“NATURAL DISASTERS, CAR ACCIDENTS, AND BOAT CRASHES! OH MY!”

THE LONG TERM PSYCHOLOGICAL AND PHYSIOLOGICAL EFFECTS OF NON-ABUSE TRAUMA IN CHILDHOOD

By

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Abstract

Over the last century the leading cause of death in the United States has moved from infectious diseases to heart disease (Tippett, 2010). Heart disease, among other chronic diseases (e.g., diabetes, cancer), is affected by personal behavior choices (e.g., tobacco use, diet, alcohol use, number of sexual partners and sexually transmitted diseases) (Leather, 2009). With this shift in causes of mortality, the question becomes what leads to the risk-taking behavior that can lead to chronic disease? Although both abuse and non-abuse trauma in childhood can lead to risk taking behavior, abuse trauma has received much more attention. This paper will review the important research studies concerning non-abuse trauma. As a comparison, the first section will review research from the Adverse Childhood Experiences study, which draws a strong connection between childhood abuse trauma, risk taking behaviors and chronic health problems. The second will review research related to betrayal trauma, which is not necessarily related to childhood abuse. The third section will address Post Traumatic Stress Disorder (PTSD) developed following natural disasters, traffic accidents, and PTSD following major accidents. This paper concludes with a focus on the future implications for both research and post trauma childcare for caregivers and medical providers.

In 1998, researchers from the Center for Disease Control (CDC) and Kaiser Permanente published an article that presented findings from a large-scale research study concerning the potential risk factors for developing high risk behaviors which then lead to chronic health problems (Felitti et. al, 1998). The study findings suggested a strong correlation between different types of traumas experienced in childhood and high-risk behaviors leading to chronic health problems in adulthood. The researchers identified the 10 most significant traumas and developed the Adverse Childhood Experiences Survey (Violence Prevention, 2016). An Adverse Childhood Experience is defined as any of the following: physical abuse, emotional abuse, sexual abuse, mother treated violently, substance abuse or mental illness of someone in the household, parental separation or divorce, criminal behavior by a household member, emotional neglect, and physical neglect. The researchers found that an increase in the number of Adverse Childhood Experiences (ACEs) a person reported was correlated with an increase in high risk behaviors and chronic health conditions later in life. The 10 high risk behaviors included in this study are smoking, severe obesity, physical inactivity, depressed mood, suicide attempts, alcoholism, any drug use, parental drug abuse, a high lifetime number of sexual partners, and a history of a sexually transmitted disease. Individuals who reported 4 or more ACEs had an 86% chance of having at least one high risk behavior as compared with 44% for those reporting no ACEs These results led to an understanding of the importance of childhood traumas in predicting risky behaviors.

Researchers associated with the Center for Disease Control (CDC) and Kaiser Permanente have also explored how the ACEs relate to Post Traumatic Stress Disorder (PTSD) and find the ACEs to be statistical significantly correlation with PTSD (Brockie et. al, 2015), there are experiences not included in the ACE survey that may also relate to PTSD. For example, researchers conducted a study in Sri Lanka found that children reported they felt more traumatized by a tsunami and the outcomes from it than parental violence or drug use (Catani, Jacob, Schauer, Kohila, & Neuner, 2008).

Although the work conducted by researchers associated with the ACE study was an important start to understanding the importance of traumas experienced as a child, a child can develop symptoms of Post-

Traumatic Stress Disorder (PTSD) from other life events not included in the ACE Survey, such as surviving a natural disaster (McDermott et. al, 2005) or major car accident (Mirza, Bhadrinath, Goodyer, & Gilmour, 1998). The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-V) defines PTSD as exposure to death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence that is persistently re-experience through intrusive thoughts, nightmares, flashbacks, emotional distress, or physical reactivity such as irritability/aggression, risky behavior, hypervigilance, heightened startle reaction, difficulty concentrating, or difficulty sleeping. The DSM-V states these symptoms must persist more than a month and create distress or functional impairment without being the result of medication, substance abuse, or other illness (American Psychiatric Association, 2013).

