and Winner (2013) attributed the children's improvement in mood to the engagement in a drawing task which distracted the children from their negative feelings and thoughts. It is possible that the drawing lessons used in the current study had the same effect in distracting the children from their feelings of stress.

However, in Drake and Winner's (2013) first study, they had the children draw a house from memory, whereas the current study required the children to copy images. Furthermore, their second study found that copying household objects was not effective in improving mood, as shown by the slight mean increase from 2.61 to 3.94, on the same 5-point scale as used in study one. Drake and Winner (2013) interpreted this finding by suggesting that drawing to generate one's own image is more effective in improving mood than copying images by others. The rationale of the current study was based on the neuroscience literature which shows that copying images activates areas of the brain associated with regulation of the autonomic nervous system Schaer, Jahn & Lotze, (2012). In addition, adult research on art interventions has shown that a lack of structure and direction during the art session can prevent an intervention from having stress reducing effects, as participant's absorption in the artistic task is disrupted by a lack of structure and direction (e.g. Curry and Kasser, 2005; van der Venet, & Serice, 2012).

This may be particularly relevant for the stressed children in the current study, as not knowing how to draw may evoke feelings of stress in these children, as opposed to reducing it. The study addressed this issue by creating structured and directive drawing lessons. After individually assessing the drawing lesson, the art material (pencils) was selected by the interventionist and the children were given a set image to copy each lesson. The interventionist showed the children how to draw the image, and provided guidance throughout the session. The children were provided with soft lead pencils and erasers in order to allow for easy removal of mistakes. Taken together, these methods allowed the children to focus on the task as opposed to becoming possibly stressed about what to draw and how to draw.

The discrepancy between the results of the current study and study two by Drake and Winner's (2013) may be explained by the art intervention research which suggests that distraction through drawing is not fully accountable for the improvements in children's mood

(Wilkinson & Chilton, 2013). Research aimed at reducing stress and improving mood in adults found that drawing positive images was more effective in reducing stress than drawing neutral or negative images (i.e. Curl, 2008; Dalebroux, Goldstein & Winner, 2008; Smolarski, Leone & Robbins, 2015). These findings are at odds with a core assumption of art therapy which posits that the expression of one's negative emotions is an important part of the therapeutic process for achieving psychological wellbeing (Pizarro, 2004). Instead, alternative research has found that the expression of positive emotions may be the essential ingredient in drawing's effectiveness in improving mood. Positive emotional expression has been shown to enhance mood, possibly due to simple distraction or through cancelling out one mood state with another (Wilkinson & Chilton, 2013). In contrast, negative emotional expression has been shown to increase stress, possibly through rumination over the negative feelings (Smolarski, Leone & Robbins, 2015).

While Drake and Winner (2013) asked children to draw a house based on the assumption that a house is neutral in nature, the researchers acknowledged that it may actually have held positive connotations for the children. The images selected to be copied in the present study were different each day, and included a sunflower, bird in a tree, owls on a branch, rocket ship, cow in a paddock, train, puppy, butterfly and fruit bowl. These images may have also held positive connotations for the children, as they were selected based on the assumption that they would appeal to young children and promote their engagement in the drawing lessons. The objects that the children copied in Drake and Winner's (2013) study were household objects (i.e. toasters and jugs), which may not have conjured positive emotions in the children. Therefore, an important aspect of improving mood through drawing, may be to select a drawing task which elicits positive emotions in the children. It is possible that the images selected to copy in the current study evoked feelings of happiness in the children, which in turn, reduced their stress levels. However, these assumptions are based on

studies with adult participants, and as such, future research should investigate whether the effectiveness of drawing in reducing stress is the result of the expression of positive emotions in children.

In contrast to the findings of Drake and Winner (2013), Zhu et al. (2014) found that copying images was effective in reducing stress in children. Furthermore, this study had a similar aim to the current study; to reduce hyperarousal symptoms in children after earthquake exposure. A notable difference between the studies was that drawing was used in the current study and Chinese calligraphy was used by Zhu et al. (2014). Chinese calligraphy is considered a fine art in China, and as this study was set in China, it was an appropriate art intervention for the children in their study, whereas drawing was more culturally appropriate for the children in the current study. However, the two art forms are considerably similar in that they both require attention and concentration and involve highly controlled moves and well-coordinated movements. Furthermore, neuroscience research on calligraphy and drawing suggests that both activities alter electrodermal activity in the brain in a way that promotes relaxation and emotion regulation (Zhang, 2014; Belkofer, Van Hecke, & Konopka, 2014.). Other research has found a connection between the complex motor movements of the two activities and a reduction in physiological activity in individuals (Kao, Lam, Robinson, & Yen, 1989; Zhu et al., 2014).

In the study by Zhu et al. (2014) 129 children were instructed to copy calligraphy figures from a book for an hour each school day over 30 days. In the first study, they found a significant reduction in hyperarousal symptoms from pre-test ($M=6.30$), to mid-test ($M=5.64$) to post-test ($M=4.84$) on the *Children's Revised Impact of Event Scale (CRIES-13)*. The CRIES is a self-report measure with a subscale aimed at assessing the behavioural effects of arousal. The current study also used a behavioural measure, The *Behaviour Problem Index(BPI)*, which contained specific items related to arousal. One difference was that in the

present study the children's teachers and parents completed the BPI, based on their observations of the child's behaviour. In contrast to the findings of Zhu et al. (2014), the current study showed some inconsistency in terms of showing a reduction in children's behavioural arousal symptoms. For example, the stressed child in dyad one's score on the items "is stubborn, irritable or sullen", "has strong temper and loses it easily" and "is rather high strung, tense and nervous" were all reduced from often true to sometimes true, on the teacher's report. And the item "is easily confused seems to be in a fog" was reduced from often true to not true, in the teachers reports. However, in terms of dyad one's parent report, no improvements were found. For the stressed child in dyad two, his scores on the item "is rather high strung, tense and nervous", was reduced from often true to sometimes true, on the teacher's report. However, his mother reported no change in hyperarousal symptoms. Therefore, while the children's teachers noticed some improvements in hyperarousal symptoms, their parents did not. This may suggest that the effects of the intervention had not generalized to the home session.

Similar to the current study, the second study reported by Zhu et al. (2014) found a significant reduction in physiological stress during the art intervention. The results of Zhu et al. (2014) showed a reduction in cortisol from pre-test ($M=13.34$) to mid-test ($M=11.61$) to post-test ($M=9.99$) indicating a reduction in physiological stress after the art intervention. The current study also found a reduction in physiological stress during and after the drawing lessons, as indicated by increases in finger temperature. Taken together, these findings support the neuroscience research that indicates that copying images can be an effective strategy in relaxing children and reducing autonomic arousal.

While cortisol was considered as a potential physiological measure of stress for the current study, finger temperature was chosen as it is a less invasive and more practical method of assessing stress in a classroom situation. Finger temperature was used in a recent

study by Ziff, Ivers and Shaw (2016) to measure stress in children 6-11 years old. Ziff, Ivers and Shaw's (2016) results reported that the children's finger temperature post-intervention increased on average by 4.6 degrees, indicating a reduction in stress in comparison with pre-intervention readings. Consistent with this finding, the current study also showed an increase in finger temperature in children after drawing lessons, with the stressed children showing increases ranging from 1 degrees to 13 degrees. These findings suggest that a school based art intervention may be effective in mitigating stress in children with social and emotional problems as measured by a physiological indicator.

The literature on school based art interventions is increasing, with several studies showing the benefits of such interventions in enhancing children's ability to cope with daily stressors (e.g. Cortina & Fazel, 2015; Kearns, 2004; Savage & Leonard, 2015). According to Ziff, Ivers and Shaw (2010), schools can play a role in mitigating stress in school students by incorporating art interventions into the classroom. Immediate triggers of child stress can often come from school itself. Stress sensitive children tend to perceive situations, such as interactions with peers and teachers or struggles with academic work, to be more stressful than they actually are (Shaw, Espinel & Schultz, 2012). Art interventions can act as "breathers", or stress-buffering positive experiences that aid children's coping skills by giving them an opportunity to take a break, recover and return to a stressful environment in a calmer state. They can also act as "sustainers", or enjoyable challenges that allow children to become absorbed in the activity, as well as help them recognise that in stressful situations they are able to not only cope, but also able to experience positive feelings. Art interventions can also act as "restorers" or restorative experiences that help children heal from stressful events. It is possible that the drawing lessons in the current study acted in the same way, by providing children an enjoyable activity in the midst of stress, which evoked positive feelings to help children cope when returning to class (Barrett & Heubeck, 2000).

However, a notable difference between the current study and the study by Ziff, Ivers and Shaw (2016) was the difference in art interventions. Ziff, Ivers and Shaw (2016) created an art intervention based on the principles of student/child centred education (Rogers, 1969) which is based on encouraging and valuing the choices and opinions of the student. Therefore, a range of art materials were provided to suit the goal of the session. However, the current study involved structured and directive drawing lessons. The rationale for this was based on an analysis of the effectiveness of studies with art interventions; in general, structured and directive art interventions were determined to have larger effect sizes as compared to unstructured and non-directive interventions, as described in chapter 2. Furthermore, analysis of the literature indicated that drawing interventions were likely to be more effective with children than other art activities. An avenue for future research would be to give children a selection of images and have them choose which one they want to draw, in order to assess what effect choice has on reducing stress during art making.

Another difference between the art interventions used in Ziff, Ivers and Shaw (2016) and the present study, was the format of the sessions. Ziff, Ivers and Shaw (2016) had a group format with 6-8 children included in each group, whereas the current study had the children work in pairs. The rationale behind this was based on the research that links art making to the concept of “flow” (Csikszentmihalyi, 1991), which is described as a state of optimal engagement and complete absorption in a task. The experience of flow has been linked to the expression of positive emotions, and the reduction of stress (Wilkinson & Chilton, 2013). Based on the concept of flow, the drawing lessons were designed to create a skill/challenge balance, where the tasks were challenging yet achievable, to ensure the flow effect could take place and children could experience success and mastery (Wilkinson & Chilton, 2013). In order to enhance the children’s opportunity to experience flow, the stressed children were paired with only one other child, and this child was a calm child.

Most of the previous art intervention research with children had small groups of children (6-10 per group) or large groups (14-20) (Cortina & Fazel, 2015; Drake & Winner, 2013; Kheibari et al., 2014; Pessoa-Aviv, Regev, and Guttman, 2014; Ziff, Ivers & Shaw, 2016; Zhu et al., 2014). However, two studies found positive effects with individual children with ADHD (Kearns, 2004; Smitherman-Brown & Church, 1996). As none of the studies compared the effectiveness of individual art interventions to group art interventions, future studies should investigate whether the flow effect is more apparent in children in individual or group settings. This may be particularly relevant for stressed children, as most of the previous group studies were with healthy children. It is possible that due to their difficulties concentrating, individual art interventions possibly may be a more effective strategy for stressed children, as it was for the children with ADHD.

One potential confounding factor in the study results is room temperature. Overly warm or overly cold classrooms could affect the reliability of measures of finger temperature. According to the PPTA for health and safety for children and teachers, acceptable standards for classroom temperatures are between 20 and 24 °C (68-75 °C) in winter, and 23 and 26C (73-79°C) with adequate ventilation (not measured in the present study). Research suggests that room temperature that is too hot might increase irritable behaviours and aggression (Graetz & Goliber, 2002). In addition, higher temperatures may also decrease children's ability to focus and learn in the classroom. One study found that each decrease in temperature by 1 °C within the range of 20-25°C, improved test scores in math by 12-13 points (Haverinen-Shaughnessy & Shaughnessy, 2015). In the present study, finger temperature measurements were taken in the last month of spring and first month of summer. The results show that the classroom temperatures were generally within the established limits by the PPTA, (68-75°C) with two out of the nineteen days slightly below the limit (66.3 and 67.2),

and no classroom temperatures above the limit. Therefore, the finger temperatures recorded by the participants were unlikely to have been confounded by room temperature.

Limitations

The current study's findings need to be considered in conjunction with the following limitations. These limitations include; the design of the study, the missed data, the recruitment process, the lack of formal measures of social validity and intervention fidelity, and the lack of reliability of the self-report measure. There were also some confounding variables which were not controlled, and may have influenced the results of the study; the removal of the child from the classroom, the art trainer's training in child and family psychology, and the pairing of a calm child with a stressed child. It is important to consider each of these limitations, in order to determine the credibility of the current study's findings.

Firstly, the findings of the current study are limited by its ABA design. While ABA is a significant step beyond an AB design, it is not a fully experimental design as a replication has not been included. In order to strengthen the validity of the findings, an ABAB design should have been conducted. An ABAB design involves the replication of the intervention phase, in order to determine whether the effect is replicated. If the intervention is shown to be effective in both B phases, it provides confidence that the intervention was responsible for the change in outcome data (Riley-Tillman & Burns, 2009). The replication of the drawing intervention would have been put in place if time had permitted. As the summer holidays were fast approaching, it was not possible to extend the study any longer.

The scheduling of the study also meant that some of the children missed sessions and these were not made up at a later point in time. The children were absent from school either due to illness or appointments. This is a limitation because missing data points limits the ability to draw conclusions from the overall analysis. It is recommended in single subject

research to have at least five points of data for each phase (Riley-Tillman & Burns, 2009). As this was achieved for the stressed child in dyad one, her data provides the most informative depiction of the effectiveness of the intervention.

The recruitment process was limited as only four children were screened for hyperarousal symptoms, due to the lack of response from many parents to whom the materials were sent. Ethically, children could only be screened for hyperarousal symptoms with their parents written consent. Due to the time constraints previously discussed, the four children who had parental consent participated in the study. Ideally, the whole class would have been given a screening measure and four children would have been selected in terms of a more stringent selection criteria. However, it is not uncommon for researchers to face difficulty in recruiting participants in post-disaster communities (Henderson et al., 2009; Kronenberg et al., 2010; Masten, & Osofsky, 2010). Communities experiencing long recovery from disasters tend to have multiple issues related to funding services, rebuilding the community and providing basic needs to affected individuals, which tend to take precedence over participating in research (Masten & Osofsky, 2010). In addition, the chaos and instability that surrounds post-disaster communities creates difficulties in organizing and implementing interventions, requiring a kind of flexibility that is not always ideal in research (Collogan, Tuma, Dolan-Sewell, Borja, & Fleischman, 2004). Fortunately, an equal number of participants were recruited for the current study and met the criteria for “calm” and “stressed”, and were able to be paired up accordingly.

However, as the participants consisted of three girls and one boy, one dyad consisted of two girls and the other dyad consisted of a girl and a boy. The ideal arrangement would have been two girls and two boys in order to maintain consistency. The pairing of a boy and girl had the potential to limit the results, based on the research that suggests that boys and girls tend to engage in different leisure activities, with boys engaging in more active and

dynamic outdoor play, and girls spend more time inside engaging in static play, such as drawing (Cherney & London, 2006). Based on this research, the girls may have been familiar and comfortable with the drawing lessons, whereas the boy may have felt stressed due to the novelty of the task, or he may have lacked interest in the task, thus, preventing engagement. Instead, having an equal number of boys and girls would have provided a more balanced view on the effects of drawing on stress in children. However, the pairing of the boy and the girl did not appear to have an effect, and not only did the results indicate a reduction in the boy's physiological stress, but his teacher also reported an improvement in behaviour.

A lack of reliability in the measures is another limitation of the present study. As previously discussed, there was a lack of consistency between the self-report and physiological measures. This is a limitation as it produces uncertainty as to whether the drawing lessons were effective in reducing stress or not. As previously discussed, physiological measures are more reliable indicators of stress than psychological measures, so the results related to finger temperature were considered more reliable than the children's self-report. This indicates that a more reliable measure of children's perception of stress needs to be developed. It also provides support for the triangulation of data in future research with children (i.e. using psychological, physiological and behavioural measures of stress) as opposed to relying solely on children's self-report.

Another limitation of the study is the lack of a formal measure of social validity. Social validity is defined as the extent to which the intervention created a change in socially important outcomes (Horner, et al., 2005). Conversations with the teachers and children in the study suggested that the drawing lessons provided a meaningful change in the children's stress. However, a more formal measure of social validity is required in order for drawing lessons to be applied to the classroom setting. Measure of social validity need to determine that the dependent variable (i.e. stress) is socially important, the magnitude of change in stress

resulting from the intervention is socially important and the implementation of the drawing lessons is practical and cost-effective (Horner, et al., 2005). Therefore, future research should provide two social validity questionnaires; one for the teacher and one for the children. A measure of social validity for the teacher would determine the teacher's perception on the effectiveness of the drawing lessons and also the feasibility it would be for a teacher to implement the intervention in the classroom. A measure of social validity for the child would determine whether the child enjoyed the lessons and would engage in the drawing lessons again in the future.

The lack of a measure of intervention fidelity is another limitation of the current study. Intervention fidelity is defined as the delivery of an intervention as it was intended to be delivered. Collecting and reporting intervention fidelity data is important in determining the reason interventions succeed or fail, and for deciding whether an intervention can be applied to larger settings. More specifically, fidelity data can allow researchers to determine whether unsuccessful results are due to unsuccessful interventions or due to a failure to implement the intervention as planned. For successful outcomes, as in the current study, fidelity results can have implications for extending the intervention to school settings. However, the education sector is increasingly placing importance in evidence based interventions. Therefore, interventions need to have clear descriptions on how the intervention should be implemented, as justified by research, and provide a measure of how well the study implemented the intervention as intended (Swanson, Wanzek, Haring, Ciullo, & McCulley, 2013).

A limitation of the current study's method was the requirement of removing the child from class in order to participate in the drawing lessons. It is possible that simply being removed from class was enough to reduce these children's stress levels, regardless of the art making intervention. For instance, as previously discussed, art interventions during class times may act as a break for children when they are feeling overwhelmed or stressed by class

activities (Ziff, Ivers & Shaw, 2016). Therefore, it is possible that simply escaping from the demands of the classroom environment was enough to relax the children, and any activity that provided children with time and space away from class may have produced the same stress reducing results. However, previous research with adults has found that when comparing artistic to non-artistic activities, artistic activities produced greater stress reduction (Abbott, Shanahan, & Neufeld, 2013). It is possible that the findings of the current study can be attributable to both the combination of having a break from class and engaging in drawing lessons. Future research could address this issue by isolating the two variables; taking a break from class and drawing lessons. Research could randomly assign children to a twenty-minute drawing lessons group, which would be set in the classroom (i.e. no removal from class), and a removal from class group, where the children are given a twenty-minute break from class.

Another limitation of the present study was that the behaviour of the art interventionist may have had an impact on the child's behaviour independent of the impact of the drawing lesson itself. The art interventionist was part of the Child and Family psychology programme at the University of Canterbury, which provides students with the relevant skills, knowledge and practise required to become a child and family psychologist. These skills include relating to children and making children feel calm and at ease while in the psychologist's company (Boggs & Eyberg, 1990; Gurland, & Grolnick, 2008). While the drawing lessons were not designed to resemble therapy lessons, it is possible that the interventionist was nonetheless successful in building a rapport with the children, which may have made the children feel calm regardless of the art making activity. However, the effect may be attributable to both the combination of the interventionist's calming influence and the art activity. Thus, further research is needed to isolate the two variables; the interventionists behaviour and the art activity, to determine whether the art activity alone is attributable to the effect. This could be done by teaching the children how to draw via a video recorded lesson or by step-by-step

visual instructions, as opposed to a person led session. Alternatively, future research could replicate the current study with a facilitator that has little experience in relating to children.

The pairing of the stressed children with the calm children as part of the study design may be a limitation in the study's methodology. It is possible that the calm children had a calming influence on the stressed children, and provided an example of good emotion regulation skills that the stressed child was able to learn. Research has shown that peers can play an effective role in interventions by demonstrating prosocial behaviours, creating and reinforcing norms that certain behaviours are not acceptable, and promoting alternatives to any deviant activities (Jason & Rhodes, 1989). The "buddy system" strategy has been shown to be effective in reducing aggressive behaviour in children, through the modelling of appropriate behaviour by a buddy (Hektner, August, & Realmuto, 2003). The return to baseline data of the present study may provide further support for the positive influence of the calm children on the stressed children, as the stress reducing effects were maintained after the drawing lessons had been removed. This suggests that the children may have learned more adaptive ways of coping with stress from the calm child they were paired with.

