PEDIATRIC MEDICAL TRAUMATIC STRESS AFTER PEDIATRIC INJURY: A REVIEW OF INTERVENTIONS WITH CAREGIVERS AND CHILDREN

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ABSTRACT

Every year more than a million children suffer an unintentional or accidental injury (e.g. injuries from motor vehicle accidents, falls, burns, etc.) causing transient or persistent stress for these children and their families. These experiences influence short-term and long-term recovery which subsequently may shape quality of life. Pediatric medical traumatic stress (PMTS) includes traumatic stress, acute stress disorder (ASD), posttraumatic stress disorder (PTSD), and posttraumatic stress symptoms (PTSS). Stress due to the experience surrounding sudden illness or injury shapes psychological and physiological experiences of children and families. However, preventive interventions post-injury can lower the risk of traumatic stress. There is a growing focus on these injured children with studies now outlining factors such as the timing of interventions and suggesting interventions targeting posttraumatic stress shortly after the injury. However, further exploration needs to focus on how the intervention outcome measurements define a successful intervention. Related to person-in-environment and the importance of a person's social ecology to processing stress, my examination of existing intervention reviews and meta-analysis also found no discussion of social stress and how it plays out in the experience of minorities with a potentially traumatic injury.

I frame my synthesis by stating that there is still much to learn about the process of these interventions that seek to enact positive health behaviors after injury, thus encouraging the

prevention and reduction of stress to improve health outcomes for children and their families. I analyze outcome measures and their application with children, parents, or families in order to evaluate definitions and measures of outcome success. My synthesis contributes to uniform definitions and measures of success when it comes to forming an intervention that seeks to address potential stress for injured children and their families. High rates of unintentional injury among children every year and the possibility of continued, accumulated stress on children post-injury deems this issue a public health concern.

The results of my synthesis were that measures of success vary, with many interventions failing to capture stress induced by the child's surrounding social ecology along with measuring changes in a child's stress level. In addition, the studies did not consider minority representation as a significant influence on the intensity and duration of PMTS. There was little to no minority representation in interventions involving children and/or families after a potentially traumatic injury. Overall, most interventions did not routinely measure health-related quality of life.

More consistent measures are needed for these types of interventions that combine measures that capture changes in the overall picture of a child's lived experience with potential stress. Health disparities among minority populations warrant further exploration in ways to intentionally increase minority representation for these types of interventions.

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LIST OF ABBREVIATIONS

PMTS- Pediatric Medical Traumatic Stress

ASD- Acute Stress Disorder

PTSD- Posttraumatic Stress Disorder

PTSS- Posttraumatic Stress Symptoms

DSM- Diagnostic and Statistical Manual of Mental Disorders

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1.0 INTRODUCTION

About one in four children sustain an unintentional injury every year that necessitates medical attention (Committee on Pediatric Emergency Medicine, 2016). A potentially traumatic injury for a child may require attention by specialized medical teams and resources. In reviewing the structure of trauma systems (a term used to describe all trauma centers) the Committee on Pediatric Emergency Medicine and colleagues (2016) noted that not all centers are equipped to treat pediatric patients. Desolate and/or rural areas or use of general hospitals to treat pediatric injury can create a geographic challenge for health access and further disparities for children suffering an injury (Committee on Pediatric Emergency Medicine, 2016). Despite protocols, guidelines, and continuing education that exist to treat pediatric trauma in general trauma centers, care for a pediatric injury at a hospital or a trauma center encompasses the lived experience for a child and their family after injury. Childhood injury may result in disability and/or change in the previous physical, mental, and emotional functioning of a child, affecting overall health-related quality of life. Winthrop (2010) and Martin-Herz, Zatzick, and McMahon (2012) note how pediatric injury and the response to the injury impacts a child's mental, physical, and social functioning or overall health-related quality of life. Reviews investigating factors that predict poor health-related quality of life after pediatric injury or trauma suggested that posttraumatic stress disorder (PTSD) was a strong predictor influencing a child's health-related quality of life (Martin-Herz et al., 2012; Winthrop, 2010). Pediatric injury thus may cause

short-term stress that may lead to chronic stress, challenging a positive health recovery for the child and their family, and potentially leading to life-long complications.

Pre-existing factors in a family's life and the traumatic event itself can impact a child and their family's immediate stress response and challenge a family's ability to mediate other potential external stressors that may exacerbate a child's stress in this injury experience. Adverse Childhood Experiences (ACEs) is a model categorizing the number of stressful, traumatic, negative events in a child's life and the likelihood of impact on a child's health in the long-term. Health outcomes seen to tie to ACEs are heart disease, cancer, greater likelihood of poor health behavior such as smoking and obesity, and increased risk of mental health issues such as suicide (referenced in Larkin, Felitti, & Anda, 2014). The Pediatric medical traumatic stress (PMTS) is a term that encompasses the response to, and experience with a serious pediatric injury or illness. PMTS is more formally defined as "a set of psychological and physiological responses of children and their families to pain, injury, serious illness, medical procedures, and invasive or frightening treatment experiences" (Price, Kassam-Adams, Alderfer, Christofferson, & Kazak, 2016). Thus, the time after pediatric traumatic injury can result in a range of lived experiences. The medical setting may be a useful location to increase access to opportunities to explore stress responses in and around traumatic injury (M. L. Marsac, Hildenbrand, & Kassam-Adams, 2017). Exploring interventions around this critical time point is about meeting families and children where they are. It is about their lived experience with stress and reducing or preventing stress through programs that may prevent the risk of long-term health consequences due to chronic, long-term stress overall.

The purpose of this synthesis is to analyze outcomes measures of interventions that address stress reduction or prevention after a child suffers a potentially traumatic injury. If there

is a difference in the factors and focus of successful outcomes of interventions after a traumatic injury among these children, caregivers or both, then this synthesis can further inform guidelines on PMTS interventions to meet both child and family needs.

My first research question looks at how "success" is defined and measured in interventions addressing stress for children and caregivers shortly after a potentially traumatic injury. My second research question explores whether interventions address and represent the needs of minority populations in their measures.

To answer the question, my synthesis is informed by a three-phase PMTS model that was recently updated by Price et al. (2016). These three phases include the time shortly after the injury, the time a child is treated in the hospital and/or is recovering, and the time close to and after discharge from care.

In the Background, I introduce key concepts that contextualize the definition of PMTS interventions, what research exists, and what is missing. I also craft my hypotheses that are explored in more detail in the Results section. The Methods section will clearly outline the strategies for article searches pertaining to stress interventions post-injury and my analysis strategy. Finally, features of the intervention that outline measures of success and definitions will be brought in full circle using the findings of predictive factors in prior studies, namely, the influence of prior behavioral and psychological behavior, the importance of family support, and the subjective experience of a child and their family post-injury. I will explore the outcome measures and any limitations while addressing my hypothesis in this section. The purpose of this synthesis is to contribute to current and future literature that seeks to comprehensively evaluate interventions implemented after a child is unintentionally or accidently injured.

2.0 BACKGROUND

According to the World Health Organization (WHO), health is defined as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (International Health Conference, 2002). When it comes to unintentional injury for a child, this holistic view of well-being may be jeopardized. About 30 million children a year experience an unintentional injury in the United States (referenced in Marsac et al., 2018). 9.2 million children ages 0-19 years old need emergency room care annually for an unintentional, accidental, pediatric injury (e.g. falls, motor vehicle accidents, burns, etc.) (Centers for Disease Control and Prevention, 2008). It was estimated that children suffering an unintentional injury receive 241,000 inpatient admissions and over 10,000,000 primary care visits (referenced in N. Kassam-Adams, Marsac, Hildenbrand, & Winston, 2013).

At 30 million unintentional injuries per year, the number of children enduring a pediatric traumatic injury is concerning in the realm of public health and health-related quality of life. Children suffering an unintentional injury have shown "high rates of post-traumatic stress and comorbid behavioral and emotional disorders" (referenced in Wise & Delhanty, 2017, p. 1). Stress post-injury has also been characterized from transient stress to the full-diagnosis of posttraumatic stress disorder (PTSD) (Wise & Delahanty, 2017). For example, 75% of children and caregivers experienced posttraumatic stress symptoms (PTSS) within a month following a pediatric injury with 15-20% children and parents reporting "persistent and impairing PTSS" at

six months, and 5-10% of children meeting diagnosis of PTSD (as referenced in Marsac, Hildenbrand, et al. 2013, p.1101). Subsequently, stress following pediatric injury is prevalent and the long-term consequences are a serious public health issue.

2.1 LONG-TERM CONSEQUENCES OF TRAUMA

Understanding adverse childhood experiences (ACEs) is important to interventions post-injury. ACEs are "defined by ten categories of abuse, neglect, and household dysfunction… and play a decisive role in the overall health, well-being, and social function of the nation" (referenced in Larkin, Felitti, & Anda, 2014, p.2). ACE have shown impact on "adult health risk behaviors and non-infectious causes of illness and death like heart disease, respiratory illness, and cancer" with greater likelihood of poor current health risk behaviors like smoking and substance abuse and current illnesses such as obesity and depression (referenced in Larkin, Felitti, & Anda, 2014, p.2). The current form of the ACE tool collects information about childhood adversity in a rather subjective way. Because of this, studies have sought to modify it in order to collect data in a more objective manner (Reuben et al.,2016). Nevertheless, results of the current version of the ACE tool still paint a poignant picture about the effect of childhood adversity on long-term health impacts.

Larkin, Felitti, and Anda (2014) explored the ACE model from a social work perspective using a biopsychosocial framework suggesting a multisystemic approach to traumatic stress. The biopsychosocial perspective on ACE posits that stress reactions are shaped by a person's developmental stage (cognitive or psychological), which relates to the biological make-up of a person (stress reactions related to genetic and predispositions) and the social environment

(including the resources that support childhood resilience). The most crucial aspect of ACE is the potential risk of long-term health outcomes from childhood to adulthood. It is also important to emphasize the possibility of influencing predictive factors to prevent long-term health outcomes of potential traumas. This synthesis emphasizes the public health problem of how traumatic stress has a potential influence on negative health outcomes in both health and health behavior when it comes to pediatric injury. Thus, exploring interventions that seek to reduce or prevent potential stress after pediatric injury are crucial to this field.

The biopsychological framework explored the mechanisms of potential stress factors on a person's cognitive development (Larkin et al., 2014). In their review of early interventions after a potentially traumatic event, De Young and Kenardy (2017) discussed how a child's developmental stage cognitively affected how they respond to stressors. Childhood (including adolescence) is a developmental stage that is crucial in observing the effect of the accumulation of stressors on the lived experience of a child. The increased likelihood that potentially traumatic events in childhood may carry forward to affect long-term health makes this issue very significant to public health.

The stress and coping framework suggested that stress is about the subjective experience of hardship (demand) in a potentially stressful event and a person's subjective assessment of resources (both external and internal) to meet the hardship (Larkin et al., 2014). The stress and coping framework stated cognitive appraisals and coping are mediators in the process of stress exacerbation or reduction (Larkin et al., 2014). Since stress is central in interventions seeking to reduce and prevent its long-term and short-term influences, this model informs how people interact with their environment and experience. By outlining the effect, the accumulation of stress and the developmental trajectories have on stress response, the ACE model illustrates the

importance of addressing trauma early to reduce its detrimental influence on health outcomes in the long-term.

2.2 STRESS DIAGNOSIS

Pediatric medical traumatic stress (PMTS) is the stress response having to do with the psychological and physiological lived experience of children and their families after a child is injured or diagnosed with an illness. PMTS was defined as "a set of psychological and physiological responses of children and their families to pain, injury, serious illness, medical procedures, and invasive or frightening treatment experiences" (as referenced in Price et al., 2016, p.86). Kazak et al. (2006) suggested that PMTS consists of posttraumatic stress symptoms (PTSS) which consists of important symptoms used to diagnose PTSD and thus PTSS can capture the complexity of a child and family's experience with a potentially traumatic event better than a diagnosis. PTSS include a variation of what is present in the categories of PTSD and ASD described in the DSM IV but similar to the DSM V as "reexperiencing the traumatic event, avoidance of stimuli associated with the trauma or emotional numbing, and hyperarousal" (as referenced in Brosbe, Hoefling, and Faust, 2011, p.719). What this demonstrates is that stress may be classified based on intensity of traumatic stress symptoms, with PTSS being a more all-encompassing term.

To qualify as a DSM V diagnosis for ASD (all ages):

- The presence of nine symptoms in the following categories must be present: Intrusion, negative mood, dissociation, avoidance, and arousal;

- Symptoms must be present for three days to one month after a potentially traumatic incident (American Psychiatric Association, 2013).

To qualify for PTSD for children six years and older:

- Presence of one or more intrusion symptom(s) and behavior of avoidance;
- Two or more negative mood or cognitive change(s) and hyperarousal
- For children six years old and under either one or more of continued avoidance or negative mood or cognitions must be present;
- The symptoms must be present for longer than one month (American Psychiatric Association, 2013).

For the purposes of the synthesis, stress, distress, traumatic stress, posttraumatic and ASD, PMTS, and pediatric traumatic stress are all encompassed into one conversation and then discussed further in the Discussion section.