Despite these studies, the correlation between trauma experiences that result in PTSD symptoms and risk-taking behavior is not consistent. For example, children that experience trauma in the form of abuse have higher correlation with health issues in adulthood than those children that survive an accidental trauma. This difference in correlations is argued to be related to the Betrayal Trauma Theory (Fryed, Klest, & Allard, 2005). The betrayal trauma theory posits that a trauma in which an individual or institution that a person depends on for survival harms or violates them in some way that results in damage to the person's well-being, relationships, self-concept, beliefs about others and the world, physical injury, or even death. (Fryed et. al, 2005). For example, while the children who survived a Nicaraguan hurricane had as a high as 95% reporting at least one PTSD symptom (Catani et. al, 2008), the likely correlation with long term physical or mental health problems is lower because there is no person or institution that betrayed them. Although their correlation to health issues as an adult is lower, it still is present and statistically significant (Fryed et. al, 2005).

This literature review explores the relationship between non-abuse related traumas experienced in childhood, specifically natural disasters and severe car accidents, and long-term PTSD symptoms that lead to risk taking behavior which can increase a person likelihood for chronic disease. As a comparison,

the first section explores the development of the ACEs Survey, which is related to abuse traumas. The second section will review research related to the theory of betrayal trauma as a potential theory for why abuse trauma has a stronger relationship to PTSD symptoms. The third section will address PTSD developed following natural disasters, traffic accidents, and major accidents. This paper concludes with a focus on the future implications for both research and post-trauma childcare for caregivers and medical providers.

I. Adverse Childhood Experiences

In the 1990s, medical professionals began to notice that increasingly mortality was positively correlated with the consequences of risk taking behavior rather than disease (McGinnis & Foege, 1993). At this time sociologists and psychologists had already published findings concerning the long-term effects/consequences of child abuse (Beitchman et. al, 1992; Egelend, Sroufe, & Erikson, 1983; Finkelhor & Browne, 1985), but with little evidence of how these traumas tied into medical problems in adulthood. Furthermore, there was little interest in this field of research because it did not directly affect most primary care providers (Hibbard, Ingersoll, & Orr, 1990). Researchers at the CDC and Kaiser-Permanente found they continued to have patients at an obesity clinic that could lose weight but could not keep it off. They decided to conduct detailed clinical interviews with the patients to determine if they could find a potential reason for this problem. What they learned is that each of these patients had a history of childhood trauma. The researchers then developed a program of research focused on gaining a better understanding of the relationship between adverse childhood experiences, risk taking behavior, and, ultimately, mortality.

Felitti and his colleagues conducted their research at the Kaiser Permanente's San Diego Health Appraisal Clinic. The sample included 8,056 patients (Felitti et. al, 1998). The first study questionnaire was constructed using questions from various abuse and trauma questionnaires (Baker, Straus, & Gelles, 1991; Wyatt, 1985; National Center for Health Statistics, 1991). The second part of the original survey,

pertaining to health-risk behavior and health problems, was developed from several risk behavior and health surveys (Siegel, Fraier, Mariolis, Brackbill, & Smith, 1993; Crespo, Keteyian, Heath, & Sempos, 1996; Felitti et. al, 1998).

The risk behaviors were then narrowed to 10 that contribute to the leading causes of morbidity and mortality in the United states: smoking, sever obesity (a body mass index equal or greater than 35 kg/meter2), physical inactivity (no participation in recreational physical activity in the past month), depressed mood, suicide attempts, alcoholism, drug abuse, parental drug abuse, a high lifetime number of sexual partners, and a history of a sexual transmitted disease. Any diseases the participants had were determined by the clinic questionnaire; including ischemic heart disease, cancer, stroke, chronic bronchitis, or emphysema (Felitti et. al, 1998).

The results of this research showed a significant probability that if a person reported one category of childhood trauma they had a 65-93% of exposure to another category. The researchers also found that there were fewer categories of exposure among older people, White or Asian people, and college graduates. The survey also revealed that there was an increased prevalence and risk (adjusted odds ratio) of the questioned risk behaviors ranging from 1.3 for physical activity to 12.2 for suicide attempts when comparing a person with 4 or more exposures to a person with none (Felitti et. al, 1998). This indicates a strong correlation between the number of childhood exposures and the number of health risk behaviors for leading causes of death in adults. While 56% of participants with no exposures had no risk behaviors, only 14% of participants with 4 or more exposures had no risk behaviors (Felitti et. al, 1998).

