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Paul T. Enlow

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The Relation of Stress and Coping to Psychosocial Outcomes in Pediatric Burn Survivors

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Thesis submitted to
The Eberly College of Arts and Sciences
at West Virginia University
in partial fulfillment of the requirements
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in
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ABSTRACT

The Relation of Stress and Coping to Psychosocial Outcomes in Pediatric Burn Survivors

Paul Enlow

Stress and coping are important predictors of psychosocial functioning in both healthy and chronically ill populations. However, no studies have investigated the relation of stressors and coping to psychosocial functioning in pediatric burn survivors. Stress consists of major life events (e.g. death of a family member) and daily hassles (e.g. receiving a speeding ticket). Results from previous studies found that stress was related to positive and negative psychosocial functioning. Coping, on the other hand, is a response that aims to combat the stressor and promote positive adjustment. Past studies have shown that the impact of stress may be moderated by constructs such as coping. The inconsistency in findings regarding the relation of stress to psychosocial outcomes, accompanied with the lack of research on pediatric burn survivors, warrant further study of stress and coping in youth with burns. The purpose of this study was to explore how levels of stress and coping are related to psychosocial functioning in pediatric burn survivors. A sample of 40 burn survivors between the ages of 7 and 17 (M age = 12.77; 65% male) and their primary caregivers were recruited from two outpatient burn centers in the United States, a burn registry patient database, and a summer camp for children with burn injuries. Youth and caregivers each completed packets assessing a range of psychosocial and burn injury variables. Hierarchical regressions were used to test whether stress or coping moderated the association between burn-injury variables and psychosocial functioning. A third exploratory aim used hierarchical regression to examine if coping moderated the association between stress and psychosocial functioning. Results indicated that neither household stress nor active coping moderated the association between burn size and psychosocial functioning. Additionally, active coping did not moderate the association between household stress and psychosocial adjustment. Greater household stress, however, was associated with more post-traumatic stress symptoms. Use of more active coping strategies was also significantly associated with better self-concept. Finally, more regular use of avoidant coping strategies was significantly related to more post-traumatic stress symptoms. Results from the current study suggest that it may be important to help pediatric burn survivors develop and utilize more adaptive coping strategies during the rehabilitative phase of their injury. Additionally, helping families learn to manage stress at home may promote adjustment following burn injuries.

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The Relation of Stress and Coping to Psychosocial Outcomes in Pediatric Burn Survivors

A burn is defined as an injury to skin or other organic tissue caused by some form of thermal or acute trauma (Kagan et al., 2009). In 2011, approximately 129,000 youth age 18 or younger sustained non-fatal burn injuries (Centers for Disease Control [CDC], 2005). In particular, young children are at greater risk for experiencing a burn injury, with 52% of all pediatric fire-related deaths occurring in children below the age of 5 years (United States Fire Administration [USFA], 2011). Gender differences in burn injuries also exist, with males accounting for 56% of non-fatal burn injuries from 2001-2011 (CDC, 2005). Finally, lower socio-economic status, lower parental education, and a greater number of residents in the household are associated with increased rates of pediatric burn injuries (Delgado et al., 2002; Petridou et al., 1998).

Three major components are used to describe burn injuries: cause, total body surface area (TBSA), and depth. The cause of a burn can be thermal, radiation, chemical or electrical. A thermal burn, such as scalding from hot water, is one of the most common forms of injury (Rivara, 1999). Total body surface area (TBSA) is the percent of the body or skin surface that is affected by the burn. It is calculated using a chart where parts of the body are designated to consist of relative percentages of the overall body surface (e.g., one arm is 9% of the TBSA) (Tarnowski, 1994). Finally, the depth of the burn is used to determine the extent of tissue damage as well as possible long-term prognosis (Kagan et al., 2009). Depths consist of first through fifth degree. A first-degree burn is any burn that is restricted to the top layer of tissue, the epidermis (Tarnowski, 1994). These superficial burns often heal very quickly. Second degree burns, also known as partial thickness burns, damage the dermis, and may require some surgery or more intensive care. Depending on the extent of the damage, some scarring and functional

impairment may occur (Kagan et al., 2009). A third degree burn has damage that extends through the dermis and to the base of the skin (e.g., nerve fibers & fatty tissue) (Tarnowski, 1994). A fourth degree burn involves damage to muscles and bones, while a fifth degree burn requires amputation (Kagan et al., 2009). Burn depth, in conjunction with TBSA, is the most commonly utilized method to report burn severity. With an accurate description of a burn injury, physicians are able to identify required treatment. For example, burns sized 30-40% TBSA or greater potentially can be fatal without rapid treatment (United States Department of Health and Human Services, 2011). Furthermore, burn injuries which are severe second degree, or deeper, typically require skin grafts.

When treating a burn injury, there are three main phases: emergency, acute, and rehabilitation (Tarnowski, 1994). During the emergency period, treatment is applied on the scene of the injury (e.g., first aid) in order to stabilize the individual. In addition, burns can cause a loss of fluids; therefore, intravenous fluids may be administered (Tarnowski, 1994). After the burn patient is stabilized and arrives at the hospital, the acute phase of treatment begins. This period of treatment focuses on caring for the actual burns (e.g., debridement of necrotic tissue, possible escharotomy or incision to alleviate pressure and prevent further damage) and is often very time consuming (Kagan et al., 2009). More severe burns may require excision (i.e., cutting away necrotic tissue) and grafting (i.e., taking skin from a non-burned area and transplanting it onto the excised burn area) (Kagan et al., 2009; Tarnowski, 1994). This new skin adheres to the wound and is eventually accepted and promotes the healing process (Tarnowski, 1994). The final phase, rehabilitation, is when the patient works to regain previous functioning as much as possible through treatments such as physical and occupational therapy, reconstructive surgery, and use of pressure garments (Tarnowski, 1994). While the main concern of burn treatment

revolves around medical issues, more recent research has begun to look at the psychosocial factors associated with recovery from burn injuries as well.

Psychosocial Outcomes for Pediatric Burn Injuries

Advances in the acute phase of burn treatment have led to a dramatic increase in survival rates among pediatric patients. For example, a recent study found that only one third of children with TBSA ranging from 60-100% died from their injuries (Sheridan et al., 2000). With this rise in burn survival, the psychosocial ramifications of pediatric burn injuries are coming under closer scrutiny. Surveys of past research noted that youth who have sustained burn injuries may exhibit emotional disturbances, such as depression or anxiety (Bakker, Maertens, Van Son, & Van Loey, 2013; Knudson-Cooper, 1984; Tarnowski, Rasnake, Gavaghan-Jones, & Smith, 1991). However, results from reviewed studies indicated that most youth with burn injuries did not have anxiety disorders at six months post-burn (De Young, Kenardy, Cobham, & Kimble, 2012). Additionally, Bakker and colleagues' review (2013) noted that not all studies found depression to be more prevalent in youth with burn injuries. Therefore, psychopathology may not be the best marker of adjustment in pediatric burn survivors; instead, other psychosocial factors may be better indicators. There is evidence that pediatric burn survivors may exhibit posttraumatic stress symptoms (Tarnowski & Brown, 2009), because these injuries often stem from traumatic events, such as car accidents, fires, or accidental scalding (De Young et al., 2012; Saxe et al., 2005). In addition, the treatments associated with burn care (e.g., debridement, skin grafting) can be very painful, and past studies have indicated that these procedures may lead to post-traumatic stress symptoms in young children (Graf, Schiestl, & Landolt, 2011). However, DeYoung and colleagues (2012) found that only a small portion of youth burn survivors actually qualified for a diagnosis of Post-Traumatic Stress Disorder. In contrast, other psychosocial

difficulties, including problems with how children perceive themselves and social functioning, frequently have been found to be related to burn injuries in youth (e.g., Stoddard et al., 2006; Tarnowski & Brown, 2009).