2.3 PRIOR SYSTEMATIC REVIEWS AND GENERAL REVIEWS

No current intervention review compares intervention outcomes and outcome measurements after a potentially traumatic injury focused on the child, caregiver, or family, or notes similarities and differences between the different categories. There are existing articles that review early interventions after a potentially traumatic event, including one meta-analysis analyzing randomized control trial interventions after a potentially traumatic event. The interventions for the synthesis are interventions that treat, decrease, or prevent stress disorders and provide additional support for children and/or families. M. L. Marsac et al. (2017) highlighted three

intervention targets (universal, targeted, indicated) that influence the structure of an intervention based on risk level and level of need:

- Universal interventions are when all children receive the intervention regardless of risk;
- Targeted interventions are when a child's distress is present or likely to have negative consequences;
- Indicated interventions are when chronic stress is present and further mental health resources are considered;
- Stepped interventions utilize risk screening and consider the variation of stress amongst the population in terms of risk and so that the intervention is shaped to the child's needs.

De Young and Kenardy (2017) and N. Kassam-Adams (2014) focused on exploring universal, targeted, and stepped interventions. In their intervention review chart, De Young and Kenardy (2017) suggested universal interventions do not include a screening for posttraumatic stress symptom risk to determine intervention eligibility, and targeted interventions consist of a screening given to the child to measure posttraumatic stress symptom risk and further qualification into the intervention. De Young and Kenardy (2017), N. Kassam-Adams (2014), and Kramer and Landolt (2011) looked at early interventions, noting the time of the intervention post-injury on their chart. This relates to the course of trauma and recovery which seems to vary from child to child and family to family. De Young and Kenardy (2017) suggested the importance of follow-up. These same articles also look at potentially traumatic events in general (not only on pediatric injury).

Prior to writing this synthesis I also found an article that reviewed a particular approach or target behind the interventions. Kramer and Landolt (2011) used meta-analysis to look at psychological randomized control trial interventions for single, "potentially traumatic" events providing a detailed analysis on the efficacy of the intervention on PTSS and analysis on the characteristics of the intervention. Stallard (2006) reviewed psychological randomized control trial interventions and the goal was to look at impact of the interventions on posttraumatic responses for children. Kassam-Adams (2014), while not a systematic review or meta-analysis, proposed a framework to look at early interventions after a potentially traumatic event and reviewed interventions categorizing articles on three focal areas of intervention targets (appraisals, interpersonal, avoidance targets). Kassam-Adams (2014) does not focus on study design, and only noted whether the intervention affected the child's PTSD and did not discuss caregivers or the family. De Young and Kenardy (2017) looked at early intervention's impact on "preventing trauma reactions following unintentional injury" (p. 139). While also not a systematic review or meta-analysis, De Young and Kenardy (2017) listed aspects of an intervention study design such as outcome measures, and their article focused primarily on randomized control trials. Similarly, the two articles did not look at the differences in interventions outcome measures and definition of success for children, parents, or families. Lastly, articles looked at the interventions impact on PTSS only, noting other intervention findings as additional information.

Research indicates that the association of health and socioeconomic status in children as it relates to more severe health issues were more prevalent among low-income and minority families (as referenced in Larkin et al., 2014). Research on predictors of posttraumatic stress following pediatric injury stated race/ethnicity was not a strong predictor of posttraumatic stress

(Brosbe, Hoefling, & Faust, 2011), yet racial and ethnic minority representation and the influence of accumulated stress factors and health disparities for this population was not discussed in prior reviews. Using the 1992 United Nations Minorities Declaration definition, minority is defined as "national or ethnic, cultural, religious and linguistic identities" (Office of the United Nations High Commissioner for Human Rights, 2010). Considering the above point on health disparities among minority populations and low-income populations and accumulation of risks and the stressors that may develop as a result, is concerning. Meyer (2003) suggested stress extends to the social environment (beyond personal single event) that can influence mental and physical well-being called social stress that may affect stigmatized groups for socioeconomic status, race/ethnicity, sexuality, and gender. When you extend stigma and a single injury event stress may follow. Minority stress is described as "excess stress to which individuals from stigmatized social categories are exposed as a result of their social, often minority position" (Meyer, 2003). In relation to the biopsychosocial framework, stress, and the potential long-term influence of adverse childhood events on the eventual health outcomes of a child, the following statement highlights why the secondary question of minority representation is important: "The experience of one risk can contribute to other risks, which also makes it more challenging for protective resources to mitigate the combination of risks and for a person to recover from the combined risks." (Larkin et al., 2014 p. 4-5). Understanding the prevalence of PMTS, the multisystemic context of accumulated stress on long-term health outcomes, and factors that measure successful interventions are crucial in the long-term impact on the quality of life these families and children.

2.4 THEORETICAL MODELS RELATED TO TRAUMATIC STRESS AFTER PEDIATRIC INJURY

2.4.1 Integrative (Trajectory) Model for PMTS

The integrative model for PMTS that was initially proposed by Kazak (2006), was recently updated by Price, Kassam-Adams, Alderfer, Christofferson, & Kazak (2016). The systematic review by Price et al. (2016) provides a thorough review of literature and a model that discussed a child's process through a potentially traumatic event in three stages: from the point when a child comes to the hospital, as they are healing, and post-discharge. It is ecological and strengths-focused, with the assumption that families and children endure and overcome stress in different ways (Price et al., 2016). Not only is the subjective experience ("perceived life threat") of a child and family considered along this trajectory after a potentially traumatic medical event, family functioning was considered in the model as well. Price et al. (2016) also provided recommendations for interventions in each phase which includes:

1. Phase 1: "changing the subjective experience of a [potentially traumatic event] PTE;
2. Phase 2: "preventing PTSS";
3. Phase 3: "reducing PTSS" (p. 87) (Price et al., 2016).

The model allows for greater variability as the child and their family follow the three phases but may not follow a strict course due to variation of responses/reactions to stress during this time. The model adjusts accordingly using four trajectories of recovery which are resilient, recovery, chronic, and escalating, and according to the model, resiliency can come early in the child's injury trajectory or later (Price et al., 2016). Le Brocque, Hendrikz, and Kenardy (2010) in their study on the variation in recovery amongst children found children experienced high

resiliency, but during traumatic events experienced more serious and complicated recovery. This illustrates the presence of variation, but also the importance of looking at the child's individual risk and their experience. Thus, each of the three phases in the integrative (trajectory) model require a screen of risk and a determination of intensity of intervention implementation.

The integrative (trajectory) model for PMTS is an updated model reflecting the lived experience of pediatric traumatic injury or illness. Each phase reflects in the ongoing journey of recovery, the need for flexibility and consideration of the different paths of coping with traumatic injury or chronic illness over time (Price et al., 2016). Although it is important to look at the physical treatment and recovery of the injury, how and why PMTS affects children and caregivers in the long-term informs the goals for interventions at the three phases in Price et al. (2016).

The goals of interventions in the three phases are:

1. Phase 1: "provide trauma-informed care and screen for risk";
2. Phase 2: "screen for risk, prevent traumatic stress, treat significant traumatic stress"; and
3. Phase 3: "Screen for traumatic and treat significant traumatic stress" (p. 93) (Price et al., 2016).

These suggested goals along with the view of PMTS as a subjective experience will inform the parameters of interventions I review for my synthesis. All three phases are informed by six assumptions that take into consideration the variation of the lived experience of potentially traumatic events for the child and responses to stress. The authors also updated the assumptions which shape the model to include the impact of PMTS on health outcomes (Price et al., 2016). This is an important assumption for my synthesis which seeks to explore these interventions from a health and health behavior standpoint.

2.4.2 Bio-psycho-social Framework

The bio-psycho-social model proposed by M. L. Marsac, Kassam-Adams, Delahanty, Widaman, and Barakat (2014), emphasized that PTSD and more broadly PTSS did not exist in separation to an injured child's biological make-up, psychological state, and social system interaction. The model related to the integrative model proposed by Kazak et al. (2006) in that they both address a potentially traumatic event and the risk of PTSS as a result of a multi-systemic interaction between the child's environmental, social, psychological (developmental), and biological (health) context. Whereas M. L. Marsac et al. (2014) looks at the peri-trauma (time shortly after injury) for his biopsychosocial model, the integrative (trajectory) model included discussion on all three phases (peri-trauma, acute medical care, and discharge). In determining predictive factors to PTSS development, M. L. Marsac et al. (2017) used the biopsychosocial model on a small sample and found coping and appraisals as significant predictors of the development of posttraumatic symptoms, but no evidence for bio-physiological measures of traumatic stress as a predictor (e.g. heart rate). For the current synthesis, the models help to understand how child and caregiver lived experience, prior traumas, and family functioning come into play in a child's recovery process.

2.4.3 Stages of Change

Authors discussed the importance of addressing recovery in stages, that stress may be transient or chronic after a potentially traumatic injury, and consequently the opportunities that lie therein to raise awareness, prevent, or treat traumatic stress (Le Brocque et al., 2010; M. L. Marsac et al., 2017; Price et al., 2016). Stages of recovery and the interventions to reduce or prevent

traumatic stress in children and families after a child is injured, relates to the stages of health behavior change. It has to do with health behavior or the motivation to implement healthy coping and awareness during recovery. James O. Prochaska's Transtheoretical Model of Change discussed how people go through stages, with some people remaining in certain stages with no motivation to move to a stage of action on a health behavior change (Prochaska & Velicer, 1997). The role of interventions and health promotion programs are to identify in what ways can this information on health behavior help to meet people where they are at and motivate the person for health behavior change. The model suggested that the intervention must be interactive and that individuals must proactively engage in the process (Prochaska & Velicer, 1997). Prochaska and Velicer (1997) stages of change model included:

1. Precontemplation or resistant to change;
2. Contemplation or consideration of change where the person understands the pros but not the cons and they feel they are not ready for action;
3. Preparation or intending to act where the action is measured as occurring within six months;
4. Action or direct change within six months;
5. Maintenance or prevention of regression of a previously enacted action toward healthy behavior change, and lastly;
6. Termination or full and complete efficacy.

The six stages included ten potential processes of health activities by a person that are key to progress in decisional balance, help with weighing pros and cons of behavior change, to produce self-efficacy for progress through the stages (Prochaska & Velicer, 1997). The ten potential processes are cited from Prochaska and Velicer (1997) (p. 39 - 40) include:

a) Consciousness-raising or greater awareness to problem behaviors;
b) Dramatic relief or when certain activities mobilize people to a specific emotional reaction;
c) Self-reevaluation or a "cognitive and affective assessment about one's self-image";
d) Environmental reevaluation or a "cognitive and affective assessment" of health behavior as it relates to their social systems;
e) Self-liberation or the perspective that change can be possible triggering the possibility to commit and recommit;
f) Motivation, or the option of more than one choice that can lead to a more inclination to enact change;
g) Social liberation or increasing opportunities in society or alternatives, which can be done through factors like advocacy;
h) Empowerment and policy making;
i) Counterconditioning or "learning healthy behaviors that can substitute problem behaviors";
j) Contingency management or reminders that inform the person of the consequences to their actions and incorporating reinforcements for the behavior, and lastly;
k) The helping relationship or surrounding social support that reinforces healthy behavior change action (Prochaska & Velicer, 1997, p. 39 – 40).

As discussed previously, children and their families may be at different stages of recovery after pediatric injury. The stages of change model and the ten potential processes highlight the different levels of readiness to adopt healthy behavior change. The theoretical model is strength-based as the model emphasized getting people to participate in their own health

behavior change by building self-efficacy to move through the process of change. If positive healthy behavior change is promoted through intervention strategies to reduce or prevent traumatic stress, it would be useful if an intervention is promoting precontemplation, contemplation, preparation, action, and maintenance in the context of a child and family's recovery. Knowing a family's readiness to change throughout the intervention can thus contribute to definitions of success and more directed outcomes measures carried forward throughout the intervention.

Additional suggested theories related to children trauma experiences shortly after injury or during the acute medical period included the "social cognitive theory, information-processing theories, models of emotional regulation and coping, and models of the interplay of neurobiological processes with emotions and coping" (As referenced in Kassam-Adams, 2014, p. 2) with others including cognitive behavioral theory and resilience theory (Kramer & Landolt, 2011). These theories are somewhat similar to the three theories focused above in that the cognitive internal processing of trauma is important, but also the interaction of the person-in-environment. Person-in-environment is key in this synthesis in both the research question, the methodology, and hypothesis. The multi-system interaction that is person-in-environment ties to the response and reactions of a child to their injury and to the recovery process for both the child and their family.

2.5 RISK AND PREDICTIVE FACTORS

Stress incurred post-injury due to the medical event may persist or present in a child and family but diminish over time depending on the resources and/or resiliency of a child or family. Yet

there are many children that maintain a high level of stress for a long duration of time, on top of other external risk factors that exacerbate the stress response. There are various catalysts that can worsen or help a child recover from stress after injury, or risk and protective factors. In a review on predictive factors for posttraumatic stress following pediatric injury, Brosbe et al. (2011) also found in the peri-trauma phase that prior psychological problems, perceived life threat (subjective experience) of a child, "beliefs regarding initial symptoms,'' "active thought suppression," and "parental posttraumatic stress" were most prevalent in the continuity of posttraumatic stress in a child after injury (p. 718). Suggestions have been interventions that may differ due to gender in the parent-child dyad (mother versus father, male versus female), age, development of child, and type of injury (Brosbe et al., 2011). As Wise and Delahanty (2017) pointed out in their review of the literature, interventions cannot be one-size-fits-all as moderating factors often influence the implementation of an intervention. Additionally, knowing risk factors that increase the likelihood of chronic stress can inform interventions to prevent the exacerbations of these factors and avoid long-term, chronic stress that has the potential to harm the overall health outcomes and risky health behaviors a child can develop in the future.