The results also had a strong positive relationship between childhood exposures and chronic disease conditions; the odds ratios ranged from 1.6 for diabetes or skeletal fractures to 3.9 for chronic bronchitis (Felitti et. al, 1998). The logistic regression models found a strong dose-response relationship between number of childhood exposures and the each of the 10 risk behaviors, as well as a significant does-response relationship between the number of childhood exposures and ischemic heart disease, cancer, chronic bronchitis or emphysema, history of hepatitis or jaundice, skeletal fractures, and poor self-rated

health (Felitti et. al, 1998). There was not a significant relationship between childhood exposures and a history of stroke or diabetes (Felitti et. al, 1998), however future studies did find a correlation between PTSD and chronic migraines, which do have a positive correlation with strokes (Tietjen, Khubchandani, Herial, & Shah, 2012) and a correlation between ACEs and Type 2 diabetes (Huang et. al, 2015).

After publishing this data, Felitti and Anda of the Center for Disease Control continued to compile data on childhood exposures to trauma, risk behaviors, and chronic disease; ultimately looking at over 17,000 adult Americans (including the original study participants). The researchers were able to narrow the childhood traumas to 10 and used these to creat the Adverse Childhood Experiences Survey (ACE). The findings of the ACEs corelating with certain chronic diseases in adulthood remained constant (Felitti, 2002).

II. Betrayal Trauma

The ACE study revealed that there is a correlation between childhood trauma and risky health behaviors, which lead to chronic health diseases (Felitti, et. al, 1998). However, whether risky health behaviors are a result of symptoms associated with PTSD has not been investigated. Freyd and her colleagues (Fryed, Klest, & Allard, 2005) hypothesized that the long-term effects would be higher in those experiencing a betrayal trauma than those who experienced a childhood trauma without betrayal. As noted above, betrayal trauma theory posits that a trauma in which an individual or institution that a person depends on for survival harms or violates them in some way that results in damage to the person's well-being, relationships, self-concept, beliefs about others and the world, physical injury, or even death. (Fryed et. al, 2005). The researchers also wanted to assess whether either type of trauma would be affected by writing about the experience. Several research studies found that writing about emotional or traumatic experiences was correlated to a decrease in visits to the student health center (Pennebaker, Kiecolt-Glaser, & Glaser, 1988), an increase in cellular immune response (Pennebaker et. al, 1998), increased lymphocyte levels (Petrie, Booth, & Pennebaker, 1998), improved immune function (Petrie et.

al, 1998), and better immune response to the hepatitis B vaccination (Petrie, Booth, Pennebaker, Davison, & Thomas, 1995).

The results revealed that, while those participants who reported a high betrayal trauma had a positive correlation with high scores on the health-related surveys, those that experienced low betrayal trauma still had statistically significant positive correlations with higher scores on the measures of physical and trauma-related symptoms (Fryed et. al, 2005). High levels of dissociation symptoms were only associated with the participants that reported high betrayal trauma. For both groups, writing about the trauma was associated with an improvement in trauma symptoms (Fryed et. al, 2005), indicating writing as an intervention may be an important part of trauma treatment. Those with few high betrayal traumas showed greater improvement in their trauma writing and on the surveys. This is consistent with past research that a writing intervention would not be helpful for those who have more severe intrapersonal (high betrayal) traumas (Batten, Follette, Hall, & Palm, 2002).

In another study, Goldsmith, Freyd, and DePrince replicated this low/high betrayal findings using a healthy college student population (Goldsmith, Freyd, & DePrince, 2012. Of the 185 participants 82% reported at least one of the specific types of trauma asked about. On average, people who experience a High Betrayal (HB) trauma had one more sick day in the last month than those with Low Betrayal (LB) trauma. Overall, HB trauma is more closely associated with negative psychological and physical symptoms than LB trauma. This extends past research (Atlas & Ingram, 1998; Freyd et al, 2005; Leahy, Pretty, & Tenenbaum, 2004; Lucenko, Gold, & Cott, 2000) to a non-clinical sample. Although LB trauma does consistently have a lower correlation with negative physical and psychological symptoms, there is still a correlation that should be considered in looking at the rates of PTSD following natural disasters, traffic accidents, and other man-made accidents.