One of the most significant psychological ramifications is the effect burns have on self-concept, with body-related perceptions being of particular concern. Self-concept is a construct that incorporates how one feels about themselves (i.e., self-esteem) along with self-observations without value judgment (e.g., “I get good grades”) (Piers & Herzberg, 2002). A meta-analysis of the psychosocial outcomes in pediatric burn survivors found self-concept to be associated with injury variables, such as the location of the burn (Noronha & Faust, 2007). While this review adequately surveyed available literature, Noronha and Faust’s meta-analysis (2007) neglected to consider potential moderating and mediating factors in psychosocial outcomes of pediatric burn survivors. Likewise, Lawrence, Rosenberg, and Fauerbach (2007) found that self-esteem was negatively associated with scar severity and perceived stigma in children and adolescents. The results from Lawrence and colleagues’ study (2007) support reviews of psychosocial outcomes in pediatric burn survivors, which found that self-esteem and perceived stigma are often associated with the physical disfigurement associated with burn injuries (e.g., Rose & Blakeney, 2006). However, results from the Lawrence and colleagues’ study should be interpreted cautiously because the comparison group was collected for a different study and lacked detailed demographic information.

The ramifications of burn injuries on self-esteem also can be seen in social functioning. Social functioning is a construct that incorporates how well someone is able to thrive in social environments by creating and maintaining meaningful peer-relationships. Past research on pediatric and adult samples has found that perceived stigmatization and visible scarring are

associated with problems reintegrating into social situations (e.g., school) (Corry, Pruzinsky, & Rumsey, 2009; Rose & Blakeney, 2006; Tarnowski, et al., 1991). Moreover, reviews of available literature have reported that pediatric burn survivors sometimes develop social anxiety and report more difficulties interacting with peers (e.g., bullying) when compared with typical youth (Bakker et al., 2013; Rose, & Blakeney, 2006). While the aforementioned reviews all effectively examine the literature, they are limited by findings of the studies they review. In addition, not all of the studies in these reviews included social functioning as a construct, but instead measured social functioning through social support and social phobia. Consequently, though these variables likely are related, they are not necessarily identical. Yet, these reviews lend some support to the importance of including social support and self-esteem as key concepts to consider in future psychosocial research for pediatric burn injuries.

Taken together, it is clear that post-traumatic stress symptoms, as well as difficulties with self-esteem, self-concept, and social support, can be associated with pediatric burn injuries and have garnered considerable attention in the research literature. While many researchers are interested in the outcomes of burn survivors, less emphasis has been placed on those factors that facilitate either positive or negative outcomes. In other words, it is unclear what factors or processes contribute to whether or not and to what degree patients with burn injuries adjust well to their condition.

Stress and Pediatric Burns

Stress is one factor that has been linked to outcomes associated with illness (e.g., DeLongis, Folkman, & Lazarus, 1988; Libby & Glenwick, 2010). Lazarus and Folkman (1984) created the widely-used transactional model of stress. This model details the interaction between a person and his or her environment, with stress as the outcome individuals experience when

they appraise and react to a stressor (i.e., an environmental influence that impacts an individual's physical or mental functioning). A stressor is some event that can be large (e.g., death in the family) or minor (e.g., speeding ticket). According to this model, when individuals experience a stressor, they appraise the situation as being threatening or not, taking into account available coping resources and possible negative or positive outcomes. Once the situation has been appraised, it is viewed as a threat if the required resources to cope are greater than those available. Then, an individual engages in a coping response that attempts to offset the threat and reduce the amount of stress experienced (Lazarus & Folkman, 1984).

Initially, many psychologists viewed major life events as the best way to assess an individual's stress level (Holmes & Rahe, 1967; Kanner & Feldman, 1987). Holmes and Rahe (1967) subscribed to this method of assessing stress and developed a measure that examines stress derived from both positive (e.g., marriage) and negative (e.g., death of a spouse) major life events. While this method of assessing stress has been popular in the past, recent research has found that the association between major life events and health outcomes is very weak (DeLongis, Coyne, Dakof, Folkman, & Lazarus, 1982; DuBois, Felner, Brand, Adan, & Evans, 1992). Consequently, although major life events are still considered, they often are measured in conjunction with minor stressors to give a more rounded evaluation of an individual's stress level (DuBois et al., 1992; Libby & Glenwick, 2010; Pinquart, 2009; Shahar & Priel, 2003).

Minor stressors, also known as daily hassles, are those events that individuals likely experience on a daily basis (DeLongis et al., 1982). DeLongis and colleagues (1982) argued that the difference between daily hassles and major life events is quite significant. Daily hassles are seen to be a proximal measure of an individual's stress, while major events are considered to be distal. Minor stressors are more chronic and thereby regularly impact an individual's stress level.

In addition, the number of hassles in an individual's life is fairly consistent over time (Kanner, Coyne, Schaefer, & Lazarus, 1981). Major life events, on the other hand, happen infrequently and therefore are thought to have relatively less impact on somebody's overall day-to-day stress. In their study, DeLongis et al. (1982) indeed obtained results confirming their theory; specifically, daily hassles accounted for health outcomes much better than major life events did in an adult sample. While this study significantly contributed to the stress and health literature, it had a homogenous sample (i.e., predominantly Caucasian, high SES, and well educated), which may limit the generalizability of the findings. Other studies have built upon the findings from DeLongis and colleagues' study (1982), and found that daily hassles are associated with higher rates of psychopathology in adult samples (e.g., DuBois et al., 1992; Lewinsohn & Talkington 1979), type A personality and use of poor coping strategies in adult samples (Sharpley, Dua, Reynolds, & Acosta, 1995), and lower psychosocial adjustment in chronically ill adults (Costanzo, Stawski, Ryff, Coe, & Almeida, 2012; Dobkin & Fortin, 1998). While a multitude of studies have found that daily hassles are associated with psychosocial outcomes in general and chronically ill samples of adults, weaknesses such as small and non-representative samples (Costanzo et al., 2012; P. Dobkin & Fortin, 1998; Sharpley et al., 1995).

Most studies that investigate the relation between daily hassles and illness-related outcomes find that an increase in stress is associated with negative outcomes (e.g., DeLongis et al., 1982; Dobkin & Fortin, 1998). However, some studies have found that having a higher number of hassles is not necessarily correlated with negative outcomes. DeLongis et al. (1988) found that approximately one third of adults in their sample had weak positive correlations between hassles and health symptoms, while another third had strong positive correlations. In addition, DeLongis (1988) found that there was little evidence supporting their hypothesis that

more stressful days would precede days of distressed mood. Results from this study are particularly noteworthy as the authors assessed within-subject variability in addition to between subject differences, which had not been done in previous research. Moreover, Costanzo et al. (2012) found that, even among adults with cancer, a higher number of hassles did not always equate with negative outcomes. Indeed, they found that individuals with a cancer diagnosis had a smaller decrease in positive affect than did healthy comparisons when they had a stressful day. Nevertheless, conclusions from this study should be interpreted with caution as the sample was not representative of the overall population and information regarding the cancer treatments received was not available.

With regard to pediatric samples, recent studies by Libby and Glenwick (2010) and von Weiss (2002) have found that social support and self-efficacy moderate the association between hassles and negative outcomes in youth with pediatric rheumatic diseases. Both studies were strong as they recruited from multiple sites and used multiple assessments of adjustment (e.g., depressive symptoms, quality of life, anxiety, behavior problems, pain ratings). Additionally, Libby and Glenwick (2010) used multiple moderators (i.e., catastrophizing, family and friend social support, self-efficacy). While these studies made significant contributions to the stress and health literature, they had some methodological limitations, such as using a predominantly Caucasian sample. Furthermore, one study did not correct for family-wise error (von Weiss et al., 2002), and the results from Libby and Glenwick's (2010) study may have been influenced by shared method variance. Thus, it is difficult to generalize results to other pediatric populations. Regardless of their limitations, the results from these studies, along with those from DeLongis et al. (1988) and Costanzo et al. (2012) suggest that mechanisms, such as coping, social support, or differences in appraisal of stressors, may contribute to variations in how people respond to

stressors. While pediatric chronic illness populations have been targeted in this line of research (e.g., Libby & Glenwick, 2010; von Weiss et al., 2002), there have been no studies that evaluate how daily hassles are related to psychosocial outcomes in pediatric burn patients. Given the combination of both acute and chronic difficulties experienced by this population, it is important to examine the association of stress and psychosocial adjustment after injury in these youth.

