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PTSD FOLLOWING A WILDFIRE: EFFICACY OF EMDR AND PLAY THERAPY AND IMPLICATIONS OF ADVERSE CHILDHOOD EXPERIENCES

Abstract:
Natural disasters affect thousands of people every year and are known to cause posttraumatic stress disorder (PTSD) in approximately 40% of those affected. Eye movement desensitization and reprocessing therapy (EMDR) has emerged as one of the most effective treatments for PTSD and PTSD following a natural disaster. Existing literature demonstrates the differences in treating children with trauma, as children lack the cognitive abilities to process trauma in the same manner as adults. Play therapy allows for children to appropriately process trauma. The experience of adverse childhood experiences (ACEs) is known to have lifelong negative implications for both physical and mental health, however it is unknown how ACEs impact the severity of PTSD in those affected by a natural disaster. Following a major wildfire in Southern California, 113 participants were analyzed and given free EMDR (N = 96) and play therapy (N = 15) treatments for PTSD as measured by scores on the Trauma Screening Questionnaire (TSQ). It was predicted that EMDR and play therapy would be effective in reducing PTSD and that the number of clinically significant ACEs would be positively correlated with PTSD severity in adult participants. Both EMDR and play therapy significantly reduced PTSD and TSQ scores at post-test, however no significant relationship was found between ACEs and PTSD severity in the participants analyzed. Limitations are discussed in regards to participant retention and accuracy of self-report measures for PTSD.

Keywords: *PTSD, natural disasters, EMDR, play therapy, ACEs*

Introduction:

Posttraumatic Stress Disorder (PTSD) is defined as the experience of intrusive thoughts, dreams, flashbacks, or prolonged psychological distress after undergoing or witnessing a traumatic event (American Psychiatric Association [APA], 2013). PTSD is also marked by negative mood and beliefs about oneself and their environment, avoidance of stimuli associated with the event, and changes in level of physiological arousal including disturbances in sleep patterns (APA, 2013). PTSD can have prolonged effects on a person's mental health. Traumatic events and PTSD also increase a person's risk for suicide ideation and attempts and increase comorbidity of other disorders such as depression and anxiety (APA, 2013). Not only does PTSD affect mental health, but it can negatively affect physical health and well-being. Longitudinal research shows a significant relationship between PTSD severity

and physical functioning during annual follow-up sessions (Ahmadian, Neylan, Metzler, & Cohen, 2019).

It is well-documented that natural disasters, such as wildfires, hurricanes, earthquakes, floods, and tsunamis can cause tremendous psychological distress, trauma, and related post-traumatic stress disorder in those affected by the disaster. It is estimated that approximately 20-40% of those directly affected by a natural disaster will develop PTSD, with thousands of people affected by natural disasters every year (Baral & K.C., 2019; Neria, Nandi, & Galea, 2008). Those who experience high losses as a result of the disaster (i.e. the destruction of a home or death of a loved one) report higher levels of PTSD (Jones, Ribbe, Cunningham, Weddle, & Langley, 2002). PTSD that results from a natural disaster, as opposed to other trauma sources, has been shown to alter the functioning of cerebral networks that are involved in spatial sequencing and topographical memory, indicating the need for specialized treatment (Piccardi, et al., 2016). In children and adolescents, exposure to a natural disaster trauma can lead to heightened levels of anxiety and PTSD as a result of their altered sense of safety and mortality in their experience of the world around them (Weems, Russell, Neill, Berman, & Scott, 2016). If not treated, PTSD rates can remain high and symptoms can last for upwards of three years following the natural disaster, indicating the need for adequate treatment for survivors (Rafiey, Alipour, LeBeau, & Salimi, 2019).

Adverse Childhood Experiences:

Adverse Childhood Experiences (ACEs) and childhood trauma can have a prolonged impact on the health and well-being of the child well into adulthood. Examples of ACEs include the experience within the first 18 years of life of physical, verbal, emotional, or sexual abuse by an adult in the household, neglect, parental divorce, parental incarceration, and alcohol or substance abuse (ACEs Questionnaire). Previous research has shown that adverse childhood experiences can have a negative effect on later adult physical and psychological well-being. Those who report having experienced four or more ACEs are 4-12 times more likely to be at risk for alcoholism, drug dependency, depression, and suicide attempts (Felitti, Anda, Nordenberg, Williamson, Spitz, Edwards, Koss, & Marks, 2019). Over the lifespan of adults, those who report ACEs have been shown to have significantly lower life satisfaction, psychological well-being, and social well-being (Mosley-Johnson, Garacci, Wagner,

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Mendez, Williams, & Egede, 2018). A higher ACE score is related to poorer quality of life in terms of lower SES, higher levels of adversity, and diminished resources for dealing with adversity in adulthood.