III. PTSD Following Natural Disaster in Childhood

In 2003, the Canberra suburbs in Australia experienced a wildfire which resulted in widespread destruction and devastation, the worst recorded in history at the time. Four people were killed, 530 houses were destroyed, infrastructure (including some school buildings) were destroyed, and several other buildings/houses were damaged. The estimated loss was 250 million Australian dollars. McDermott and his colleagues (McDermott, Lee, Judd, & Gibbon, 2005) conducted a study to assess the PTSD symptoms in school-aged children six months after the wildfire to investigate the wildfire-related factors (Did you see smoke? Did you see flames? Were you burned? Was anyone in your family burned?) and their relation to PTSD symptoms in children and to compare child/adolescent reports of PTSD with parent reports of child/adolescent post-disaster general psychopathology.

A child psychologist, child psychiatrist, and teacher administered a screening instrument (Frederick, 1987) and a measure of emotional problems (Goodman, 1997, 2001). The 222 study participants were children in grades 4 to 12 attending a nondenominational private school considered to be "wildfire affected." Wildfire affect was defined as those that saw smoke or flames, were in danger, had a family member in danger, or experienced damage to their home or community. For analysis the school grades were split into three categories: primary school (grades 4-6), junior high (grades 7-9), and senior high (grades 10-12) (McDermott et. al, 2005).

This study revealed that 6 months after the wildfire, 21.1% of the children still showed signs of moderate, severe, or very severe PTSD. The findings revealed that the children who thought they or a family member might die, were within 50 meters of the flames, saw flames, or were home alone scored higher on the PTSD symptom questionnaire. Those who saw smoke, felt a threat to them or a family member, or had to move following the fire scored higher on a measure of emotional problems. Secondly, younger children were more likely to report PTSD and emotional problems following the disaster. Third, female students were more likely to report fearing for their own life or a family member's than the male students; however, there were no significant differences on measures of PTSD symptoms or emotional

problems (McDermott et. al, 2005). Based on this, further research should look at the relations between post-disaster functional impairment and PTSD, depressive symptoms, and general psychopathology.

These results suggest post-wildfire interventions should focus on those who experienced critical elements of the fire, were the most afraid of the fire, or feared the most for their or their family's lives. These are particularly important for younger children involved in a natural disaster. These results are consistent with national averages and past studies. (McDermott et. al, 2005).

Another study in 1991 in Buffalo Creek, West Virginia looked parental responses and family atmosphere after a dam broke and subsequent flood. Green and colleagues (Green et. al, 1991) used data collected in 1974 from two separate structured interviews of 118 children as part of the lawsuit following the flood. Although PTSD was not an official diagnosis at that time, researchers combined the documentation of symptoms the defense's neuropsychiatrist found with the symptoms the plaintiff's mental health professionals found to assess many PTSD symptoms.

The results of this study revealed a "probable" diagnoses of PTSD for 37% of the children, which is higher than the percentage of children that survived the Australia Wildfire mentioned above (McDermott et. al, 2005). In general, primary predictors of PTSD symptoms were: loss or life threat, age group and gender, parent rating on the PEF, and family atmosphere. The results revealed that the youngest children were the most affected by their parent's functioning after the disaster; however, these same children were the least affected by the disaster itself. The researchers hypothesized this was most like due to a lower cognitive ability to understand the disaster and process it. Children above the age of 8 were more affected by their individual experience of the disaster. While children above the age of 12 fell into this group, their symptoms were also strongly influenced by their parent's reactions. Overall, although severity of

flood experience was strongly associated with PTSD symptoms, the strongest predictors of PTSD symptoms among children were parent functioning and family environment (Green et. al, 1991). These findings indicated, that while child assessment and treatment following a disaster is important, parental functioning post-disaster is also critical in determining a child's long-term outcomes.