Taken together, the study has limitations that should be addressed in future research investigating the effect of drawing lessons on children's stress. These include improving the design of the study and the recruitment process, adding formal measures of social validity and intervention fidelity, and using a more reliable self-report measure for children. There were also confounding variables that may have accounted for the positive results, as opposed to the drawing lessons themselves. These variables need to be controlled for in future research, in order to determine what aspects of the drawing lessons were attributable to the stress reduction shown in the study. In light of these limitations, it is uncertain whether the drawing lessons were solely accountable for the reduction in children's stress. While drawing lessons may be effective in reducing stress in children, further research which addresses the

limitations of the current study is required in order to have confidence in the effect of drawing lessons on reducing stress in children.

Implications

Future research should aim to expand the study to determine whether drawing lessons may be an effective strategy in reducing stress in the classroom. To do this, the drawing lessons used in the current study would be applied to the whole class, instead of just two children. Applying the drawing lessons to the whole class, addresses some of the studies previously mentioned limitations. For example, the drawing lessons would be conducted in the classroom, in order to control for the effect of being removed from the classroom. In addition, the drawing lessons would be led by a teacher, as opposed to a child and family psychology student. Furthermore, the children would not be paired up, but the whole class would be involved. Therefore, the confounding variables in the present study could be controlled for by extending the study to the classroom.

In order to do this, the class teacher would be taught how to facilitate the lessons in the same way as the current study. Baseline phase would be 5 days long, as in the present study, and would involve the researcher taking the finger temperature of six children selected at random, before and after a 20-minute period of class time in the afternoon. After the baseline phase, the nine drawing lessons would be introduced. The children's finger temperature of the same six children, selected at random, would be taken before and after each 20-minute drawing lesson. Then after the nine sessions, the class will return to their normal class routine, with finger temperatures measures as in baseline. This research could help determine whether daily drawing lessons is an effective strategy to help improve the overall functioning of the classroom as a whole.

In terms of the practical implications, the findings of the current study indicate that drawing lessons in a separate setting to the classroom may be effective in reducing stress in 8-year-old children working in pairs, with one child exhibiting hyperarousal symptoms and the other child not. Therefore, a twenty-minute drawing lesson during the afternoon of the school day may be an effective way of helping children keep calm, after a morning of learning. Christchurch school children have faced a significant amount of stress since the Canterbury earthquakes, which has had a lasting impact on some of these children (Liberty et al., 2016). The current study adds to the increasing research aimed at developing coping strategies for stress sensitive children to enhance their functioning at school. As the children's improvement in stress was maintained after the drawing lessons were removed, this suggests that the stressed sensitive children had developed some skills around regulating their stress. This strategy of reducing stress and promoting self-regulation in children has practical implications for implementation in current and future post-disaster contexts.

The drawing lessons were based in a school significantly affected by the Canterbury earthquakes, and provided a practical intervention for helping a few students cope with stress. The drawing lessons were cost effective, and did not require a range of different art materials; sketching pencils, sketching paper, erasers and pencil sharpeners were the only materials required for the drawing lessons. In addition, the drawing lessons were simple, based on the lessons in the *Drawing with Children* book by Mona Brookes (Brookes, 1996), so a teacher without artistic ability could easily lead the lessons. Furthermore, the drawing lessons were 20 minutes long, meaning they do not require a considerable amount of class time in order to be effective. Therefore, including drawing lessons in the daily classroom routine may be a simple and efficient way of helping children cope with stress at school.

Conclusion

The 2010-2011 Canterbury earthquakes and the subsequent aftershocks and prolonged rebuild has had a devastating impact on the region. The effect of prolonged trauma has taken its toll on the mental health and wellbeing of many Cantabrian people (Potter, Becker, Johnston & Rossiter, 2015). In particular, there has been an increase in post-traumatic stress symptoms in school children (Liberty et al., 2016). Many of these children experienced the earthquakes during a sensitive period of their development, which may have had a damaging impact on their brain development (Pechtel & Pizzagalli, 2011). Specifically, neuroscience research has shown that early life stress may damage areas of the brain associated with the regulation of the autonomic nervous system, causing children to develop a heightened sensitivity to stress (Shonkoff et al., 2012). This is expressed through the hyperarousal symptoms of PTSD, i.e. hypervigilance, inability to concentrate, angry outbursts and sleep disturbances. These symptoms tend to interfere with children's ability to function well at school, resulting in social, behavioural and learning problems (McCraty, Atkinson, Tomasino, Goelitz & Mayrovitz, 1999).

While cognitive behavioural therapy (CBT) is the typical treatment method of PTSD, there are insufficient clinicians to treat the high numbers of children in post-disaster communities. There is also evidence that CBT may be ineffective for young children with hyperarousal symptoms. Research has shown that the effectiveness of CBT diminishes with the age of the child, due to the limited verbal abilities of young children (Grave & Blissett, 2004). Furthermore, research has shown that early life stress may cause damage to the language processing areas of the brain, making the verbal expression and reasoning involved in CBT, particularly challenging for these children (Carey, 2006). Most importantly, CBT is a psychological intervention that does not target the physiological effect of trauma on the autonomic nervous system. Children with hyperarousal symptoms may require a non-verbal intervention that focuses on regulating the autonomic nervous system (Kozłowska & Hanney,

2001). Neuroscience research has shown that drawing activates the areas of the brain connected to the autonomic nervous system, and helps promote relaxation and self-regulation (Belkofer and Konopka, 2008; Belkofer, Van Hecke, Milwaukee and Konopka, 2014). Furthermore, the art intervention research has shown a paradigm shift away from tradition art therapy practises of negative catharsis, towards a positive psychology approach that attributes the effectiveness of art making in reducing stress and improving mood to the induction of flow and the expression of positive emotions (Wilkinson & Chilton, 2013).

The previously discussed limitations of the present study suggest that this a preliminary study in an area that requires further exploration. However, the positive findings of the study indicate that drawing lessons may be an effective strategy for helping children with hyperarousal symptoms manage their stress in an adaptive and positive way. Further research is necessary to create confidence in the current findings, and to expand the research to the classroom setting. Due to the increased number of Christchurch children exhibiting hyperarousal symptoms post-earthquake, the need for strategies targeting autonomic regulation is important in helping children cope with minor day-to-day stressors that may occur at school. While art is part of the New Zealand primary school curriculum, it does not include the structured and directive drawing lessons used in the current study (Ministry of Education, 2017). The addition of a 20-minute drawing intervention in the afternoon of the school day is a simple and cost-effective intervention that has the potential to help children develop emotion-regulation, and is therefore, a promising area for future research.

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Appendices

Appendix A. University of Canterbury Ethics Approval

Appendix B. University of Canterbury Ethics Approval

Appendix C. Participant information forms

Appendix D. Teacher report forms

Appendix E. Parent report forms

Appendix F. Tables of reviewed art intervention and art therapy studies.

Appendix A. University of Canterbury Ethics Approval

Ref: 2016/56/ERHEC

10 October 2016

Jade Adams

School of Health Sciences

UNIVERSITY OF CANTERBURY

Dear Jade

Thank you for providing the revised documents in support of your application to the Educational Research Human Ethics Committee. I am very pleased to inform you that your research proposal “The Effect of Drawing Lessons on Hyperarousal in Children who Experienced the Canterbury Earthquakes” has been granted ethical approval.

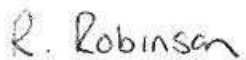
Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 5th October 2016.

Should circumstances relevant to this current application change you are required to reapply for ethical approval.

If you have any questions regarding this approval, please let me know. We wish you well for your research.

Yours sincerely

pp

A handwritten signature in dark ink, appearing to read "P. Robinson". The signature is written in a cursive, slightly slanted style.

Patrick Shepherd

Chair

Educational Research Human Ethics Committee

Appendix B. Participant information forms

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Information Sheet for The Board of Trustees

My name is Jade Adams and I am a postgraduate student at the College of Health Sciences, University of Canterbury, undertaking my Masters' of Science thesis. For my thesis, I will be studying the effects of drawing lessons on children's ability to remain calm in the classroom. Research suggests that drawing can have calming effect on the mind and body. This study has the potential to benefit both teachers and children by providing a new strategy to help children remain calm, which teachers can add to their repertoire.

I am seeking your permission to contact the principal and teachers at your school to provide them with the opportunity to take part in this study. The study involves teachers nominating two eight-year-old children they believe would benefit from learning a new strategy to remain calm at school, and two eight-year-old children who already display good strategies in remaining calm at school. The four nominated children will be given the opportunity to take part in nine free drawing lessons. Assent from the nominated children and consent from the children's parents will be obtained prior to beginning the study.

The study will take place at a time designated by the teacher, but usually it will be during play time, unless the teacher prefers another time. For example, the teacher may have an 'art' time already scheduled during Term 4 of the school year and that may be the time preferred by the teacher. There will be five baseline sessions, nine drawing lessons, and five follow-up sessions. At the designated time of day, during baseline and follow-up, the children will go to the back of the classroom or the library where the researcher will be sitting. Their finger temperatures and self-reported stress will be recorded, in order to assess their stress levels. This will take approximately 1 minute per child. After 30 minutes of normal classroom activity, the child will return to the researcher and their stress levels will be assessed again, in the same way. Before and after each drawing lesson, the children's stress levels will be measured in the same way as in baseline and follow-up. The art lessons will be 30 minutes long and will be taught by the researcher. They will take place in the back of the classroom, library or other space designated by the school. It is expected that other teachers and pupils may be in and out of the library during the lesson. The children will be able to give assent to take part in the art lessons, or to go to the other classroom activity, on each day of each of the nine art lessons. The children's drawing may be photographed after each drawing lesson, only upon their assent. The children's names will be on the back of their drawing, so no identifying information will be shown in the photograph.

Participation in this study is voluntary. The participants can withdraw from the study at any time, up until data collection. All the data collected in this study will remain confidential to

the researcher and supervisory team. The identity of the school, teachers and children involved in this study will not be made public, as I will use pseudonyms. All data will be kept securely in a locked filing cabinet at the University of Canterbury, which my supervisors' and I only have access to. The data will be kept for a maximum of five years following completion of the study, and then destroyed. Upon completion, my thesis will be publicly available in the University of Canterbury library. The results of the study may be published in journal articles and presented at conferences; however, all names will be changed in order to protect the school and children's identity. The school will receive a report on the findings of the study.

The study has been reviewed and approved by the University of Canterbury Ethics Committee. Participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz).

If you have any further questions, please contact me from the contact details provided above.
Yours sincerely,

Jade Adams

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Information Sheet for the Principal

My name is Jade Adams and I am a postgraduate student at the College of Health Sciences, University of Canterbury, undertaking my Masters' of Science thesis. For my thesis, I will be studying the effects of drawing lessons on children's ability to remain calm in the classroom. Research suggests that drawing can have calming effect on the mind and body. This study has the potential to benefit both teachers and children by providing a new strategy to help children remain calm, which teachers can add to their repertoire.

I would like to invite your school to be part of my thesis study. If you agree to take part in the study, your role will be to support me in contacting the teachers who have eight-year old children in their class. Upon the teachers consent to be part of the study, I will request the teachers to nominate two eight-year-old children they believe would benefit from learning a new strategy to remain calm at school, and two eight-year-old children who already display good strategies in remaining calm at school. The four nominated children will be given the opportunity to take part in nine free drawing lessons. Assent from the nominated children and consent from the children's parents will be obtained prior to beginning the study.

The study will take place at a time designated by the teacher, but usually it will be during play time, unless the teacher prefers another time. For example, the teacher may have an 'art' time already scheduled during Term 4 of the school year and that may be the time preferred by the teacher. There will be five baseline sessions, nine drawing lessons and five follow up sessions. At the designated time of day, during baseline and follow-up, the children will go to the back of the classroom or library where the researcher will be sitting. Their finger temperature and self-reported stress will be recorded, in order to assess their stress levels. This will take approximately 1 minute per child. After 30 minutes of normal classroom activity, the children will return to the researcher and their stress levels will be assessed again, in the same way. Before and after each drawing lesson, the children's stress levels will be measured in the same way as in baseline and follow-up. The art lessons will be 30 minutes long and will be taught by the researcher. They will take place in the back of the classroom, library or other space designated by the school. It is expected that other teachers and pupils may be in and out of the library during the lesson. The children will be able to give assent to take part in the art lessons, or to go to the other classroom activity, on each day of each of the nine art lessons. The children's drawing may be photographed after each drawing lesson, only upon their assent. The children's names will be on the back of their drawing, so no identifying information will be shown in the photograph.

Participation in this study is voluntary. The participants can withdraw from the study at any time, up until data collection. All the data collected in this study will remain confidential to the researcher and supervisory team. The identity of the school, teachers and children involved in this study will not be made public, as pseudonyms will be used in any write up

and presentations. All data will be kept securely in a locked filing cabinet at the University of Canterbury, which my supervisors' and I only have access to. The data will be kept for a maximum of five years following completion of the study, and then destroyed. Upon completion, my thesis will be publicly available in the University of Canterbury library. The results of the study may be published in journal articles and presented at conferences; however, all names and locations will be changed in order to protect the school and children's identity. The school will receive a report on the findings of the study.

The study has been reviewed and approved by the University of Canterbury Ethics Committee. Participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz).

If you have any further questions, please contact me from the contact details provided above.
Yours sincerely,

Jade Adams

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Information Sheet for Teachers

My name is Jade Adams and I am a postgraduate student at the College of Health Sciences, University of Canterbury, undertaking my Masters of Science thesis. For my thesis, I will be studying the effects of drawing lessons on children's ability to remain calm in the classroom. Research suggests that drawing can have a calming effect on the mind and body. This study has the potential to benefit both teachers and children by providing a new strategy to help children remain calm, which teachers can add to their repertoire.

I would like to invite you to be part of my thesis study. If you agree to take part in the study, your role will be to nominate two eight-year-old children they believe would benefit from learning a new strategy to remain calm at school, and two eight-year-old children who already display good strategies in remaining calm at school. The nominated children will be given the opportunity to take part in nine free drawing lessons. Assent from the nominated children and consent from the children's parents will be obtained prior to beginning the study. Upon parental consent, you will be requested to fill out questionnaires about each of the nominated children's behaviour at school.

The study will take place at a time designated by the teacher, but usually it will be during play time, unless the teacher prefers another time. For example, the teacher may have an 'art' time already scheduled during Term 4 of the school year and that may be the time preferred by the teacher. There will be five baseline sessions, nine drawing lessons and five follow up sessions. At the designated time of day, during baseline and follow-up, the children will go to the back of the classroom or library where the researcher will be sitting. Their finger temperature and self-reported stress will be recorded, in order to assess their stress levels. This will take approximately 1 minute per child. After 30 minutes of normal classroom activity, the child will return to the researcher and their stress levels will be assessed again, in the same way. Before and after each drawing lesson, the children's stress levels will be measured in the same way as in baseline and follow-up. The art lessons will be 30 minutes long and will be taught by the researcher. They will take place in the back of the classroom, library or other space designated by the school. It is expected that other teachers and pupils may be in and out of the library during the lesson. The children will be able to give assent to take part in the art lessons, or to go to the other classroom activity, on each day of each of the nine art lessons. The children's drawing may be photographed after each drawing lesson, only upon their assent. The children's names will be on the back of their drawing, so no identifying information will be shown in the photograph.

Participation in this study is voluntary. The school, teachers and children can withdraw from the study at any time, up until data collection. All the data collected in this study will remain confidential to the researcher and supervisory team. The identity of the school, teachers and children will not be made public, as I will use pseudonyms. All data will be kept securely in a

locked filing cabinet at the University of Canterbury, which I and my supervisors only have access to. The data will be kept for a maximum of five years following completion of the study, and then destroyed. Upon completion, my thesis will be publicly available in the University of Canterbury library. The results of the study may be published in journal articles and presented at conferences; however, all names will be changed in order to protect the school and children's identity. The school will receive a report on the findings of the study.

The study has been reviewed and approved by the University of Canterbury Ethics Committee. Participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz).

If you agree to participate in this study, please ensure you complete the attached consent form and you post it to me in the attached confidential envelope by _____.

Yours sincerely,

Jade Adams

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Information Sheet for Parents/Caregivers

My name is Jade Adams and I am a postgraduate student at the College of Health Sciences, University of Canterbury, undertaking my Masters of Science thesis. For my thesis, I will be studying the effects of drawing lessons on children's ability to remain calm in the classroom. Research suggests that drawing can have a calming effect on the mind and body. This study has the potential to benefit both parents and children by providing a new strategy to help children remain calm, which parents can implement at home.

I would like to invite your child to be part of the study, which involves participation in nine free drawing lessons. The study will take place at a time designated by the teacher, but usually it will be during play time, unless the teacher prefers another time. For example, the teacher may have an 'art' time already scheduled during Term 4 of the school year and that may be the time preferred by the teacher. There will be five baseline sessions, nine drawing sessions and five follow-up sessions. At the designated time of day, during baseline and follow-up, your child will go to the back of the classroom or library where the researcher will be sitting. Your child's finger temperature and self-reported stress will be recorded, in order to assess their stress levels. This will take approximately 1 minute. After 30 minutes of normal classroom activity, your child will return to the researcher and their stress levels will be assessed again, in the same way. Before and after each drawing lesson, your child's stress levels will be measured in the same way as in baseline and follow-up. The art lessons will be 30 minutes long and will be taught by the researcher. They will take place in the back of the classroom, library or other space designated by the school. It is expected that other teachers and pupils may be in and out of the library during the lesson. Your child will be able to give assent to take part in the art lessons, or to go to the other classroom activity, on each day of each of the nine art lessons. Your child's drawing may be photographed after each drawing lesson, only upon their assent. Your child's name will be on the back of their drawing, so no identifying information will be shown in the photograph.

Participation in this study is voluntary. Your child can withdraw from the study at any time, up until data collection. All the data collected in this study will remain confidential to the researcher and supervisory team. The identity of your child will not be made public, as I will use pseudonyms. All data will be kept securely in a locked filing cabinet at the University of Canterbury, which I and my supervisors only have access to. The data will be kept for a maximum of five years following completion of the study, and then destroyed. Upon completion, my thesis will be publicly available in the University of Canterbury library. The results of the study may be published in journal articles and presented at conferences; however, all names will be changed in order to protect the school and children's identity.

The study has been reviewed and approved by the University of Canterbury Ethics Committee. Participants should address any complaints to The Chair, Human Ethics

Committee, University of Canterbury, Private Bag 4800, Christchurch
(humanethics@canterbury.ac.nz).

If your child agrees to participate in this study, please ensure you complete the attached permission slip and your child completes the consent form and you post it to me in the attached confidential envelope by _____.

Yours sincerely,

Jade Adams

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

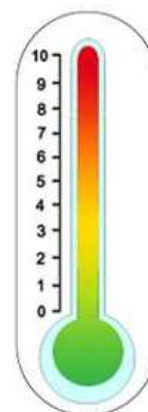
Information Sheet for the Child

(For the parent/ caregiver to read to the child)

Jade Adams is doing a project at the university. For her project she will be taking you for nine drawing lessons at your school. Jade wants to find out whether drawing helps you feel more relaxed at school. To do this, she will be coming to your school five times before the drawing lessons to find out how relaxed you are before the drawing lessons. Then she will see how relaxed you are before and after each of the drawing lessons. She will come back to the school five more times to see how relaxed you are after the nine drawing lessons.



To find out how relaxed you are, Jade will use the equipment on the picture on the left. All you have to do is hold the sensor in between your fingertips as shown. This has been used with children before, and it is safe and painless.



To find out how relaxed you are, Jade will also use the picture of a thermometer on the right. All you have to do is point on the thermometer which number you are feeling from 0=relaxed to 10=stressed.

The drawing lessons are made to be stress-free and fun. Jade will also be given your own drawing book at the end of the session, if you want to keep on drawing.