There are notable factors that show a common pattern in the literature on risk and protective factors for traumatic stress following pediatric injury. The three factors include family functioning, subjective experience, and prior psychological and behavioral issues. In addition, family functioning has a big impact on a child recovery process and ability to reduce stress-related symptoms due to injury (Wise & Delahanty, 2017). The preeminence of family functioning takes on a unique role in preventing or potentially exacerbating stress (Brosbe et al., 2011; Cobham et al., 2012; Nocera, Gjelsvik, Wing, & Amanullah, 2016; Wise & Delahanty,

2017). As such, Wise and Delahanty (2017) stated that due to the potential condition the child may be in, it is recommended to integrate parental interventions.

The subjective experience of a child also heightens the risk of persistent to chronic stress (Brosbe et al., 2011; Langeland & Olff, 2008). Price et al. (2016) identified a child's subjective experience and prior behavioral and psychological problems as contributing to the altered risk of some children and their families, consequently illustrating that the injury trajectory is indeed complex and unique for different children. For instance, prior risk factors from previous traumas, behavioral and psychological complications, life circumstances like violence that create the sense of not being safe can contribute to the subjective experience of a child and their family in the post-injury experience (Brosbe et al., 2011; N. Kassam-Adams, Marsac, Hildenbrand, & Winston, 2013; Kazak et al., 2006; Langeland & Olff, 2008; M. L. Marsac et al., 2017; Price et al., 2016). Lastly, prior psychological and behavioral issues have shown higher risk to traumatic stress exacerbation and these authors highlight the importance of identifying this factor in children (Brosbe et al., 2011; Langeland & Olff, 2008). For the purposes of this synthesis, I focus on these three factors and whether outcome measures look further at identifying and addressing family functioning, child subjective experience, and prior behavioral and psychological issues.

2.6 INTERVENTIONS

Many current interventions exist addressing the need to prevent stress from trauma as it may lead to more chronic or persistent stress. For instance, the National Child Traumatic Stress Network (NCTSN) toolkit for PMTS in a hospital setting is a toolkit used by health professionals (De

Young & Kenardy, 2017). There is ongoing integration of trauma-informed care in pediatric centers, including psychological first aid after a crisis, a skill-based intervention on psychological recovery focused primarily on disasters, school-based intervention to assist with recovery, and general screening and monitoring (De Young & Kenardy, 2017). These interventions illustrate the importance of integrating trauma-informed care, and the importance of addressing child responses to symptoms such as stress when it comes to their long-term health outcome.

3.0 THE CURRENT SYNTHESIS

Three aspects in Price et al. (2016) updated model are significant for the analysis behind this synthesis: The additional assumption that child health outcomes are affected by PMTS, the importance of the subjective experience of injured children and their family in the trajectory of recovery, and the emphasis that children heal from stress after injury at a different pace and family has a strong role in this process.

As such, my research questions and hypotheses are as follows:

1. How is "success" defined and measured in interventions addressing stress for children and caregivers shortly after a pediatric traumatic injury?

Hypothesis: All outcome measures cover both the traumatic symptoms and the management of traumatic stress in the child's environment.

2. Do any interventions have a representation of minority populations in their measures?

Hypothesis: Minorities have little to no representation in interventions after a child is injured.

This synthesis can further inform guidelines on PMTS interventions to meet both child and family needs and address inclusivity of certain populations in these types of interventions.

4.0 METHODS

For this synthesis and search I will explain my process in evaluating the articles most relevant to my primary and secondary research question. The method is informed by prior reviews in an effort to be able to compare the articles found across these reviews and their findings.

4.1 LITERATURE SEARCH PROCESS

I completed my synthesis search through *OVID, PsychINFO, PubMed,* and *Scopus,* which also included *ProQuest.* Any additional articles were extracted using reference lists at the end of key articles. The Boolean terms "AND" and "OR" were used for the search. I limited the keyword search to exclusively appear in the main title and abstract. This limitation was justified as the articles must exclusively include some element of measuring stress post-injury in an intervention with children, their families, or both. It ensured the greatest reach of relevant articles and the narrowing down of the number of articles found.

The key terms in Figure 1 shaped the parameters of the search. Early intervention for my synthesis was also defined as the "efforts undertaken in peri-trauma [shortly after injury] and early post-trauma [recovery and discharge] period to prevent or reduce the development, persistence, and severity of traumatic stress responses and to promote children's resilience and full emotional recovery after exposure to an acute, potentially traumatic event"(p.1) (N. Kassam-

Adams, 2014). The definition of a "child" was all children ages 0-19 years old. "Adolescent" is defined by the World Health Organization (WHO, 2018) standards of adolescents ages 10-19 years old, and I classified young children as ages 0-9 years old.

After I conducted various term searches and tested the range of capture for each term (Figure 1 and 2), the search terms for this synthesis were narrowed down.

Injury	Parent(s)	Children	Stress	Intervention
- Child Injury - Traumatic injury - Pediatric injury - Unintentional Injury - Accidental Injury	- Caregiver - Kin(ship)* - Famil(ies)*	- Youth Infant(s) -Adolescent(s) - Pediatric	- Traumatic stress - Posttraumatic stress symptoms - Acute stress disorder - Trauma* - Posttraumatic stress disorder - Medical traumatic stress	- Program, nonmedical - Early intervention

Figure 1: Terms Used in the Search, by Domain

Terms in the main keyword search include:

- (child* OR adolescen* OR child* OR infant* OR child* OR youth*) AND Injury AND stress AND intervention AND trauma*
- (parent* OR caregiver* OR famil* AND stress) AND (child* OR adolescen* OR child* OR infant* OR child* OR youth*) AND injury AND stress AND intervention AND trauma*
- pediatric injury AND Stress AND Intervention* AND Trauma*

Pubmed Terms Search (All Years)		
Search Terms or Strategies Used (Limits: No MESH and no keyword search.)	# of Hits/Results	Notes
injury[Title/Abstract]	685274	Term Search Results Include: child injury[Title/Abstract], traumatic injury[Title/Abstract], pediatric injury[Title/Abstract], unintentional injury[Title/Abstract], accidental injury[Title/Abstract]
child injury[Title/Abstract]	335	-
traumatic injury[Title/Abstract]	5061	-
pediatric injury[Title/Abstract]	227	-
unintentional injury[Title/Abstract]	883	-
accidental injury[Title/Abstract]	1074	-
child*[Title/Abstract]	13 16667	OR infant*[Title/Abstract]-1580321 OR adolescen*[Title/Abstract] - 1455272 (((child*[Title/Abstract]) OR adolescen*[Title/Abstract])) OR ((child*[Title/Abstract]) OR infant*[Title/Abstract])- 1716631* ((((((child*[Title/Abstract]) OR adolescen*[Title/Abstract])) OR ((child*[Title/Abstract]) OR infant*[Title/Abstract]))) OR (child*[Title/Abstract] OR youth*[Title/Abstract]))-1741331
youth*[Title/Abstract]	66548	child*[Title/Abstract] OR youth*[Title/Abstract] - 1358519
infant*[Title/Abstract]	422079	-
adolescen*[Title/Abstract]	255349	-
pediatric*[Title/Abstract]	306791	-
parent[Title/Abstract]	239345	(parent[Title/Abstract]) OR caregiver[Title/Abstract] -285826 (((parent[Title/Abstract]) OR caregiver[Title/Abstract])) OR kinship - 142270
caregiver[Title/Abstract]	54456	
famil*[Title/Abstract]	975017	(((parent[Title/Abstract]) OR caregiver[Title/Abstract])) AND famil*[Title/Abstract]-79837 (((parent[Title/Abstract]) OR caregiver[Title/Abstract])) OR famil*[Title/Abstract] -1181006
kin*[Title/Abstract]	5703	
stress[Title/Abstract]	659024	Term Search Results Include: (stress[Title/Abstract]) OR ((post traumatic stress symptoms[Title/Abstract]) OR posttraumatic stress symptoms[Title/Abstract]) (stress[Title/Abstract]) OR traumatic stress[Title/Abstract] (post traumatic stress disorder[Title/Abstract]) OR posttraumatic stress disorder[Title/Abstract] (stress[Title/Abstract]) OR ((posttraumatic stress[Title/Abstract]) OR post traumatic stress[Title/Abstract]) (stress[Title/Abstract]) OR ((Acute stress disorder[Title/Abstract]) OR Acute stress[Title/Abstract])
traumatic stress[Title/Abstract]	12017	-

posttraumatic stress[Title/Abstract]	26879	-
posttraumatic stress disorder[Title/Abstract]	23612	-
posttraumatic stress symptoms[Title/Abstract]	1969	-
post traumatic stress[Title/Abstract]	10336	-
post traumatic stress disorder[Title/Abstract]	8982	-
post traumatic stress symptoms[Title/Abstract]	582	-
(post traumatic stress symptoms[Title/Abstract]) OR posttraumatic stress symptoms[Title/Abstract]	1987	-
(post traumatic stress disorder[Title/Abstract]) OR posttraumatic stress disorder[Title/Abstract]	24131	-
(posttraumatic stress[Title/Abstract]) OR post traumatic stress[Title/Abstract]	27454	-
post traumatic stress[Title/Abstract]	10336	-
Acute stress[Title/Abstract]	6163	Term Search Includes: (Acute stress disorder[Title/Abstract]) OR Acute stress[Title/Abstract]
Acute stress disorder[Title/Abstract]	533	-
trauma*[Title/Abstract]	321660	(stress[Title/Abstract]) AND trauma*[Title/Abstract] =30450
medical traumatic stress[Title/Abstract]	17	(stress[Title/Abstract]) OR medical traumatic stress[Title/Abstract] - 632845
intervention[Title/Abstract]	778712	Term Search Includes: (intervention[Title/Abstract]) OR early intervention[Title/Abstract]
early intervention[Title/Abstract]	14429	-

Figure 2: Search Terms and Results

4.2 INCLUSION CRITERIA FOR ARTICLES

Inclusion criteria considered what was included in previous articles to help limit the scope of interventions to the main research question of measures and definitions of success after unintentional injury.

Inclusion criteria were:

- Interventions for and/or with children under 19 years old;
- Interventions about single pediatric injury;
- The interventions that involve children, caregivers, or the whole family;
- The article must address stress related to pediatric injury using terms such as pediatric medical traumatic stress (PMTS), posttraumatic stress disorder (PTSD), acute stress disorder (ASD), and posttraumatic stress symptoms (PTSS), traumatic stress, or stress in general;
- Articles must be peer-reviewed;
- The language of the publication must be in English only;
- The intervention must include outcome measures and evaluation related to early intervention impact on child stress;
- Articles must cover interventions shortly after injury. Timing is a characteristic factor that shapes interventions post-injury (De Young & Kenardy, 2017; N. Kassam-Adams, 2014; M. L. Marsac et al., 2017). To fulfill the criteria, the intervention must have been related to the single event injury, initiated while the child was at the hospital, or at a follow-up appointment related to the injury. The decision to extend scope of intervention for injury was informed by readings which mentioned interventions done during the same hospitalization may be challenging for the injured child or adolescents due to factors in their recovery, for example when children receive medication or have a long duration recovery due to a severe injury (N. Kassam-Adams, 2014; Wise & Delahanty, 2017). I depended less on defining timing to a specific timeframe. Timing is thus an extra part of the observation because stress recovery varies from family to child, and this restriction of timeframe could limit analysis for

my particular synthesis. Thus, the cut-off for this synthesis is all interventions implemented as early as possible (within 12 to 24 months maximum).

4.3 EXCLUSION CRITERIA

Significant to this synthesis are the aim, outcome, and outcome measures. I used prior exclusion criteria in reviews of interventions to reduce or prevent traumatic stress after unintentional injury.

Criteria exclude:

- Trauma in adult injury or illness;
- Literature that centers on the physical injury and not the psychological or lived experience and response to PMTS;
- Nonmedical trauma;
- The literature does not mention traumatic stress, stress, pediatric medical traumatic stress (PMTS), acute stress disorder (ASD), posttraumatic stress disorder (PTSD), or posttraumatic stress symptoms (PTSS);
- Medication-based treatment as an intervention;
- Interventions that focus on children with additional medical complications other than the presenting injury;
- Interventions that do not indicate an outcome in the reduction to stress post-injury as defined by their outcome measures;
- Interventions include intentional traumatic injury or injury suspected as a result of neglect or abuse, are excluded.

To respond to my research questions, I constructed a table with the following information:

- Intervention Description,
- Sample and Sample Description,
- Outcome, and
- Outcome Measurement

4.4 ANALYSIS

To further analyze similarities and differences of interventions between child, caregiver, and family, I further divided the sections on the chart with these headings. Using similar inclusion and exclusion criteria and similar headings on my chart, the expectation is that this synthesis would follow prior intervention review standards to be able to compare and contrast on similar studies. The second chart on outcome themes was informed by the three predominant risk factors to traumatic stress after injury which include family functioning, a child's subjective experience, and prior psychological and behavioral problems. The goal is to see if articles about interventions monitor changes in these risk factors.