Although the Buffalo Creek analysis was conducted before the Australian wildfire study, it did have several limitations as all the data came from the lawsuit. The researchers believe symptoms may have been overreported by the prosecution and underreported by the defense (Green et. al, 1991). However, because both studies had little variation and the McDermott study was both reliable and valid (McDermott et. al, 2005), it can be inferred that children who experience a natural disaster are at higher risk for PTSD symptoms.

Natural Disasters are an unpredictable reality of life that can lead to times of destruction, turmoil, and stress. As seen in several studies (McDermott et. al, 2005; Green et. al, 1991; Bokszczanin, 2008) children who survive natural disasters are at a much higher risk than the general population for experiencing PTSD symptoms. Another unpredictable traumatic disaster many children will experience that can result in PTSD symptoms are traffic accidents.

IV. PTSD Following Motor Vehicle Accidents in Childhood

At the same time researchers began publishing statistics about the long-term health effects of Adverse Childhood Experiences, researchers were also looking into the psychological effects of other severe traumatic events in children. Researchers at the University of Cambridge noticed that, while there were several studies showing that PTSD can occur in adults and children following traffic accidents, most of the studies had methodological issues such as: small sample size, sampling bias, lack of control group, non-standardized instruments, lack of direct interviews, and unstructured interviews or self-rated

questionnaires. Mirza and colleagues (Mirza, Bhadrinath, Goodyer, & Gilmour, 1998) set out to determine if PTSD was a significant disorder in children and adolescents following traffic accidents. They wanted to determine the prevalence of PTSD and the relationship to severity of physical injury, pre-accident pathology, demographic variables, type of traffic accident, and involvement of family members in the accident (Mirza et. al, 1998).

The 45% of children showing PTSD symptoms at six weeks is comparable with adults after traffic accidents and children that survive disasters (Mirza, 1998). The results, similar to those from adults, indicate time tends to improve PTSD for most people. Being a girl or a passenger in a motor vehicle led to a higher likelihood of PTSD symptoms. Subjects that had severe symptoms at six weeks were also more likely to still have symptoms at six months. Severity of injury, pre-existing behavioral deviance, or a past consultation for psychological problems was not associated with PTSD (Mirza, 1998). As is consistent with past studies, there is a high comorbidity of other psychiatric disorders in children with PTSD symptoms.

This study found, specifically, a significant association between anxiety and depression in pre-accident functioning, indicating a need for control groups in future studies. These numbers and the frequencies of certain symptoms implicate children may be getting underdiagnosed post-accident when a clinician follows the DSM-IV criteria. This study indicates further studies may be necessary to understand this underdiagnoses further and that health professionals should be made aware of this, even for minor traffic accidents.

In 2002, a similar study was conducted among children in the United States. Keppel-Benson and colleagues (Keppel-Benson, Ollendick, & Benson, 2002) assessed how pre-trauma variables (age, sex, socioeconomic status, history of previous accidents), trauma-specific variables (extent of injury, mode of accident), and post-trauma variables (social support, parenting style following the accident) affect the short-term response and long-term adaption following a traumatic car accident. They identified 50 children 7 to 16 years old an average of 9 months post-accident using local police accidents reports

(Keppel-Benson et. al, 2002). The children were first given a structured accident interview with questions written by the researchers and based of the McFarlane study of Australian bushfires (McFarlane, 1987). Diagnostic information was obtained (Reich & Welner, 1988). For this study, one of the child's parents were assessed as well (Reich & Welner, 1988).

The results of this study showed 26% of the participants met criteria for PTSD, and 10% met the criteria for a Simple Phobia. Accident history, injury severity, and social support surrounding the accident were all statistically significant predictors of the number and extent of PTSD symptoms (Keppel-Benson et. al, 2002). A history of a traumatic event increasing likelihood of PTSD symptoms following a traffic accident is consistent with Stallard and Baldwin's research at the Royal United Hospital in Bath (Stallard, Velleman, & Bladwin, 1998). The relationship between injury severity was different from past research and indicates an area for further investigation (Mizra et. al, 1998; Stallard, Velleman & Bladwin, 1998).