Jade will let your parents, teachers and principal know what she found out about how you felt before and after the drawing lessons. Jade's finished project will be put in the library at the university for other people to read. Code names will be used instead of your name, so no one will know who you are or where you live or go to school.

Jade would like to photograph your drawings so she can add them to her project. You can decide on the day whether or not you would like your drawing to be photographed.

If you have any questions about the project, you can ask Jade or your parents or teacher.

If you change your mind about being in the project, that's fine too. All you have to do is tell Jade, your parents or teacher.

Jade Adams

Appendix C. Participant Consent Forms

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Consent Form for the Board of Trustees

- I have been given adequate information about the study, as well as the opportunity to ask further questions.
- I understand the school, the principal, the teachers and the children's participation in the study is voluntary.
- I understand that the school, the principal, the teachers and the children involved in the study can withdraw at any time until data collection.
- I understand that the school will receive a report on the findings of the study.
- I understand that the thesis is a public document and will be available through the UC library; however, the identity of participants identifying data will be kept confidential.
- I understand that findings may be presented at future workshops, conferences, and/or presentations or published in journal articles; however, the anonymity of the school and participants is assured.
- I understand that all raw data will be held securely and will be destroyed after five years of the study's completion.
- I understand that I can contact the Chair, University of Canterbury Educational Research Human Ethics Committee, if I have any complaints.

By signing below, I agree to the School's participation in this study.

Head of the Board of Trustees: _____

Signature: _____

Date: _____

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Consent Form for the Principal

- I have been given adequate information about the study, as well as the opportunity to ask further questions.
- I understand my role in the study is to grant permission for the study to take place at school, during school time, and to support contact between the researcher and teachers involved in the study.
- I understand the school, the teachers and the children involved in the study can withdraw at any time up until data collection.
- I understand that the school will receive a report on the findings of the study.
- I understand that the thesis is a public document and will be available through the UC library; however, the identity of the school and the participants will be kept confidential through the use of pseudonyms.
- I understand that findings may be presented at future workshops, conferences, and/or presentations or published in journal articles; however, the identity of the school and participants will be kept confidential through the use of pseudonyms.
- I understand that all raw data will be held securely password protected computer, locked filing cabinet and will be destroyed after five years of the study is completed.
- I understand that I can contact the Chair, University of Canterbury Educational Research Human Ethics Committee, if they have any complaints.

By signing below, I agree to participation in this study.

Principal's name: _____

Signature: _____

Date: _____

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Information Sheet for Teachers

My name is Jade Adams and I am a postgraduate student at the College of Health Sciences, University of Canterbury, undertaking my Masters of Science thesis. For my thesis, I will be studying the effects of drawing lessons on children's ability to remain calm in the classroom. Research suggests that drawing can have a calming effect on the mind and body. This study has the potential to benefit both teachers and children by providing a new strategy to help children remain calm, which teachers can add to their repertoire.

I would like to invite you to be part of my thesis study. If you agree to take part in the study, your role will be to nominate two eight-year-old children they believe would benefit from learning a new strategy to remain calm at school, and two eight-year-old children who already display good strategies in remaining calm at school. The nominated children will be given the opportunity to take part in nine free drawing lessons. Assent from the nominated children and consent from the children's parents will be obtained prior to beginning the study. Upon parental consent, you will be requested to fill out questionnaires about each of the nominated children's behaviour at school.

The study will take place at a time designated by the teacher, but usually it will be during play time, unless the teacher prefers another time. For example, the teacher may have an 'art' time already scheduled during Term 4 of the school year and that may be the time preferred by the teacher. There will be five baseline sessions, nine drawing lessons and five follow up sessions. At the designated time of day, during baseline and follow-up, the children will go to the back of the classroom or library where the researcher will be sitting. Their finger temperature and self-reported stress will be recorded, in order to assess their stress levels. This will take approximately 1 minute per child. After 30 minutes of normal classroom activity, the child will return to the researcher and their stress levels will be assessed again, in the same way. Before and after each drawing lesson, the children's stress levels will be measured in the same way as in baseline and follow-up. The art lessons will be 30 minutes long and will be taught by the researcher. They will take place in the back of the classroom, library or other space designated by the school. It is expected that other teachers and pupils may be in and out of the library during the lesson. The children will be able to give assent to take part in the art lessons, or to go to the other classroom activity, on each day of each of the nine art lessons. The children's drawing may be photographed after each drawing lesson, only upon their assent. The children's names will be on the back of their drawing, so no identifying information will be shown in the photograph.

Participation in this study is voluntary. The school, teachers and children can withdraw from the study at any time, up until data collection. All the data collected in this study will remain

confidential to the researcher and supervisory team. The identity of the school, teachers and children will not be made public, as I will use pseudonyms. All data will be kept securely in a locked filing cabinet at the University of Canterbury, which I and my supervisors only have access to. The data will be kept for a maximum of five years following completion of the study, and then destroyed. Upon completion, my thesis will be publicly available in the University of Canterbury library. The results of the study may be published in journal articles and presented at conferences; however, all names will be changed in order to protect the school and children's identity. The school will receive a report on the findings of the study.

The study has been reviewed and approved by the University of Canterbury Ethics Committee. Participants should address any complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (humanethics@canterbury.ac.nz).

If you agree to participate in this study, please ensure you complete the attached consent form and you post it to me in the attached confidential envelope by _____.

Yours sincerely,

Jade Adams

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Consent Form for the Teacher

- I have been given adequate information about the study, as well as the opportunity to ask further questions.
- I understand my role in the study is to grant permission for the study to take place at school, during school time, and to support contact between the researcher and teachers involved in the study.
- I understand that my involvement in the study requires me to nominate children in my class to participate in the study, and to complete questionnaires about the nominated children's behaviour at school.
- I understand the school, the teachers and the children involved in the study can withdraw at any time up until data collection.
- I understand that the school will receive a report on the findings of the study.
- I understand that the thesis is a public document and will be available through the UC library; however, the identity of the school and the participants will be kept confidential through the use of pseudonyms.
- I understand that findings may be presented at future workshops, conferences, and/or presentations or published in journal articles; however, the identity of the school and participants will be kept confidential through the use of pseudonyms.
- I understand that all raw data will be held securely password protected computer, locked filing cabinet and will be destroyed after five years of the study is completed.
- I understand that I can contact the Chair, University of Canterbury Educational Research Human Ethics Committee, if I have any complaints.

By signing below, I agree to participation in this study.

Teacher's name: _____

Signature: _____

Date: _____

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm

Consent Form for the Parents/Caregivers

- I have been given adequate information about the study, as well as the opportunity to ask further questions.
- I understand my role in the study is to grant permission for my child to take part in drawing lessons at school, during school time.
- I understand the school, the teachers and the children involved in the study can withdraw at any time up until data collection.
- I understand that the thesis is a public document and will be available through the UC library; however, the identity of the school and the participants will be kept confidential through the use of pseudonyms.
- I understand that I will receive a report on the findings of the study.
- I understand that findings may be presented at future workshops, conferences, and/or presentations or published in journal articles; however, the identity of the school and participants will be kept confidential through the use of pseudonyms.
- I understand that all raw data will be held securely password protected computer, locked filing cabinet and will be destroyed after five years of the study is completed.
- I understand that I can contact the Chair, University of Canterbury Educational Research Human Ethics Committee, if they have any complaints.

By signing below, I agree for my child to participate in this study.

Child's name: _____

Parent/caregiver Signature: _____

Date: _____

Jade Adams

Telephone: 0273766685

Email: jad160@uclive.ac.nz



The Effects of Drawing Lessons on Children's ability to Remain Calm
Assent Sheet for Children

- My parents have told me about this project.
- I am happy to be a part of this project and take part in drawing lessons.
- I know that the drawing lessons are made to be fun and stress-free.
- I know Jade will be finding out about how relaxed I am feeling, by asking me to rate my feelings from 0-10, and by using a piece of equipment which have been used with children before, and is safe and painless.
- I know my drawings will be photographed by Jade and put in her project, as long as I agree.
- I can change my mind about being in the project.
- I know that Jade's project will be kept in the library at the university for other people to see. I know that a code name will be used instead of my real name.
- If I have any questions about the project, I know I can ask Jade or your parents or teacher.

By signing below, I agree to be part of Jade's project.

Child's name: _____

Signed by child/or on behalf of child: _____

Parents/caregivers signature: _____

Date: _____

Appendix D. Teacher report form

Teacher Report on Children's behaviour at school

1. Child Name _____

2. Name of Teacher/s Completing This Report: _____

3. Room Number: _____

3. Date of Report ____/____/____
dd / mm /yr

4. How long have you known this child for? _____

5. This child age is: _____

6. This child is at year level: _____

Directions: For the next set of statements, decide whether they are not true, sometimes true, or often true, of the child's behaviour, over the **PAST TWO WEEKS.**

He/She	Not True	Sometimes True	Often True
a. has sudden changes in mood or feeling.			
b. feels or complains that no one loves him/her.			
c. is rather high strung, tense and nervous.			
d. cheats or tells lies.			
e. is too fearful or anxious.			
f. argues too much.			
g. has difficulty concentrating, cannot pay attention for long.			
h. is easily confused, seems to be in a fog.			
i. bullies or is cruel or mean to others.			
j. is disobedient.			
k. does not seem to feel sorry after (he/she) misbehaves.			
l. has trouble getting along with other children (his/her) age.			
m. is impulsive, or acts without thinking.			
n. feels worthless or inferior.			
o. is not liked by other children (his/her) age			
p. has a lot of difficulty getting (his/her) mind off certain thoughts.(if often true, "obsessions")			
q. is restless or overly active, cannot sit still.			
r. is stubborn, sullen, or irritable.			
s. has a very strong temper and loses it easily.			
t. is unhappy, sad or depressed.			
u. is withdrawn, does not get involved with others.			
v. breaks things on purpose or deliberately destroys things.			
w. clings to adults.			
x. cries too much.			
y. demands a lot of attention.			

He/She	Not True	Some-times True	Often True
z. is too dependent on others.			

Other Information

Please feel free to add any information that you think might be helpful in understanding this child's behaviour at school over the PAST TWO WEEKS.

Thank you for your help! *Please return to Jade Adams*

Appendix E. Parent report form

Parent Report on Children's behaviour at home

1. Child Name _____

2. Name of parent/guardian/s Completing This Report: _____

3. Child's birthdate ____/____/____
dd / mm /yr

4. Date of Report ____/____/____
dd / mm /yr

Directions: For the following statements, decide whether they are not true, sometimes true, or often true, of your child's behaviour, over the past 2 WEEKS.

He/She	Not True	Sometimes True	Often True
a. has sudden changes in mood or feeling.			
b. feels or complains that no one loves him/her.			
c. is rather high strung, tense and nervous.			
d. cheats or tells lies.			
e. is too fearful or anxious.			
f. argues too much.			
g. has difficulty concentrating, cannot pay attention for long.			
h. is easily confused, seems to be in a fog.			
i. bullies or is cruel or mean to others.			
j. is disobedient.			
k. does not seem to feel sorry after (he/she) misbehaves.			
l. has trouble getting along with other children (his/her) age.			
m. is impulsive, or acts without thinking.			
n. feels worthless or inferior.			
o. is not liked by other children (his/her) age			
p. has a lot of difficulty getting (his/her) mind off certain thoughts. (if often true, "obsessions")			
q. is restless or overly active, cannot sit still.			
r. is stubborn, sullen, or irritable.			
s. has a very strong temper and loses it easily.			
t. is unhappy, sad or depressed.			
u. is withdrawn, does not get involved with others.			
v. breaks things on purpose or deliberately destroys things.			
w. clings to adults.			
x. cries too much.			
y. demands a lot of attention.			

He/She	Not True	Some-times True	Often True
z. is too dependent on others.			
aa. has difficulty falling asleep at night.			
bb. has nightmares.			
cc. wakes up in the night.			
dd. wets or soils the bed.			
ee. experiences headaches.			
ff. experiences stomach aches.			
gg. has eating problems.			

Other Information

Please feel free to add any information that you think might be helpful in understanding your child's behaviour at home over the past TWO WEEKS.

Thank you for your help! *Please return to Jade Adams.*

Appendix F.

Table A-1.

Methods of Art Therapy Studies with Adult participants

Citation & Classification	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Morgan & Johnson (1995) Structured & Directive. Drawing.	Compare the effectiveness of drawing and writing therapies on reducing nightmares in veterans with PTSD.	•N=2 •Age=42 and 44 •Vietnam combat veteran's w/ PTSD inpatient •≥4 combat nightmares one-month prior.	•Single-subject design •Alternating ABAB or BABA format	12 weeks A= 3 weeks B= 3 weeks A= 3 weeks B= 3 weeks Phase A= drawing the nightmare immediately after waking. Phase B= writing about the nightmare immediately after waking.	Self-report, Likert 0-4 Nightmare frequency, Nightmare intensity Nightmare severity Sleep Problem. Startle
Johnson, Lubin, James & Hale (1997) Structured & directive.	Examine the effectiveness of individual treatment components within an inpatient posttraumatic stress disorders programme.	•N=12 •Mage=40.2 •Vietnam combat veterans	•Pre-test-post test	•15 treatment components: Traumatic memories, anger management, community lecture, finding your father, group therapy, family issues, relaxation, journal writing, art therapy, drama therapy, video, Vietnam play, work shop, community service, week in review. •Art Therapy—variety of art materials used to express feelings about traumatic experiences and current struggle with their PTSD.	•The Psychological State Questionnaire (PSQ)

Citation & Classification	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Pizarro (2004) Group 2. Structured & directive. Drawing	Compare the effectiveness of art therapy and writing therapy in improving psychological and health outcomes.	<ul style="list-style-type: none"> •N= 45 •Age range= 17-37 years. •M age=18 •Undergraduate students 	<ul style="list-style-type: none"> •Pre-test-post test •Random assignment: to 3 groups 	2 x 1 hr sessions for each participant 1. Writing about stressful event N=15 2. Drawing stressful event N=12 3. Contrast: Drawing a still life N=14	<ul style="list-style-type: none"> •General Health Questionnaire (GHQ) •Global Measure of Perceived Stress (GMPS) •The Profile of Mood States (POMS) •Participant Satisfaction Questions
Chan and Horneffer, 2006	To investigate the effectiveness of art therapy in reducing stress in university students.	<ul style="list-style-type: none"> •N=107 •University students 	1. journaling group ($n = 29$) 2. drawing group ($n = 29$) 3. control group ($n = 34$)	<ul style="list-style-type: none"> •2x 15-minute sessions 1. Journaling group: write about a current or previous stressful event 2. Drawing group: draw about a current or previous stressful event 3. Control group: Class as usual 	<ul style="list-style-type: none"> •Symptom Checklist 90-Revised (SCL-R)
Nainis, Paice, Ratner, Wirth, Lai, & Shott (2006) Unstructured & directive Drawing.	To investigate the effectiveness of art therapy in reducing anxiety in individuals with cancer.	<ul style="list-style-type: none"> •N=50 •Age Range=19-82 •M age=53.1 •Cancer patients form an inpatient oncology unit 	<ul style="list-style-type: none"> •Pre-test post-test design 	<ul style="list-style-type: none"> •1-hour long •Participants given a choice of art materials and a wide range of activities: drawing, painting, sculpting, and craft activities. • Session was guided by an art therapist who encouraged the participants to discuss how they were feeling at the end of the session. 	<ul style="list-style-type: none"> •The State-Trait Anxiety Index (STAI-S)

Citation & Classification	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Henderson, Rosen & Mascaro (2007). Group 1. Directive and structure. Drawing.	Test the psychological and physical health benefits of mandala drawing within a trauma population.	<ul style="list-style-type: none"> •N=36 •Age range= 18-23 •Mage= 18.4 •Undergraduate students •Experienced some form of trauma 	<ul style="list-style-type: none"> •Pre-test post-test design •Random assignment to treatment and contrast groups 	<p>All participants</p> <ul style="list-style-type: none"> •3 consecutive days •20 minutes each session <ol style="list-style-type: none"> 1. Experimental group: N=19 Asked to draw a large circle on their paper and then fill the circle with representations of feelings or emotions related to their trauma using symbols, patterns, designs and colours that felt right to them. 2. Contrast group: N=17 Instructed to draw an object over the next 3 days. 	<ul style="list-style-type: none"> •The PDS •The Beck Depression Inventory, Second Version (BDI-II) •The State-Trait Anxiety Inventory (STAI)-State subscale
Thyme, Sundin, Wiberg, Öster, Åström, & Lindh (2009). Structured & directive.	Investigate the effect of art therapy of the psychiatric symptoms of cancer patients.	<ul style="list-style-type: none"> •N=41 •Age range=37-69 • Cancer patients 	<ul style="list-style-type: none"> •RCT • Random assignment to groups: <ol style="list-style-type: none"> 1. Art therapy (N=20) 2. Control (N=21) 	<ul style="list-style-type: none"> •5 sessions over 5 weeks <ol style="list-style-type: none"> 1. Art therapy: Art therapists guided the participants through 5 different art activities designed to help them express thoughts and feelings. <ul style="list-style-type: none"> •A range of art materials were provided; watercolours, lead pencils, charcoal, tape, scissors, paintbrushes, and sheets of paper. <ol style="list-style-type: none"> 2. Control: Treatment as usual. 	<ul style="list-style-type: none"> • The Symptom Checklist (SCL-90).

Citation & Classification	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Mercer, Warson & Zhao (2010) Structured & directive. Drawing.	Examining the effectiveness of a visual journaling intervention in lowering stress and anxiety levels, while increasing affect levels.	<ul style="list-style-type: none"> •N=10 •Adults •5 medical students •5 staff members 	•Pre-test–post-test with follow-up.	<ul style="list-style-type: none"> •Participants given a journal and a variety of art supplies •Guided imagery visualization. •Drew images of stress which were elicited through visualization. •Completed self-exploration questions. •Reflected on their drawing •Second brief visual imaging exercise. •Envisioned a new, less-stressful image related to their stress, which they then drew. •Another shorter list of self-exploration questions. 	<ul style="list-style-type: none"> •State-Trait Anxiety Inventory (STAI) •Positive and Negative Affect Schedule (PANAS-X)
Visnola, Sprūdža, Ārija, Baķe & Piķe (2010) Unstructured & Directive Drawing.	To assess the effectiveness of art therapy in reducing stress and anxiety in health care employees.	<ul style="list-style-type: none"> •N=60 •Age range= 20-69 •Mean age= 40 •Women working in health care 	<ul style="list-style-type: none"> •RCT •Random assignment to groups: <ol style="list-style-type: none"> 1. Art therapy group 2. Control group 	<ol style="list-style-type: none"> 1. Art therapy <ul style="list-style-type: none"> • A discussion about emotions for 30 mins • Art therapy session for 1 hour which involved drawing, painting, collage, clay and creative journaling • Reflection about art works produced, the emotions expressed and new ways of coping with stress for 30 mins. 3. Control group <ul style="list-style-type: none"> •No therapy 	<ul style="list-style-type: none"> •State Trait Anxiety Inventory (STAI) •Cortisol

Citation & Classification	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Muthard & Gilbertson (2016) Structured & directive	To investigate the effectiveness of art therapy on the anxiety levels of thirty-seven undergraduate students.	•N=37 •Undergraduate Students	•RCT •Random assignment to groups: 1. Mandala colouring group 2. Control group	•7 minutes, one session. 1. Mandala colouring group: Coloured a mandala while being guided through a breathing exercise 2. Control group: Sat quietly	•State Trait Anxiety Inventory (STAI) •Blood Pressure

Table A-2.