5.0 RESULTS

This synthesis includes a final total of 13 interventions. Figure 3 illustrates the process of elimination for articles to include and exclude in the process of this synthesis. As mentioned previously, the literature search includes multiple articles that were included in prior literature charts. Yet, as illustrated in Table 1, the main focus for this synthesis is on outcomes, outcome measures, and relevant details to my research question and hypotheses.

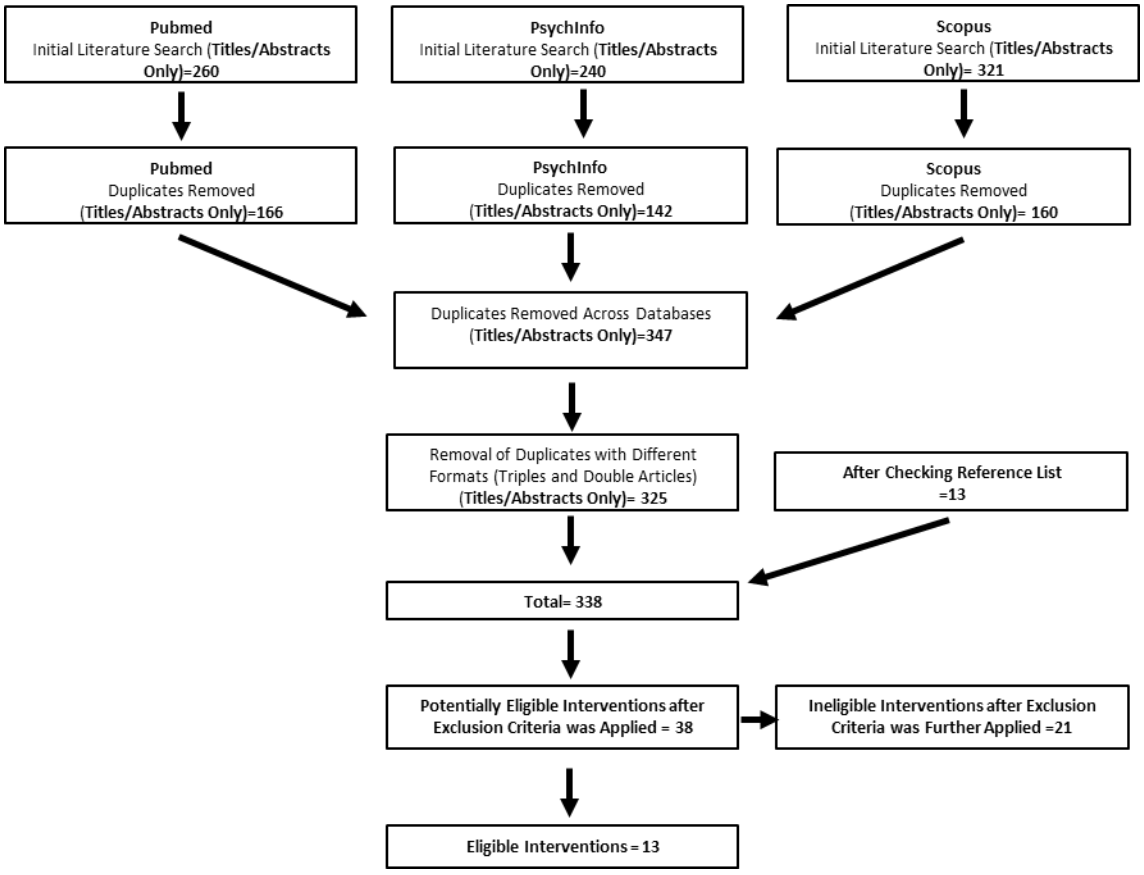

Figure 3: Process to Evaluate Inclusion and Exclusion of Articles

After searching *PubMed*, *PsychInfo*, and *Scopus* individually, there were 821 articles found. After removing duplicates and accounting for articles not in the database search, there were 338 articles that were eligible for review. Articles were from the U.S. and internationally. Despite cultural differences and possible variation in accessibility to a hospital (e.g. insurance and number of hospitals), international articles were included as the conversation of PMTS, pediatric injury, and preventing persistent traumatic stress through interventions after unintentional injury were still relevant.

From the 338 articles based on the keyword search term, I found 38 potentially eligible interventions. Upon further evaluation of the 38 potentially eligible intervention using the exclusion criteria, 13 intervention articles were eligible for review in my synthesis. Three were interventions with parents only, three with children only, and seven were family-focused.

Twenty-five articles out of the 38 potentially eligible for the synthesis were excluded due to the mechanism of the intervention outcomes as it related to the synthesis inclusion criteria. The following are articles highlighted for their reason of exclusion in my synthesis. One was excluded because the acute medical events used for the intervention included a very low sample of injured children. Three articles on the same intervention were excluded due to their focus on acquired brain injury, which is not exclusive to traumatic brain injury due to a potentially traumatic injury. One article discussed the intervention with the primary outcomes which did not include measures of distress. The second of the three was an additional analysis on the same intervention. The one addressed the secondary outcomes which included measuring parent stress after acquired brain injury. Two articles were excluded due to inclusion of children with suspected or substantiated child abuse related to their injury. Another article was excluded as it dealt with parental distress among patients diagnosed with cancer and/ or enduring serious

cardiac surgery. The reason to exclude the above articles is to ensure differing injury responses and the external outside stress (both psychological and emotion stress) did not interact with findings specifically addressing PMTS after unintentional injuries. One article was excluded as the measures of stress in the intervention related to wound healing process of pediatric burns and not to behavioral characteristics to overall stress. Another article was excluded because it included intentional injuries and the primary outcome was reduction in weapon carrying among adolescent with no findings in the reduction in factors such as depression and levels of PTSD. Two articles were on interventions after traumatic brain injury, but only measured behavioral issues post-injury with no measures referring to stress. Two articles only address traumatic stress interventions in the context of case studies. Two medication-related interventions were excluded as they did not include further observation on positive behavioral change and recovery in their intervention. As mentioned above, no other reviews have looked at interventions from a focus on the parent, caregiver or both in terms of outcomes.

5.1 INTERVENTION CHARACTERISTICS

Table 1 lists outcomes and outcome measures. Table 1 also presents sample information, indicating if minorities are represented in the intervention and if there were criteria that could potentially exclude certain populations (e.g. non-English speaking). The specification of outcome and outcome measure are central to the research question determining the definition of outcome successes. Length, duration, intensity, and type of the interventions varied. Injury type also varied with some intentionally excluding traumatic brain injury due to possibility that the results could be contributed to the child's brain injury. There was a mixture of the role of parents

in the intervention and variation of assessment of risk. Assessments to include and exclude children in a specific intervention were not consistent.

The majority early interventions with caregivers only or caregiver involvement and the measures looking at both or family outcomes may confirm what was previously mentioned in the background section that the state of health of a child or adolescent shapes the opportunity to administer an early intervention with the child as well. The interventions completed with caregivers and families confirms the fact that family functioning does have a strong correlation with the health and wellness of a child (Wise & Delahanty, 2017). Yet, there were few interventions that focus outcome measures only on the child. The context and choice to include family or caregivers suggest there is a focus on the multisystemic context of stress after injury.

Most articles show that the interventions had low to no impact on child posttraumatic stress disorder for children who suffered a traumatic injury (N. Kassam-Adams et al., 2011; Kenardy, Thompson, Le Brocque, & Olsson, 2008; Zehnder, Meuli, & Landolt, 2010). Other more recent studies also confirm this low findings on PTSS (M. Marsac et al., 2018; M. L. Marsac, Kohser, et al., 2013). However, one early intervention was found to lower anxiety (Cox, Kenardy, & Hendrikz, 2010) and one early intervention lowered depression in children 7-16 years, but not 2-6 years (Kramer & Landolt, 2014). Another early intervention was found to have a potential for preventing PTSS (Nancy Kassam-Adams et al., 2015). Heterogeneity of implementation and measures account for these differences in findings. The outcome measures do not always weigh strength of the finding, effect size, or lack of a finding on PTSS but look at other responses/reactions from child that may inform stress level (e.g. anxiety, depression, behavior).

Several outcome measures illustrate that PTSS were of focus without looking at accumulation of risk of traumatic stress in the social environment. Without consideration of accumulation of risk, success is shaped by varied levels of PTSS among children and adolescents. Outcome success does not indicate where children/adolescents and caregivers are on a continuum of positive health behavior change and recovery process due to lack of indication of accumulation of risk of stress in the social environment over time. This is something to further consider when it comes to standard approaches to measure intervention success and in defining success.

Table 1: Interventions by Outcome Measures, Outcome, and Sample Representation

Reference/ Year/ Name	Description of Intervention	Sample	Outcome	Outcome Measurement
Outcome Focus Caregiver				
(Wade et al., 2014) Counselor-Assisted Problem Solving (CAPS) USA	RCT intervention implemented with family but focused on parents of children diagnosed with mild to severe TBI within 1-6 months. Psychologist implemented intervention, first setting goals with families at home and then providing a teleconference at the end with family. Self-directed modules were completed by family with information including problem-solving, stress management, self-care, and cognitive reframing. Other areas of training include communication and management of emotions. The aim was to reduce caregiver depression and distress and increase caregiver efficacy following TBI. Follow-up was included in the intervention. No screening done prior to intervention to assess level of child stress. Conducted after discharge.	N= 132 children ages 12-17-year-old. 65 eligible for intervention. Minority representation is low with 19% and 20% non-white in control and intervention. Race investigated as a moderator but found to have no impact Exclusion criteria eliminates non-English speakers potentially eliminating particular populations.	There was borderline to non-significant result of the intervention on parental depressive symptoms. Caregiver distress went down in both intervention and control. No statistical significance in moderators with race, caregiver education, computer use. Computer usage moderated caregiver efficacy with illustrated increase in efficacy in intervention group. Did not reflect on prior studies where socioeconomic status influenced efficacy.	Parent global psychiatric symptoms and distress- GSI and SCL-90-R (Parent-reported). Parent depression symptoms- CES-D (Parent-reported). Parenting efficacy in relation to coping and burden post-injury- CSES (Parent-reported).
(M. L.	RCT intervention implemented	N=100 children	There was an	Parent knowledge

Table 1 continued

Reference/ Year/ Name	Description of Intervention	Sample	Outcome	Outcome Measurement
Marsac, Hildenbrand, et al., 2013) AfterTheInjury.org USA	with parents of child who sustained an unintentional injury within 60 days. Research assistant present the web-based intervention to parents called AfterTheInjury.org (ATI). ATI presents psychoeducation and information on trauma and trauma reactions, ways to help the child cope, and when to seek help. The aim is to promote emotional recovery and prevent PTSS in injured children by teaching parents how to assess with accuracy a child's reactions to injury and provide coping assistance. Follow-up was included in the intervention. No screening done prior to intervention to assess level of stress. Conducted during acute medical care to use after discharge.	age 6-17 years old Minority representation was not mentioned in demographics. Exclusion criteria eliminates non-English speakers potentially eliminating particular populations.	immediate parent knowledge increase following use of ATI. The relation between knowledge of injury reactions and parent reported child PTSS and parent PTSS were inconsistent. Intervention and control saw increase of parental knowledge overall from baseline to 6-week follow-up. Parent knowledge increased with no impact at 6 weeks on parent PTSS and knowledge overall. Not effective in preventing PTSS in parent and child.	of child reactions to injury- PKQ-R – (Parent-reported). Child PTSS as a PTSD severity score- PCL-C/PR (Parent- reported). Parent PTSS- PCL (Parent-reported). Child Posttraumatic stress symptom severity as a score- CPSS (Child-reported-Valid with 7-17-year-old, but 6 year old not included)
(Mortenson, Singhal, Hengel, & Purtzki, 2016) Telephonic Postconcussion Intervention Canada	Pilot RCT intervention implemented with parents of teens with a concussion injury 3 months prior. The occupational therapist researcher calls parents and discusses symptom management and activity participation prompted from questions on the child's daily functioning. Follow-up was included in the intervention. No screening done prior to intervention to assess level of stress. Conducted after discharge or post-acute care.	N= 66 parents of children ages 5 -16 years old. No mention of race through demographics or exclusion criteria	No statistically significant difference between groups in post-concussion symptoms. No statistical significance between groups in family stress as a result of intervention	Child post-concussion symptom level- PCSI (Parent-reported). Parent adjustment and stress following child's traumatic brain injury- FBII (Parent-reported).
Outcome Focus: Child				
(Kramer & Landolt, 2014) Early Psychological Intervention for Children and Parents (EPICAP)- 2-	RCT intervention implemented with children 2 weeks after a road traffic accident or burn. Intervention was implemented with children (7-16 years-old) and children (2-6 years-old). Adapted from Zehnder et al. (2010). Two-session early psychological (cognitive	N= 108 children ages 2-16 years old. There is no mention of minority representation in demographics.	2-6-year-old: No effect on symptoms of depression, PTSD symptom intensity and diagnosis, or behavioral problems. 7-16 years old: At 3-month follow-up, the intervention group	Child 2-6 years old PTSD-diagnosis and alternative symptoms- PTSDSSI- (Parent-reported). Child external and