The correlation between immediate social support and improved outcomes is arguably the most important. This relationship is consistent with past research (Keppel-Benson & Ollendick, 1993; Udwin, 1993). This suggests immediate social support helps a child begin to deal with the traumatic event while diminishing the chances of subsequent avoidance. Children that reported having a first responder or healthcare provider that told them "everything would be alright" or helped them "talk about it" felt the most supported. These results along with past studies on the efficacy of Cognitive Behavior Therapy on other anxiety disorders in adolescents, children who have survived a single-incident trauma, and with adults after motor vehicle accidents, indicate CBT with social support could be a viable treatment for children after traffic accidents (Keppel-Benson et. al, 2002).

Although automobiles are a common type of motor vehicle accident children encounter, bus and boat accidents also fall into this category. With both bus and boat accidents, longitudinal studies were conducted to determine the immediate and lasting effects of these vehicle accidents. Arnberg and colleagues (Arnberg, Rydelius, & Lundin, 2011) looked at the prevalence of PTSD and Post Traumatic Stress Symptoms (PTSS) 9 months, 4 years, and 20 years following a bus accident where 12 of the 23

children passengers were killed. Because previous studies have determined there is no difference in PTSD symptoms between subjects that survive a traumatic event and subjects that were supposed to be at a traumatic event but were not (Simon & VonKorff, 1995; Milgram, Toubiana, Klingman, Raviv, & Goldstein, 1988; Pynoos et. al, 1987). The 11 children on the bus (directly affected) as well as 96 children who were the in the same grade at the same school but opted not to go on the outing (indirectly affected) were surveyed at 9 months. However, none of the directly affected children responded at 4 years, but 7 of them did respond at 20 years (Amberg et. al, 2011). General mental health, reaction indexes, and grief were all assessed with the surveys at each given time period (Simon & VonKorff, 1995; Pynoos et. al, 1987; Sveen, Low, Dyster-Aas, Ekselius, Willebrand, & Gerdin, 2010; Weiss & Marmar, 1997; Goldberg, 1972; Nilsson, Leppert, Simonsson, & Starrin, 2010; Bergh Johannesson et. al, 2009; Arnberg, Eriksson, Hultman, & Lundin, 2011)

Although there were limitations with this study as none of the directly affected responded at four years and there were significantly less directly affected children than indirectly affected children to begin with, these findings could contribute to further research and are consistent with past research. Initially, the psychological resources were high and the psychological reactions of those in the indirectly affected group decreased with time. There was no difference in the general mental health of the two groups but the directly affected subjects still had complicated grief and posttraumatic stress reactions and reported the crash still affected their daily lives (Arnberg et. al, 2011). At nine months, 9% of the indirectly affected subjects reported nightmares, similar to the numbers from the Israel bus-train collision. Only 8% of the indirectly affected wanted to meet with a professional at nine months, while about 50% wanted to talk to a professional at four years. During the first four years the most commonly reported symptoms were sleeping difficulties, nervousness, avoidance, instability, and bed-wetting (Arnber et. al, 2011); consistent with the symptoms a longitudinal study found in children that survived a mudslide (Lacey, 1972)

After 20 years, subjects in the directly affected group reported higher posttraumatic stress reactions than those in the indirectly affected group. Posttraumatic stress reactions can be prolonged in those that

have been to single traumatic events, as supported by past research (Morgan, Scourfield, Williams, Jasper, & Lewis, 2003; Milgram et. al, 1988; Bolton, O'Ryan, Udwin, Boyle, & Yule, 2000). Negative life events outside the bus crash were associated with overall decreased mental health but not PTSS. This research supports past studies that traumatic events in children directly or indirectly affected may have long-term posttraumatic stress reactions, even in adulthood (Arnberg et. al, 2011).

Previous to this bus accident study, Yule and colleagues (Yule, Bolton, Udwin, Boyle, O'Ryan, & Nurrish, 2000) preformed a similar longitudinal study of students that survived a ship crash and sinking. While there is considerable evidence that children and adolescents exposed to traumatic experiences during a disaster can suffer from post-traumatic stress, there is limited research on the long-term outcomes and what research there is has one or more methodological disadvantages. Yule and colleagues (Yule, Bolton, Udwin, Boyle, O'Ryan, & Nurrish, 2000) found a unique advantage in that following the sinking of the Jupiter cruise ship as the passengers aboard the ship were screened at 5 months and 18-months post incident as part of their class action lawsuit (Yule et. al, 2000).