Results of Art Therapy Studies with Adults

Citation & Effect Category	Intervention	Measures	Results	Effect size
Morgan, & Johnson (1995). Effect size: High calibre	12 weeks A= 3 weeks B= 3 weeks A= 3 weeks B= 3 weeks Phase A= consisted of drawing the nightmare immediately after waking. Phase B= The second condition consisted of writing a nightmare immediately after waking.	Self-report, Likert 0-4 Nightmare frequency, Nightmare intensity Nightmare severity Sleep Problem. Startle	F (1,2) = 10.99, $p < .01$ F (1,2) = 12.85, $p < .01$ F(1,2) = 11.53, $p < .01$ F(1,2)= 21.40, $p < .001$ F(1,2)=31.26, $p < .001$	d=4.68 d=12.85 d=4.80 d=6.54 d=7.91
Johnson, Lubin, James & Hale (1997). Effect size: Good quality	•15 treatment components: Traumatic memories, anger management, community lecture, finding your father, group therapy, family issues, relaxation, journal writing, art therapy, drama therapy, video, Vietnam play, work shop, community service, week in review. •Art Therapy—variety of art materials used to express feelings about traumatic experiences and current struggle with their PTSD.	Self-report measures •The Psychological State Questionnaire (PSQ)	Overall Pre Test. $M = 2.27$ $SD = .35$ Post-test $M = 2.36$ $SD = .36$ Art therapy pre-test $M = 2.44$, $SD = .54$, post-test $M = 2.75$, $SD = .46$.	d=0.25 d=0.61

Citation & Effect Category	Intervention	Measures	Results	Effect size
Pizarro, J. (2004) Group 2. Effect size: N/A Due to negative results	Two 1 hr sessions for each participant 1. Writing about stressful event N=15 2. Drawing stressful event N=12 3. Contrast: Drawing a still life N=14	•General Health Questionnaire (GHQ) •Global Measure of Perceived Stress (GMPS) •The Profile of Mood States (POMS): mood states. •Participant Satisfaction Questions	Social dysfunction subscale 1. Write-stress: $M=1.92$ $SE=0.09$ 2. Draw-stress: $M=2.26$, $SE=0.10$ 3. Contrast: $M=2.08$ $SE=0.09$ Scores not provided 1. Write-stress: $M=2.169$, $SD=.119$; 2. Art-stress: $M=1.990$, $SD=.119$ 3. Control: $M=1.544$, $SD=.115$. 1. Write-stress $M=2.52$, $SD=.776$; 2. Art-stress $M=2.98$, $SD=.684$ 3. Control $M=3.36$, $SD=.694$	N/A. N/A.
Chan and Horneffer, 2006 Effect size: Beneficial	•2x 15-minute sessions 1. Journaling group: write about a current or previous stressful event (n=29) 2. Drawing group: draw about a current or previous stressful event (n=29) 3. Control group: Class as usual (n=34)	•Symptom Checklist 90-Revised (SCL-R)	Drawing vs. journaling $F(1, 54) = 12.90$, $p = .00$ Drawing vs. control $F(1, 59) = 0.73$, $p > .05$	d=0.24 d=0.91

Citation & Effect Category	Intervention	Measures	Results	Effect size
Nainis, Paice, Ratner, Wirth, Lai, & Shott (2006) Effect size: N/A	<ul style="list-style-type: none"> •1-hour long •Participants given a choice of art materials and a wide range of activities: drawing, painting, sculpting, and craft activities. • Session was guided by an art therapist who encouraged the participants to discuss how they were feeling at the end of the session. 	•The State-Trait Anxiety Index (STAI-S)	Despite researchers stating a statistically significant difference in pre and post-intervention scores across most of the domains measured by the STAI-S, no means and standard deviations were provided.	N/A
Henderson, Rosen & Mascaro (2007). Group 1. Effect size: Poor.	<ul style="list-style-type: none"> •All participants •3 consecutive days •20 minutes each session <p>1. Experimental group: N=19 Asked to draw a large circle on their paper and then fill the circle with representations of feelings or emotions related to their trauma using symbols, patterns, designs and colours that felt right to them.</p> <p>2. Contrast group: N=17 Participants were instructed to draw an object over the next 3 days.</p>	<p>The PDS: self-report measure of PTSD.</p> <p>The Beck Depression Inventory, Second Version (BDI-II): self-report measure of depression.</p> <p>The State-Trait Anxiety Inventory (STAI)-State subscale</p>	<p>Mandala group Pre-test: M=19.37, SD=7.06 Post-test: M=18.05, SD=9.71</p> <p>Contrast group Pre-test: M=15.71, SD=6.89 Post-test: M=15.14, SD=8.49</p> <p>Mandala group Pre-test: M=17.95, SD=9.26 Post-test: M=16.63, SD=11.74</p> <p>Contrast group Pre-test: M=15.35, SD=7.11 Post-test: M=13.95, SD=8.55</p> <p>Mandala group Pre-test: M=45.05, SD=10.75 Post-test: M=41.16, SD=11.30</p> <p>Contrast group Pre-test: M=49.05, SD=12.29 Post-test: M=42.0, SD=13.2</p>	<p>d=0.16</p> <p>d=0.07</p> <p>d=0.12</p> <p>d=0.18</p> <p>d=0.35</p> <p>d=0.56</p>

Citation & Effect Category	Intervention	Measures	Results	Effect size
Thyme, Sundin, Wiberg, Öster, Åström, & Lindh (2009). Effect size: Good quality	<ul style="list-style-type: none"> •5 sessions over 5 weeks •Art therapists guided the participants through 5 different art activities designed to help participants express their thoughts and feelings. •A range of art materials were provided; watercolours, lead pencils, charcoal, tape, scissors, paintbrushes, and sheets of paper. 	<ul style="list-style-type: none"> • The Symptom Checklist (SCL-90). 	<p>Art Therapy (N=20) Pre-test: M=.42, SD=.46 Post-test: M=.33, SD=.41 Follow-up: M=.16, SD=.19</p> <p>Control (N=21) Pre-test: M=.49, SD= .44 Post-test: M=.49, SD= .48 Follow-up: M=.40, SD=.39</p>	<p>d= 0.20 d=0.74</p> <p>d=0 d=0.22</p>
Mercer, Warson & Zhao (2010). Effect size: N/A	<ul style="list-style-type: none"> •Participants given a journal and a variety of art supplies •Guided imagery visualization. •They drew images of stress which were produced through visualization. •Completed self-exploration questions. •Reflected on their drawing •Second brief visual imaging exercise. •Envisioned a new, less-stressful image related to their stress, which they then drew. •Another shorter list of self-exploration questions. 	<ul style="list-style-type: none"> •State-Trait Anxiety Inventory (STAI) •Positive and Negative Affect Schedule (PANAS-X) 	No scores were reported. The authors interpretation of the results was a general decrease in anxiety and negative affect levels among nearly all participants from the pre-test to the post-test.	N/A

Citation & Effect Category	Intervention	Measures	Results	Effect size
Ando & Ito (2014) Group 1 Effect size: Beneficial	1. Art therapy • 20 minutes of mindfulness therapy which included breathing, yoga and a body scan led by a psychologist and a yoga specialist. • The next 40 minutes they created art by using drawing, collage or clay. 2. Art only • Did not have mindfulness therapy, and created art for the whole 60 minutes.	• The Japanese Profile of Mood States (POMS) short version: Tension-anxiety subscale	Group 1 (N=17) Pre-test M=3.06, SD=3.24 Post-test M=0.90, SD=2.14 Group 2 (N=22) Pre-test M=5.54, SD=3.87 Post-test M=3.31, SD=3.73	d= 0.77 d= 0.59
Visnola, Sprūdža, Ārija Baķe & Piķe (2010) Effect size: High Calibre.	1. Art therapy group (N=30) • A discussion about emotions for 30 mins • Art therapy session for 1 hour which involved drawing, painting, collage, clay and creative journaling • Reflection about art works produced, the emotions expressed and new ways of coping with stress for 30 mins. 2. Control group (N=30) No intervention.	• State Trait Anxiety Inventory (STAI) • Cortisol	State subscale 1. Pre-test: M=38.3, SD=11.0 Post-test: M=28.6, SD= 6.0 2. Pre-test: M=47.7, SD=11.8 Post-test: M=39.3, SD= 10.5 Trait subscale 1. Pre-test: M=41.3, SD=8.4 Post-test: M=38.7, SD=7.7 2. Pre-test: M=45.9, SD=8.5 Post-test: M=45.2, SD=9.0 1. Pre-test: M=13.94, SD=4.15 Post-test: M=5.15, SD=0.99 2. Scores not provided.	d=1.06 d=0.75 d=0.32 d=0.08 d=2.92 d=N/A

Citation & Effect Category	Intervention	Measures	Results	Effect size
Muthard & Gilbertson (2016)	<ul style="list-style-type: none"> •7 minutes, one session. 1. Art therapy group Coloured a mandala while being guided through a breathing exercise 2. Control group Sat quietly. 	<ul style="list-style-type: none"> •State Trait Anxiety Inventory (STAI) •Blood Pressure •Pulse •SCL •Heart rate 	<p>Researchers reported a significant difference between groups $t(35) = -1.76, p = .08, n^2 = .08$</p> <p>Researchers reported no significant differences between groups on physiological measures.</p>	d=0.59

Table A-3.

Methods of Art Therapy Studies with Child Participants

Citation & Category	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Rosal (1993) Group 1. Unstructured and non-directive.	Compare the effectiveness of cognitive behaviour art therapy and arts and crafts activities in improving locus of control and classroom behaviour.	<ul style="list-style-type: none"> •N=36 •M age=10.2 •17 boys and 19 girls •Behavioural difficulties •Primary school 	<ul style="list-style-type: none"> •RCT •Pre-test post-test •Random assignment to groups: Cognitive-Behavioural art therapy Art and crafts activities (3) control 	50 min/session 2 sessions/week 20 sessions over 10-weeks. 1. Cognitive behaviour art therapy N=12 <ul style="list-style-type: none"> • directive therapist •muscle relaxation & imagery activity •therapist selected art materials/session •discussion. 2. Art and crafts activity N=12 <ul style="list-style-type: none"> •nondirective therapist •a variety of art and craft materials available every session. 3. Control Group N=12 <ul style="list-style-type: none"> •no activity 	<ul style="list-style-type: none"> •Children's Nowicki Strickland Internal-External Locus of Control (CNS-IE) •Teacher Rating Scale (TRS) •A personal construct drawing interview (PCDI)
Saunders & Saunders (2000) Unknown category.	Investigate the effectiveness of art therapy in reducing behavioural problems in children	<ul style="list-style-type: none"> •N=94 •Age range=2-16 •Mage=8 •Children with behaviour problems. 	<ul style="list-style-type: none"> •Pre-test post test 	<ul style="list-style-type: none"> •The details of the art therapy intervention were not provided. 	<ul style="list-style-type: none"> •Severity and frequency of behaviour problems by a questionnaire constructed by researchers. • Relationship between therapist and client rated on a 5 point likert scale.

Citation & Category	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Chapman, Morabito, Ladakakos, Schreier, & Knudson (2001). Structured & directive Drawing	Investigate the effect of art therapy on the posttraumatic stress symptoms of children who had been admitted to the level 1 trauma unit for head injuries.	<ul style="list-style-type: none"> •N=58 •Mage=10.7 •Age range=7-17 • Children who had been admitted to a Level I Trauma Centre for traumatic injuries. 	<ul style="list-style-type: none"> •RCT •Random assignment to groups 1. Art therapy group (N=31) 2. Control group (N=27)	1. Art therapy group (N=31) <ul style="list-style-type: none"> •The Chapman Art Therapy Treatment Intervention (CATTI) •A specific drawing intervention developed as a brief, trauma resolution method. •The CATTI is facilitated in a one-to-one session at the child's bedside in the hospital room. •The CATTI is designed to be completed in approximately 1 hour, with minimal art media 2. Control group (N=27) <ul style="list-style-type: none"> •Treatment as usual 	<ul style="list-style-type: none"> • Post Traumatic Stress Disorder Diagnostic Scale (Foa, 1995) • University of California at Los Angeles Post Traumatic Stress Disorder Index (PTSD-I) Child/Adolescent Version and parent version (Rodriguez, Steinberg, & Pynoos, 1997)

Citation & Category	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Pifalo (2002) Structured & Directive Drawing	Investigate the effectiveness of art therapy in reducing post-traumatic stress symptoms in children who had experienced sexual abuse.	<ul style="list-style-type: none"> •N=13 •Age range=8-17 •Females •Traumatized children 	•Pre-test post-test	<ul style="list-style-type: none"> •A 10-week art therapy session which combined the techniques of art therapy and CBT. •Each session was 1 ½ hours •The children were split into groups according to their age (8-10 years; 11-13 years; 14-17 years). •Sessions involved drawing mandalas, sculpting with clay, decorating a container, drawing their “safe place”, making bracelets, and designing t-shirts. 	•Trauma Symptom Checklist for children (TSCC).
Pifalo (2006) Structured & Directive Drawing	Investigate the effectiveness of art therapy in reducing post-traumatic stress symptoms in children who had experienced sexual abuse. Replication of the Pifalo (2002) study.	<ul style="list-style-type: none"> •N=41 •Age range=8-17 • Children who have experienced child abuse 	•Pre-test post test	<ul style="list-style-type: none"> • A 10-week art therapy session which combined the techniques of art therapy and CBT. •Each session was 1 ½ hours •The children were split into groups according to their age (8-10 years; 11-13 years; 14-17 years). •Sessions involved drawing mandalas, sculpting with clay, decorating a container, drawing their “safe place”, making bracelets, and designing t-shirts. 	•Trauma Symptom Checklist for children (TSCC).

Citation & Category	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Lyshak-Stelzer, Singer, Patricia & Chemtob, (2007). Group 1. Structured & Directive Drawing	To compare the effectiveness of Trauma Focused Art Therapy (TF-ART) with the treatment as usual arts activity (TAU-ART) in reducing PTSD symptoms.	<ul style="list-style-type: none"> •N=29 •Age range=13-15 •Inpatient psychiatric facility for youth. PTSD symptoms	<ul style="list-style-type: none"> •Pre-test post-test. •Random Assignment to groups Group 1: Trauma focused art therapy N=14 Group 2: Treatment as usual art activity N=15	<ul style="list-style-type: none"> •One-hour group session/week •16 weeks 1. TF-ART: N=14 Registered art therapist. Collages or drawings compiled in a book format to express their “life story.” Share trauma-related experiences and describe coping responses. 2. TAU-ART: N=15 2 sessions each: sewing pillows; making jewellery; making a ceramic bowl; creating a mosaic tile tray; making lanyard craft; creating decoupage and stained wooden plaques; stitching leather purses; and making decorations.	<ul style="list-style-type: none"> •UCLA PTSD Reaction Index for DSM-IV, Child Version: PTSD symptoms in 7-12 year olds.

Citation & Category	Aim	Participants Characteristics Setting	Design	Intervention	Measures
Freilich & Shechtman (2010) Unstructured & non-directive	Investigate the effectiveness of art therapy in reducing internalizing and externalizing behaviour problems in children with a learning disability.	<ul style="list-style-type: none"> • N= 93 • Learning disabilities centre 	<ul style="list-style-type: none"> • RCT • Random assignment to groups: <ol style="list-style-type: none"> 1. Art therapy (N=42) 2. Control group (N=51) 	<ol style="list-style-type: none"> 1. Art therapy <ul style="list-style-type: none"> • 1 hour of art therapy • 2 hours of learning assistance a week • The art therapy sessions involved the child selecting a topic and art materials for a project of interest, and the art therapist guiding the child towards completion of the project. 2. Control group <ul style="list-style-type: none"> • 3 hours of one-on-one learning assistance with a tutor. 	<ul style="list-style-type: none"> • Child Behaviour Checklist (CBCL) • Teacher Evaluation Form (TRF)
Mousavi & Sohrabi (2014) Structured & Directive Drawing	Investigate the effectiveness of art therapy in reducing anger in children aged 7 to 11 years old referred to a mental health centre due to severe aggressive behaviour.	<ul style="list-style-type: none"> • N=30 • Age= 7-11 • Severe aggressive behaviour 	<ul style="list-style-type: none"> • RCT • Random assignment to groups <ol style="list-style-type: none"> 1. Art therapy group 2. Control group 	<ol style="list-style-type: none"> 1. Art therapy group (N=15) <ul style="list-style-type: none"> • 2-hour session • Once a week for 10 weeks • The aim of each art therapy session was to help the children learn to express their anger and aggression in more adaptive ways, and also to develop prosocial behaviour. This was taught through the art of drawing. 2. Control group (N=15) <ul style="list-style-type: none"> • No intervention 	<ul style="list-style-type: none"> • The Nelson and Finch (2000) Child Inventory of Anger.

Results of Art Therapy Studies with Children

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Citation & Effect Category	Intervention	Measures	Findings	Effect size
Chapman, Morabito, Ladakakos, Schreier, & Knudson (2001). Effect size: N/A	1. Art therapy group (N=31) <ul style="list-style-type: none"> •The Chapman Art Therapy Treatment Intervention (CATTI) •A specific drawing treatment intervention was developed as a brief, trauma resolution method. •Facilitated in a one-to-one session at the child's bedside in the hospital room. •Designed to be completed in approximately 1 hour, with minimal art media 2. Control group (N=27) <ul style="list-style-type: none"> •Treatment as usual 	<ul style="list-style-type: none"> • University of California at Los Angeles Post Traumatic Stress Disorder Index (PTSD-I) Child or Adolescent Version (Rodriguez, Steinberg, & Pynoos, 1997) • University of California at Los Angeles Post Traumatic Stress Disorder Index (PTSD-I) Parent Version (Rodriguez, Steinberg, & Pynoos, 1997) 	The researchers reported that there was no significant difference in patients' PTSD-I scores between those in the art therapy group and those in the control group; there was a decrease in symptoms for each group of children from baseline to 1 week and 1 month. However, no scores were provided.	N/A
Pifalo, 2002 Effect size: Good quality	<ul style="list-style-type: none"> •A 10-week art therapy session which combined the techniques of art therapy and CBT. Each session was 1 and a ½ hours long. <ul style="list-style-type: none"> •The children were split into groups according to their age (8-10 years; 11-13 years; 14-17 years). •Sessions involved drawing mandalas, sculpting with clay, decorating a container, drawing their "safe place", making bracelets, and designing t-shirts. 	<ul style="list-style-type: none"> •Trauma Symptom Checklist for children (TSCC). 	Anxiety Subscale Pre-test M=9.61, SD=5.09 Post-test M=7.15, SD=5.35 Post-traumatic stress Subscale Pre-test M=11.77, SD=6.34 Post-test M=8.38, SD=6.59	d=0.75 d=0.52

Citation & Effect Category	Intervention	Measures	Findings	Effect size
Pifalo (2006)	<ul style="list-style-type: none"> •A 10-week art therapy session which combined the techniques of art therapy and CBT. 	Trauma Symptom Checklist for Children (TSCC)	Anxiety subscale: Pre-test: $M=52.51$, $SD=12.07$ Post-test: $M=47.56$, $SD=9.66$	$d=0.45$
Effect size: Good quality	<p>Each session was 1 and a ½ hours long.</p> <ul style="list-style-type: none"> •The children were split into groups according to their age (8-10 years; 11-13 years; 14-17 years). •Sessions involved drawing mandalas, sculpting with clay, decorating a container, drawing their “safe place”, making bracelets, and designing t-shirts. 		Post-traumatic stress Subscale Pre-test: $M=52.71$, $SD=9.18$ Post-test: $M=46.78$, $SD=8.21$	$d=0.68$
Lyshak-Stelzer, Singer, Patricia & Chemtob (2007). Group 1.	<ul style="list-style-type: none"> •One-hour group session/week •16 weeks <p>1. TF-ART: $N=14$ Registered art therapist. Collages or drawings compiled in a book format to express “life story.” Share trauma-related experiences and describe coping responses.</p>	<ul style="list-style-type: none"> •UCLA PTSD Reaction Index for DSM-IV, Child Version: PTSD symptoms in 7-12 year olds. 	Group 1. TF-ART Pre-intervention: $M=58.1$, $SE=4.0$. Post-intervention: $M=37.1$, $SE=2.9$	$d=1.67$
Effect size: High calibre	<p>2. TAU-ART: $N=15$ 2 sessions each: sewing pillows; making jewellery; making a ceramic coil-bowl and slab-box; creating a mosaics tile tray; making lanyard craft; creating decoupage and stained wooden plaques; stitching leather purses; and making decorations.</p>		Group 2. TAU Pre-treatment: $M=58.1$, $SE=3.9$. Post treatment: $M=55.6$, $SE=2.8$.	$d=0.20$

Citation & Effect Category	Intervention	Measures	Findings	Effect size
Freilich & Shechtman (2010) Effect Size: Marginal quality	1. Art Therapy (Pre-test post-test: N=42, Follow-up: N=21) The art therapy sessions involved the child selecting a topic and art materials for a project of interest, and the art therapist guiding the child towards completion of the project.	• Child Behaviour Checklist (CBCL)	1. Art therapy Pre-test: M=.56, SD=.17 Post-test: M=.47, SD=.22 Follow up: M=.52, SD=.16	d=0.46 d=0.24
			2. Control group Pre-test: M=.5, SD=.22 Post-test: M=.5, SD=.23 Follow-up: M=.44, SD=.19	d=0.46 d=0.29
	2. Control group (Pre-test post-test: N=51, Follow-up: N=31) 3 hours of one-on-one learning assistance with tutor	• Teacher Evaluation Form (TRF)	1. Art therapy Pre-test: M=.4, SD=.2 Post-test: M=.41, SD=.26 Follow-up: M=.58, SD=.3	d=0.04 d=.75
			2. Control group Pre-test: M=.39, SD=.19 Post-test: M=.38, SD=.19 Follow-up: M=.28, SD=.17	d=0.05 d=0.60

Table A-5.