Table 1 continued

Reference/ Year/ Name	Description of Intervention	Sample	Outcome	Outcome Measurement
session Switzerland	behavioral) intervention. Researchers implement two sessions at child's home or in the hospital and have the child reconstruct the accident, dysfunctional appraisals are identified, and change is supported, psychoeducation on common acute stress reactions given and normalized, coping skills discussed, and a leaflet is provided on posttraumatic stress with a contact address. Follow-up was included in the intervention. Screening done prior to intervention to assess level of stress. Conducted at acute care phase to discharge.	German fluency required potentially excluding particular populations. Socioeconomic status was indicated based on Swiss standards with a greater representation of high socioeconomic status potentially excluding particular populations.	had borderline decrease in PTSD symptom severity (p=.06) and fewer internalizing behavioral problems at 3 months. The intervention showed no impact on externalizing behavioral problems. There were less prominent results at 6-months. Depressive symptoms were not influenced by intervention.	internal behavior- CBCL (Parent-reported). Child 7-16 years old PTSD-diagnosis and symptoms- CAPS-CA German Version (Child-reported). Child 7-16 years old acute stress symptoms- ASCC German Version (Child-reported). Child 7-16-year-old depression symptoms- CDI (Child-reported)
(Zehnder et al., 2010) Early Psychological Intervention for Children and Parents (EPICAP)- 1-session Switzerland	RCT intervention implemented with child within 10 days after a road traffic accident. The psychologist implemented the intervention using prompts to go through a 4-step process: The process includes: reconstruction, accident-related appraisals, psychoeducation and information to normalize child stress reactions, leaflet given to provide information and contact address. Follow-up was included in the intervention. No screening done prior to intervention to assess level of stress. Conducted at acute care phase.	N= 99 ages 7 -16 years old. There is no mention of minority representation in demographics. German fluency required potentially excluding particular populations. Socioeconomic status was indicated with a greater representation of high socioeconomic status potentially excluding particular populations.	No beneficial impact on PTSS, depressive symptoms, and behavioral problems. Reduced depressive symptoms and behavioral problems for ages 7 to 11 year old (high effect size).	Child acute and PTSD symptoms-diagnosis- CAPS-CA German Version (Child-reported). Child depression symptoms- CDI German Version-(Child-Reported). Child competencies and behavior problems- CBCL (Parent-reported). Family life events prior and after injury- (Parent reported).
(Stallard et al., 2006) Critical Incident Stress Debriefing (CISD)	RCT intervention implemented with children within 4 weeks (28 days) after a road traffic accident met with a trained researcher on debriefing. Researchers used prompts, first reconstructing accident, identify thoughts and	N=158 children ages 7-18 years old Minority representation not indicated in demographic	No gains between intervention and control. Improvements were the same. There were improvements on SDQ for the child.	Child PTSD diagnosis- CAPS-C Child reaction to trauma- CIES (Child-reported).

Table 1 continued

Reference/ Year/ Name	Description of Intervention	Sample	Outcome	Outcome Measurement
UK	discuss emotional reactions. To normalize reactions, information on how to cope, information on common thoughts and feeling were provided. Information was focused on reducing psychological reactions. Follow-up was included in the intervention. No screening done prior to intervention to assess level of stress. Conducted shortly after discharge.	information. No inclusion/exclusion criteria discussed to find out further on exclusion.		Child depression- BDI (Child-reported). Child anxiety- MAS-R (Child-reported). Child behavior problems- SDQ (Parent- and Child-Reported).
Outcome Focus Family				
(M. Marsac et al., 2018) Celie Coping Kit USA	Pilot study implemented by research assistant with child-parent dyad during child's hospitalization for a general injury, TBI, or burn that occurred within the last month. Research assistant presented items, family identified distressing challenge, coping items and strategies were given. Aim was to provide strategies to families to manage injury-related challenges to improve child health outcomes. Various coping strategies were suggested. Follow-up was included in intervention. No screening done prior to intervention to assess level of stress. Conducted during early acute to acute medical care	N= 61 children ages 7-13 years old and 61 parents 24 NEast general injury 17 SEast, Burns 20 MWest TBI Minority representation is low with: 21%, 15%, 5% Black 67%,53.8%,95% Caucasion 13%, 31%, 0% Other Exclusion criteria eliminates non-English speakers potentially eliminating particular populations. SEast was more rural and had more appeal to the intervention. Intervention was low-cost ($3 per intervention) increasing potential inclusivity	Families learned new strategies coping with child's injury related symptoms. However, there was no statistically significant change from pre to post intervention on quality of life and PTSS.	Child and parent quality of life (physical, mental, emotional functioning)- PedsQL (Parent- and child-reported). Child trauma symptoms related to their injury- CPSS (Child reported).

Table 1 continued

Reference/ Year/ Name	Description of Intervention	Sample	Outcome	Outcome Measurement
(Wade et al., 2012) Teen Online Problem-Solving (TOPS) USA	RCT intervention implemented with teens with a severe to moderate TBI 3-19 months prior and their family.at home. Staff psychologist implement initial visit and teleconference with 9-13 web-based sessions self-directed. The psychologist reviewed the modules and problem-solving skills with family via videoconference and helps to implement problem-solving goal selected by the family. Content was focused on teens, but family participating is encouraged to practice problem solving skills. Main aim is problem-solving, modeling problem-solving can lead to increase skill and reduction of distress and depression in the family. Follow-up was included in the intervention. No screening done prior to intervention to assess level of stress. Conducted after discharge or post-acute care.	N= 41 children ages 11-18 years old Minority representation is low with 89% and 94% Caucasian in control and intervention. Exclusion criteria eliminates non-English speakers potentially eliminating particular populations. Socioeconomic status is considered with measures taken to reduce barriers to access computers and web-intervention.	No statistically significant difference between intervention and control group on global distress. Socioeconomic status moderated improvement in problem-solving and depressive symptoms.	Family problem solving before and after intervention- SPSI-R:S (Parent-reported). Parent distress-GSI and SCL-90-R (Parent-reported). Child symptoms of depression- CES-D (parent-reported).
(N. Kassam-Adams et al., 2011) Stepped Preventative Care Intervention USA	Pilot RCT intervention implemented by nurse or social worker with child-parent dyad within 1 week following unintentional injury during child's hospitalization. They administer two sessions, one session is psychoeducation and parent concern. There is a discussion of current distress, review of baseline measures of PTSD, barriers to current support providing best support to child. Questions about medical care along with binders with tip sheets, workbooks (for kid and parent), and further information on care post-injury are given. Other session reviewing and providing assistance is given on the phone. Follow-up was included in intervention. Screening done prior to	N=85 children ages 8-17 year old Minority representation is present but not discussed. It is low in the intervention group. Usual care group: 18% African American, 19% Caucasian, 2% other Intervention group 12% African American, 30% Caucasian, 4% other Exclusion criteria eliminates non-	Did not reduce PTSD symptom severity. Both intervention and usual care improved in traumatic stress symptoms over the course of the intervention. Did not reduce depression severity or increase health-related quality of life.	Child PTSD diagnosis based on symptom presence- CPSS (Child-reported). Child depression symptoms- CES-D (Child-reported). Child pre- and post-injury functioning- PedsQL(Child-reported).

Table 1 continued

Reference/ Year/ Name	Description of Intervention	Sample	Outcome	Outcome Measurement
	intervention to assess level of stress. Conducted during early acute to acute medical care.	English speakers potentially eliminating particular populations.		
(Cox et al., 2010) "So you've been in an accident" website and "So your child has been in an accident" Australia	RCT intervention implemented with child-parent dyad within 2-3 weeks after child's unintentional injury. Information based website for children and booklet for parents. Information aimed to normalize and relieve trauma reactions. The booklet emphasized role of parents and provides tools to assist child in coping; also includes section about their own distress. Follow-up was included in intervention. No screening done prior to intervention to assess level of stress. Conducted during early acute to acute medical care.	N= 56 children ages 7-16 years-old No mention of minority group. Exclusion criteria eliminates non-English speakers potentially eliminating particular populations.	Anxiety reduced in the intervention group and increased in anxiety in control. Secondary outcomes in children such as anger, depression, posttraumatic stress, and dissociative symptoms decreased and control group increased although not reaching statistical significance. No parental differences between groups on intrusive thoughts or PTSS. No parental differences between groups on avoidance or hyperarousal.	Child posttraumatic reactions, anxiety, posttraumatic stress, depression, dissociative reactions-TSCC-A (Child-reported). Parent intrusive, avoidance, and hyperarousal symptoms- IES-R (Parent-reported).
(Kenardy et al., 2008) 'So you've been in an accident' and "So your child has been in an accident" Booklet Australia	RCT implemented with child-parent dyad within 72 hours of admission for an unintentional injury. Researcher provided booklets, one for parent and one for children 11 and younger or12 and over. The booklet normalizes the stress responses in children and provides additional basic information and fosters the expectation of improvement by listing common reaction, timescale, self-help advice and whom to seek help if necessary. The booklet encourages the return to normal activities and to seek assistance if needed. Follow-up was included in intervention. No screening done prior to intervention to assess level of stress. Conducted during early acute to acute medical care.	N=103 children ages 7-15 years old No mention of minority representation in demographics Exclusion criteria eliminates non-English speakers potentially eliminating particular populations.	There was a reduction of child anxiety symptoms and increase anxiety in control. No impact on traumatic stress symptoms in children. Parent adjustment increased over time, PTSS and intrusive symptoms declined post-trauma to 1 month, but no change at 6 months. Parents had no change in avoidance symptoms and depression.	Child symptoms of intrusion and avoidance. This measure was used to designate child acute and posttraumatic symptoms-CIES (Child-reported). Child anxiety (covers the spectrum of anxiety)- SCAS (Child-reported). Parent subjective distress- intrusion and avoidance responses. Used to measure parent acute and PTSS - IES (Parent-reported). Parents negative

Table 1 continued

Reference/ Year/ Name	Description of Intervention	Sample	Outcome	Outcome Measurement
				emotional states of depression, anxiety, and stress. Used to measure parent's psychological adjustment- DASS (Parent-reported).
(Wade, Michaud, & Brown, 2006) Family Problem-Solving Intervention USA	RCT intervention implemented with child and family at home or the hospital within 18 months after TBI. The therapist provided seven sessions over six months. The sessions include problem-solving/skill-building guidance. There were 5 parts: Aim, Brainstorm, Choose, Do It, Evaluate. The intervention was framed in the positive light of problem-solving either an injury related or non-related goal. There was a family stepped plan constructed, psychoeducation on injury, coping and family-adjustment. Follow-up was included in the intervention. No screening done prior to intervention to assess level of child stress. Conducted after discharge.	N= 32 children ages 5-16 years-old and their family 13%=African American 81%=Caucasian	Positive awareness and knowledge across children, siblings, and parents, improved parent-child reporting. There were improvements in child internalizing behavioral symptoms, anxiety/depression and removal from previous activities. No group differences in parental distress and no differences on parent and child conflict behavior questionnaire.	Child behavior problems (Internal and External) and attention issues, anxiety/depression, and withdrawal. Used to measure child adjustment - CBCL(Parent-reported). Parent psychological distress- BSI (Parent-reported). Parent-child interaction identifies distressed and non-distressed families- CBQ (Parent-reported and children ages 8 and older answered the CBQ).
(Wade, Wolfe, Brown, & Pestian, 2005) USA	Pilot intervention implemented with child and family at home within 16 months after TBI. Therapist conducted weekly sessions, there were weekly self-guided web-based activities, followed by therapist meeting and applying session to problem solve goal or problem identified by the family. Follow-up was included in the intervention. No screening done prior to intervention to assess level of child stress. Conducted after discharge.	N=9 parents and 6 children ages 5-16 years old In the sample of 6 children and 9 parents 1child was African American and 1 was biracial.	Improved parent burden and distress and all measures reduced from pre-to post-intervention. Child behavior problems reduced.	Family context-specific stress to see if family needed more services- FBII (Parent-reported). Child antisocial and social competence in behavior- HCSBS (Parent-reported). Parent global psychiatric symptoms and distress GSI of SCL-90-R (Parent reported). Child depression-

Table 1 continued

Reference/ Year/ Name	Description of Intervention	Sample	Outcome	Outcome Measurement
				CDI (Child-reported). Parent depression- CES-D (Parent reported). Parent anxiety- AI- (Parent-reported). Parent stress related to parenting- PSI (Parent-reported). Parent rated the therapeutic alliance with therapist as well

Acronyms: Anxiety Inventory (AI); Acute Stress Checklist for Children (ASCC); Birleson Depression Inventory (BDI); Brief Symptom Inventory (BSI); Clinician-Administered PTSD Scale for Children and Adolescent (CAPS-C/A); Child Behavior Checklist (CBCL); Conflict Behavior Questionnaire (CBQ); Child Depression Inventory (CDI); Center for Epidemiologic Studies Depression Scale (CES-D); Children's Impact of Events Scale (CIES); Child PTSD Symptom Scale (CPSS); Child Posttraumatic Cognitions Inventory (CPTCI); Caregiver Self-Efficacy Scale (CSES); Depression anxiety stress scale: (DASS); Family Burden of Injury Interview (FBII); Global Severity Index (GSI) of Symptom Checklist-90 (SCL-90-R); Home and Community Social Behavior Scale (HCBS); Impact Event Scale (IES); Impact Event Scale Revised (IES-R); Revised Manifest Anxiety Scale (MAS-R); Pediatric Quality of Life Inventory (PedsQL); Post Concussion Symptom Inventory (PCSI); PTSD Checklist (PCL); PTSD Checklist for Child-Parent Report (PCL-C/PR); Parent knowledge questionnaire-revised (PKQ-R); Parenting Stress Inventory (PSI); PTSD Semi-Structured Interview and Observational Record for Infants and Young Children (PTSDSSI); Spence Child Anxiety Scale (SCAS); Strengths and Difficulties Questionnaire (SDQ); Social problem solving- problem solving inventory-revised short form (SPSI-R:S); Trauma symptom checklist for children-A (TSCC-A)

5.2 MINORITY EXCLUSION

Corresponding with the secondary research question, minority representation is low to non-existent in these particular interventions. However, as indicated in Table 1, there is an exclusion criterion throughout nearly all interventions that can further create barriers to exclude certain minorities and perpetuate health disparities for minority children post-injury: exclusion of non-English or exclusion of populations without the dominant language of the area.