The previously reviewed literature focused on the direct effects of stress on psychosocial adjustment. However, researchers also have been interested in the indirect effects of stress on psychological outcomes. The diathesis-stress model, for example, has been purported to explain the cause of some mental health disorders (Monroe & Simmons, 1991). This theory states that individuals have predispositions to particular psychological disorders (e.g., depression), but require exposure to stressors before they exhibit substantial psychopathology. For instance, Metalsky, Halberstadt, and Abramson (1987) found that college students reported long-lasting depressed mood only when they had a maladaptive attributional style (i.e., attributed negative events to internal causes) as well as a recent negative life event (e.g., poor performance on midterm exam). Students who had adaptive attributional styles or performed well on the exam did not report persistent low mood. Given the acute and chronic difficulties of chronic illness and injury, it is not surprising that similar processes may exist in pediatric populations.

Burke and Elliott (1999) outlined how the diathesis-stress model could be applied to depression in chronic illness and injury populations. Specifically, the authors noted that rates of depression were higher in pediatric burn, asthma, irritable-bowel disease, and diabetes populations. Furthermore, stressors, such as negative life events and family conflict, were found to moderate the association between recent illness diagnosis and depressive symptomology. However, no study has assessed stress as a moderator of depression or other psychosocial

difficulties in pediatric burn survivors. Although Burke and Elliott (1999) provided an adequate survey of the literature, conclusions should be drawn with caution as the findings are limited by the studies they reviewed. Additionally, it is not known if the moderation effect of stress found in chronic illness populations would be present in burn survivors. Given the differences in the between pediatric burn and chronic illness populations, further study is needed.

Coping in Pediatric Populations

The transactional coping model proposed by Lazarus and Folkman (1984) contains an appraisal component where individuals determine whether a stressor is a threat or not. After this component, a coping response attempts to offset any negative effects from the stressor. Past research in the area of stress has found that there are variations in the way in which people react to stressors. These differences in stress responses have been attributed to unique coping styles and resources available to each person (Compas, 1987).

Coping responses traditionally have been divided into different domains by the particular approach taken to deal with stressors. Lazarus and Folkman (1984) made one of the earliest distinctions by dividing coping behaviors into problem-focused and emotion-focused categories. Problem-focused coping is when people attempt to reduce their levels of stress by actively changing their environment. An example of this would be studying excessively to reduce the stress felt right before an important test. Emotion-focused coping, on the other hand, denotes attempts to manage or reduce distress by addressing emotional states instead of the problem at hand. An example of this would be focusing on the positive aspects of a new job offer to reduce negative features of the new position, such as having to move to a less-desirable location. Past research has found that problem-focused coping is more effective than emotion-focused coping

in reducing stress-related problems (Compas, Malcarne, & Fondacaro, 1988). Later models of coping, however, strayed from the problem-focused and emotion-focused dichotomy.

Recently, researchers have begun to view coping through a multidimensional framework. For instance, Rudolph, Dennig, and Weisz (1995) focused on a three dimensional framework, which consisted of primary control coping, secondary control coping, and disengagement coping. Primary control coping, also known as active coping, is when someone attempts to actively change the source of stress. Secondary control, also known as accommodative coping, is when an individual attempts to reappraise stressors through acceptance, distraction, or cognitive restructuring. Finally, disengagement coping, also known as avoidant or passive coping, is when someone engages in both cognitive and behavioral avoidance of stressors. Multidimensional frameworks such as this have been used in a wide variety of studies and were found to be good representations of how coping functions in relation to stress and outcomes in both youth and adult populations (Ayers, Sandier, West, & Roosa, 1996; Cash & Gardner, 2011; Compas, Jaser, Dunn, & Rodriguez, 2012; Gil et al., 1993; Zehnder, Prchal, Vollrath, & Landolt, 2006). In addition, research has begun to examine how stressors uniquely associated with chronic health conditions are affected by coping strategies.

Children and adolescents who experience a chronic illness represent one quarter of the youth in the United States (Van Cleave, Gortmaker, Perrin, 2010). These children experience daily hassles and major life events just like typical youth; however, they also have to manage stressors that are unique to their illness (e.g., following a healthcare regimen, limitations on physical activity, etc.). Past research supports the idea that children with a chronic illness tend to have more adjustment issues when compared with healthy controls (Lavigne & Faier-Routman, 1992; Rodriguez et al., 2011). In addition, illness-related stressors, which are often less

controllable, combine with non-illness-related stressors to impact adjustment outcomes (Rodriguez et al., 2011). In particular, the controllability of a stressor affects the effectiveness of coping responses (Compas et al., 2012). When stressors are less controllable (e.g., chronic pain), primary control coping methods often are not associated with positive outcomes. However, a large review revealed that secondary control methods, such as cognitive restructuring, are related to positive outcomes in youth with diabetes, chronic pain, and cancer (Compas et al., 2012). Primary control strategies, on the other hand, produce positive results in some pediatric disease groups (i.e., Type 1 Diabetes, cancer) but not in others (i.e. chronic pain). Lastly, disengagement coping was associated with negative outcomes in pediatric diabetes, chronic pain, and cancer groups (Compas et al., 2012).

Recent research has borrowed from early research on coping (e.g., Compas & Connor-Smith, 2001; Compas, 1987), and applied it to pediatric populations. A study by Gil et al. (1993) found that variations in adjustment to Sickle Cell Disease may be associated with differences in coping style; those youth who used more active coping strategies (e.g., cognitive restructuring) had less activity reduction due to episodes of pain. Conversely, more negative thinking was associated with higher health care costs (Gil et al., 1993). This study is particularly noteworthy as it was longitudinal and thereby allows conclusions to be drawn about the long-term effects of coping strategies. However, this study does have considerable limitations, such as reliance on parent report for outcome variables (e.g., activity limitations) and pain ratings of younger children, which may limit the generalizability of findings. Additionally, a study by Zehnder and colleagues (2006) found that active coping strategies reduced internalizing and externalizing behavior problems, and religious coping reduced post-traumatic stress symptoms. This study is noteworthy as it was longitudinal and thereby considered the long-term psychosocial outcomes

of particular coping styles. However, the study does have limitations which may limit the validity of the results, such as use of measures with an inappropriate age group, having a sample which is too heterogeneous, and not assessing other variables which may influence adjustment (e.g. family factors, prior levels of adjustment). While the coping methods and outcomes have been studied in many pediatric populations, this line of research has not been pursued with pediatric burn survivors. Given that burn survivors may face different stressors in response to experiencing acute medical complications through long-term social issues, it is important to determine how different coping strategies affect outcomes in this particular population.

It would be assumed that having a chronic illness, with all the additional stressors it brings, would be consistently associated with negative outcomes. However, certain studies actually have demonstrated that some youth with a chronic illness perform comparably to, or better than, healthy controls on outcome and stress measures (e.g., Noll & Kupst, 2007). Noll and Kupst (2007) conducted a short survey of pediatric cancer research and determined that many studies failed to find a difference in psychosocial adjustment between patients and healthy controls. In addition, other studies have indicated that there are individual differences in the way in which stressors affect outcomes in adolescents (Pinquart, 2009). Like studies with adults (e.g., Costanzo et al., 2012; DeLongis et al., 1988), coping behaviors have been found to help explain why these dissimilarities exist in children (Gil et al., 1993; Zehnder et al., 2006). Interestingly, individual differences (e.g., levels of self-esteem, prevalence of post-traumatic stress symptoms) have been found in how pediatric burn patients react to their burn injuries (DeYoung et al., 2012; Lawrence et al., 2007); however, research has not attempted to explain why these differences exist, how they develop, and whether stress and coping may explain outcomes in this specific population.