Methods of Art Intervention studies with Adult Participants

Citation & Category	Aim	Participants	Design	Intervention	Measures
Pizarro (2004) Group 3. Structured & Directive Drawing	Compare the effectiveness of art therapy and writing therapy in improving psychological and health outcomes.	<ul style="list-style-type: none"> •N= 45 •Age range= 17-37 years. •M age=18 •Undergraduate students 	<ul style="list-style-type: none"> •Pre-test-post test •Random assignment: to 3 groups 	2 x 1 hr sessions for each participant 1. Writing about stressful event N=15 2. Drawing stressful event N=12 Contrast: Drawing a still life N=14	Self-report measures <ul style="list-style-type: none"> •General Health Questionnaire (GHQ): average health functioning and distressing symptoms •Global Measure of Perceived Stress (GMPS): life stress. •The Physical Symptoms Inventory (PSI): physical complaints. •The Profile of Mood States (POMS): mood states. •Participant Satisfaction Questions
Walsh, Martin & Schmidt (2004) Unstructured & Directive	To investigate the effectiveness of art making on reducing stress and anxiety in caregivers of patients with cancer.	<ul style="list-style-type: none"> •N=37 •Mage=51.43 •Caregivers of cancer patients 	<ul style="list-style-type: none"> •Pre-test-post test 	<ul style="list-style-type: none"> •1-hour session •Participants chose one or more activities and the researcher demonstrates how to complete the chosen activity. •5 different arts and craft activities 	<ul style="list-style-type: none"> •the Profile of Moods State (POMS) •the Beck's Anxiety Inventory (BAI) •the Derogatis Affects Balance Scale (DABS).

Citation & Category	Aim	Participants	Design	Intervention	Measures
Chang (2005). Structured & non-directive	To participate in an experimental research study, and test the effect of a creative arts intervention on students' stress, anxiety, and emotions.	<ul style="list-style-type: none"> •N= 36 junior and senior nursing students. •Age= 18- 50 years. •All women 	<ul style="list-style-type: none"> •RCT •Random assignment to art making and control groups 	1. Art making 1 session Participated in all of the following art activities: Mono-prints or greeting cards Self-portrait collage Large group art project Small group mandala drawing 2. Control group Continued with regular class	The Mini-Profile of Mental States (Mini-POMS): self-report measuring mood The Beck Anxiety Inventory (BAI): self-report questionnaire measuring anxiety. The Affects Balance Scale (ABS): positive and negative emotions.
Curry & Kasser (2005) Group 1 & 2. Structured and Directive. Group 3. Structured & non-directive	This study examined the effectiveness of different types of art activities in the reduction of anxiety.	<ul style="list-style-type: none"> •N= 84 •Age=18-22. •Undergraduate students 	<ul style="list-style-type: none"> •Pre-test post-test •Random assignment: 1. colour a mandala 2. colour a plaid form 3. colour on a blank piece of paper. 	<ul style="list-style-type: none"> •All participants underwent a brief anxiety-induction •All participants instructed to colour the paper in front of them for 20 mins using coloured pencils 1. The mandala group was given an outline of a mandala. N=30 2. The plaid group was given an irregular plaid design. N=27 3. The free-form group was given a blank piece of paper. N=27 	The State Anxiety Inventory: Current level of anxiety.

Citation & Category	Aim	Participants	Design	Intervention	Measures
De Petrillo & Winner (2005)	Experiment 1 & 2. To determine whether a reduction in negative mood and anxiety through art making was due to “catharsis” or “redirection”	Experiment 1. •N=42 •Age range=18-22 •Mage=19 •Undergraduate students	•Random assignment to groups 1. Art group 2. Contrast group	Experiment 1. 1. Art group (N=22) Created a drawing based on their feelings 2. Contrast group (N=20) Copied geometric shapes	Affect Grid
Experiment 1. Group 1. Structured & directive Drawing					
Experiment 2. Group 1. Structured & directive Drawing		Experiment 2 •N=22 •Age range= 18-22 •Mage=19 •Undergraduate students		Experiment 2. 1. Art group (N=10) Participants were required to make a drawing based on their feelings 2. Contrast group (N=20) Puzzle activity.	

Citation & Category	Aim	Participants	Design	Intervention	Measures
Bell & Robbins (2007). Unstructured and non-directive. Drawing	Test the assertion that it is the production of art (as opposed to exposure to art) which has therapeutic effects.	<ul style="list-style-type: none"> •N= 50 •Age=18-30 years •University students 	<ul style="list-style-type: none"> •RCT •Random assignment to groups: <p>Experimental: Create art work Control: View and sort art prints</p>	<ul style="list-style-type: none"> •Both groups: 20-minute session <p>1. Art production group: N=25</p> <ul style="list-style-type: none"> •Free access to paper and choice of crayons, coloured pencils, charcoal pencils, or oil pastels. •Could draw whatever they liked. <p>2. Control group: N=25</p> <ul style="list-style-type: none"> •View and sort 60 art prints. 	<p>Profile of Mood States (POMS)</p> <p>States State-Trait Anxiety Inventory (STAI)</p>

Citation & Category	Aim	Participants	Design	Intervention	Measures
Henderson, Rosen & Mascaro (2007). Group 2. Contrast. Structured and directive. Drawing.	Test the psychological and physical health benefits of mandala drawing within a trauma population.	<ul style="list-style-type: none"> •N=36 •Age= 18-23 •Mean age: 18.4 •Undergraduate students •Experienced some form of trauma 	<ul style="list-style-type: none"> •Pre-test post-test design •Random assignment to mandala making and contrast groups 	<ul style="list-style-type: none"> •All participants •3 consecutive days •20 minutes each session <ol style="list-style-type: none"> 1. Mandala group: N=19 Instructed to draw a circle on their paper and fill it with representations of feelings or emotions related to their trauma 2. Contrast group: N=17 Instructed to draw an object 	<ul style="list-style-type: none"> •The PDS: self-report measure of PTSD. •The Beck Depression Inventory, Second Version (BDI-II) •The State-Trait Anxiety Inventory (STAI)-State subscale •The Spiritual Meaning Scale Self-report inventory (SMS) •The Pennebaker Inventory of Limbic Languidness (PILL)
Walsh, Radcliffe, Castillo, Kumar & Broschard (2007) Unstructured & directive.	Investigate the effectiveness of art making on reducing stress and anxiety in caregivers with cancer.	<ul style="list-style-type: none"> •N=67 • Mage=51.4 •Caregiver of cancer patients 	<ul style="list-style-type: none"> •Pre-test post test 	<ul style="list-style-type: none"> • 2 hours • participants chose an art activity, and then were instructed on how to complete the activity. •Activities included decorated jewellery boxes, mono-prints, watercolour paintings, silk scarves or wall hangings, mandala creations, mosaic tile trays and ribbon gems. 	<ul style="list-style-type: none"> •Beck's Anxiety Inventory (BAI) •Cortisol levels in saliva

Citation & Category	Aim	Participants	Design	Intervention	Measures
<p>Curl & Forks (2008)</p> <p>Group 1, 2, 3 & 4. Structured & directive.</p> <p>Group 2 & 4 Drawing.</p>	Determine whether art making was effective through either catharsis or problem solving.	<ul style="list-style-type: none"> •N=40 •Age range=27 •Mage=19.65 years •Undergraduate Students 	<ul style="list-style-type: none"> •Random assignment to one of four treatment groups; 1. collage and positive focus group (N=10) 2. drawing and positive focus group (N=10) 3. collage and negative focus group (N=10) 4. drawing and negative focus group. (N=10) 	<ul style="list-style-type: none"> •25 minutes •one session •Participants in the negative focus groups were asked to focus on a personally stressful situation while they created their art work, and participants in the positive focus groups were required to focus on a positive situation 	<ul style="list-style-type: none"> •State Trait Anxiety Inventory (STAI) •Heart rate
<p>Dalebroux, Goldstein, & Winner (2008).</p> <p>Group 1. Structured & directive</p> <p>Group 2. Structured & directive</p>	To investigate whether drawing improves mood through venting, positive expression or distraction.	<ul style="list-style-type: none"> •N=75 •Age range=18-22 •University students 	<ul style="list-style-type: none"> •Pre-test post test •Random assignments to groups 1. Venting 2. Positive expression 3. Distraction 	<ul style="list-style-type: none"> •Mood induction: Watching a sad video 1. Venting: Draw a picture that expresses your feelings in reaction to this clip 2. Positive expression: Draw a picture that predicts happiness 3. Distraction control: Crossing out symbols 	<ul style="list-style-type: none"> •Positive and Negative Affect Schedule (PANAS)

Citation & Category	Aim	Participants	Design	Intervention	Measures
Yang, Li, Hong, & Kao, (2010). Group 2. Structured and directive.	This study was to compare the effects of calligraphy handwriting with those of progressive muscle relaxation and imagery training in Chinese Nasopharyngeal Carcinoma patients.	•N= 90 •Adults •Nasopharyngeal Carcinoma patients.	•RCT •Random Assignment: 1. relaxation and guided imagery training group 2. Calligraphy handwriting group 3. Control group.	1. Relaxation and guided imagery: N=30 20-min relaxation was followed by 10-min guided imagery 2. Calligraphy: N=30 Brush handwriting by tracing strokes and structures of Chinese characters •Both group 1 and 2 had sessions for 30 minutes a day for 4 consecutive weeks. 3. Control group: No intervention.	•Physiological arousal parameters: heart rate, blood pressure and respiration rate •Symptom Distress Scale •Profile of Mood State-Short Form

Citation & Category	Aim	Participants	Design	Intervention	Measures
Boothby and Robbins (2011) Groups 1 & 3. Unstructured & non-directive	To compare the effects of making art versus viewing art, with and without music on participant's mood and stress levels.	<ul style="list-style-type: none"> •N=60 •Age range=18-55 •Mage=21.5 •University students 	<ul style="list-style-type: none"> •$2 \times 2 \times 2$ factorial design •Random assignment to 4 groups; <ol style="list-style-type: none"> 1. art production and music 2. art sorting and music 3. art production and non-music 4. art sorting and no music. 	<ul style="list-style-type: none"> •All sessions 10 minutes long. 1. Participants completed a free art task while listening to classical music 2. Participants viewed and freely sorted 60 prints of famous art paintings while listening to classical music 3. Participants completed a free art task with no music playing. 4. Participants viewed and sorted the 60 art prints with no music playing. 	<ul style="list-style-type: none"> •Profile of Moods State (POMS) •The State Trait Anxiety Scale (STAI)
Drake, Coleman, & Winner (2011). Structured & non-directive Drawing	Investigated the effects of drawing versus writing and emotion regulation strategy (coping by venting versus coping by distraction) on short-term mood repair.	<ul style="list-style-type: none"> •N=40 •Age=18-22 •University students 	<ul style="list-style-type: none"> •Pre-test post-test •Random assignment to groups: <ol style="list-style-type: none"> 1. Writing 2. Drawing 	All participants watched a sad movie to induce a negative mood. <ol style="list-style-type: none"> 1. instructed to write whatever they liked for 10 mins 2. instructed to draw whatever they liked for 10 mins 	<ul style="list-style-type: none"> •Affect Grid

Citation & Category	Aim	Participants	Design	Intervention	Measures
Schrade, Crystal, Tronsky & Kaiser (2011). Group 1: Unstructured & Non-directive Drawing Group 2: Unstructured & Directive Drawing	Determine whether systolic blood pressure, diastolic blood pressure and/or pulse changed differently across the control, free draw, or mandala making activities in adults with ID.	•N= 19 •Age range= 55 to 74. •Males=10 •Females=9 •Participants' diagnoses ranged from mild to severe ID.	•RCT •Each group: 3 participants who participated in 3 separate conditions 1. a mandala making condition 2. a free drawing condition 3. control condition on different days.	•All groups: One 15-minute session Coloured markers Coloured pencils Coloured oil pastels. 1. Mandala making group: N=19 Piece of paper with a circle drawn lightly in the centre. 2. Free draw group: N=19 A blank piece of white paper. 3. The control group: N=19 A variety of puzzles and/or table games.	Physiological monitoring equipment: •Systolic blood pressure •Diastolic blood pressure •Pulse
Drake & Winner (2012). Group 1: Structured & directive Group 2: Structured and directive	Investigated whether art making improved mood via venting or distraction.	•N=80 •Age=18-22 •University students	•Pre-test post-test •Random assignment to groups: 1. Venting 2. Distraction	All participants watched a sad movie to induce a negative mood. 1. Venting: Instructed to draw something about the film 2. Distraction: Instructed to draw a neutral object	•Positive and Negative Affect Schedule (PANAS)

Citation & Category	Aim	Participants	Design	Intervention	Measures
Kimport, & Robbins (2012). Group 1. Structured & non-directive	Compare the effectiveness of manipulating clay vs. stress ball on improving mood	<ul style="list-style-type: none"> •N=104 •Age range=18-63 •Mean age=22.3 •University students 	<ul style="list-style-type: none"> •Pre-test post-test •Random assignment to groups: 1. Structured clay 2. Unstructured clay 3. Structured stress balls 4. Unstructured stress ball 	1. Working with clay for 10 minutes 2. Manipulating a stress ball for 10 minutes	<ul style="list-style-type: none"> •The Profile of Moods States (POMS) •The State Trait Anxiety Inventory (STAI)
Sandmire, Gorham, Rankin, & Grimm (2012). Structured & Non-directive Drawing	Whether a brief period of art making can significantly reduce a person's state of anxiety.	<ul style="list-style-type: none"> •N= 57 •45 females •12 males •1st year undergraduate student 	<ul style="list-style-type: none"> •RCT •Random assignment: art making group Control group 	Both groups: one 30-minute session Art making group: N=29 Painting or colouring pre-designed mandalas, free-form painting, collage making, still life drawing, and modelling with clay. Control group: N=28 Sat in comfortable chairs in the other room.	State-Trait Anxiety Inventory: <ul style="list-style-type: none"> •State subscale: current level of anxiety •Trait subscale: a person's long-term disposition toward anxiety.

Citation & Category	Aim	Participants	Design	Intervention	Measures
van der Venet & Serice (2012). Group 1 & 2 Structured and directive Group 3 Unstructured & Non-directive	To test whether colouring a mandala would reduce anxiety.	<ul style="list-style-type: none"> •N= 50 •41 women •9 men •Psychology undergraduate students •Age range= 21-59 •M age = 34.2 	<ul style="list-style-type: none"> • Pre-test post-test •Random assignment to 3 groups that coloured on: 1. a mandala design 2. a plaid design blank paper. 	<ul style="list-style-type: none"> •One session •20 minutes •Anxious mood induced via a writing activity <p>Mandala design: N=13 Plaid design: N=15 Blank paper: N=22</p>	The State Anxiety Inventory (SAI): Current levels of anxiety.
Lawson, et al. (2012) Structured & non-directive	Investigate the effect of art making on stress in cancer patients	<ul style="list-style-type: none"> •N=20 •Patients receiving treatment at an outpatient clinic participated in the study. 	<ul style="list-style-type: none"> •Crossover design 	<ul style="list-style-type: none"> •40-60 minutes •Painting tiles 	<ul style="list-style-type: none"> •The Stat Trait Anxiety Inventory (STAI) •Salivary Cortisol

Citation & Category	Aim	Participants	Design	Intervention	Measures
Abbott, Shanahan and Neufeld (2013) Group 1. Unstructured & nondirective. Drawing	Compared artistic activities to non-artistic activities in reducing stress in adults.	<ul style="list-style-type: none"> •N=52 •Age range=18-44 •M age=22.7 •University students 	<ul style="list-style-type: none"> • 2 × 2 factorial design • Random assignment to groups: <ol style="list-style-type: none"> 1. Active artistic 2. Passive artistic 3. Active non-artistic 4. Passive non-artistic 	<ol style="list-style-type: none"> 1. Involved drawing whatever they liked with their choice of materials 2. Involved coming up with adjectives to describe a piece of art 3. Involved assembling a puzzle 4. Involved deciphering a map. 	<ul style="list-style-type: none"> •The Subjective Stress Scale (SSS) •The Stress Adjective Checklist (SAC).
Ando & Ito (2014) Group 2. Unstructured & non-directive Drawing	To compare the effectiveness of mindfulness art therapy with an art only activity in improving mood.	<ul style="list-style-type: none"> •N=22 •University students 	<ul style="list-style-type: none"> •RCT •Random assignment to groups: <ul style="list-style-type: none"> Group 1. Art therapy (N=17) Group 2. Art only group (N=22) 	<ol style="list-style-type: none"> 1. Art therapy <ul style="list-style-type: none"> • 20 minutes of mindfulness therapy • 40 minutes of art by using drawing, collage or clay. 2. Art only <ul style="list-style-type: none"> • Created art using clay, collage or drawing for the whole 60 minutes. 	<ul style="list-style-type: none"> •The Japanese Profile of Mood States (POMS) short version

Citation & Category	Aim	Participants	Design	Intervention	Measures
deMorais, Dalécio, Vizmann, Bueno, Roecker, Salvagioni, & Eler (2014). Structured & non-directive	To evaluate the effect of clay work on depression and anxiety in patients in a day hospital compared with patients who did not undergo therapy.	<ul style="list-style-type: none"> •N=24 •Age=18-65 yrs. •Patients with mental disorders. 	<ul style="list-style-type: none"> •Quantitative & Qualitative. •Random assignment to: <ol style="list-style-type: none"> 1. Clay work group 2. Control group (No treatment) 	<ol style="list-style-type: none"> 1. Modelling with clay <ul style="list-style-type: none"> • Clay work group was split into 2 groups of six • Eight sessions of therapy for eight weeks on Tuesdays (Group 1) or Thursdays (Group 2), for 3 hours. • Therapists encouraged emotion expression 2. Control group <ul style="list-style-type: none"> • No intervention 	<ul style="list-style-type: none"> •Beck Depression Inventory •Spielberger's State-Trait Anxiety Inventory
Drake, Drake & Hodge (2015) Structured & Non-directive Drawing	Investigated whether the most effective medium for improving mood depends on one's preference for drawing or writing, and what strategy (venting or distraction) is used for writing or drawing.	<ul style="list-style-type: none"> •N=80 •Age range=18-22 •Mean age=18.8 •University students 	<ul style="list-style-type: none"> •Pre-test Post-test •Random assignment to groups: <ol style="list-style-type: none"> 1. Preferred activity 2. Non-preferred activity 	<ul style="list-style-type: none"> •Mood induction: watched a sad video clip •Instructed to use the next 10 mins to write/draw whatever they liked. 	Positive and Negative Affect Schedule (PANAS)

Citation & Category	Aim	Participants	Design	Intervention	Measures
Laurer and van der Vennet (2015) Group 1. Unstructured & nondirective	Investigated the effectiveness of art making in reducing anxiety in substance abusers.	<ul style="list-style-type: none"> •N=28 •Age range=18-54 •M age=30.5 •Substance abuse patients 	<ul style="list-style-type: none"> •Pre-test post-test •Random assignment to groups: 1. Art production 2. Art viewing 	<ul style="list-style-type: none"> •20 minutes 1. Drew whatever they liked and were provided with coloured pencils, charcoal pencils, oil pastels, chalk pastels and watercolour paint. Viewed and sorted 60 classical art prints. 	<ul style="list-style-type: none"> •Profile of Mood States (POMS) •State Trait Anxiety Inventory (STAI)
Smolarski, Leone & Robbins (2015) Group 1 Structured and directive Group 2 Structured & directive	To determine whether drawing to express happiness (positive expression), drawing to express (venting), or tracing and colouring a simple line drawing (distraction control) was more effective in improving mood.	<ul style="list-style-type: none"> •N=45 •Age=18-22 •Undergraduate university students 	<ul style="list-style-type: none"> •Pre-test post-test and follow-up •Random assignment to groups 1. Venting group 2. Positive expression group 3. Tracing group 	<p>All participants were given written instructions and spent 10 minutes drawing according to the instructions.</p> <ol style="list-style-type: none"> 1. instructed to create a drawing expressing their current feelings of stress 2. instructed to draw something that made them happy 3. Trace a colour book outline of a sailboat 	<ul style="list-style-type: none"> •The Profile Of Mood State (POMS) questionnaire

Citation & Category	Aim	Participants	Design	Intervention	Measures
Sandmire et al. (2015)	Examine whether art making reduces anxiety in young adults by using both subjective and objective measures.	<ul style="list-style-type: none"> •N=47 •Age=18-19 •Healthy first year university students 	<ul style="list-style-type: none"> •Pre-test post-test Within subject design 	Prior to student's final examinations	<ul style="list-style-type: none"> •The State Anxiety Inventory (SAI): Current levels of anxiety. •Heart Rate Variability (HRV)
Group 1 & 2 Structured & Directive				All participants: 3x 30-min art session Colouring mandalas Modelling with clay Free-form painting	
Group 3 Structured & non-directive				1x 30-minute non-art making	
Kaimal, Ray & Muniz (2016)	Investigate the impact of visual art making on the cortisol levels of healthy individuals	<ul style="list-style-type: none"> •N=39 •Age= 18-59 •Mage= 38.88 •Healthy adults: university students and staff 	<ul style="list-style-type: none"> •Pre-test post test 	<ul style="list-style-type: none"> •One 45-min art session •Participants had the option of using collage, clay, fine-tip markers, or a combination. 	<ul style="list-style-type: none"> •Cortisol levels in saliva
Unstructured and non-directive					

Table A- 6.