ACEs have been shown to have significant association with indicators of impaired mental health in adulthood (Nurius, Green, Logan-Greene, & Borja, 2015). As ACEs score increases, so do the odds of experiencing drug and alcohol use, suicide attempts, and depression (Merrick, Ports, Ford, Afifi, Gershoff, & Grogan-Kaylor, 2017). In addition to depression and substance abuse, those who experienced adverse events during childhood are more likely to experience PTSD if exposed to trauma in adulthood, with stronger effects occurring for those who experienced sexual or emotional abuse as children (Wu, Schairer, Dellor, & Grella, 2010; Messman-Moore & Bhuptani, 2017). In a study of deployed troops, those with two or more adverse childhood experiences were at increased risk for meeting standards for clinical depression and PTSD and ACEs were a significant predictor of PTSD and depression symptoms in general (Cabrera, Hoge, Bliese, Castro, & Messer, 2007). PTSD symptoms are best predicted by a higher number of ACEs, regardless of the age of the child during the experience (Schalinski, Teicher, Nischk, Hinderer, Muller, & Rockstroh, 2016).

EMDR as Treatment for PTSD:

Eye movement desensitization and reprocessing (EMDR) therapy is an approach developed by Francine Shapiro (1989) used by psychotherapists in treating numerous disorders, especially PTSD. EMDR has proven to be significantly effective in treating PTSD at both clinical and sub-clinical levels and psychological distress following traumas (Lee & Cuijpers, 2014). After a single-incident traumatic event, high rates of remission from sub-threshold PTSD were achieved using EMDR (Roos, Oord, Zijlstra, Lucassen, Perrin, Emmelkamp, & Jongh, 2017). EMDR is widely popular as a treatment for PTSD because it has shown to hold long-term effectiveness after a limited number of treatment sessions. Schubert et al., (2016) found a significant reduction in PTSD symptoms at a 3-month follow-up after a short treatment period of four sessions over the span of 13 days. In comparison to other treatment options for PTSD such as cognitive behavioral therapy (CBT), EMDR has been found to be as effective as trauma-focused CBT and exposure therapy and more effective than other therapies and stress management (Bisson, Ehlers, Matthews, Pilling, Richards, & Turner, 2007).

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EMDR has also shown to significantly reduce feelings of distress and PTSD symptoms in participants affected by natural disasters. A study of survivors of a major hurricane found that those treated with EMDR sessions had significant improvements in PTSD symptoms compared to controls (Grainger, Levin, Allen-Byrd, Doctor, & Lee, 1997). A review of eight studies on the use of EMDR in treating PTSD following natural disasters found clinical and statistical significance in the reduction of PTSD symptoms as well as reductions of anxiety, fear, depression, and phobia across age groups (Natha & Daiches, 2014). An approach that provided treatment within three months of a devastating earthquake suggested that, because of the short timespan between the trauma and treatment, reduction in PTSD symptoms were a result of EMDR and not merely the lapse of time (Saltini, Rebecchi, Callerame, Fernandez, Bergonzini, & Starace, 2018).

Trauma in Children:

Children experience trauma differently than adults as a result of the inability to process events and cope in the same manner as adults due to limited developmental abilities in abstract thinking, cognition, and language (Ogawa, 2004). This is especially prevalent when children experience traumas at a very early age before the development of verbal language (Van der Kolk, 2014, as cited in Spiel, Lombardi, & DeRubeis-Byrne, 2019). Therefore, different courses of treatment are needed in children. Proper treatment is imperative to the development of the child, as prolonged stress caused by the trauma can result in changes to the still-developing nervous system (Ryan, Lane, & Powers, 2017).