The sinking of the Jupiter occurred in October of 1988 when around 400 schoolchildren were aboard when it was struck by another ship and sunk within 45 minutes. A classmate, teacher, and two rescuers were killed or presumed dead. Survivors were tracked down using the lawsuit, newspaper stories, and other survivors for a follow up five to 8 years after the incident. For this study, 217 of the 331 contacted children agreed to participate, 203 of which had participated in the 5 months follow up screening. Each child interviewed was asked to nominate a same sex and same age friend for the control group, which ended up being composed of 87 children (Yule et. al, 2000).

Of the survivor group, 51.5% had developed PTSD in the follow up period, compared with only 3.4% of the control group. Of those with PTSD, 90% developed symptoms almost immediately after the disaster. Furthermore, about a third of those cases recovered within a year of onset, while about a quarter had symptoms that lasted longer than five years. (Yule et. al, 2000).

The results of this are in the upper end of the 30-60% of incidence of PTSD following various traumatic experiences in childhood/adolescence from other studies (Yule et. al, 2000). The incidence being so much higher than the control group indicate PTSD is common consequence of disasters that experienced in adolescence. The results about onset indicate that there is a very low incidence of delayed PTSD (more than 6 months post event) in children. These results rely on the validity of the participants' recall of particular symptoms occurring during a particular time, which could have been affected by mood or symptoms at the time of the follow up. These results are generalizable when a few things are considered. First, being on a sinking cruise ship is a rare disaster to experience, however the rate of PTSD developed was still similar to other disasters. Second, the survivors, and consequently the control group, were primarily middle class and being lower class is a risk factor for mental health problems thus the participants of this study were at a lower risk to begin with (Yule et. al, 2000). The implications of this study are that adolescents are at a high risk of developing PTSD following a disaster and should receive appropriate intervention.

V. Interventions

Although non-abuse trauma, such as accidents or natural disasters, do not have the same strength of correlation with health issues or psychological problems as the ACEs originally studied, there is still a positive correlation. Taking into account the 21.1% of children that experienced PTSD following a natural disaster (McDermott et. al, 2005), the 45% initially showing PTSD symptoms following a car accident (Mirza et. al, 1998), and the 51.5%% experiencing PTSD following a ship accident (Yule et. al, 2000), children experience PTSD following rates similar to adults and should be provided appropriate treatment. These similar rates become problematic in that PTSD can interrupt normal psychological and physiological development.

Interventions for PTSD should likely begin for those effected as soon as possible as PTSD following an accident is immediate for most cases that will develop (Yule et. al, 2000). Currently, trauma-

related treatments for adults can vary significantly. The American Psychological Association (APA) provides a clinical practice guideline for treating PTSD (APA, 2017). This guideline strongly recommends Cognitive Behavior Therapy (CBT), Cognitive Processing Therapy, Cognitive Therapy, and Prolonged Exposure, as these all have strong evidence that they can lead to positive client outcomes and provide a good balance of the risks versus the benefits (Jonas et. al, 2013). APA also conditionally recommends Brief Eclectic Psychotherapy, Eye Movement Desensitization and Reprocessing Therapy, Narrative Exposure Therapy (Jonas et. al, 2013). APA recommends against using Seeking Safety or relaxation for treatment of PTSD (Jonas et. al, 2013). Any treatment with a conditional recommendation has some supportive evidence but should not be considered as effective without further research (APA, 2017). Critical Incident Stress Debriefing is still a common intervention following traumatic events but there is evidence that it can actually prolong PTSD symptoms (Raphael, Meldrum, & McFarlane, 1995) and can increase anxiety, PTSD, and psychopathology (Bisson, Jenkins, Alexander, & Bannister, 1997; Mayou, Ehlers, & Hobbs, 2000) with no more benefit than those that did not receive treatment (Lilienfeld, 2007). Thus, Critical Incident Stress Debriefing should not be used. Although children have rates of PTSD similar to adults, the APA conditional recommended treatments have inconclusive data when it comes to children (National Collaborating Centre for Mental Health, 2005). Along with the APA suggestions for treatments, there is also some very preliminary evidence that writing about the trauma decreases the health issues and psychological symptoms (Freyd et. al, 2005). This research needs to be replicated as other evidence indicates that writing can have negative health consequences for some people (Bourassa, Allen, Mehl & Sbarra, 2017). This research has not been attempted with children.