Results of Art Intervention studies with Adult Participants

Citation & Category	Intervention	Measures	Results	Effect size
Pizarro, J. (2004)	•All participants underwent a brief anxiety-induction	Self-report measures	Social dysfunction subscale	
Group 3: control (drawing a still life)	•All participants were instructed to colour the paper in front of them for 20 minutes using the coloured pencils provided.	•General Health Questionnaire (GHQ)	1. Write-stress: $M= 1.92$ $SE=0.09$, 2. Draw-stress: $M=2.26$, $SE=0.10$. 3. Control: $M= 2.08$ $SE=0.09$	N/A
Effect size: High calibre	The mandala group was given an outline of a mandala. N=30 The plaid group was given an irregular plaid design. N=27 The free-form group was given a blank piece of paper. N=27	•Global Measure of Perceived Stress (GMPS): life stress. . •The Profile of Mood States (POMS): mood states.	N/A	N.A
		•Participant Satisfaction Questions	Write-stress $M= 2.52$, $SD=.776$; Art-stress $M=2.98$, $SD=.684$ Control $M=3.36$, $SD=.694$	d=1.45 d= 0.31

Citation & Category	Intervention	Measures	Results	Effect size
Walsh, Martin & Schmidt (2004) Effect size: Good quality	<ul style="list-style-type: none"> •1-hour session •Participants chose one or more activities and the researcher demonstrates how to complete the chosen activity. •5 different arts and craft activities 	•the Profile of Moods State (POMS)	Pre-test M=13.27, SD=6.00 Post-test M=9.85, SD=5.84	d=0.58
		•the Beck's Anxiety Inventory (BAI)	Pre-test M=32.8, SD=9.38 Post-test M=27.8, SD=7.74	d=0.58
		•the Derogatis Affects Balance Scale (DABS).	Pre-test M=139.55, SD=19.09 Post-test M=151.42, SD=24.05	d=0.55
Chang (2005). Effect size: High Calibre	<ul style="list-style-type: none"> •Both groups: 20-minute session Art production group: N=25 •Free access to blank sheets of white paper and choice of crayons, coloured pencils, charcoal pencils, or oil pastels. •Could draw whatever they liked. 	The Mini-Profile of Mental States (Mini-POMS): self-report measuring mood	Experimental less stress t= -3.20, p=0.003	d=1.07
		The Beck Anxiety Inventory (BAI): self-report questionnaire measuring anxiety.	Experimental less anxiety t= -2.29, p = 0.029	d=0.76
	Control group: N=25 <ul style="list-style-type: none"> •View and sort 60 art prints. •The prints were of famous paintings and participants were asked to categorize them into groups based on their pictorial content. 	The Affects Balance Scale (ABS): positive and negative emotions.	Experimental more positive emotions t=3.99, p=0.001	d=1.33

Citation & Category	Intervention	Measures	Results	Effect size
Curry & Kasser (2005)	All sessions •One-hour group session/week •16 weeks 1. TF-ART: N=14	The State Anxiety Inventory: Current level of anxiety.	The mandala group Pre-test: M=49.17, SD=20.10 Post-test: M= 32.07, SD= 11.66	d=1.04
Group1 Effect Size: High Calibre	Registered art therapist. Collages or drawings compiled in a book format to express “life story.” Share trauma-related experiences and describe coping responses.		The plaid group Pre-test: M=49.26, SD=18.74 Post-test: M= 35.78, SD= 16.06	d=0.77
Group 2 Effect Size: Beneficial	2. TAU-ART: N=15 2 sessions each: sewing pillows; making jewellery; making a ceramic bowl; creating a mosaics tile tray; making		The free-form group Pre-test: M=55.15, SD=22.62 Post-test: M= 55.07, SD= 20.51	d=0.003
Group 3: Effect Size: Poor	lanyard craft; creating decoupage and stained wooden plaques; stitching leather purses; and making decorations.			

Citation & Category	Intervention	Measures	Results	Effect size
De Petrillo, & Winner (2005) Group 1: High calibre Group 2: Marginal effect size	Experiment 1.	Affect Grid	Experiment 1.	
	1. Art group (N=22) Participants were required to make a drawing based on their feelings		1. Art group Mood valence •Art majors (N=10) Pre-test: M=2.8, SD=.79 Post-test: M=6.2, SD=1.0	d=3.77
	2. Contrast group (N=20) Participants were required to copy geometric shapes		•Non-art majors (N=12) Pre-test: M=2.5, SD=.52 Post-test: M=5.4, SD=.90	d=3.95
			2. Contrast group Mood valence •Art majors (N=10) Pre-test: M=2.5, SD=.97 Post-test: M=3.3, SD=1.4	d=0.66
			•Non-art majors (N=10) Pre-test: M=3.3, SD=1.4 Post-test: M=3.7, SD=1.3	d=0.30
	Experiment 2.		Experiment 2.	
	1. Art group (N=22) Participants were required to make a drawing based on their feelings		1. Art group Same scores as above.	
	2. Contrast group (N=20) Participants complete puzzle.		2. Contrast group (N=20) Mood valence Pre-test: M=3.2, SD=1.4 Post-test: M=3.8, SD=1.6 Mood arousal Pre-test: M=4.6, SD=1.6 Post-test: M=5.2, SD=1.5	d=0.40 d=0.39

Citation & Category	Intervention	Measures	Results	Effect size
Bell & Robbins (2007). Effect size: High Calibre	•Both groups: 20-minute session 3. Art production group: N=25 •Free access to blank sheets of white paper and choice of crayons, coloured pencils, charcoal pencils, or oil pastels. •Could draw whatever they liked.	Profile of Mood States (POMS): current mood	Experimental group Pre: $M=65.4$, $SD=31.5$ Post: $M=31.4$, $SD=29.0$	d=1.12
			Contrast group Pre: $M=94.8$, $SD=38.0$, Post: $M=84.7$, $SD=48.2$	d=0.23
	4. Control group: N=25 •View and sort 60 art prints. •The prints were of famous paintings and participants were asked to categorize them into groups based on their pictorial content.	State-Trait Anxiety Inventory (STAI): •The “trait” questions: stable, long-term anxiety levels;	Experimental group Pre: $M=48.8$, $SD=7.5$, Post: $M=42.2$, $SD=7.5$	d=0.88
			Contrast group Pre: $M=50.2$, $SD=9.0$, Post: $M=51.2$, $SD=7.1$	d=0.12
		•The “state” questions: current level of anxiety.	Experimental group Pre: $M=54.9$, $SD=9.7$, Post: $M=38.0$, $SD=7.4$	d=1.20
			Contrast group Pre: $M=55.2$, $SD=11.9$ Post: $M=55.0$, $SD=10.4$.	d=0.02

Citation & Category	Intervention	Measures	Results	Effect size
Henderson, Rosen & Mascaro (2007). (Contrast group) Effect size: Poor	<ul style="list-style-type: none"> •All participants •3 consecutive days •20 minutes each session <p>3. Experimental group: N=19 Asked to draw a large circle on their paper and then fill the circle with representations of feelings or emotions related to their trauma using symbols, patterns, designs and colours that felt right to them.</p> <p>4. Contrast group: N=17 Participants were instructed to draw an object over the next 3 days.</p>	•The PDS: self-report measure of PTSD.	Mandala group Pre-test: M=19.37, SD=7.06 Post-test: M=18.05, SD=9.71	d=0.16
			Contrast group Pre-test: M=15.71, SD=6.89 Post-test: M=15.14, SD=8.49	d=0.07
		•The Beck Depression Inventory, Second Version (BDI-II): self-report measure of depression.	Mandala group Pre-test: M=17.95, SD=9.26 Post-test: M=16.63, SD=11.74	d=0.12
			Contrast group Pre-test: M=15.35, SD=7.11 Post-test: M=13.95, SD=8.55	d=0.18
		•The State-Trait Anxiety Inventory (STAI)-State subscale	Mandala group Pre-test: M=45.05, SD=10.75 Post-test: M=41.16, SD=11.30	d=0.35
			Contrast group Pre-test: M=49.05, SD=12.29 Post-test: M=42.0, SD=13.26	d=0.56
Walsh, Radcliffe, Castillo, Kumar and Broschard (2007) Effect size: Marginal	<ul style="list-style-type: none"> • 2-hours long • participants chose an art activity, and then was instructed on how to complete the activity. •The activity included, decorated jewellery boxes, mono-prints, watercolour paintings, silk scarves or wall hangings, mandala creations, mosaic tile trays and ribbon gems. 	•Beck's Anxiety Inventory (BAI)	Pre-test M=7.28, SD=6.80 Post-test M=2.49, SD=4.50	d=0.83
		•Cortisol levels in saliva	Pre-test M=0.089, SD=0.05 Post test M=0.087, SD=0.06	d=0.04

Citation & Category	Intervention	Measures	Results	Effect size
Curl & Forks (2008)	•Participants in the negative focus groups were asked to focus on a personally stressful situation while they created their art work	•State Trait Anxiety Inventory (STAI)	Cognitive focus 1. Positive M=7.00, SD=6.07 2. Negative M=-3.35, SD=10.6	d=0.42
Group 1, 2, 3, 4 Effect size: Marginal	•participants in the positive focus groups were required to focus on a positive situation while they created their art work •25 minutes, one session		Artistic activity 1. Drawing M=1.10, SD=8.37 2. Collage M=2.55, SD=11.64	d=0.14
		•Heart rate	Cognitive focus 1. Positive M=-0.21, SD=3.61 2. Negative M=0.28, SD=2.97	d=0.15
			Artistic activity 1. Drawing M=0.44, SD=2.73 2. Collage M=-0.04, SD=3.76	d=0.12
Dalebroux, Goldstein, & Winner (2008).	•Mood induction: Watching a sad video 1. Venting: Draw a picture that expresses your feelings in reaction to this clip (N=25) 2. Positive expression: Draw a picture that predicts happiness (N=25) 3. Distraction control: Crossing out symbols (N=25)	•Affect Grid	1. Pre-test: M= 2.08, SD= 1.04 Post-test: M= 6.4, SD= 1.71 2. Pre-test: M= 2.84, SD= 1.34 Post-test: M=5.04, SD= 1.88 3. Pre-test: M= 2.20, SD= 0.82 Post-test: M= 4.76, SD=1.30	d=3.05 d=1.35 d=2.80
Group 1. High calibre Group 2. High calibre				

Citation & Category	Intervention	Measures	Results	Effect size
Yang, Li, Hong, & Kao, (2010). Effect size: Beneficial	1. Relaxation and guided imagery: N=30 20-min relaxation was followed by 10-min guided imagery	Physiological arousal parameters: heart rate, blood pressure and respiration rate	Researchers reported no difference between conditions	N/A
		Symptom Distress Scale	Calligraphy Insomnia Pre-test: M=2.13, SD=.99 Post-test: M=1.92, SD=.58 Follow-up: M=1.75, SD=.68	d=0.26 d=0.45
	2. Calligraphy: N=30 Brush handwriting by tracing strokes and structures of Chinese characters •Both group 1 and 2 had sessions for 30 minutes a day for 4 consecutive weeks.		Concentration Pre-test: M=2.12, SD=.68 Post-test: M=1.54, SD=.66 Follow-up: M=1.21, SD=.42	d=0.87 d=0.30
			Control Insomnia Pre-test: M=2.03, SD=.87 Post-test: M=1.46, SD=.86 Follow-up: M=1.83, SD=.81	d=0.66 d=0.24
	3. Control group: No intervention.	Profile of Mood State-Short Form	Concentration Pre-test: M=2.00, SD=.76 Post-test: M=2.03, SD=.68 Follow-up: M=1.59, SD=.63	d=-0.04 d=0.59

Citation & Category	Intervention	Measures	Results	Effect size
Boothby and Robbins (2011) Group 1 & 2 N/A	<ul style="list-style-type: none"> •All sessions 10 minutes long. 1. Participants completed a free art task while listening to classical music. 2. Participants viewed and freely sorted 60 prints of famous art paintings while listening to classical music. 3. Participants completed a free art task with no music playing. 4. Participants viewed and sorted the 60 art prints with no music playing. 	<ul style="list-style-type: none"> •Profile of Moods State (POMS) •The State Trait Anxiety Scale (STAI) 	The researchers reported no significant effects for the art groups, and did not provide scores for these groups.	N/A
Drake, Coleman, & Winner (2011). Effect size: High calibre	<p>All participants watched a sad movie to induce a negative mood.</p> <ol style="list-style-type: none"> 1. instructed to write whatever they liked for 10 mins (n=20) 2. instructed to draw whatever they liked for 10 mins (n=20) 	<ul style="list-style-type: none"> •Affect Grid 	<ol style="list-style-type: none"> 1. Pre-test M=-2.93, SD=2.78 Post-test M=-.08, SD=3.99 2. Pre-test M=-2.20, SD=2.77 Post-test M=3.38, SD=2.24 	<p>d=0.82</p> <p>d=2.22</p>

Citation & Category	Intervention	Measures	Results	Effect size
Schrade, Crystal, Tronsky & Kaiser (2011).	•All groups: One 15-minute session Box of coloured markers Box of coloured pencils Box of oil pastels.	Physiological monitoring equipment: •Systolic blood pressure	1. Mandala making Pre-test: M= 120.9 SD=20.2 Post-test: M=116.8 SD=17.6 2. Free draw Pre-test: M=118.1 SD=17.0 Post-test: M=119.4, SD=16.8 3. Control Pre-test: M= 115.4 SD=18.3 Post-test: M=116.4 SD=27.8	d=0.22 d=-0.08
Group 1: Effect size: poor	1. Mandala making group: N=19 One piece of white paper with a circle drawn lightly in the centre.	•Diastolic blood pressure	1. Mandala making Pre-test: M=70.3 SD=10.1 Post-test: M=68.7 SD=10.2 2. Freeform Pre-test: M=70.7, SD=11.2 Post-test: M=73.4 SD=16.0 3. Control Pre-test: M= 71.1, SD=9.8 Post-test: M=73.4 SD=16.0	 d=0.16
Group 2: Effect size: poor	N=19 A blank piece of white paper. 3.The control group: N=19 A variety of puzzles and/or table games.			d=0.05
		•Pulse	1. Mandala making Pre-test: M=72.9 SD=21.7 Post-test: M=71.7 SD=20.2 2.Free-form Pre-test M=68.1, SD=12.0 Post-test: M=68.1 SD=12.5 3. Control Pre-test: M=68.1, SD=14.0 Post-test: M=68.9 14.3	 d=0.06 d=0 d=-0.06

Citation & Category	Intervention	Measures	Results	Effect size
Lawson et al. (2012)	•40-60 minutes •Painting tiles	•The Stat Trait Anxiety Inventory (STAI)	Art intervention	
			Pre-test: $M=46.73$, $SD=5.73$	
			Post-test: $M=48.65$, $SD=7.78$	$d=0.28$
			Control	
Effect size: Marginal quality		•Salivary Cortisol	Pre-test: $M=47.95$, $SD=5.37$	
			Post-test: $M=47.3$, $SD=5.55$	$d=0.11$
			Art intervention	
			Pre-test: $M=118.95$, $SD=88.84$	
			Post-test: $M=81.33$, $SD=39.81$	$d=0.55$
			Control	
			Pre-test: $M=160.53$, $SD=200.55$	
			Post-test: $M=107.88$, $SD=130.16$	$d=0.31$
Sandmire, Gorham, Rankin, & Grimm (2012).	Both groups: one 30-minute session 1. Art making group: $N=29$ Painting or colouring pre-designed mandalas, free-form painting, collage making, still life drawing, and modelling with clay. 2. Control group: $N=28$ Sat in comfortable chairs in the other room.	State-Trait Anxiety Inventory: •State subscale: current level of anxiety	Art-making	
			Pre-test: $M=39.3$, $SD=9.4$	
			Post-test: $M=29.5$, $SD=8.6$	$d=1.09$
			Control	
Effect size: Beneficial quality		•Trait subscale: a person's long-term disposition toward anxiety.	Pre-test: $M=36.2$, $SD=8.8$	
			Post-test: $M=36.0$, $SD=10.9$	$d=0.02$
			Art-making	
			Pre-test: $M=39.1$, $SD=5.8$	
			Post-test: $M=33.3$, $SD=6.1$	$d=0.97$
			Control	
			Pre-test: $M=39.3$, $SD=9.4$	
			Post-test: $M=36.0$, $SD=10.9$	$d=0.32$

Citation & Category	Intervention	Measures	Results	Effect size
Van der Vennet & Serice (2012). Group 1: High Group 2: Good Group 3: Beneficial	<ul style="list-style-type: none"> •One session •20 minutes •Anxious mood induced via a writing activity <ol style="list-style-type: none"> 1. Mandala design: N=13 2. Plaid design: N=15 3. Blank paper: N=22 	The State Anxiety Inventory (SAI): Current levels of anxiety.	<p>Mandala design Pre-test: M=44.28, SD=16.96 Post-test: M=29.46, SD=9.10</p> <p>Plaid design Pre-test: M=40.27, SD=11.26 Post-test: M=34.60, SD=13.23</p> <p>Blank paper Pre-test: M=39.32, SD=11.14 Post-test: M=30.95, SD=9.16</p>	<p>d=1.09</p> <p>d=0.46</p> <p>d=0.82</p>
Abbott, Shanahan and Neufeld (2013) Effect size: High calibre	<ol style="list-style-type: none"> 1. The active artistic group involved drawing whatever they liked with their choice of materials 2. The passive artistic group involved coming up with adjectives to describe a piece of art 3. The active non-artistic group involved assembling a puzzle 4. The passive non-artistic view involved deciphering a map. 	<ul style="list-style-type: none"> •The Subjective Stress Scale (SSS) •The Stress Adjective Checklist (SAC). 	<p>Activity type (artistic vs. non-artistic) F(2, 44) = 3.45, p < .05</p> <p>Coping approach (active vs. passive) F(2, 44) = 0.26, p < .05</p>	<p>d=1.03</p> <p>d=0.28</p>