Play Therapy:

Play therapy works in treating trauma in children because it provides a way for the child to express their feelings about and re-create and play out the traumatic event in a way that they are able to process (Ryan & Needham, 2001). Unstructured play allows children to benefit from the expression and release of feelings about their situation and create more positive outcomes for their self-projected characters (Nabors, Bartz, Kichler, Sievers, Elkins, & Pangallo, 2013). Because play is such a natural and comfortable setting for children, it offers them the chance to sift through and learn about their thoughts, fears, and memories in an environment safe to them (Nabors et al., 2013). The relatively unstructured nature of play therapy allows the therapist to tailor the play and treatment to fit the needs and likings of the child. Play therapy has been proven effective in reducing symptoms of PTSD, anxiety, and

depression to non-clinically significant ranges (Reyes & Asbrand, 2005). Additionally, play therapy has emerged as one of the leading treatments for children dealing with trauma and PTSD as the result of natural disasters and other single-event traumas (Jordan, Perryman, & Anderson, 2013).

Background: The Woolsey Fire

On November 8, 2018 a wildfire ignited in the canyons outside the city of Malibu, California. By the next morning, the fire had grown drastically and prompted the evacuation of the entire city of Malibu and surrounding areas, causing thousands of residents to leave their homes. The fire spread rapidly, fueled by dry conditions and wind gusts up to 60 mph. The fire destroyed 1,500 structures, including many homes and businesses within the city of Malibu. By the time the fire was contained on November 21, 2018, it had burned over 96,000 acres and resulted in three fatalities (State of California, 2019). Thousands of people were exposed to the psychological trauma of fear of death and physical injury and the devastating loss of property and assets.

Hypotheses:

The major goal of this study was to examine the effects of EMDR and play therapy on the elimination of PTSD symptoms in adults and children who lost their homes in the wildfire. Specifically, it was expected that EMDR therapy would reduce or eliminate PTSD symptoms (<6 on the Trauma Screening Questionnaire). It was also expected that adults who reported a higher ACE score would therefore report more symptoms of PTSD and higher levels of trauma from the fire. Because of the inclusion of children in this study, it was separately hypothesized that a play therapy approach would reduce trauma symptoms in children.

Hypothesis 1: PTSD will be reduced or eliminated using EMDR
Hypothesis 2: high ACES scores = more traumatized from the fire
Hypothesis 3: Play therapy will reduce PTSD in children

Method

Participants:

Target subjects for this study were families from the Malibu community who lost their homes during the

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November wildfire. Participants were recruited to the study through various community outreach events, social media and email marketing, and word-of-mouth throughout the community advertising free therapy sessions to those who lost their homes in the fire. 165 participants, adults and their children from the city of Malibu and surrounding Santa Monica Mountain areas, initially expressed interest in receiving free treatment and were admitted into the program. Of the initial participants, 115 were female and 48 were male. 87 initial participants were located in the city of Malibu and 76 were located in the surrounding Santa Monica Mountain areas, with a majority of those in the surrounding areas living in middle and low-income housing prior to the fire. However, several participants were unable to attend all ten therapy sessions primarily because they responded to the availability of the free therapy toward the closing of the program. Some chose to terminate treatment early for various personal reasons. Participants were excluded from data analysis if they chose to terminate therapy sessions early or if they were missing data in pre-test or post-test scores. The data from 25 children were excluded from this report as trauma levels were not evaluated at both the beginning and end of treatment. Therefore, the participants included in analysis were 113 individuals, with 98 adults and 15 children.

Measures:

Data collection began approximately two months after the fire and ended approximately eight months after the fire. Participants completed the Trauma Screening Questionnaire (TSQ) as a measure of PTSD. The TSQ is a short self-report consisting of 10 items that respond to the DSM-IV criteria for re-experiencing symptoms of PTSD (5 items) and arousal symptoms of PTSD (5 items). Participants are asked to respond yes or no as to whether they have experienced the listed reactions at least twice in the past week. Scores range from 0-10. In accordance with TSQ scoring and interpretation, participants answering ‘yes’ to 6 or more of the listed reactions are indicated as having PTSD. Participants completed the TSQ twice over the course of treatment, once before the start of treatment and once at the completion of treatment in order to measure changes in PTSD symptoms as a result of treatment.