As previously mentioned, stress is not always associated with negative outcomes. Studies have found that the majority of healthy adults report better mood the day after a very stressful day (DeLongis et al., 1988), and that adults with a cancer diagnosis have smaller changes in positive affect and cortisol levels in response to daily hassles than do healthy adults (Costanzo et al., 2012). One possible explanation for the variations in response to high levels of stress is relative loss, which states that individuals use their typical levels of stress as reference when determining whether or not an event is stressful. The idea of relative loss fits well with Lazarus and Folkman's transactional coping model (1984); an individual will compare potentially stressful events with what is already going on in their lives in order to determine if it is a threat. If the individual already has a very tumultuous life, then they may view the particular event (e.g., burn injury) as less threatening, and thereby have better outcomes. However, if the youth's life is less stressful, then they may perceive the burn injury to be more threatening and thus have worse outcomes in comparison with those who have higher levels of stress. This concept can also be applied to youth who have sustained a burn injury. If a child or adolescent has a more chaotic life, they may perceive the injury to have less of an impact, and consequently adjust better; those youth who experience fewer daily hassles may have more trouble adjusting. Furthermore, individuals with more stress in their life may have more opportunities to try out different coping strategies. Consequently, they may be more adept at choosing coping strategies which are most effective in a particular situation. This may work in conjunction with relative loss to promote better outcomes in individuals with more daily hassles.

Relative Loss

Findings from most research identify stress as a detrimental influence on psychosocial functioning (DeLongis et al., 1982; Libby & Glenwick, 2010; von Weiss et al., 2002). In their

transactional model of stress and coping, Lazarus and Folkman (1984) note that stress occurs when a stressor overwhelms someone's coping resources. However, an event is only impactful if it is appraised as a stressor. This means that not everyone will consider a life event to be stressful. The theory of relative loss stems from the concept of stressor appraisal. If youth experience a number of daily hassles and major life events, then the addition of another stressor, such as a burn injury, may not be considered overly impactful in the context of their current situation. Additionally, these youth may regularly practice effective coping strategies to deal with frequently incurred stressors and are thereby more competent in coping with new challenges. Furthermore, use of adaptive coping strategies may also cultivate resilience in these youth and allow them to overcome sustaining a burn injury. In contrast, children and adolescents who have a less stressful life may perceive a burn injury to be more serious and thereby a major source of stress. This idea of relative loss previously has not been tested in pediatric burn injuries, but there is some evidence that a high amount of stress is not necessarily associated with poor psychosocial functioning (DeLongis et al., 1988 & Costanzo et al., 2012).

Summary and Critique of Past Literature

Burns are a common type of injury in youth (Tarnowski, KJ & Brown, 2009). In addition, they are a complex injury as they consist of both acute concerns (e.g., burn wound care, skin grafting) and long-term adjustment (e.g., scarring, social troubles) (Rose & Blakeney, 2006; Tarnowski et al., 1991). Results from burn studies indicate that self-esteem, social functioning, and post-traumatic stress symptoms are outcomes of interest when assessing post-burn adjustment (e.g., Bakker et al., 2013; Lawrence et al., 2007; Rose & Blakeney, 2006). Though many studies have examined how burn-related variables predict adjustment (e.g., Noronha &

Faust, 2007), few have analyzed variables that may moderate the relation between burn injuries and psychosocial functioning.

The link between stress and health-related outcomes (e.g., changes in mood, number of somatic symptoms) has been demonstrated by many studies (e.g., Chamberlain & Zika, 1990; DeLongis et al., 1982). Minor stressors have become the preferred method for predicting health-related outcomes, but often are assessed alongside major life events (e.g., Libby & Glenwick, 2010). Studies of pediatric chronic illness groups have found that daily hassles are the best predictors of psychosocial adjustment, and can be moderated by social-support and self-efficacy (Libby & Glenwick, 2010; von Weiss et al., 2002). Additionally, stress has been shown to moderate the effect of recent illness diagnosis on depressive symptoms in pediatric populations, such that youth with more negative life events and conflict at the time of diagnosis are more depressed (Burke & Elliott, 1999). While stress has typically been viewed as detrimental to psychosocial functioning, some studies have found that higher levels of stress are associated with better adjustment (e.g., Costanzo et al., 2012; DeLongis, Folkman, & Lazarus, 1988). Therefore, stress may also moderate the association of burn injury variables (e.g., severity) to psychosocial outcomes. Given that stress is found to be a key variable in psychosocial functioning in other illness populations, and that the effect of stress on functioning is not always clear, further study in relation to burn injuries is warranted. Therefore, the primary aim of the current project was to evaluate whether or not stress moderated how key burn injury variables (i.e., size) are related to psychosocial outcomes among pediatric burn survivors.

Finally, other studies have examined how coping moderates the relation between various predictors (e.g., stress, injury/illness-related variables) and psychosocial outcomes (Compas et al., 2012; Libby & Glenwick, 2010; Zehnder et al., 2006). Because burn survivors have been

found to be relatively resilient in long term adjustment in some studies (e.g., Bakker et al., 2013; De Young et al., 2012), it is probable that significant moderating variables (e.g., coping) play a role in individual variation in outcomes. Indeed, differences in reaction to stressors have been identified in multiple studies of pediatric chronic illness (e.g., Libby & Glenwick, 2010; Noll & Kupst, 2007). The studies that investigated coping as a key mechanism underlying variations in response to stressors were the most promising (e.g., Compas et al., 2012; Zehnder et al., 2006); yet, this relation has not been investigated in youth burn survivors. As such, additional aims of the current study were to (1) test whether or not coping moderated the relation between burn-injury variables and psychosocial outcomes, and (2) examine whether or not coping moderated the relation between household stress (i.e., combined parental and youth stress across major life events and daily hassles) and psychosocial outcomes.

Aims and Hypotheses

Given the acute and chronic difficulties experienced by this pediatric population (e.g., painful medical procedures, scarring, limitations in functioning), and the potential role that stressors and coping may play in psychosocial outcomes, this is an important area to investigate in youth in an effort to promote their adjustment to injury. Indeed, the rationale for the hypotheses is based on previous literature that has suggested that different levels of stress may be related to different psychosocial outcomes (DeLongis et al., 1988), particularly when considering other key variables such as the type of coping strategies employed. For instance, higher levels of stress may result in more frequent use of effective coping strategies and thereby result in better psychosocial functioning. To better understand post-burn adjustment, the current study evaluated how stressors and coping are linked to self-esteem, social functioning, and post-traumatic stress symptoms among pediatric burn-survivors. Moreover, the current project incorporated methods

(e.g., using multiple informants) to address methodological weaknesses (e.g., shared method variance) in the existing literature.

The specific aims and hypotheses of this study were as follows:

Aim 1: Assess the extent to which household stress (summary index score representing parent- and youth-report of major and minor stress) moderated the relation between burn injury variables and youth report of self-esteem, youth- and parent-report of youth social functioning, and youth-report of post-traumatic stress symptoms.

- Hypothesis 1: It was hypothesized that overall household stress would moderate the relation between burn injury variables and self-esteem, social functioning, and post-traumatic stress symptoms. Specifically, it was anticipated that the magnitude of the association of burn injury severity (i.e., TBSA) to low self-esteem, low social functioning, and high perceived impact, would be smaller in burn survivors from high stress families compared with youth from low stress families.

Aim 2: Evaluate whether different coping styles moderated how burn injury variables predicted youth-report of self-esteem, youth- and parent-report of youth social functioning, and youth-report of post-traumatic stress symptoms.

- Hypothesis 2: It was hypothesized that active coping would moderate the relation between burn injury variables and self-esteem, social functioning, and post-traumatic stress symptoms. Specifically, it was anticipated that the relation of more severe burn injuries to low self-esteem, low social functioning, and high perceived impact would be weaker when burn survivors more frequently used active coping strategies.