5.3 OUTCOME MEASURE THEMES

In order to evaluate the outcome measures, I categorized outcome measures into main themes. The main themes overall were health-related quality of life, trauma symptoms (ranged from the general PTSS to getting deeper into assessing PTSD and ASD), parent mental health functioning (from psychological distress to depression), parent knowledge, child subjective experience, child behavior, child mental health (depression or anxiety) and a miscellaneous category for measures that did not fit in any of these categories (measuring therapeutic alliance and life events measures).

There were similarities in what the scales measured and what the scales were used for specifically health related quality of life and trauma symptoms. The outcome measures most used in at least three interventions include:

- Clinician-Administered PTSD Scale for Children and Adolescent (CAPS-C/A);
- Center for Epidemiologic Studies Depression Scale (CES-D);
- Child PTSD Symptom Scale (CPSS);
- Global Severity Index (GSI) of Symptom Checklist-90 (SCL-90-R)

The measure of PTSS varies across interventions with some investigating deeper into stress intensity than others. Trauma symptoms measured from PTSS, to PTSD severity and diagnosis, and ASD. Parent mental health was prominent for caregiver and family interventions measuring distress to depression, child behavior was measured for child and family interventions, child subjective experience was measured only once for a child intervention, and child mental health for child and family interventions which measured anxiety and/depression only. As illustrated the range of measures varies. There is no clear measure on traumatic stress and PTSD symptom

used. It seems like best efforts were made to have children report on their own experience. This is valuable information as it is not reported secondhand.

Surprisingly although interventions varied in timing (within 1-2 years after unintentional injury) the only difference in timing specifically for the implementation of the measure for children was their medical state of recovery after injury. As mentioned in the background section PTSS can vary in severity, with chronic stress most concerning for PTSD. The themes will inform further discussion, but most importantly provide a glimpse on what is included and excluded. In addition, it shows what measures are used throughout child, caregiver, and family interventions, possibly pointing to the measure's importance. In addition, this chart also illustrates the difference in definitions of success in interventions after unintentional injury.

Table 2: Major Themes with Outcome Measures

Health-Related Quality Life (HRQL)	Child Trauma Symptoms	Parent Mental Health Functioning	Parent Knowledge	Child Subjective Experience	Child Behavior	Child Mental Health	Misc
Outcome Focus: Caregiver							
	PTSS- CPSS (M. L. Marsac, Hildenbrand, et al., 2013) PTSS (PTSD Severity Scale)- PCL-C/PR (M. L. Marsac, Hildenbrand, et al., 2013)	Psychiatric symptoms and distress- GSI and SCL-90-R (Wade et al., 2014) Depression- CES-D (Wade et al., 2014) PTSS- PCL (M. L. Marsac, Hildenbrand, et al., 2013)	Child Reactions- PKQ-R (M. L. Marsac, Hildenbrand, et al., 2013) Efficacy- CSES (Wade et al., 2014) Adjustment and Stress- FBII (Mortenson et al., 2016)				
Outcome Focus: Child							

Table 2 continued

Health-Related Quality Life (HRQL)	Child Trauma Symptoms	Parent Mental Health Functioning	Parent Knowledge	Child Subjective Experience	Child Behavior	Child Mental Health	Misc
	PTSD (2-6 years old)- PTSDSSI (Kramer & Landolt, 2014) ASD (7-16 years old)- ASCC (Kramer & Landolt, 2014) PTSD (7-16 years old)- CAPS-CA (Kramer & Landolt, 2014) PTSD- CAPS-CA (Zehnder et al., 2010) PTSD- CAPS-C (Stallard et al., 2006)			Child reaction to trauma- CIES (Stallard et al., 2006)	External and internal behavior- CBCL (Kramer & Landolt, 2014; Zehnder et al., 2010) Child behavior problems- SDQ (Stallard et al., 2006)	Depression (7-16 year-old) - CDI (Kramer & Landolt, 2014; Zehnder et al., 2010) Depression- BDI (Stallard et al., 2006) MAS-R: Child-reported. Measured anxiety(Stallard et al., 2006)	Family life events prior and after injury- (Zehnder et al., 2010)
Outcome Focus: Family							
PedsQL- C.R. (functioning) (N. Kassam-Adams et al., 2011) and (M. Marsac et al., 2018)	PTSD-CPSS (N. Kassam-Adams et al., 2011) Acute and posttraumatic PTSS- Intrusion/Avoidance- CIES (Kenardy et al., 2008) Trauma symptoms- CPSS (M. Marsac et al., 2018)	Intrusive, avoidance, and hyperarousal symptoms- IES-R (Cox et al., 2010) Distress- IES- (Kenardy et al., 2008) Depression, Anxiety, Distress- DASS (Kenardy et al., 2008) Distress- BSI (Wade et al., 2006) Psychiatric symptoms	Family problem solving - SPSI-R:S (Wade et al., 2012) Family Stress- FBII (Wade et al., 2005)		CBCL- P.R. Internal and external behavior- CBCL (Wade et al., 2006)	Anxiety plus range of posttraumatic reactions- TSCC-A (Cox et al., 2010) Anxiety- SCAS- (Kenardy et al., 2008) Depression - CES-D (N. Kassam-Adams et al., 2011) Depression- CES-D (Wade et al., 2012) Depression- CDI (Wade et al., 2005)	Parent-Child Relationship- CBQ (Wade et al., 2006) Social competence and behavioral- HCSBS (Wade et al., 2005) Rating therapeutic alliance (Wade et al., 2005)

Table 2 continued

Health-Related Quality Life (HRQL)	Child Trauma Symptoms	Parent Mental Health Functioning	Parent Knowledge	Child Subjective Experience	Child Behavior	Child Mental Health	Misc
		and distress-GSI/SCL-90 (Wade et al., 2005) Depression-CES-D (Wade et al., 2005) Anxiety- AI (Wade et al., 2005) Distress-GSI and SCL-90-R (Wade et al., 2012) Parenting Stress- PSI (Wade et al., 2005)					

6.0 DISCUSSION

The following discussion will highlight that interventions did consider family functioning in the intervention process and outcome measures did vary and did not always measure intervention progress in relation to the child-in-environment. Lastly, the discussion will highlight key ways the interventions had little to no representation of minorities and potential implication in research on interventions decreasing, preventing, or treating stress due to pediatric injury. This is the first synthesis known to look at parent, child, and family interventions separately, while comparing and contrasting their definitions and measures of outcome success in interventions shortly after pediatric injury. This is the first synthesis to highlight outcome measures and look into these measures from three predictive factors of traumatic stress following pediatric injury: family functioning, childhood subjective experience, and prior psychological and behavioral problems in children.

Sample population measured the number of children experiencing the unintentional injury although the intervention had to do with the caregiver or family experience. Interventions discussed family functioning in terms of caregiver functioning or family system functioning. Interventions that integrated caregiver intervention or skill-building or family input in the process discussed boosting coping skills, knowledge of child emotional reactions, and some interventions looked at parental mental health functioning surrounding the pediatric injury. The five themes that surround outcome measures highlight these features in interventions. Key

features for child interventions were measures of stress using PTSS as a basis to the varied measures. In addition, some interventions looked at the axis of internal and external behavior post-injury through caregiver-reported measures. Reported measures from caregivers as indicated in Table 2 may contain bias leaning towards successful recovery so as to not highlight a child's stress response. Further consideration in terms of outcome measures and definitions of success should look into this bias. Knowing the interaction and which outcome measures in the five themes capture the least bias should be further considered. Success in caregiver interventions included tools to help mediate stress, but there was no reported success in reducing PTSS in a child or caregiver due to the intervention. Many factors may play into lack of impact on PTSS, including variations in recovery and timing of when and if a caregiver implements skills shown in the intervention.

Interventions involved strengths-based aspects of equipping parents with the tools to help their child overcome distress. As illustrated by the five themes behind the measures of success, many interventions aimed to reformulate negative injury-related subjective perceptions and normalize the experience of stress in a child's injury process towards recovery. Yet, looking at accumulation of risk of stress from a multicontextual framework in outcome measures was not often the main end goal. Reflecting on the stages of change model, the initiation of an intervention shortly after unintentional injury and positive health behavior change through overall recover may be challenging and less successful for children and families due to the accumulation of risk of a child and/or caregiver. Further consideration should look at consistent ways to make outcome measures reflect this multicontextual process around the lived experience of a child after unintentional injury.

Literature evaluating the articles mention the significance of reaching children most at risk and the pros and cons to a more targeted approach to interventions rather than a universal approach (De Young & Kenardy, 2017; N. Kassam-Adams, 2014). Namely, only one article that unfortunately has a low sample size of injured children and was excluded as a result, mentioned that they did not check-in with children on readiness to receive intervention, which may have helped measure effectiveness (Nancy Kassam-Adams et al., 2015). Considering readiness in positive health behavior change and recovery related to the intervention also must account for accumulation of risk prior to and during recovery for an unintentional injury. De Young and Kenardy (2017) mention the importance of follow-up and recommend a follow-up after the intervention for this specific population. Follow-up also ensures that any effects of an intervention are lasting, which is especially important when traumatic stress can have long-term effects on health status and health behaviors. An intervention that only temporarily reduces symptoms of traumatic stress is only temporarily useful.

No prior reviews on interventions after unintentional injury or meta-analyses look at sample representation in terms inclusivity and health disparities among racial and ethnic minorities. Looking at the prevalence of minority representation in interventions that address stress post-injury can shed light upon what it means to have an inclusive, representative sample. Addressing minority representation in relation to the varied recovery trajectories in the integrative (trajectory) model may contribute to a culturally inclusive conversation around child and family resiliency post-injury. Greater minority representation can promote culturally competent interventions that allows for more fluidity in recruitment, design, and understanding of the lived experience of stress and health outcomes after unintentional injury. Lastly, understanding if little to no representation exists for minorities in prior interventions can further

learning opportunities that create potential opportunities to modify interventions avenues to further minority representation across interventions. Table 1 also presents findings on minority representation in the interventions for this synthesis. I list further characteristics of included/excluded characteristics that are not part of the definition of minority representation but play a large role in potentially excluding minority populations (exclusion of non-English speakers).

6.1 RESEARCH QUESTION 1

My research question was how is "success" defined and measured in interventions addressing stress for children and caregivers shortly after a pediatric traumatic injury? My hypotheses were that all outcome measures cover both the traumatic symptoms and the interventions impact on management of traumatic stress for a child's environment. My hypothesis was not fully supported. Overall, few articles took into account the multicontextual nature of the trauma experience in their outcome measures and definitions of success. The synthesis highlights interventions that look for reasons of intervention successes. Kids and Accidents website (Cox et al., 2010) is still the strongest early interventions found for pediatric traumatic injury. Yet it looked at reduction of anxiety (Cox et al., 2010) and did not impact overall PTSS while another study also showed a reduction in depression (Kramer & Landolt, 2014). In a brief review of the articles that did not qualify for this synthesis they did not qualify some did not qualify as the measures and definitions of success were strictly on wound healing (Brown, Kimble, Rodger, Ware, & Cuttle, 2014) and stress responses to healing (Ponsford et al., 2001) while another did show success in lowering PTSS through a web-based medium called Coping Coach, but only a

small sample of injured children along with other types of hospital visit(Nancy Kassam-Adams et al., 2015). These studies do show there are different ways to measure a child's lived experience after an unintentional injury, but that the intervention must encompass behavior change surrounding the lived experience with traumatic stress. Considering the stages of change, targeting specific risk factors in the intervention based on the particular injury may make a difference to track potential stage or readiness for change.

Since this synthesis looked at interventions and not just at screening after pediatric injury, interventions fell close to discharge or post-discharge. Looking at the three phases in Price et al (2016) most articles fall within preventing PTSS and treating the symptoms. Including parents was important for many articles and included measures for both or one in the child-parent dyad. Assessment and treating symptoms are a crucial time to assess for the stage of change for a family, both integrating education and awareness of how to approach the injury post-discharge. Interventions integrate preparation through skill-based processes to ensure reduction or maintenance of potential traumatic stress symptoms after a child has been injured and ways for families to be there and ensure smooth recovery post-discharge. Knowing readiness of change or consideration of the interventions shortly after unintentional injury between parent and child may be useful in this process. The goal is that intervention skills are carried forward through the child's healing process. This synthesis finds that although impact on PTSS was low for interventions with child unintentional injury, there is a potential through risk assessment and identifying the stage of change of a parent and/or child that may strengthen intervention material and effects.