Participants completed the ACEs questionnaire as a measure of undergoing adverse childhood experiences before beginning treatment sessions. Two different ACEs questionnaires were utilized: a long version of the questionnaire with 30 questions being analyzed and a short version of the

questionnaire with 10 questions being analyzed. For our purposes of data collection, we concluded that answering 'yes' or an affirmative ('many times', 'a few times', 'once') in questions that ask frequency to 30% or more of the questions on either of the ACEs questionnaires would be counted as having experienced a high number of ACEs as a child. Therefore, answering 'yes' or affirmative answers to 9 or more questions on the 30-question ACEs questionnaire or answering 'yes' or affirmative answers to 3 or more questions on the 10-question ACEs questionnaire were defined as clinically significant. For data analysis purposes, scores from the 10-item questionnaire were multiplied by three, making them equal to the scores of the 30-item questionnaire. ACEs questionnaires were utilized only with adult participants and were not given to any children participants because of the nature of the questionnaire.

Procedures:
All EMDR and play therapy treatment sessions took place in several offices in the Malibu area. Therapy sessions were completed by 11 licensed EMDR therapists, with sessions lasting for an average of 90 minutes. All participants were offered ten free therapy sessions as part of the program. EMDR procedures followed the standard 8-step protocol outlined by Shapiro (2001) of history taking, treatment planning, preparation, reprocessing, installation of a positive cognition, check for and processing any residual disturbing body sensations, and positive closure and evaluation.

Play therapy sessions lasted for a total of 60 minutes each session for ten total sessions. 20 child participants were treated with play therapy. Play therapy sessions were conducted by four play therapists. Children treated with play therapy were only treated with play therapy and did not partake in EMDR therapy. Children were engaged in a number of different play and art activities as a part of their treatment. Examples of art activities included having the children draw pictures of their experience during the fire and then drawing a subsequent picture of themselves in a safe place. Other art therapy activities involved having the children make stress balls while therapists taught and practiced mindfulness techniques with them. Children also played therapeutic games, such as tossing a ball around with a therapist and saying what they were feeling when they caught the ball. A total of 20 children were given play therapy treatment. Five children, however, did not complete the post-test TSQ

or their parents chose to terminate their treatment early. Therefore, the data from 15 of the participants will be analyzed in this report.

Results:

The pre-test screening of PTSD using the TSQ showed that 81 total participants (72%) met criteria for PTSD (a TSQ score of 6 or higher) and that 32 total participants (28%) did not meet criteria for PTSD (a TSQ score lower than 6). Following ten sessions of treatment, post-test TSQ scores showed that 24 participants (21%) still met criteria for PTSD and 89 participants (79%) no longer met criteria for PTSD. Therefore, PTSD was eliminated in 59 participants. 11 participants still met criteria for PTSD but experienced a decrease in TSQ score between the pre-test and post-test. Overall, 94 participants saw a decrease in TSQ score between the pre-test and post-test (96%) Of the 96 adults treated with EMDR, 80 saw an improvement in TSQ scores and 56 who were indicated as having PTSD at pre-test no longer qualifying at post-test.

Table 1: Total participant TSQ scores:

PTSD	M	SD	Yes (≥6)	No (<6)
Pre-test	6.55	2.27	81	32
Post-test	3.56	2.82	24	89

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Table 2: Improvements in PTSD:

	Lower TSQ	Same TSQ	Higher TSQ	No longer have PTSD	Still have PTSD
All	94	11	8	59	22
EMDR	80	9	7	56	16
Play Therapy	13	2	0	3	5

64% of adult participants (N=51) indicated a clinically significant number of adverse childhood experiences. On average, participants reported exposure to M = 8.98 (SD = 6.28) adverse childhood experiences. Of the 72 participants who indicated had TSQ scores indicating PTSD at pre-test, 44 of them (61%) also had a clinically significant number of ACEs. Of the 96 adult participants included in this report, 5 were did not complete an ACEs questionnaire and were therefore excluded from ACEs score analysis. Small positive correlations were found between number of ACEs and PTSD symptoms at pre-test ($r = .103$,) and at post-test ($r = .107$), however they were not significant values ($p = .330$; $p = .314$) Therefore the hypothesis that a higher ACEs score would be positively correlated with the number of PTSD symptoms was rejected.

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Table 3: Participants with clinically significant ACEs:

ACE score	N
≥9	51
<9	40

Of the children treated with play therapy (N=15), all participants saw either an improvement in TSQ scores (N=13) or no change in TSQ (N=2). No participants reported an increase in TSQ scores. 3 participants who had TSQ scores indicating PTSD at pre-test no longer had so at post-test.