Aim 3: Determine whether different coping styles moderated how overall stress (index score representing parent- and youth-report of major and minor stress) predicted youth-report of self-

esteem, youth- and parent-report of youth social functioning, and youth-report of post-traumatic stress symptoms.

- Hypothesis 3: It was hypothesized that active coping would moderate the relation between overall stress and self-esteem, social functioning, and post-traumatic stress symptoms. Specifically, it was anticipated that use of active coping strategies would attenuate the link between high household stress and low self-esteem, low social functioning, and high perceived impact.

Method

Participants

The sample for this study consisted of 40 participants and their primary caregiver (see Table 1 for description of sample). Inclusion criteria consisted of youth who: (1) sustained a burn injury at least one month prior to participation; (2) were between the age of 7 and 17 years at time of recruitment; (3) had at least one primary caregiver willing to participate; and (4) were English speaking (questionnaires are validated in English only). Youth who (1) had significant cognitive impairment or a diagnosis of intellectual or developmental disabilities (thereby limiting their ability to complete the measures independently); or (2) had a coexisting chronic impairment from causes other than a burn injury (e.g., significant physical disability) were not recruited. Participants were recruited as part of a larger study from four settings: the Western Pennsylvania Hospital (WPH) Outpatient Burn Clinic (Pittsburgh, PA), the Nationwide Children's Hospital (NCH) Outpatient Burn Clinic (Columbus, OH), WPH Summer Camp for Burned Children, and the WPH burn registry database for the WPH Burn Center.

The mean age of the participants was 12.77 years ($SD = 2.61$) and 65% were male. The median family income for this sample was \$50,000 - \$59,999. The average total body surface

area (TBSA) for our sample's burn injury was 10.25% ($SD = 12.45\%$; Range = 1-58.5%). They sustained their injury an average of 3.5 years ago ($SD = 4.03$; Range = 0.09-11.79 years) and were hospitalized for their burn care an average of 12.73 days ($SD = 22.22$; Range = 1-110 days). The etiology of most participants' burns was thermal (e.g., falling into campfires; 47.5%) or scalds (e.g., hot water spill; 30%). A majority of participants had visible burn injuries (92.5%), were hospitalized for treatment of their burns (82.5%), and had skin graft surgery (70%). About 57% of the sample was prescribed physical and/or occupational therapy, while only 7.5% reported significant medical complications related to their burn injury. Finally, most participants used a pressure garment during the course of their treatment (67.5%), although only some youth were currently using the garments at the time of the study (27.5%).

Procedure

Approval from the Institutional Review Boards at Western Pennsylvania Hospital, Nationwide Children's Hospital, and West Virginia University was obtained prior to recruiting participants or collecting data. Medical staff affiliated with the study identified potential participants at the WPH and NCH Outpatient Burn Clinics. These research team members reviewed patients' charts when they arrived for scheduled visits to the clinic, and those individuals who met the inclusion criteria were asked if they wanted to learn more about the study. Interested participants were given a description of the study, which outlined the potential risks, benefits, and requirements. Written consent and assent were obtained from caregivers(s) and their children, respectively. A copy of the consent form was given to the participating family.

Participants also were recruited from the WPH Summer Camp for Burned Children. Participants who met inclusion criteria were identified prior to the start of camp by medical staff

affiliated with this project, and approached during camp registration. Consent and assent were obtained from caregiver(s) and children, respectively, and a copy of the consent form was provided to the family.

Finally, participants were recruited using the WPH burn registry database. Individuals meeting the inclusion criteria (upon review by medical staff members affiliated with this research) received letters that described the study and its requirements, and provided information about who they should contact if they wished to participate. Project-affiliated medical staff members also contacted the family via telephone approximately 1-2 weeks after it was mailed. Those individuals who wished to participate were given more details about the study upon contact. Participants had the option to come to WPH to complete the study packet, or have a packet mailed to the family along with a self-addressed, stamped envelope. Informed consent and assent were obtained from caregivers and youth, respectively, in person for the former situation and by telephone (after having received the study packet) in the latter circumstance.

Each participant and caregiver completed a packet of questionnaires. For those participants with reading difficulties, the items were read or explained as needed, either in person (for clinic and camp participants) or via telephone (for burn registry participants). Telephone numbers were obtained from those families completing and sending questionnaires by mail to provide an opportunity for research staff to ask questions to clarify unclear participant responses or errors in completing the forms.

Youth participants completed the following measures: (a) *Children's Hassles Scale*, (b) *Child Coping Strategies Checklist* (c) *Living with a Chronic Injury – Youth version* (d) *Piers-Harris Children's Self Concept Scale – Second Edition*, (e) *Coddington Life Events Scale – Adolescent Form*, and (f) *Children's Revised Impact of Events Scale*. Caregivers completed a

separate packet with the following measures: (a) *Family Information Form*, (b) *Weekly Stress Inventory*, (c) *Social Readjustment Rating Scale*, and (d) *Living with a Chronic Injury – Parent version*. Financial reimbursement in the form of gift cards (\$10 for parent; \$10 for youth) was provided upon receipt (in person or by mail) of completed packets.

Measures

Chart Review Form. A data collection form was used for research staff to record relevant burn injury information (e.g., date of injury, total body surface area, skin graft surgery) from the child's medical record or burn registry data set (a database for all inpatient and outpatient burn patients treated at our burn center).

Family Information Form (FIF). The *Family Information Form* was created for this study to obtain demographic and medical information such as patient and caregiver age, ethnicity, caregiver education level, and patient medical history.

Predictors

Children's Hassles Scale (CHS) (Kanner, Feldman, Weinberger, & Fold, 1987). The *CHS* was used to identify levels of minor stressors in our sample. This 25-item youth-report measure assesses the frequency and intensity of hassles an individual might experience during the preceding one-month time period. Items such as "kids at school teased you" were rated on a 3-point Likert-type scale to determine how it made the youth feel (1 = *didn't feel bad*, 2 = *felt sort of bad*, 3 = *felt very bad*). In addition, each item included a "didn't happen" response when a stressor was not applicable. Internal consistency for the CHS total score has been reported to be satisfactory ($\alpha = .87$) (Kanner et al., 1987). This instrument has seen wide use in clinical populations ranging in age from 8 to 17 years (e.g., Libby & Glenwick, 2010). For example, von Weiss and colleagues (2002) used the CHS to examine how daily hassles contributed to anxiety

in children with rheumatic disease. Finally, this measure has been found to relate to outcome variables such as emotional distress (Blount et al., 2008).

To ensure sufficient coverage of stressors relevant to our burn sample, 58 items were added to the scale. These items were derived by first reviewing other hassle-related questionnaires to obtain a list of novel issues not already assessed by the CHS, such as problems with money or performance in school. These items were then listed and reviewed by 14 individuals (i.e., psychology graduate students, psychology faculty, and burn care physicians and nurses). Those items that were agreed upon by the majority of reviewers were included in the revised measure.

One item (“Being involved in too many activities [e.g., sports, clubs]”) had an item-to-total correlation < 0.20 and was subsequently deleted. Internal consistency was excellent for both the 25-item ($\alpha = .89$) and 83-item ($\alpha = .97$) versions of the CHS. Given that the 83-item version had greater internal consistency and assessed a wider range of daily hassles, it was used in all of the analyses.

Child Coping Strategies Checklist (CCSC) (Ayers, Sandler, West, & Roosa, 1996). The CCSC is a self-report questionnaire of coping style in youth; it consists of 52 items. These items are divided into four secondary subscales (active coping, distraction strategies, avoidance strategies, and support seeking strategies), and then further divided into eleven tertiary subscales (cognitive decision making, direct problem solving, seeking understanding, positive cognitive restructuring, physical release of emotions, distracting actions, avoidant actions, cognitive avoidance, problem focused support, and emotion focused support). Each item was rated on a 4-point Likert-type scale ranging from 1 (*never*) to 4 (*most of the time*). The responses were then scored, with higher scores indicating greater use of a specific coping strategy.