The findings of the synthesis suggest variation in definitions and measures of success. All focus on stress as this was an inclusion criterion for the intervention review, but they vary in

focus on psychological mental health and functioning, child behavior, child mental health, etc. Taken within the context of stages of change, outcomes that may indirectly impact a child (e.g. anxiety, depression, parent knowledge) should all contribute to the long-term reduction of PTSS (Cox et al., 2010; N. Kassam-Adams et al., 2011; Kenardy et al., 2008; Kramer & Landolt, 2014; Stallard et al., 2006). Family and child functioning as it relates to a potentially traumatic injury not only can risk positive short-term well-being and health outcomes, but also a long-term process towards positive health and wellness. Thus, the tools to equip children and families in this process may shape the trajectory of change taken by a family and their child after an unintentional injury. Applying the model of change compared to the integrative (trajectory) model for families after a child's injury, a child and family may face a potentially traumatic injury which may induce stress and interventions may provide tools to ensure the reduction or elimination of stress, but it is the child and family's health behavior practice during and after the intervention that may further determine the long-term health and well-being of the child. The findings where outcome measures were varied and the need to find ways to address the multicontextual nature are all essential to address this readiness of change in a child, caregiver, or family.

One way to ensure proper implementation and greater chances of adoption of intervention strategies is screening and timing of intervention shortly after the injury with children, families, or both. There is much to learn in the format of interventions shortly after an unintentional injury and health behavior changes during this stressful time. The ecology of stress deems a more multisystemic perspective on a child's lived experience after a potentially traumatic injury. Those that did measure mental health factors or family functioning showed moderate to

significant success. Looking at these measures accounts for the variation in recovery, from resilience to chronic stress, that children may potentially face after an unintentional injury.

In this synthesis, research still shows there is still little if any discussion on health-related quality of life and the process of health behavior change when it comes to traumatic stress and interventions shortly after unintentional injury. There is however growing literature looking at quality of life after pediatric injury and the potential traumatic stress endured by some children and adolescents during and after hospitalization due to pediatric injury. Focus has increased on the experience after a pediatric injury in terms of the healing and the recovery process for a child (Martin-Herz et al., 2012). According to Price et al. (2016) there is growing literature on health-related quality of life since 2015 as it relates to traumatic stress. Health related quality of life (HRQOL) is described in many terms including "[quality of life], well-being, life satisfaction, health status, functional status, and [health-related quality of life] HRQOL." Measuring health-related quality of life requires "investigating an illness or disability's [e.g. traumatic injury] impact on personal functioning" (Martin-Herz et al., 2012). The social environment has a lot to do with informing the quality of life (well-being and long-term health outcome) of a child. As part of the six assumptions that inform the integrative (trajectory) model for PMTS, Price et al. (2016) includes the family as having varied responses of posttraumatic stress and recovery, further dividing recovery into four continuous, but non-linear categories: resilient, recovery, chronic, and escalating. Considering interventions from the role that family takes and how family informs health outcomes in the process of recovery accounts for the complexity behind a child's traumatic injury trajectory. The role of family in the trajectory of recovery and overall health outcome of a child confirms the need for tailored interventions that take into account what

resources are present and missing in a child's ecological system (family, community, etc.) after an unintentional injury.

One unique contribution of the updated integrative model for PMTS is the added assumption of the influence of PMTS on health outcomes (Price et al., 2016). Adverse childhood experience (ACE) and the known impact of long-term traumatic events on health outcomes is confirmation in the importance of trauma on health outcomes and the risk and protective factors existing prior to a potentially traumatic event (Larkin et al., 2014). Post-traumatic stress symptoms due to pediatric injury have also tied to negative impact physical recovery and adherence to medical treatments (as referenced Marsac, Hildenbrand et al., 2013). Stress impacts children beyond the hospital, noted by examples of "significant social impairments, cognitive deficits, poor academic performance, and increased risk for emotion-related disorders over the lifespan" (referenced in Wise & Delahanty, 2017). Pediatric traumatic injury includes a complex multi-systemic trajectory that impacts the child and the functioning of their closest social system, the family, at this crucial time. To echo Wise and Delahanty (2017), interventions are necessary to assist in transient or abrupt stress due to pediatric injury rather than have the symptoms form into chronic stress. Historically, this was not considered when it came to a child's lived experience after unintentional injury.

Due to the increasing survival rate in children over time after injury, the lived experience of an injured child has increasingly been a topic tied to well-being and functioning of a child after a potentially traumatic event (Martin-Herz et al., 2012; Price et al., 2016). This is the first synthesis to look at how outcome measures were defined and used to determine success and how they relate to the overall lived experience of a child after unintentional injury. Past meta-analyses and intervention reviews did not put into perspective the value of knowing outcomes measures

beyond whether the intervention impacted PTSS only. In addition, the prior intervention reviews and meta-analyses did not separate family, caregiver, and child-focused interventions to compare differences and similarities in terms of outcome measures and definitions of success. Measures of health-related quality of life in these interventions can further elaborate on where children, caregivers, and families are after an unintentional injury in terms of their current and long-term functioning. Having quality of life outcome measures is thus important to these interventions, but few interventions use this measure. For example N. Kassam-Adams et al. (2011) and M. L. Marsac et al. (2018) include health-related quality of life, two studies where the outcome measures focus on the family. Further research should look at what ways unintentional injury and its potential to reduce physical, but emotional and psychological functioning, determines overall health outcomes.

Using a stepped or target intervention rather than a universal model may or may not fall in line with the integrative (trajectory) model when it comes to the different paths of recovery. Further exploration on interventions does warrant more focus in these three models as it relates to definitions and measures of success.

Stepped protocol compared to universal or targeted intervention fit with the varied recovery trajectory and the degree to which the intervention needed to be modified. In the studies for this synthesis, most were universally implemented. This is indicated by the column that indicates whether or not the intervention included a screening for risk. Stepped protocol considers who will receive the intervention by using an assessment prior to the intervention. It is similar to the targeted intervention although the stepped protocol ensures a degree of intervention care based on need. The stepped model and assessment to determine the risk for a child following unintentional injury may capture children and families considering or ready to adopt

intervention measures, thus reflecting back on the stages of change. This type of model may ensure interventions tailor information given to the family based on family needs. Due to the stepped model's relevance to the stages of change it might be the strongest approach for ensuring interventions promote positive health behaviors in the reduction or prevention of potential traumatic stress in children after pediatric injury. Screening may not be central to my synthesis but prior reviews on interventions showed screening for traumatic risk may ensure intervention effects are strongest where it is most needed and most successful in its measurements.

6.2 RESEARCH QUESTION 2

My second research question was do any interventions have a representation of minority populations in their measures? My hypothesis is that there was little to no representation of minorities. My hypothesis was supported as articles did not include large samples of minority representation and the one that did, did not elaborate on this feature in their intervention. None of the prior intervention reviews indicate the significance of racial and ethnic group health disparities to inform the framework of interventions to reduce or prevent trauma for potentially traumatic events after a pediatric injury. Research shows the impact of chronic traumatic stress is prevalent in minorities. Meyer (2003) discusses how being part of a stigmatize group (sexuality, gender, race/ethnicity, or socioeconomic status) may create social stress also called minority stress. The assumptions in minority stress is:

- "unique—that is, minority stress is additive to general stressors that are experience by all people, and therefore stigmatized people are required an adaptation effort above that required of similar others who are not stigmatized;"

- "chronic—that is minority stress is related to relatively stable underlying social and cultural structures;"
- "socially based—that is, it stems from social processes, institutions, and structures beyond the individual rather than individual events or conditions that characterize general stressors or biological, genetic, or other non social characteristics of the person or group" (Meyer, 2003) (p.4).

Discussion of minority representation is important for interventions reducing PTSS to increase access to stress prevention or reduction after a potentially traumatic injury that in turn reduce health disparity in a pediatric population.

6.2.1 Theoretical Model to Reduce Race and Ethnic Health Disparities

In an article suggesting a health intervention framework modified from the Institute of Medicine model for reducing health disparities, Cooper, Hill, and Powe (2002) state "family structure may impact on individuals' ability and desire to seek health care services"(p.478). Family members are often involved in medical decision-making, especially for children, the elderly, and terminally or chronically ill patients, and "patient preferences and expectations of treatment for depression, cardiovascular disease, and renal disease have been shown to differ by race and may impact upon use of health care services," "personal health behaviors…that impact upon patient's outcomes are known to differ by race and ethnicity," and "ethnic minority patients are more likely to have inadequate or marginal health literacy, a factor associated with worse health status and increased risk of hospitalization" (p.478) (Cooper et al., 2002). All the interventions looked at family as increasing access to health care, specifically for the intervention. Yet as seen in the articles, there are several complexities in family functioning that must be considered, and there is

a need to see these issues through a cultural lens (Cooper et al., 2002). Some interventions speak to surveying family acceptability and feasibility as important to capture minority opinion on these early interventions, again, from a cultural lens. Patient involvement in medical decision-making is important for acceptability and adherence in this model (Cooper et al., 2002). If we look at the interventions in my synthesis, there was significant focus on strengths-based interventions, looking at equipping patients and families with the tools to cope with traumatic stress. Personal health beliefs are also important and should be surveyed as they differ across culture for their potential impact in participation as well as relevance of intervention tools for coping. The interventions in my synthesis deal with different mediums to disseminate education, from psychoeducation to booklets to a website or a combination, as well as teaching (research assistant to psychotherapist to self-administered modules). In considering access to interventions for children after they experience a potentially traumatic injury, health literacy is important to address for the child and family. Understanding how these factors play into health care access can further inform factors that play into minority inclusion and exclusion.

Interventions in this synthesis sought to reduce or prevent trauma on the health and well-being of children and adolescents. However, few intentionally sought to reduce barriers to access health interventions, except for constructing interventions as simple and affordable. For instance, some interventions sought to increase accessibility to children with a traumatic injury and their families (i.e. making the intervention simple and cost-effective, providing computer and internet access)(Cox et al., 2010; M. Marsac et al., 2018; Wade et al., 2006; Wade et al., 2005), while others did not explicitly stress these barriers. Few articles mention in their limitations how the lack of immigrant representation, low-income participants, or non-English speakers may impact the generalizability of a study. Such observations should be elaborated in the shape, recruitment,

and accessibility to interventions for families and children potentially experiencing a traumatic injury. A further question to address minority representation may be in what ways can we use what we know to increase minority representation with the interventions we have to address potentially traumatic injuries?

As interventions consider trauma on the health and well-being of a child, few address factors that contribute to health disparities among populations and how this further excludes them from the health care system. Cooper et al. (2002) recommends an intervention model that reduces racial and ethnic disparities with consideration of the systematic barriers around the healthcare system. For instance, one systematic barrier interventions could address is determining how provider interactions and intervention structure shape or reduce the difficulties in health care access for racial and ethnic minorities. Contributing risks can be just as important to highlight when it comes to exclusion of certain populations, namely minority and/or underrepresented populations. Social inequities such as low-socioeconomic status that impact minorities in the U.S., low health literacy as a result of education level or language as a second language, and lack of language access in a health care environment as displayed in the interventions above may exacerbate health disparities for minority or underrepresented populations.

6.2.2 Study Designs and Minority Representation

When considering barriers in interventions to reduce health disparities among racial and ethnic groups the type of study may create barriers. Since randomized control trials were primarily used in interventions in this synthesis, it is the main focus in the discussion of minority representation and barriers to inclusivity. Obstacles in using randomized control trials (RCTs): are external

validity (e.g. tests/assessments impacting outcome and subsequently not being representative of other populations), flexibility to needs of the target population, and expanding outcome measures of success to more than one indicator of success (Cooper et al., 2002). Exclusion criteria for an intervention may indirectly exclude certain populations. However, study design is one element to further consider on whether or not the design must be modified to be more inclusive.

6.3 LIMITATIONS

There were several limitations to this literature review. The synthesis only used specified databases which may have contributed to missed articles. The author may have missed key words which contributed to missing articles. Since I wrote a synthesis and not a systematic review or meta-analysis, I chose to not specify my search any further by using Medical Subject Headings (MeSH) headings. I may have missed any interventions further captured through MeSH headings. However, I reviewed all database platforms in detail, ensuring that I used a systematized process of elimination. I also cross-checked with different systematic reviews, and there was a comparable comprehensive identification of articles.

Another limitation for this synthesis was not capturing all the articles on interventions after traumatic injury addressing traumatic stress. The focus may have been too narrow on measuring for PTSS and should continue to explore reduction or prevention of stress as it relates to improved behavioral problems and decrease in anxiety that contributes to a lessened risk of PTSS. There may be interventions missed because they were not initiated while children were inpatient or discharged the same day that may produce notable results. The synthesis may be out

of date by the time of publication, as new data may arise and new or modified interventions may attest to or contradict the findings in this synthesis.