There is also some evidence that CBT conducted in schools may be beneficial (Jaycox, 2003). In 11 studies children who received school-based mental health and psychosocial interventions were found to have reduced PTSD symptoms (Fu & Underwood, 2015). Other treatments, such as mastering disaster challenges to restore a sense of safety have shown a decrease in PTSD symptoms of children (Chemtob, Nakashima, & Hamada, 2002).

While group and individual interventions are both effective, those children with individual interventions showed great improvement. Similarly, interventions from any provider are effective but those from mental health professionals produced greater improvement. It is also suggested parental involvement in interventions is optimal but not necessary (Newman et. al, 2014).

With all these interventions, deciding when they should be applied is the next key step. As seen in every example of trauma, most cases of PTSD develop within the first 6 months following a traumatic event (McDermott et. al, 2005). While some of the cases will dissipate with time, others can extend at least 33 years (Morgan et. al, 2003), so these interventions may need to begin as soon as possible. Specifically, with the CBT or supportive therapy there are an array of options for what can be done in these circumstances and there is no evidence it would be harmful to a child that is not developing PTSD (National Collaborating Centre for Mental Health, 2005). Currently, psychological first aid and social support as early interventions with children are promising but need further research with controls (Ramirez et. al, 2013, 2014; Grolnick, 2018). Massage therapy (Feild, Seligman, Scafidi, & Schanberg, 1996) and spiritual hypnosis (Lesmana, Suryani, Jensen, & Tilopoulos, 2009) show problems as early interventions but also need further research.

While treatment beginning as soon as possible after an event may be best (Keppel-Benson et. al, 2002), each traumatic event has particular individuals may need to be more focused on for interventions. For any traumatic event, younger children are more likely to develop PTSD symptoms. Following traffic accidents, the severity of injury should minimally be considered and rather children that were in car for the traffic accident and/or had a family member in the care should be the focus of PTSD interventions. Following natural disasters or other accidents, those that felt more of a threat to themselves or family members are the most at risk for PTSD symptoms. Following any sort of traumatic event, children should be assessed as to the specific elements of that event they experienced, and a determination made about what treatment may be most appropriate, when a treatment should begin and indicators of when treatment should be discontinued.

There is also evidence that parental mental health following an event makes a difference in how a child reacts (Green et. al, 1991; Bokszczanin, 2008). For incidences such as the wildfire or traffic accidents where the child was the passenger of a parent, where the parent experienced the trauma as well, the parent should also be assessed and treated if necessary. Parents that are more mentally healthy are better able to support their child in a way that promotes treatment and healthiness (Green et. al, 1991). Researchers at the New York University Child Study Center encourage parents to allow their child to express their feelings, keep a routine, provide a sense of safety, encourage friendships and social networks, teach coping skills, listen to their child, and be aware of any signs of abnormal distress when trying to help a child cope with traumatic experiences (Koplewicz et. al, 2006).

VI. The Future/Implications

The implications of this review are that non-abuse trauma should be taken as seriously as trauma from abuse because it can be just as long lasting and has the possibility of being just as detrimental to long-term health. There is currently a lot of research for Adverse Childhood Experiences and their direct correlation to risk taking behavior that leads to chronic diseases. However, the research on non-abuse trauma long term effects is significantly more limited or was done in studies with methodological disadvantages, such as unreliable assessment tools or without a control group. In the future, longitudinal studies with control groups follow traffic accidents, natural disasters, and other life accidents that assess PTSD and health issues in adulthood are necessary. Studies investigating the effectiveness of newer forms of PTSD intervention with children could reveal what is truly the best form and timing of therapy.

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