Table 4: Play Therapy TSQ scores

PTSD	M	SD	Yes (≥6)	No (<6)
Pre-test	6.13	3.18	8	7
Post-test	3.73	3.69	5	10

Discussion:

This study provides evidence that EMDR therapy is effective in the treatment of PTSD symptoms from the single-event trauma of a natural disaster. Consistent with our first hypothesis, EMDR therapy was effective in alleviating symptoms of trauma and PTSD in adults who lost their homes to wildfire. PTSD scores decreased from pre-test to post-test in 96% of those studied. PTSD was completely eliminated in 78% of EMDR treated participants who indicated PTSD at pre-test. The majority of participants saw a

decrease in PTSD symptoms as measured by pre-test and post-test TSQ scores. A significant number of participants who met criteria for PTSD at the start of treatment no longer met criteria at the end of treatment. These results are consistent with previous findings on the efficacy of EMDR to treat PTSD symptoms (Grainger, Levin, Allen-Byrd, Doctor, & Lee, 1997; Natha & Daiches, 2014; Saltini, Rebecchi, Callerame, Fernandez, Bergonzini, & Starace, 2018). Our second hypothesis that those who had adverse childhood experiences would report more PTSD symptoms could not be proven. No significant correlations between number of adverse childhood experiences and PTSD were found at either pre-test or post-test. Our third hypothesis that play therapy would be effective in reducing PTSD in children was supported. The majority (87%) of participants saw a decrease in TSQ scores between pre-test and post-test, indicating improvement in PTSD consistent with findings by Reyes and Asbrand (2005) and Jordan, Perryman, and Anderson (2013).

While a majority of participants reported a decrease in the number of PTSD symptoms, three participants reported that an increase or no change in the number of PTSD symptoms. These findings can be explained by a delay in onset of PTSD symptoms as reported by participants. Some participants reported that they felt “numb” when completing the pre-test and were experiencing a delay in onset of symptoms. It is possible that these participants did not fully feel the traumatic effects of the fire when taking the pre-test and therefore could not accurately self-report PTSD symptoms. However, when completing the post-test after the self-realized onset of symptoms, these participants were more likely to report more symptoms of PTSD.

Limitations:

There were several limitations to the study, especially in regards to participant retention. Several participants did not complete all therapy sessions, did not complete both the pre-test and post-test, did not complete an ACEs questionnaire, or chose to terminate treatment. Therefore, the total number of participants with data included was reduced from 165 to 113. Participants noted scheduling complications and the needs to prioritize other tasks associated with the chaotic aftermath of the fire, such as insurance and legal complications and relocation due to displacement from the fire, as reasons for terminating treatment or not attending all therapy sessions. We also interpret these results as such because of the nature of the free therapy: because people were not paying for it, they did not feel as

much commitment to show up to every therapy session. It is also relevant to note that there were a four participants who received more than ten sessions because of a switch in therapists. These participants were originally paired with a therapist who was not the right fit for them personally, therefore they were transferred to another therapist who was a better fit. As a result of the transfer, the participants were given extra sessions to complete all eight stages of the EMDR therapy.

It is also possible that participants did not accurately report symptoms during the initial pre-test because of the delay between the actual wildfire and the beginning of treatments. While the wildfire burned during mid-November, the first treatments did not begin until mid-January. It is possible that overall two month time-lapse from November to January accounted for a lower self-report of PTSD symptoms during the pre-test. Participants may have reported more PTSD symptoms if pre-tests and treatments started sooner after the onset of the trauma.

While the results from this study show the effectiveness of EMDR and play therapy in treating the trauma of a natural disaster, it should be noted that the sample size of those who received play therapy was much smaller than the EMDR sample. Further research should be conducted with a significantly larger sample size to determine the efficacy and validity of play therapy in the treatment of posttraumatic stress disorder in the wake of a natural disaster.

Conclusions:

This study of PTSD following a large wildfire demonstrates that EMDR and play therapy approaches are effective in reducing PTSD symptoms. However, our findings cannot conclude the existence of a relationship between adverse childhood experiences and experience of PTSD later in adulthood following a natural disaster.

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