7.0 CONCLUSION

PMTS interventions lead to the improved support of patients and families during a time of crisis. More research should consider how to standardize measures for interventions after pediatric injury. My synthesis found that examples of intervention outcomes such as positive family coping and reduction in anxiety and depression after interventions effectively capture the definition of success in reducing or eliminating the risk of traumatic stress, rather than just the measure of traumatic stress reduction by itself. Considering the multiple factors that contribute to preventing or reducing traumatic stress speaks to the variation of lived experience after injury. Lastly, to promote positive well-being in children and adolescents, the importance of reducing or decreasing risk of traumatic stress early after pediatric injury deserves to be an outcome for everyone. To eliminate risk of excluding minority populations in interventions, studies should consider what criteria (e.g. inclusion/exclusion criteria overall, unequal representation of minorities, excluding non-English speakers) lead to exclusion of minority populations in interventions and work to proactively engage these populations who may face the highest rate of health and health access disparities.

Thirty million children are affected by an unintentional injury every year, with some children and families fully recovering and others continuing to suffer a range of stress symptoms. Further consideration should look at multisystemic changes in the child's life after recovery. While reviewing outcome measures for this synthesis, key themes emerged, including health-

related quality of life, trauma symptoms, parent mental health functioning, parent knowledge, child subjective experience, child behavior, and mental health. Resolution of stress due to an unintentional injury can be impacted by both external and internal resources to cope at the time and can contribute to accumulated, pre-existing stress in the child and family's life. Thus, the experience and measures after injury cannot exist in a vacuum. Interventions to reduce or prevent stress cannot be a one-size fits all; the possible suffering of current or accumulated stress on children deems this issue a crucial public health concern.

BIBLIOGRAPHY

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*: American Psychiatric Pub.

Brosbe, M. S., Hoefling, K., & Faust, J. (2011). Predicting posttraumatic stress following pediatric injury: a systematic review. *Journal of Pediatric Psychology, 36*(6), 718-729.

Brown, N. J., Kimble, R. M., Rodger, S., Ware, R. S., & Cuttle, L. (2014). Play and heal: randomized controlled trial of Ditto intervention efficacy on improving re-epithelialization in pediatric burns. *Burns, 40*(2), 204-213. doi:10.1016/j.burns.2013.11.024

Centers for Disease Control and Prevention. (2008). CDC childhood injury report. *Atlanta, Georgia: Department of Health and Human Services, CDC*.

Cobham, V. E., March, S., de Young, A., Leeson, F., Nixon, R., McDermott, B., & Kenardy, J. (2012). Involving Parents in Indicated Early Intervention for Childhood PTSD Following Accidental Injury. *Clin Child Fam Psychol Rev, 15*(4), 345-363. doi:10.1007/s10567-012-0124-9

Committee on Pediatric Emergency Medicine, C. o. I., Violence, and Poison Prevention, Section on Critical Care, Section on Orthopaedics, Section on Surgery, Section on Transport Medicine, Pediatric Trauma Society, and Society of Trauma Nurses Pediatric Committee. (2016). Management of Pediatric Trauma. *Pediatrics*. doi:10.1542/peds.2016-1569

Cooper, L. A., Hill, M. N., & Powe, N. R. (2002). Designing and evaluating interventions to eliminate racial and ethnic disparities in health care. *J Gen Intern Med, 17*(6), 477-486.

Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2010). A randomized controlled trial of a web-based early intervention for children and their parents following unintentional injury. *J Pediatr Psychol, 35*(6), 581-592. doi:10.1093/jpepsy/jsp095

De Young, A. C., & Kenardy, J. A. (2017). Preventative Early Intervention for Children and Adolescents Exposed to Trauma. In *Evidence-Based Treatments for Trauma Related Disorders in Children and Adolescents* (pp. 121-143): Springer.

International Health Conference. (2002, 01/23). *Constitution of the World Health Organization. 1946.* Paper presented at the Bulletin of the World Health Organization.

Kassam-Adams, N. (2014). Design, delivery, and evaluation of early interventions for children exposed to acute trauma. *Eur J Psychotraumatol, 5*. doi:10.3402/ejpt.v5.22757

Kassam-Adams, N., Felipe García-España, J., Marsac, M. L., Kohser, K. L., Baxt, C., Nance, M., & Winston, F. (2011). A pilot randomized controlled trial assessing secondary prevention of traumatic stress integrated into pediatric trauma care. *Journal of Traumatic Stress, 24*(3), 252-259. doi:10.1002/jts.20640

Kassam-Adams, N., Marsac, M. L., Hildenbrand, A., & Winston, F. (2013). Posttraumatic stress following pediatric injury update on diagnosis, risk factors, and intervention. *JAMA Pediatr, 167*(12), 1158-1165. doi:10.1001/jamapediatrics.2013.2741

Kassam-Adams, N., Marsac, M. L., Kohser, K. L., Kenardy, J., March, S., & Winston, F. K. (2015). Pilot randomized controlled trial of a novel web-based intervention to prevent posttraumatic stress in children following medical events. *Journal of Pediatric Psychology, 41*(1), 138-148.

Kazak, A. E., Kassam-Adams, N., Schneider, S., Zelikovsky, N., Alderfer, M. A., & Rourke, M. (2006). An integrative model of pediatric medical traumatic stress. *J Pediatr Psychol, 31*(4), 343-355. doi:10.1093/jpepsy/jsj054

Kenardy, J., Thompson, K., Le Brocque, R., & Olsson, K. (2008). Information-provision intervention for children and their parents following pediatric accidental injury. *Eur Child Adolesc Psychiatry, 17*(5), 316-325. doi:10.1007/s00787-007-0673-5

Kramer, D., & Landolt, M. (2011). Characteristics and efficacy of early psychological interventions in children and adolescents after single trauma: a meta-analysis. *Eur J Psychotraumatol, 2*. doi:10.3402/ejpt.v2i0.7858

Kramer, D., & Landolt, M. (2014). Early psychological intervention in accidentally injured children ages 2-16: A randomized controlled trial. *European Journal of Psychotraumatology Vol 5 2014, ArtID 24402, 5*.

Langeland, W., & Olff, M. (2008). Psychobiology of posttraumatic stress disorder in pediatric injury patients: A review of the literature. *Neuroscience and Biobehavioral Reviews, 32*(1), 161-174. doi:10.1016/j.neubiorev.2007.07.002

Larkin, H., Felitti, V. J., & Anda, R. F. (2014). Social work and adverse childhood experiences research: implications for practice and health policy. *Soc Work Public Health, 29*(1), 1-16. doi:10.1080/19371918.2011.619433

Le Brocque, R. M., Hendrikz, J., & Kenardy, J. A. (2010). The course of posttraumatic stress in children: examination of recovery trajectories following traumatic injury. *J Pediatr Psychol, 35*(6), 637-645. doi:10.1093/jpepsy/jsp050

Marsac, M., Weiss, D., Kohser, K., Van Allen, J., Seegan, P., Ostrowski-Delahanty, S., . . . Kassam-Adams, N. (2018). The cellie coping kit for children with injury: Initial feasibility, acceptability, and outcomes. *Child: Care, Health and Development*, No Pagination Specified.

Marsac, M. L., Hildenbrand, A. K., & Kassam-Adams, N. (2017). Interventions in Medical Settings. In M. A. Landolt, M. Cloitre, & U. Schnyder (Eds.), *Evidence-Based Treatments for Trauma Related Disorders in Children and Adolescents* (pp. 405-425). Cham: Springer International Publishing.

Marsac, M. L., Hildenbrand, A. K., Kohser, K. L., Winston, F. K., Li, Y., & Kassam-Adams, N. (2013). Preventing posttraumatic stress following pediatric injury: a randomized controlled trial of a web-based psycho-educational intervention for parents. *J Pediatr Psychol, 38*(10), 1101-1111. doi:10.1093/jpepsy/jst053

Marsac, M. L., Kassam-Adams, N., Delahanty, D. L., Ciesla, J., Weiss, D., Widaman, K. F., & Barakat, L. P. (2017). An initial application of a biopsychosocial framework to predict posttraumatic stress following pediatric injury. *Health Psychol, 36*(8), 787-796. doi:10.1037/hea0000508

Marsac, M. L., Kassam-Adams, N., Delahanty, D. L., Widaman, K. F., & Barakat, L. P. (2014). Posttraumatic stress following acute medical trauma in children: a proposed model of

bio-psycho-social processes during the peri-trauma period. *Clin Child Fam Psychol Rev, 17*(4), 399-411. doi:10.1007/s10567-014-0174-2

Marsac, M. L., Kohser, K. L., Winston, F. K., Kenardy, J., March, S., & Kassam-Adams, N. (2013). Using a web-based game to prevent posttraumatic stress in children following medical events: Design of a randomized controlled trial. *Eur J Psychotraumatol, 4*(SUPPL.). doi:10.3402/ejpt.v4i0.21311

Marsac, M. L., Weiss, D., Kohser, K. L., Van Allen, J., Seegan, P., Ostrowski-Delahanty, S., . . . Kassam-Adams, N. (2018). The Cellie Coping Kit for Children with Injury: Initial feasibility, acceptability, and outcomes. *Child Care Health Dev*. doi:10.1111/cch.12565

Martin-Herz, S. P., Zatzick, D. F., & McMahon, R. J. (2012). Health-Related Quality of Life in Children and Adolescents Following Traumatic Injury: A Review. *Clin Child Fam Psychol Rev, 15*(3), 192-214. doi:10.1007/s10567-012-0115-x

Meyer, I. H. (2003). Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. *Psychol Bull, 129*(5), 674-697. doi:10.1037/0033-2909.129.5.674

Mortenson, P., Singhal, A., Hengel, A. R., & Purtzki, J. (2016). Impact of early follow-up intervention on parent-reported postconcussion pediatric symptoms: A feasibility study. *J Head Trauma Rehabil, 31*(6), E23-E32.

Nocera, M., Gjelsvik, A., Wing, R., & Amanullah, S. (2016). The Association of Parental Coping and Childhood Injury. *Maternal and child health journal, 20*(11), 2357-2366. doi:10.1007/s10995-016-2059-0

Ponsford, J., Willmott, C., Rothwell, A., Cameron, P., Ayton, G., Nelms, R., . . . Ng, K. (2001). Impact of early intervention on outcome after mild traumatic brain injury in children. *Pediatrics, 108*(6), 1297-1303.

Price, J., Kassam-Adams, N., Alderfer, M. A., Christofferson, J., & Kazak, A. E. (2016). Systematic Review: A Reevaluation and Update of the Integrative (Trajectory) Model of Pediatric Medical Traumatic Stress. *J Pediatr Psychol, 41*(1), 86-97. doi:10.1093/jpepsy/jsv074

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *Am J Health Promot, 12*(1), 38-48. doi:10.4278/0890-1171-12.1.38

Reuben, A., Moffitt, T. E., Caspi, A., Belsky, D. W., Harrington, H., Schroeder, F., . . . Danese, A. (2016). Lest we forget: comparing retrospective and prospective assessments of adverse childhood experiences in the prediction of adult health. *J Child Psychol Psychiatry, 57*(10), 1103-1112. doi:10.1111/jcpp.12621

Stallard, P. (2006). Psychological interventions for post-traumatic reactions in children and young people: a review of randomised controlled trials. *Clin Psychol Rev, 26*(7), 895-911. doi:10.1016/j.cpr.2005.09.005

Stallard, P., Velleman, R., Salter, E., Howse, I., Yule, W., & Taylor, G. (2006). A randomised controlled trial to determine the effectiveness of an early psychological intervention with children involved in road traffic accidents. *J Child Psychol Psychiatry, 47*(2), 127-134. doi:10.1111/j.1469-7610.2005.01459.x

Wade, S. L., Karver, C. L., Taylor, H. G., Cassedy, A., Stancin, T., Kirkwood, M. W., & Brown, T. M. (2014). Counselor-assisted problem solving improves caregiver efficacy following adolescent brain injury. *Rehabil Psychol, 59*(1), 1-9. doi:10.1037/a0034911

Wade, S. L., Michaud, L., & Brown, T. M. (2006). Putting the pieces together: preliminary efficacy of a family problem-solving intervention for children with traumatic brain injury. *J Head Trauma Rehabil, 21*(1), 57-67.

Wade, S. L., Walz, N. C., Carey, J., McMullen, K. M., Cass, J., Mark, E., & Yeates, K. O. (2012). A randomized trial of teen online problem solving: efficacy in improving caregiver outcomes after brain injury. *Health Psychol, 31*(6), 767-776. doi:10.1037/a0028440

Wade, S. L., Wolfe, C., Brown, T. M., & Pestian, J. P. (2005). Putting the pieces together: preliminary efficacy of a web-based family intervention for children with traumatic brain injury. *J Pediatr Psychol, 30*(5), 437-442. doi:10.1093/jpepsy/jsi067

Winthrop, A. L. (2010). Health-related quality of life after pediatric trauma. *Curr Opin Pediatr, 22*(3), 346-351. doi:10.1097/MOP.0b013e3283394351

Wise, A. E., & Delahanty, D. L. (2017). Parental factors associated with child post-traumatic stress following injury: A consideration of intervention targets. *Front Psychol, 8*(AUG). doi:10.3389/fpsyg.2017.01412

Zehnder, D., Meuli, M., & Landolt, M. A. (2010). Effectiveness of a single-session early psychological intervention for children after road traffic accidents: A randomised controlled trial. *Child and Adolescent Psychiatry and Mental Health, 4*. doi:10.1186/1753-2000-4-7