Citation & Category	Intervention	Measures	Results	Effect size
DeMoraes, Dalécio, Vizmann, Bueno, Roecker, Salvagioni, & Eler (2014). Effect size: Good quality effect	1. Modelling with clay (N=12) <ul style="list-style-type: none"> • Clay work group was split into 2 groups of six • Eight sessions for eight weeks on Tuesdays (Group 1) or Thursdays (Group 2), for 3 hours. 2. Control group (N=12) <ul style="list-style-type: none"> • No intervention 	<ul style="list-style-type: none"> • State-Trait Anxiety Inventory 	1. Clay group M=44.9, SD=11.7 2. Control group M=52.08, SD=13.1	d=0.58
Drake, Drake & Hodge (2015) Effect Size Group 2 (Drawing group): Beneficial quality	<ul style="list-style-type: none"> •Mood induction: watched a sad video clip •Instructed to use the next 10 mins to write (N=40)/draw (N=40) whatever they liked. 	Positive and Negative Affect Schedule (PANAS)	Negative Affect 1. Write Pre-test M= 16.30, SD= 5.02 Post-test M= 14.00, SD= 5.33 2. Draw Pre-test M= 16.25, SD=4.65 Post-test M=12.45, SD=3.48	d=0.44 d=0.93

Citation & Category	Intervention	Measures	Results	Effect size
Laurer & van der Vennet (2015) Effect Size: Good quality	•20 minutes 1. Participants in the art production group were required to draw whatever they liked and were provided with coloured pencils, charcoal pencils, oil pastels, chalk pastels and watercolour paint. 2. Participants in the art viewing group were required to view and sort 60 classical art prints.	•Profile of Mood States (POMS)	1. Art production (N=14) Pre-test: M=28.4, SD=35.4 Post-test: M=13.6, SD=23.4	d=0.49
			2. Art viewing (N=14) Pre-test: M=47.7, SD=45.8 Post-test: M=36.4, SD=39.9	d=0.26
		•State Trait Anxiety Inventory (STAI) State subscale	1. Art Production Pre-test: M=38.8, SD=12.9 Post-test: M=33.9, SD=9.7	d=0.43
		Trait subscale	2. Art viewing Pre-test: M=44.1, SD=11.1 Post-test: M=47.9, SD=12.4	d=0.32
Smolarski, Leone & Robbins (2015) Effect size: Group 1: Poor Group 2: High Calibre	All participants were given written instructions and spent 10 minutes drawing according to the instructions. 1. instructed to create a drawing expressing their current feelings of stress 2. instructed to draw something that made them happy 3. instructed to trace a colour book outline of a sailboat	•The Profile of Mood State (POMS) questionnaire	1. Pre-test: M=41.9, SD=32.6 Post-test: M=31.3, SD=30.9	d=0.93
			2. Pre-test: M=46.0, SD=46.9 Post-test: M=9.6 SD=29.8	d=0.33
			3. Pre-test: M=40.5, SD=44.5 Post-test: M=26.6, SD=34.2	d=0.35

Citation & Category	Intervention	Measures	Results	Effect size
Sandmire et al. (2015)	<ul style="list-style-type: none"> •Prior to student's final examinations All participants: •3 30-min art session 	The State Anxiety Inventory (SAI): Current levels of anxiety.	1. Mandala Mchange: -5.19, SD= 6.19 2. Clay Mchange: -4.67, SD: 6.24 3. Free-form Mchange: -5.48, SD: 6.23 4. Control Mchange: -2.76, SD: 6.22	d=0.68 d=0.59 d=0.80 d=0.30
Effect size: Group 1: Good Group 2: Good Group 3: Beneficial	1. Colouring mandalas 2. Modelling with clay 3. Free-form painting •1 30-minute non-art making	Heart Rate Variability (HRV)	1. Mandala Mchange: 0.10, SD: 0.11 2. Clay Mchange: -4.67, SD: 6.22 3. Free-form Mchange: 0.08, SD: 0.1 4. Control Mchange: -0.04, SD: 0.12	d=0.52 d=0.52 d=0.52 d=0.24
Kaimal, Ray & Muniz (2016)	<ul style="list-style-type: none"> •One 45-min art session •Participants had the option of using collage, clay, fine-tip markers, or a combination. 	•Cortisol levels in saliva	Pre-test M D=17.85, SD D=5.11 Post-test M D=14.77, SD D=5.06 t(38) D 4.54, p < .01	d=0.87
Effect size: Beneficial				

Table A-7

Method of Art Intervention with Children.

Citation & Category	Aim	Participants	Design	Intervention	Measures
Rosal (1993)	Compare the effectiveness of cognitive behaviour art therapy and an arts and craft activity in improving locus of control and classroom behaviour.	<ul style="list-style-type: none"> •N=36 •M age=10.2 •17 boys and 19 girls •Behavioural difficulties •Primary school 	<ul style="list-style-type: none"> •RCT •Pretest-post test •Random assignment to groups: (1) Cognitive-Behavioural art therapy (2) Art and crafts activity (3) control 	20 sessions 50 min/session 2 sessions/wk 10-weeks. (1) Cognitive behaviour art therapy N=12 •Directive therapist •muscle relaxation & imagery activity •therapist selected art materials •discussion. (2) Art and crafts N=12 •nondirective therapist: •a variety of art materials available every session. (3) Control Group N=12 no activity	<ul style="list-style-type: none"> •Children's Nowicki Strickland Internal-External Locus of Control (CNS-IE) •Teacher Rating Scale (TRS) – measure of problem behaviour •A personal construct drawing interview (PCDI)- evaluate/ interpret attitudes towards self.

Citation & Category	Aim	Participants	Design	Intervention	Measures
Smitherman-Brown & Church (1996) Structured and Non-directive. Drawing	Incorporation of an active centering technique in the form of a mandala drawing at the start of each art therapy session to foster increased attentional capabilities and effectively decrease impulsive tendencies during the session.	<ul style="list-style-type: none"> •N= 8 •Age=10-13 •Attending an Intensity V school: children with severe emotional and developmental issues •ADD or ADHD •Ongoing history of impulsive behaviours. 	<ul style="list-style-type: none"> •Single-subject •Multiple-baseline research design across participants 	<p>Experimental group: N= 4</p> <ul style="list-style-type: none"> •Free-choice circular drawing for first 5 minutes before artwork. •Began in the centre of the circle and drew whatever he/she wished. •Free choice of artwork/art materials for the remainder of the session. <p>Control group: N=4</p> <ul style="list-style-type: none"> •Nondirective art therapy techniques. •Not introduced to the mandala exercise. 	<p>Baseline data: historical and observable patterns of behaviour</p> <p>Child Behaviour Checklist (CBCL)</p>

Citation & Category	Aim	Participants	Design	Intervention	Measures
Kearns (2004). Structured & directive	To determine whether art activities improves classroom performance and which art activity (clay work, finger painting or easel painting) produces the greatest improvement in classroom performance.	<ul style="list-style-type: none"> •N=1 •Age=5 •Male •Sensory integration difficulties. 	Single case. A-B-A-B. A= No-treatment condition B= Intervention	<ul style="list-style-type: none"> •20 minute sessions •Brief verbal check-in, selected his materials, engaged in his art or pre-art activity and transition to the classroom. •Oil-based clay work, finger painting, and easel painting offered the opportunity for various types of kinaesthetic stimulation in addition to visual stimulation. 	<ul style="list-style-type: none"> •Classroom observation Behaviour rated by teacher and recorded.

Citation & Category	Aim	Participants	Design	Intervention	Measures
Lyshak-Stelzer, Singer, Patricia & Chemtob, (2007). Group 2. Structured and directive.	To compare the effectiveness of Trauma Focused Art Therapy (TF-ART) with the treatment as usual arts activity (TAU-ART) in reducing PTSD symptoms.	<ul style="list-style-type: none"> •N=29 •Age range=13-15 •Inpatient psychiatric facility for youth. PTSD symptoms 	<ul style="list-style-type: none"> •Pre-test post-test. •Random Assignment to groups Group 1: Trauma focused art therapy N=14 Group 2: Treatment as usual art activity N=15 	<ul style="list-style-type: none"> All sessions •One-hour group session/week •16 weeks TF-ART: N=14 Registered art therapist. Collages or drawings compiled in a book format to express “life story.” Share trauma-related experiences and describe coping responses. TAU-ART: N=15 2 sessions each: sewing pillows; making jewellery; making a ceramic coil-bowl and slab-box; creating a mosaics tile tray; making lanyard craft; creating decoupage and stained wooden plaques; stitching leather purses; and making decorations. 	<ul style="list-style-type: none"> •UCLA PTSD Reaction Index for DSM-IV, Child Version: PTSD symptoms in 7-12 year olds.

Citation & Category	Aim	Participants	Design	Intervention	Measures
Yount, Rachlin & Siegel (2013). Structured & Directive	Effectiveness of healing sock creature's therapy	<ul style="list-style-type: none"> •N=25 •M age=8 years •Age range=3-17 years •Admitted to hospital. 	<ul style="list-style-type: none"> •Pre-test post test •Random Assignment to 2 groups: 1. Treatment 2.Waitlist control 3. 	<p>Treatment group: N=13</p> <ul style="list-style-type: none"> •Saliva sample at 4:30 pm •Healing Sock <p>Creatures therapy session for 90 minutes.</p> <ul style="list-style-type: none"> •Saliva sample at 6.30 pm. <p>Control group: N=12</p> <p>3. •Provided saliva samples at the same times but did not receive therapy between the two sample collections.</p>	Salivary cortisol

Citation & Category	Aim	Participants	Design	Intervention	Measures
Drake & Winner (2013) Study 1. Group 1 & 2 Structured & directive Drawing	Study 1. To determine whether the effectiveness of drawing was due to “distraction” (expressing something unrelated to the negative feeling) or “venting” (expressing negative feelings). Furthermore, they sought to determine whether developmental level was a factor.	<ul style="list-style-type: none"> •Study 1. N= 83. •Age= 43 children aged 6-8 years and 40 children aged 10-12 years •Healthy children 	<ul style="list-style-type: none"> •Pre-test post •Random assignment to groups <ol style="list-style-type: none"> 1. Vent 2. Distraction 	<ul style="list-style-type: none"> •Study 1. • Children were instructed to think of a time they really wanted something good to happen but it did not. • Children then engaged in the drawing activity. <ol style="list-style-type: none"> 1. “vent” condition: given 5 minutes to draw the event they had thought of. 2. “distraction” condition: given 5 minutes to draw a house. 	To assess mood, the children were presented with five schematic faces ranging from very sad to very happy. Children were asked to select the face that represented how they were feeling.

Citation & Category	Aim	Participants	Design	Intervention	Measures
Drake & Winner (2013) Study 2. Group 3: Structured & Directive Drawing	Study 2. To determine whether the effect of drawing on mood is due to the creation of one's own drawing to distract oneself, or whether copying an image would have the same effects.	<ul style="list-style-type: none"> •Study 2. N=113 •Age= 58 children aged 6-8 years and 65 children aged 10-12 years •Healthy children 	<ul style="list-style-type: none"> •Pre-test post •Random assignment to groups 1. Vent 2. Distraction 3. Copying 	<ul style="list-style-type: none"> •Study 2. •Same as study, except for the addition of the copying condition. 3. Children in the copying condition 	To assess mood, the children were presented with five schematic faces ranging from very sad to very happy. Children were asked to select the face that represented how they were feeling.
Pesso-Aviv, Regev, and Guttman (2014) Group 1, 2 & 3 Structured & directive. Group 3. Drawing	Investigate whether art was effective in reducing anxiety and aggression and increasing self-control in children. Furthermore, they aimed to compare the effectiveness of three different art activities; gouache paints, oil chalks or pencils.	<ul style="list-style-type: none"> •N=41 •Age range=7-9 •Mage=8.26 •Healthy children on summer camp 	<ul style="list-style-type: none"> •Pre-test Post-test Random assignment to groups: 1. Gouache paints (N=14) 2. Oil chalks (N=14) 3. Pencils (N=13) 	<ul style="list-style-type: none"> •Each group partook in 10 sessions that were conducted with minimal guidance by the researcher. •The instructions were identical for the three groups; the groups differed only in the art material they received and the work techniques, which were appropriate to each of the three art materials. 	<ul style="list-style-type: none"> •Buss and Perry's questionnaire on the expression of aggression • The State Trait Anxiety Inventory (STAI) • The Self Control Questionnaire • The Session Evaluation Questionnaire

Citation & Category	Aim	Participants	Design	Intervention	Measures
Zarezadeh Kheibari (2014) Unstructured & non-directive Drawing	To examine the effectiveness of art making on decreasing anxiety of orphaned girls living in family-like centres of Mashhad Iran.	•N=26 •Age: 10-13 years •Mage: 11.1 years	•Random assignment to art group (n=13) and control group (n=13)	•1x 30-minute session 1. Choose one of 5 activities: Mandala design, painting, collage making, clay, drawing. •Read simple instructions to guide them through the activity 2. Control: sat in comfortable chairs	•The State Trait Anxiety Inventory (STAI) form Y
Zhu, et al. (2014) Structured & Directive	Investigate the effectiveness of calligraphy treatment in reducing PTSD symptoms in a sample of children 1 year after exposure to the china earthquake.	•N=210 •M age: 10 years •Randomly selected from 5 classrooms of schools in disaster areas.	•RCT •2 experiments •Random assignment to groups: Calligraphy treatment: Experiment 1 N=129 Experiment 2 N=41 Control: Experiment 1 N=81 Experiment 2 N=39 5.	Calligraphy: Required to brush write 40 medium-sized Chinese characters. •1 hour a day •5 days a week •30 days •Teacher supervision if at school •Parent supervision if at home Control: Carried on their regular school activities	Experiment 1 Experiment 1 •Children's Revised Impact of Event Scale (CRIES-13): behavioural effects. Arousal scale. Experiment 2 •Salivary cortisol measurement: Stress levels.

Citation & Category	Aim	Participants	Design	Intervention	Measures
Cortina and Fazel (2015) Structured & Directive.	To evaluate the effectiveness of a school-based group intervention for students with emotional and behavioural problems.	•N=169 •Age=5-16 years •Children identified by teachers as needing additional emotional and behavioural support	•Pre-test post-test	•The Art room •1-2 hours •10 weeks	•Strength and Difficulties Questionnaire (SDQ) •The Mood and Feelings Questionnaire-Short Form (sMFQ)
Carsley, Heath and Fajnerova (2015) Group 1. Structured & directive Group 2. Unstructured & nondirective	To compare the effectiveness of a structured (mandala colouring) and unstructured colouring (free colouring) activity in reducing test anxiety in children.	•N=52 •Mage=10.92 •Primary school Children	•Pre-test post-test •Random assignment to groups: 1. Mandala colouring (N=26) Free colouring (N=26)	•Both groups were given 15 minutes to colour. 1. Mandala colouring (N=26) Free colouring (N=26)	•State-Trait Anxiety Inventory for children (STAI-C)

Citation & Category	Aim	Participants	Design	Intervention	Measures
Savage and Leonard (2015). Structured & Directive	Kaiapoi Borough school applied to the Canterbury community trust to run an art therapy/development programme to assist children who were working to overcome social and emotional issues following the 2010 and 2011 earthquakes.	<ul style="list-style-type: none"> •N=3 •Children at Kaiapoi Borough primary school •Exposed to the 2010 and 2011 Canterbury earthquakes 	Qualitative analysis: Grounded Theory Case studies	<ul style="list-style-type: none"> •Art specialist •Small groups of up to 10 children •45-minute art sessions. •Aim to ensure that art became the medium of interaction with a focus on social inclusion, co-operation and supporting positive pro-social skill development. •Specific art therapy approaches •Small group approach for individualised support and tailoring to meet individual needs 	Qualitative analysis: The classroom teachers interviewed students and the researcher conducted phone interviews with the student's parents. Classroom teachers responded to the researcher's questions by email.
Ziff, Ivers, & Shaw (2016) Unstructured & directive.	To investigate whether a counselling based art programme helps reduce stress and improve emotional and social skills in children.	<ul style="list-style-type: none"> •N=39 •Age range=5-12 years •School children referred for emotional and behavioural problems. 	•Pre-test Post-test	<ul style="list-style-type: none"> • School based • 6-8 children per group • variety of art activities including drawing, painting, finger painting, collage and craft construction. •Facilitated by the school counsellor. 	•Fingertip temperature

Table A-8.

Results of Art Interventions with Children.

Citation & Category	Intervention	Measures	Results	Effect size
Rosal (1993) Group 2.	<u>All Sessions</u> 20 sessions 50 min/session 2 sessions /week 10-weeks.	Children's Nowicki Strickland Internal-External Locus of Control (CNS-IE)	No improvement $F(2,33)=0.43$, $P=0.05$	$d=.32$
Effect size: Beneficial	(1) Cognitive behaviour art therapy N=12 •therapist directive activities: •muscle relaxation •imagery activity •therapist selected different art materials/session •discussion. (2) Arts and crafts activity N=12 •Nondirective therapist •A variety of art materials available every session (3) Control Group N=12 •No activity	Teacher Rating Scale (TRS) – measure of problem behaviour A personal construct drawing interview (PCDI)- evaluate/ interpret attitudes towards self.	Improved diagnosis $F(2,33)=4.04$, $p=0.05$. Researchers interpretation was that both Groups 1 and 2 showed positive changes in attitudes to school, increased intrapersonal understanding, and increased understanding of problem behaviour.	$d=.821$ $d= N/A$

Citation & Category	Intervention	Measures	Results	Effect size
Smitherman-Brown & Church (1996) Effect size: N/A	<p>Experimental group: N= 4</p> <ul style="list-style-type: none"> •Free-choice circular drawing for first 5 minutes before artwork. •Began in the centre of the circle and drew whatever he/she wished. •Free choice of artwork/art materials for the remainder of the session. <p>Control group: N=4</p> <ul style="list-style-type: none"> •Nondirective art therapy techniques. •Not introduced to the mandala exercise. <p>All groups: Every 2 months all the students completed the task, “Draw a person picking an apple from a tree.”</p>	<p>Baseline data: historical and observable patterns of behaviour and Child Behavioural Checklist (CBCL)</p> <p>Intervention data:</p> <p>Teacher observation: pre- and post-checklist on attention and impulsivity</p>	<p>According to the researchers, comparison of the Baseline Performance Data Over Time between experimental and control subject groups showed an increase in attention span and a decrease of impulsive behaviours in all participants. The experimental group, however, improved attention span after introduction of the intervention by an average of 23% while the increase in attentional span observed in the control group averaged a bit less than 10%. A decrease in impulsivity of 24% was observed in the experimental group and a decrease of 12% within the control group. However, no scores were provided.</p>	N/A
Kearns, D. (2004). Effect calibre: Good	<ul style="list-style-type: none"> •20 minute sessions •Brief verbal check-in, selected his materials, engaged in his art or pre-art activity, transition to the classroom on school bell. •Oil-based clay work, finger painting, and easel painting for various types of kinaesthetic stimulation in addition to visual stimulation. 	<ul style="list-style-type: none"> •Classroom observation <p>Behaviour rated by teacher and recorded.</p>	<p>No data reported. According to the researchers, Michael’s teacher rated his behaviour positive for more blocks of the day when his morning check-in session included art activities. He was able to maintain positive behaviours 20 mins longer after easel painting than clay (finger painting fell in the middle).</p>	Good quality