Past research has found that active coping strategies tend to be more effective at mitigating the maladaptive effects of stress, while avoidant coping is more often associated with negative psychosocial outcomes (Compas et al., Zehnder et al., 2006). Therefore, this study used the active coping (representative item: “When you had problems in the past month, you tried to make things better by changing what you did.”) and avoidance coping (representative item: “When you had problems in the past month, you avoided the people who made you feel bad.”) subscale scores. Internal consistency for this subscale was found to be satisfactory in previous research ($\alpha = .88$) (Ayers et al., 1996). Validity for the CCSC is supported by correlations between coping strategies (e.g., active and avoidance) and outcomes (Kliewer & Lewis, 1995). The standardization sample for this instrument consisted of children ranging in age from 9 to 13 years. The CCSC has been used with children and adolescents, ages 7-18, with mobility impairment as well as chronic illness, such as asthma and sickle cell disease (Greene, Murdock, & Mitchell, 2006; Jemtå, Dahl, Nordahl, & Fugl-Meyer, 2007; Kliewer & Lewis, 1995). For the current sample, internal consistency for the active coping subscale was high ($\alpha = .93$) and good for the avoidance coping subscale ($\alpha = .75$).

Coddington’s Life Events Scale for Adolescents (CLES-A) (Coddington, 1999). The CLES-A is a 50-item self-report measure where youth indicated the number of times a stressful life event (e.g., “death of a parent”) occurred in the previous year. Respondents also indicated how long ago the event occurred (i.e., 0-3 months, 4-6 months, 7-9 months, 10-12 months). The responses were then totaled to create a Life Change Unit (LCU) Score, which represented the amount of stress an individual experienced due to major life events. This scale includes positive events (e.g., find a new dating partner) in addition to negative events, as they are both viewed to be taxing on coping resources.

This study used the total LCU score in the analyses. Higher scores indicated that an individual experienced more life events. This measure was designed for children and adolescents ranging from 13 to 19 years of age. However, most of the items are appropriate for younger children. Thus, to maintain consistency across our sample, the adolescent version was used with all participants. Coddington (1999) reported on the psychometric properties of the CLES-A scores. Test-retest reliability has been found to be good with retest at 3 months providing the best reliability ($r = .69$), and 11 months providing the weakest estimate ($r = .56$). Inter-rater reliability between adolescents and parents has been described as adequate ($r = .57$). The CLES-A has demonstrated content validity by comparing events endorsed on the questionnaire with parent and child reports of events experienced in the previous year. Concurrent validity was demonstrated by comparing the amount of life events reported by children and their parents.

Weekly Stress Inventory (WSI) (Brantley, Jones, Boudreaux, & Catz, 1997). The *WSI* is a self-report measure that assesses the amount of minor stress adults experience over the preceding week. This questionnaire was used to assess minor stress events in the caregivers of our participants. The measure consists of 87 items, with each item representing a different stressful event (e.g., “argued with a friend”). Respondents rate each item on an 8-point Likert-type scale ranging from 0 (*did not occur*) to 7 (*extremely stressful*).

The present study used the total score in analyses. Higher total scores indicated more intense and frequent minor stressors experienced. Internal consistency has been shown by Brantley et al. (1997) to be satisfactory ($\alpha = .92$). The *WSI* has been shown to effectively assess the relation between stress and outcome variables, such as treatment regimen adherence and quality of life (Ames, Jones, Howe, & Brantley, 2001; P. L. Dobkin et al., 2006), in adult medical samples. Internal consistency for the current sample was high ($\alpha = .98$).

The Social Readjustment Rating Scale (SRRS) (Holmes & Rahe, 1967). The *SRRS* is a 43-item scale that was used to assess major life events in caregivers. The scale asks participants to indicate whether or not major events (e.g., death of spouse, marriage) have occurred in the past year. Then, each item is assigned a numerical value or weight; a total score is derived by adding the weights for all items endorsed by the respondent. This scale includes positive events in addition to negative events, as they are both thought to be challenging even though positive events may be viewed in a positive manner.

The current study used the total score in data analyses. Higher total scores indicate a higher number and intensity of stressors. Test-retest reliability has been demonstrated to be good for non-psychiatric patients at 3-6 month ($r = .83$) (Gerst, Grant, Yager, & Sweetwood, 1978). Additionally, scores from this scale are related to manifest anxiety, thereby providing evidence for convergent validity (Dekker & Webb, 1973). Furthermore, the *SRRS* is the most widely used measure of major life stress, even though it is over 40 years old (Scully, Tosi, & Banning, 2000).

Outcomes

Living with a Chronic Injury – Youth (LCI-Y) and Parent (LCI-P) Version (Piazza-Waggoner, Butcher, Adams, Goldfarb, & Slater, 2004). The *LCI* scale was used to measure injury-related social functioning in children. The youth- and parent-report versions each consist of 29 items and yield two summary scores: Injury-related social difficulties and Non-injury-related social difficulties. Each item was rated on a dichotomous scale to determine whether or not a social situation occurred (True/False). If the item was endorsed as having occurred, the respondent then indicates whether or not the social situation was related to the youth's injury (Yes/No), and how upsetting the situation was for the child on a 4-point Likert-type scale ranging from *not at all* to *very much*.

For the present study, the injury-related score was used as a measure of social difficulties stemming from the child's burn injury. Internal consistency has been reported as satisfactory for both parent ($\alpha = .86$) and youth ($\alpha = .82$) dichotomous responses (true/false) (Adams et al., 2002). Pearson correlations between the LCI and other relevant measures [e.g., *Child Behavior Checklist (CBCL)*, *Youth Self-Report (YSR)*, *Self-Perception Profile for Children/Adolescents (SPPC/A)*] provided evidence of convergent validity. Specifically, injury-related difficulties on both the LCI-Y and LCI-P significantly correlated with internalizing problems and competence difficulties on the CBCL, YSR, and SPPC/A (Adams et al., 2002). Internal consistency for the injury scores in current sample was good for the LCI-Y ($\alpha = .86$) and high for the LCI-P ($\alpha = .95$).

Piers-Harris Children's Self Concept Scale – Second Edition (PH-2) (Piers & Herzberg, 2002). The *PH-2* is a youth-report questionnaire of self-concept consisting of 80 items that comprise six separate subscales (behavioral adjustment, intellectual and school status, physical appearance, freedom from anxiety, popularity, and happiness) as well as a total score representing overall self-concept. Each item was rated on a dichotomous scale (yes/no). The responses were then scored, with some items being reversed keyed. Higher scores indicate greater self-concept.

The *PH-2* total score was used in the present study. Internal consistency for the total score, measured by coefficient alpha, was reported as .91 (Piers & Herzberg, 2002). In addition, test-retest reliability for this measure was found to be .87 (Piers & Herzberg, 2002). The *PH-2* is normed for children ages 7-18 years old. This scale has been used widely with pediatric burn populations as well as pediatric illness populations, such as diabetes, asthma, and cystic fibrosis

(e.g., Herzer, Umfress, Aljadeff, Ghai, & Zakowski, 2009). Internal consistency for the *PH-2* total score in the current sample was high ($\alpha = .93$).

Children's Revised Impact of Event Scale (CRIES-13). (Smith, Perrin, Dyregrov, & Yule, 2003). The *CRIES-13* is a 13-item self-report measure that assesses post-traumatic stress symptoms in children and adolescents. To make the scale relevant to burn survivors, the respondents were instructed to refer to their burn injury and subsequent medical treatment and rehabilitation when answering each question.

Individuals indicate how often each item occurred during the past week on a 4-point scale (0 = none, 1 = rarely, 3 = sometimes, 5 = a lot). Items are divided into three different subscales: Intrusion (e.g., "Do you think about it [the event] when you don't mean to?"), Avoidance (e.g., "Do you try to remove it from your memory?"), and Arousal (e.g., "Do you have difficulties paying attention or concentration?"). Responses are totaled to yield three different sub-scores, ranging from 0 to 20 for the Intrusion and Avoidance subscales, and 0 to 25 for the Arousal subscale. The three subscales are summed to create a total impact of event score ranging from 0 to 65.

The present study utilized the total impact of event score. Higher scores indicated that the event had a greater negative impact. Internal consistency has been shown to be adequate for the Intrusion ($\alpha = .70$), Avoidance ($\alpha = .73$), and Arousal ($\alpha = .60$) subscales, as well as the total score ($\alpha = .80$) (Smith et al., 2003). In addition, past studies have demonstrated concurrent validity when being used to diagnose children with PTSD (Dow, Kenardy, Le Brocque, & Long, 2012). The *CRIES-13* has been used to assess post-traumatic stress in youth in hospital settings as well as war survivors (Dow et al., 2012; Smith et al., 2003). The internal consistency for the current sample's *CRIES-13* total score was high ($\alpha = .91$).

Results

Power Analysis

An *a priori* power analysis was conducted using *G Power* to estimate the study's sample size. Results indicated that a total of 43 participants was required to detect a large effect size with 80% power and an alpha of .05. In contrast, to detect a medium effect size with the same power and alpha, a sample of 92 participants was needed. Previous research findings for similar research were reviewed to gauge anticipated effect sizes for the current study. For example, DeLongis and colleagues (1982) found medium effect sizes for daily hassles predicting overall health status ($\beta = -.26$, $R^2 = .13$, $p < .01$) and somatic symptoms ($\beta = .34$, $R^2 = .13$, $p < .01$) in adults from the general population. Von Weiss and colleagues (2002), using the *Children's Hassles Scale* with children diagnosed with pediatric rheumatic disease, also obtained medium effect sizes when predicting depression through the interactions of hassles and classmate social support ($\beta = .25$, $R^2 = .05$, $p < .05$), and hassles and teacher social support ($\beta = -.18$, $R^2 = .05$, $p < .05$). Furthermore, this study found medium to large effect sizes for the correlation of daily hassles to depression ($r = .37$, $p < .005$) and trait anxiety ($r = .50$, $p < .005$).

Though these studies investigated psychosocial outcomes in healthy adults and in children with rheumatic disease, studies with burn survivors have not tested the association of stress and coping to post-injury psychosocial functioning. The present study deviates from the current literature in that it aims to characterize the associations amongst these particular variables in a pediatric sample. Thus, prior findings may not provide a close estimate of anticipated effect sizes for the current study. Indeed, because stress and coping likely have a more direct relation to psychosocial outcomes in burn survivors than variables used in published research, we

anticipate obtaining at least moderate, and more likely, large effect sizes in our study. This, coupled with the scope of the current project, led us to plan a sample of 43 participants.

Preliminary Analyses

Data were reviewed for missing values and to ensure that any missing data occurred at random. Two participants did not have complete youth packets and consequently did not contribute to analyses utilizing youth-reported variables (i.e., self-concept, youth-reports of youth social functioning, post-traumatic stress symptoms, youth daily hassles and major life events, and active coping). Additionally, one participant did not answer the *Children's Revised Impact of Events Scale (CRIES)* and was excluded from analyses involving post-traumatic stress symptoms. Also, one participant did not fully complete the *Children's Coping Strategies Checklist (CCSC)* and was subsequently excluded from analyses in aims two and three. Finally, three participants did not correctly complete the *Living with a Chronic Injury Scale (LCI)* – youth report and thus were not included in relevant analyses in aims one, two, and three. Person-mean imputation (i.e., substituting the participant's mean score on a scale for missing items) was used to address missingness on each questionnaire for participants with less than 25% missing item ratings. For the following variables, at least one item throughout the entire questionnaire were was missing: TBSA ($n = 4$), *Coddington Life Events Scale* ($n = 3$), LCI – youth report ($n = 11$) and parent report ($n = 5$), CRIES ($n = 4$), *Children's Hassles Scale (CHS)*; $n = 5$), *Weekly Stress Inventory (WSI)*; $n = 5$), *CCSC active coping* ($n = 5$) and *avoidant coping* ($n = 6$) subscales, and the *Piers-Harris Children's Self-Concept Scale* ($n = 2$). Participants' mean scores were used to impute data on the following questionnaires: LCI – parent ($n = 6$) and youth report ($n = 6$), the CHS ($n = 3$), the WSI ($n = 5$), and the CCSC active coping ($n = 2$) and avoidance coping ($n = 3$) subscales.

Between-group comparisons were conducted to better understand who participated in the current study and who refused. A total of 164 pediatric burn survivors and their families were approached to participate in the study. Of these patients, 40 agreed to participate and 124 refused. Of the 124 youth who were not enrolled in the study, 21 actively refused (i.e., told the researcher they were not interested) and 103 passively refused (i.e., did not return mailed consent forms). The most common known reasons for those individuals who actively refused were the study taking too long to complete, not wanting to talk about burn injuries, or not being interested in taking part in research. Independent samples t-tests were then conducted to determine if participants and refusers differed on demographic (e.g., age, gender) or burn-injury variables (i.e., time since burn). The Levene's test for both age and time since burn were significant; therefore, adjusted t-values are reported. It was found that the time in years since the injury was greater for patients who participated ($M = 3.51$, $SD = 4.03$) than those who refused ($M = 1.68$, $SD = 12.42$), $t(39.59) = 2.82$, $p = .01$. There were no significant differences in age or gender between youth who were or were not enrolled in the study.

Next, descriptive statistics (e.g., means, distribution) for the sample were computed (see Table 1). Predictor and outcome variables were tested for skewness, kurtosis, and univariate outliers. The youth- and parent-report version of the *Living with a Chronic Injury Scale* (LCI) were negatively skewed and kurtotic. To correct these problems, squareroot, log, and inverse transformations were performed; inverse transformations corrected problems of skewness and kurtosis in both versions of the LCI. To arrive at an overall stress score (i.e., "household stress"), the four scores for parent and youth report on daily hassles and life events each were converted to z-scores and then combined. Prior to regression analyses, scatter plots were created to ensure that linear associations existed between each predictor (i.e., stress, coping, and TBSA) and each

outcome variable (i.e., self-concept, youth- and parent-reports of youth social functioning, and post-traumatic stress symptoms).

To better understand the type and severity of burns experienced by participants in this study, burn-injury variables were compared with samples of other pediatric burn survivors. The average TBSA for this sample ($M = 10.25$, $SD = 12.45$) was slightly higher than other samples of pediatric burn survivors ($M = 11.93$, $SD = 8.38$), and the current sample was hospitalized for more days ($M = 12.73$, $SD = 22.22$) than other samples of youth with burn injuries ($M = 6.5$, $SD = 10.9$; Kent, King, & Cochrane, 2000). Additionally, time since burn in years was somewhat less for the current sample ($M = 3.51$, $SD = 4.03$) than a sample recruited by Tarnowski, Rasnake, Linscheid, & Mulick (1989; $M = 4.06$, $SD = 1.27$).

Next, to characterize the psychosocial functioning of the current sample, mean scores on predictor and outcome variables were compared with those of other samples. Values on the CCSC, in general, indicate that youth in the current sample ($M = 2.67$, $SD = .68$) used somewhat more coping strategies than the standardization sample ($M = 2.27$, $SD = .73$), and the same amount of avoidance coping strategies ($M = 2.41$, $SD = .59$) as the standardization sample ($M = 2.47$, $SD = .75$; Ayers et al., 1996). Scores on the first 25 items of the CHS ($M = 21.18$, $SD = 13.62$) were comparable with a sample of children with pediatric rheumatic disease recruited by von Weiss and colleagues (2002; $M = 22.85$, $SD = 13.99$); scores on the full 78 items of the CHS could not be compared to other samples, as these additional items were created specifically for this study. Most youth in the current study (59.5%) fell above the clinical cut-off on the CLES-A, which indicates that they are at risk for physical and emotional problems. In terms of psychosocial functioning, most youth reported self-concept scores within the average (68.42%) or high (23.7%) range, while only a small percentage (7.8%) had scores in the low range (Piers

& Harris, 2002). Youth-reports of social functioning ($M = 4.68$, $SD = 12.02$) were comparable to a sample of burn survivors ($M = 4.4$, $SD = 7$) recruited by Piazza-Waggoner et al. (2004); however, parents in the current sample reported better social functioning ($M = 1.67$, $SD = 3.56$) than samples in the aforementioned study ($M = 7.8$, $SD = 11.7$). Finally, the mean score on the *CRIES* was 17.69 ($SD = 17.14$), which is above the clinical cut-off score of 17. (Smith et al., 2003).