Citation & Category	Intervention	Measures	Results	Effect size
Lyshak-Stelzer, Singer, Patricia & Chemtob (2007).	All sessions •One-hour group session/week •16 weeks 1. TF-ART: N=14 Registered art therapist. Collages or drawings compiled in a book format to express “life story.” Share trauma-related experiences and describe coping responses.	•UCLA PTSD Reaction Index for DSM-IV, Child Version: PTSD symptoms in 7-12 year olds.	Group 1. TF-ART Pre-intervention: $M=58.1, SE=4.0$. Post-intervention: $M=37.1, SE=2.9$.	$d=1.67$
Group 2. Effect size: Poor	2. TAU-ART: N=15 2 sessions each: sewing pillows; making jewellery; making a ceramic coil-bowl and slab-box; creating a mosaics tile tray; making lanyard craft; creating decoupage and stained wooden plaques; stitching leather purses; and making decorations.		Group 2. TAU Pre-treatment: $M=58.1, SE=3.9$. Post treatment: $M=55.6, SE=2.8$.	$d=0.20$

Citation & Category	Intervention	Measures	Results	Effect size
Drake & Winner, (2013) Study 1. Effect size: Group 1 & 2 Highest calibre	<ul style="list-style-type: none"> • Study 1. • Children were asked to think of a time they really wanted something good to happen, but it didn't, so they were upset and disappointed. • Children then engaged in the drawing activity. 	To assess mood, the children were presented with five schematic faces ranging from very sad to very happy. Children were asked to select the face that represented how they were feeling.	1. Vent Condition 6-8 year olds (N=23) Pre-test: M=2.13, SD=0.82 Post-test: M=3.57, SD=0.99	d=1.58
			8-10 year olds (N=20) Pre-test: M=2.10, SD=0.91 Post-test: M=3.30, SD=0.80	d=1.40
			2. Distraction Condition 6-8 year olds (N=20) Pre-test: M=2.35, SD=1.04 Post-test: M=4.30, SD=0.77	d=2.13
			8-10 year olds (N=20) Pre-test: M=1.75, SD=0.55 Post-test: M=3.60, SD=0.68	d=2.56

Citation & Category	Intervention	Measures	Results	Effect size
Drake & Winner, (2013) Study 2. Group 3 Effect size: Highest calibre	<ul style="list-style-type: none"> •Study 2. •Same as study, except for the addition of the copying condition. 3. Children in the copying condition were instructed to copy drawings of common objects (e.g. teapot, toaster) for 5 minutes. 	<p>To assess mood, the children were presented with five schematic faces ranging from very sad to very happy. Children were asked to select the face that represented how they were feeling.</p>	<ul style="list-style-type: none"> •Study 2. 1. Vent Condition 6-8 year olds (N=20) Pre-test: M=2.25, SD=0.91 Post-test: M=3.85, SD=1.04 	d=1.64
			8-10 year olds (N=20) Pre-test: M=2.25, SD=0.51 Post-test: M=3.18, SD=1.01	d=2.75
			2. Distraction Condition 6-8 year olds (N=20) Pre-test: M=1.90, SD=0.85 Post-test: M=4.25, SD=0.72	d=2.98
			8-10 year olds (N=22) Pre-test: M=2.25, SD=0.72 Post-test: M=4.20, SD=0.70	d=2.98
			3. Copying Condition 6-8 year olds (N=18) Pre-test: M=2.61, SD=0.92 Post-test: M=3.94 SD=0.83	d=1.51
			8-10 year olds (N=23) Pre-test: M=2.52, SD=0.79 Post-test: M=4.00, SD=0.67	d=2.02

Citation & Category	Intervention	Measures	Results	Effect size
Yount, Rachlin & Siegel (2013). Effect size: Poor	<ul style="list-style-type: none"> •One 45-minute art session •Participants had the option of using collage, model magic clay, fine-tip markers, or a combination. •13 collage •9 clay •6 markers •4 markers and clay •3 collage and clay •3 collage and markers •1 all media 	Salivary cortisol	<p>Salivary cortisol:</p> <p>Treatment group initial: $M=6.89$, $SE=1.72$ Final: $M=5.94$, $SE=0.93$.</p> <p>Control group: Initial: $M=4.77$, $SE=0.61$. Final: $M=5.47$, $SE=0.75$</p>	<p>d=0.20</p> <p>d=0.31</p>

Citation & Category	Intervention	Measures	Results	Effect size
Pesso-Aviv, Regev, & Guttman (2014)	•Each group partook in 10 sessions that were conducted with minimal guidance by the researcher.	•Buss and Perry's questionnaire on the expression of aggression	1. Pencil (N=13) Pre-test: M= 3.07, SD=0.60 Post-test: M=2.09, SD=0.50	d=1.77
Effect size:	•While each group was instructed as to what to draw, these instructions were provided in the form of suggestions, fundamentally giving the children free choice.		2. Oil pastels (N=14) Pre-test: M=2.92, SD=0.44 Post-test: M=2.71, 0.62	d=0.39
Group 1.			3. Gouache paints (N=14) Pre-test: M=3.02, SD=0.68 Post-test: M=2.09, SD=0.50	d=1.55
Good quality Drawing Group 2	•The instructions were identical for the three groups; the groups differed only in the art material they received and the work techniques, which were appropriate to each of the three art materials.	• The State Trait Anxiety Inventory (STAI)	Trait subscale 1. Pencil Pre-test: M=1.68, SD=0.22 Post-test: M=1.66, SD=0.35	d=0.07
Marginal quality			2. Oil pastels Pre-test: M=1.73, SD=0.32 Post-test: M= 1.56, SD=0.46	d=0.43
Group 3:			3. Gouache paints Pre-test: M=1.62, SD=0.25 Post-test: M= 1.56, SD=0.26	d=0.24
Good quality			State subscale 1. Pencil Pre-test: M=1.35, SD=0.12 Post-test: M=1.39, SD=0.16	d=0.28
			2. Oil pastels Pre-test: M=1.33, SD=0.33 Post-test: M=1.33, SD=0.24	d=0
			3. Gouache paints Pre-test: M=1.28, SD=0.30 Post-test: 1.24, SD=0.25	d=0.14
		• The Self Control Questionnaire	1. Pencil Pre-test: M=3.48, SD=0.63 Post-test: M=3.80, SD=0.62	d=0.51
			2. Oil pastels Pre-test: M=3.61, SD=0.94 Post-test: M=3.75, SD=0.91	d=0.15
			3. Gouache paints Pre-test: M=3.88, SD=0.80 Post-test: M=3.54, SD=0.76	d=0.44

Citation & Category	Intervention	Measures	Results	Effect size
Zarezadeh Kheibari (2014)	<ul style="list-style-type: none"> •1x 30-minute session 1. Choose one of 5 activities: Mandala design, painting, collage making, clay, drawing. •Read simple instructions to guide them through the activity 2. Control: sat in comfortable chairs 	<ul style="list-style-type: none"> •The <i>State Trait Anxiety Inventory (STAI) form Y</i> 	1. Pre-test •M=39.6, SD=7.7 Post-test •M=28.8, SD=8.4 2. Pre-test •M=37.2, SD= 8.6 Post-test •M=37.0, SD=9.1	
Zhu, et al. (2014).	Calligraphy: Required to brush write 40 medium-sized Chinese characters.	Experiment 1 •Children's Revised Impact of Event Scale (CRIES-13): behavioural effects. Arousal scale.	Calligraphy: Pre-test: $M=6.30, SD=4.78$ Mid-test: $M=5.64, SD=4.38$ post-test $M=4.84, SD=4.25$	d=0.14 d=0.32
Effect size: Beneficial	<ul style="list-style-type: none"> •1 hour a day •5 days a week •30 days •Teacher supervision if at school •Parent supervision if at home Control: Carried on their regular school activities	Experiment 2 •Salivary cortisol measurement: Stress levels.	Control group Pre-test: $M=5.14, SD=3.18$ Mid-test: $M=4.96, SD=4.03$ Post-test $M=5.10, SD=4.43$ Calligraphy group: Pre-test $M=13.34, SD=2.88$ Mid-test $M=11.61, SD=2.17$ Post-test $M=9.99, SD=1.81$. Control group: Pre-test $M=13.19, SD=2.97$ Mid-test $M=12.63, SD=2.85$ Post-test $M=12.67, SD=2.70$	d=0.05 d=0.01 d=0.68 d=1.39 d=0.19 d=0.18

Citation & Category	Intervention	Measures	Results	Effect size
Cortina and Fazel (2015)	<ul style="list-style-type: none"> •The Art room •1-2 hours •10 weeks 	<ul style="list-style-type: none"> •Strength and Difficulties Questionnaire (SDQ) •The Mood and Feelings Questionnaire-Short Form (sMFQ) 	Pre-test: M=13.87, SD=7.23 Post-test: M=11.6, SD=6.19 Pre-test: M=5.13, SD=5.03 Post-test: M=2.07, SD=2.55	d=0.47 d=0.54
Effect size: Good quality				
Carsley, Heath & Fajnerova (2015)	<ul style="list-style-type: none"> •Both groups were given 15 minutes to colour. 1. Mandala colouring (N=26) Free colouring (N=26) 	<ul style="list-style-type: none"> •State-Trait Anxiety Inventory for children (STAI-C) 	Mandala Pre-test: M=31.77, SD=6.257 Post-test: M=28.92, SD=6.33 Free colouring Pre-test: M=28.31, SD=4.42 Post-test: M=25.85, SD=4.14	d=0.54 d=0.57
Effect size: Good quality				

Citation & Category	Intervention	Measures	Results	Effect size
Savage & Leonard (2015). Effect: High Calibre	<ul style="list-style-type: none"> •Art specialist •Small groups of up to 10 children •45-minute art sessions. •Aim to ensure that art became the medium of interaction with a focus on social inclusion, co-operation and supporting positive pro-social skill development. •Specific art therapy approaches <p>5. •Small group approach for individualised support and tailoring to meet individual needs</p>	<p>Qualitative analysis</p> <p>The classroom teachers interviewed students and the researcher conducted phone interviews with the student's parents. Classroom teachers responded to the researcher's questions by email.</p>	<p>According to the authors the process of art making, making decisions and taking creative risks provided an excellent medium to develop pro-social skills. The art specialist was described as being clearly skilled in both art and building relational skills with the children, and the authors suggested that the children benefited from her guidance. The authors stated that the changes that the students experienced varied, but they all presented with positive change in their behaviour and relationships at school.</p>	Good quality
Ziff, Ivers, & Shaw (2016) Effect size: High calibre	<ul style="list-style-type: none"> • School based • 6-8 children per group • variety of art activities including drawing, painting, finger painting, collage and craft construction. •Facilitated by the school counsellor. 	<ul style="list-style-type: none"> •Fingertip temperature 	<p>$t(38) = -6.952, p = .000$</p>	$d=2.23$

Citation & Category	Intervention	Measures	Results	Effect size
Rosal (1993) Group 2.	<u>All Sessions</u> 20 sessions 50 min/session 2 sessions /week	Children's Nowicki Strickland Internal-External Locus of Control (CNS-IE)	No improvement F(2,33)=0.43, P=0.05	d=.32
Effect size: Beneficial	10-weeks. (1) Cognitive behaviour art therapy N=12 •therapist directive activities: •muscle relaxation •imagery activity •therapist selected different art materials/session •discussion. (2) Arts and crafts activity N=12 •Nondirective therapist •A variety of art materials available every session (3) Control Group N=12 •No activity	Teacher Rating Scale (TRS) – measure of problem behaviour A personal construct drawing interview (PCDI)- evaluate/ interpret attitudes towards self.	Improved diagnosis F(2,33)=4.04, p=0.05. Researchers interpretation was that both Groups 1 and 2 showed positive changes in attitudes to school, increased intrapersonal understanding, and increased understanding of problem behaviour.	d=.821 d= N/A

Citation & Category	Intervention	Measures	Results	Effect size
Smitherman-Brown & Church (1996) Effect size: N/A	<p>Experimental group: N= 4</p> <ul style="list-style-type: none"> •Free-choice circular drawing for first 5 minutes before artwork. •Began in the centre of the circle and drew whatever he/she wished. •Free choice of artwork/art materials for the remainder of the session. <p>Control group: N=4</p> <ul style="list-style-type: none"> •Nondirective art therapy techniques. •Not introduced to the mandala exercise. <p>All groups: Every 2 months all the students completed the task, “Draw a person picking an apple from a tree.”</p>	<p>Baseline data: historical and observable patterns of behaviour and Child Behavioural Checklist (CBCL)</p> <p>Intervention data:</p> <p>Teacher observation: pre- and post-checklist on attention and impulsivity</p>	<p>According to the researchers, comparison of the Baseline Performance Data Over Time between experimental and control subject groups showed an increase in attention span and a decrease of impulsive behaviours in all participants. The experimental group, however, improved attention span after introduction of the intervention by an average of 23% while the increase in attentional span observed in the control group averaged a bit less than 10%. A decrease in impulsivity of 24% was observed in the experimental group and a decrease of 12% within the control group. However, no scores were provided.</p>	N/A
Kearns, D. (2004). Effect calibre: Good	<ul style="list-style-type: none"> •20 minute sessions •Brief verbal check-in, selected his materials, engaged in his art or pre-art activity, transition to the classroom on school bell. •Oil-based clay work, finger painting, and easel painting for various types of kinaesthetic stimulation in addition to visual stimulation. 	<ul style="list-style-type: none"> •Classroom observation <p>Behaviour rated by teacher and recorded.</p>	<p>No data reported. According to the researchers, Michael’s teacher rated his behaviour positive for more blocks of the day when his morning check-in session included art activities. He was able to maintain positive behaviours 20 mins longer after easel painting than clay (finger painting fell in the middle).</p>	Good quality

Citation & Category	Intervention	Measures	Results	Effect size
Lyshak-Stelzer, Singer, Patricia & Chemtob, 2007).	All sessions •One-hour group session/week •16 weeks 1. TF-ART: N=14 Registered art therapist. Collages or drawings compiled in a book format to express “life story.” Share trauma-related experiences and describe coping responses.	•UCLA PTSD Reaction Index for DSM-IV, Child Version: PTSD symptoms in 7-12 year olds.	Group 1. TF-ART Pre-intervention: $M=58.1, SE=4.0$. Post-intervention: $M=37.1, SE=2.9$.	$d=1.67$
Group 2. Effect size: Poor	2. TAU-ART: N=15 2 sessions each: sewing pillows; making jewellery; making a ceramic coil-bowl and slab-box; creating a mosaics tile tray; making lanyard craft; creating decoupage and stained wooden plaques; stitching leather purses; and making decorations.		Group 2. TAU Pre-treatment: $M=58.1, SE=3.9$. Post treatment: $M=55.6, SE=2.8$.	$d=0.20$

Citation & Category	Intervention	Measures	Results	Effect size
Drake & Winner, (2013) Study 1. Effect size: Group 1 & 2 Highest calibre	•Study 1.	To assess mood, the children were presented with five schematic faces ranging from very sad to very happy. Children were asked to select the face that represented how they were feeling.	1. Vent Condition 6-8 year olds (N=23) Pre-test: M=2.13, SD=0.82 Post-test: M=3.57, SD=0.99	d=1.58
	• Children were asked to think of a time they really wanted something good to happen, but it didn’t, so they were upset and disappointed.		8-10 year olds (N=20) Pre-test: M=2.10, SD=0.91 Post-test: M=3.30, SD=0.80	d=1.40
	• Children then engaged in the drawing activity.		2. Distraction Condition 6-8 year olds (N=20) Pre-test: M=2.35, SD=1.04 Post-test: M=4.30, SD=0.77	d=2.13
	4. Children in “vent” condition were given 5 minutes to draw the event they had thought of.		8-10 year olds (N=20) Pre-test: M=1.75, SD=0.55 Post-test: M=3.60, SD=0.68	d=2.56
	5. Those children in the “distraction” condition were given 5 minutes to draw a house.			

Citation & Category	Intervention	Measures	Results	Effect size
Drake & Winner, (2013) Study 2. Group 3 Effect size: Highest calibre	<ul style="list-style-type: none"> •Study 2. •Same as study, except for the addition of the copying condition. 3. Children in the copying condition were instructed to copy drawings of common objects (e.g. teapot, toaster) for 5 minutes. 	<p>To assess mood, the children were presented with five schematic faces ranging from very sad to very happy. Children were asked to select the face that represented how they were feeling.</p>	<ul style="list-style-type: none"> •Study 2. 1. Vent Condition 6-8 year olds (N=20) Pre-test: M=2.25, SD=0.91 Post-test: M=3.85, SD=1.04 	d=1.64
			<ul style="list-style-type: none"> 8-10 year olds (N=20) Pre-test: M=2.25, SD=0.51 Post-test: M=3.18, SD=1.01 	d=2.75
			<ul style="list-style-type: none"> 2. Distraction Condition 6-8 year olds (N=20) Pre-test: M=1.90, SD=0.85 Post-test: M=4.25, SD=0.72 	d=2.98
			<ul style="list-style-type: none"> 8-10 year olds (N=22) Pre-test: M=2.25, SD=0.72 Post-test: M=4.20, SD=0.70 	d=2.98
			<ul style="list-style-type: none"> 3. Copying Condition 6-8 year olds (N=18) Pre-test: M=2.61, SD=0.92 Post-test: M=3.94 SD=0.83 	d=1.51
			<ul style="list-style-type: none"> 8-10 year olds (N=23) Pre-test: M=2.52, SD=0.79 Post-test: M=4.00, SD=0.67 	d=2.02

Citation & Category	Intervention	Measures	Results	Effect size
Yount, Rachlin & Siegel (2013).	<ul style="list-style-type: none"> •One 45-minute art session •Participants had the option of using collage, model magic clay, fine-tip markers, or a combination. 	Salivary cortisol	Salivary cortisol: Treatment group initial: $M=6.89, SE=1.72$ Final: $M=5.94, SE=0.93$.	d=0.20
Effect size: Poor	<ul style="list-style-type: none"> •13 collage •9 clay •6 markers •4 markers and clay •3 collage and clay •3 collage and markers •1 all media 		Control group: Initial: $M=4.77, SE=0.61$. Final: $M=5.47, SE=0.75$	d=0.31

Citation & Category	Intervention	Measures	Results	Effect size
Zarezadeh Kheibari et al. (2014)			1. art group Pre-test M=39.1, SD=5.8 Post-test M=33.3, SD=6.1	d=0.97
Effect size: Beneficial			2. Control group Pre-test M=38.2, SD=10.2 Post-test M=37.3, SD=11.2	d=0.08
Zhu, et al. (2014).	Calligraphy: Required to brush write 40 medium-sized Chinese characters.	Experiment 1 •Children's Revised Impact of Event Scale (CRIES-13): behavioural effects. Arousal scale.	Calligraphy: Pre-test: $M=6.30$, $SD=4.78$ Mid-test: $M=5.64$, $SD=4.38$ post-test $M=4.84$, $SD=4.25$	d=0.14 d=0.32
Effect size: Beneficial	•1 hour a day •5 days a week •30 days •Teacher supervision if at school •Parent supervision if at home		Control group Pre-test: $M=5.14$, $SD=3.18$ Mid-test: $M=4.96$, $SD=4.03$ Post-test $M=5.10$, $SD=4.43$	d=0.05 d=0.01
	Control: Carried on their regular school activities	Experiment 2 •Salivary cortisol measurement: Stress levels.	Calligraphy group: Pre-test $M=13.34$, $SD=2.88$ Mid-test $M=11.61$, $SD=2.17$ Post-test $M=9.99$, $SD=1.81$.	d=0.68 d=1.39
			Control group: Pre-test $M=13.19$, $SD=2.97$ Mid-test $M=12.63$, $SD=2.85$ Post-test $M=12.67$, $SD=2.70$	d=0.19 d=0.18

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Effect size: Good quality				

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Ziff, Ivers, & Shaw (2016) Effect size: High calibre	<ul style="list-style-type: none"> • School based • 6-8 children per group • variety of art activities including drawing, painting, finger painting, collage and craft construction. •Facilitated by the school counsellor. 	<ul style="list-style-type: none"> •Fingertip temperature 	<p>$t(38) = -6.952, p = .000$</p>	$d=2.23$