With respect to caregivers in our sample, scores on the WSI ($M = 82.83$, $SD = 89.96$) were substantially less than those found in the standardization sample ($M = 105.38$, $SD = 87.74$; Brantley et al., 1997). Also, most parents' scores (52.5%) on the SRRS indicated that they were at a low risk of health-related problems.

A one-way ANOVA was conducted to determine if there were differences in the predictor and outcome variables by recruitment method [i.e., West Penn Hospital (WPH) burn camp, WPH outpatient clinic, WPH burn registry, or Nationwide Children's Hospital (NCH) outpatient burn clinic]. Results indicated no differences between recruitment methods except for the *Children's Revised Impact of Events Scale*, $F(3, 34) = 2.98$, $p = .05$. Youth recruited from WPH burn camp reported significantly fewer post-traumatic stress symptoms ($M = 10.5$, $SD = 11.18$) than youth recruited at WPH outpatient burn clinic ($M = 28.67$, $SD = 21.45$).

Finally, Pearson and Spearman correlation coefficients were calculated for demographic and medical variables (e.g., TBSA, time since burn, patient age, SES) in relation to outcome variables to determine if any covariates existed. Time since burn was negatively correlated with post-traumatic stress symptoms ($r = -.33$, $p = .05$), with youth having more elapsed time since their injury reporting fewer symptoms. Age was significantly correlated with youth self-concept ($r = .34$, $p = .04$), such that older children reported better self-concept. Additionally, family

income was associated with parent report of youth social functioning ($r = .42, p = .01$), with parents from families with higher income reporting better social functioning in their children. Finally, there was a significant association between participant race and youth reports of social functioning ($r = .36, p = .03$), with Caucasian participants reporting better social functioning than non-Caucasian participants. In conclusion, age and family income were used as covariates in relevant analyses; however, due to small cell sizes for race (i.e., 40 Caucasian vs. 4 non-Caucasian), this variable was not used as a covariate.

Aim 1

The purpose of the first aim was to investigate whether stress moderates the relation between burn variables and self-esteem, social functioning, and post-traumatic stress symptoms (see Figure 1). To accomplish this, four multiple regression analyses were conducted (see Tables 4.1 to 4.4). For each regression analysis, burn TBSA was entered as the predictor variable with household stress as the moderator. The dependent variables were youth-reported self-concept (PH-2), youth- and parent-reported social functioning (LCI), and youth-reported post-traumatic stress symptoms (CRIES), respectively, for each regression analysis. Covariates were entered in Block 1 of the model. Then, centered TBSA and centered household stress score were entered in Block 2. Finally, the interaction term was entered in to Block 3.

The full model of variables did not significantly predict global self-concept, and household stress also did not moderate the association between TBSA and self-concept. Similarly, the combination of variables did not significantly predict youth- or parent-reports of social functioning. Interestingly, family income was the only significant predictor of parent report of social functioning. Household stress did not moderate the associations between TBSA and youth- or parent-reports of social functioning. The final model did not significantly predict

post-traumatic stress symptoms. Although household stress did not moderate the association between TBSA and post-traumatic stress symptoms, there was a main effect of household stress on post-traumatic stress symptoms such that greater household stress predicted higher post-traumatic stress symptoms.

Aim 2

The second aim evaluated the extent to which coping moderates the association between burn variables and the same outcome variables from the first aim (see Figure 2). Four multiple regression analyses were calculated (one per outcome variable) (see Tables 5.1 to 5.4). For each regression analysis, covariates were entered in Block 1 of the model. Then, centered burn TBSA and centered active coping were entered in Block 2. Finally, the interaction term of burn TBSA X coping was entered in Block 3.

Results from the first hierarchical regression analysis found that the full model significantly predicted overall self-concept and accounted for 23.5 % of the variance. Active coping was the only significant predictor of global self-concept such that increased use of active coping strategies was associated with higher overall self-concept. However, active coping did not moderate the effect of TBSA on self-concept.

The combination of variables did not predict youth-reports of social functioning on the LCI. Active coping did not moderate the association between TBSA and youth-reports of social functioning. Similarly, the full model of the third regression did not predict parent-reports of youth social functioning, and active coping did not moderate the association between TBSA and parent-reports of social functioning. However, family income was again a significant predictor of parent-reports of social functioning in that parents in families with higher income reported that their children had better social functioning.

Finally, the full set of variables in the fourth regression analysis did not significantly predict post-traumatic stress symptoms. There was also no interaction between active coping and TBSA on post-traumatic stress symptoms.

Follow-up Analyses. Although active coping is considered beneficial to psychosocial adjustment, other coping strategies (i.e., avoidance), on the other hand, have been associated with poor psychosocial functioning (Compas, 2012). Additionally, previous research has found that maladaptive coping strategies are associated with post-traumatic stress symptoms (Fairbank, Hansen, & Fitterling, 1992; La Greca, Silverman, Vernberg & Prinstein, 1996). Given these previous findings, follow-up analyses were conducted to evaluate the relation of avoidance coping in predicting post-traumatic stress symptoms (i.e., CRIES) in our sample. Specifically, a hierarchical regression was used to test if avoidance coping style moderated the relation between TBSA and post-traumatic stress symptoms (Table 5.5). Centered TBSA and centered avoidance coping were entered in the first block. The interaction term of TBSA X avoidance coping was entered in the second block. The full model did not significantly predict post-traumatic stress symptoms. Neither TBSA nor avoidance coping significantly predicted post-traumatic stress symptoms. Additionally, avoidance coping did not moderate the association between TBSA and post-traumatic stress symptoms.

Aim 3

The third aim is exploratory and attempted to understand whether active coping moderates the effect of household stress on outcome variables (see Figure 3). Four multiple regression analyses were conducted (see Tables 6.1 through 6.4). Consistent with the first two aims, dependent variables were scores from the PH-2, parent- and youth-report of the LCI, and CRIES. For each regression analysis, potential covariates were entered in Block 1 of the model;

centered coping and centered household stress were entered in Block 2. Finally, the interaction term of household stress X coping was entered in Block 3.

In the first regression analysis, the full model significantly predicted overall self-concept, and accounted for 37.3% of the variance. Active coping was a significant predictor of overall self-concept. Additionally, the interaction between active coping and household stress (Figure 4) was trending towards significance. These results suggest that youth who used more active coping strategies reported better self-concept.

The combination of variables in the second regression analysis did not significantly predict youth-reports of social functioning. Active coping also did not moderate the association between household stress and youth-reports of social functioning.

Results from the third regression analysis indicate that the full set of predictors were not significantly associated with parent reports of youth social functioning. Family income was the only significant predictor of this variable; this finding suggests that parents from families with higher income reported that their children had better social functioning. However, active coping did not moderate the association between household stress and parent reports of social functioning. Finally, the full model did not significantly predict post-traumatic stress symptoms, and active coping did not moderate the association between household stress and post-traumatic stress symptoms.

Follow-up Analyses. Similar to the previous aim in this study, follow-up analyses were conducted to investigate whether avoidance coping moderates the association between household stress and post-traumatic stress symptoms. To investigate if avoidance coping moderated the association between household stress and post-traumatic stress, a hierarchical regression was conducted (Table 6.5). Post-traumatic stress symptoms measured by the CRIES was used as the

dependent variable. Centered household stress and centered avoidance coping were entered in the first block. Then, the interaction between household stress and avoidance coping was entered in the second block. The full model trended toward significance in predicting CRIES scores, and accounted for 14.7% of the variance. Avoidance coping significantly predicted post-traumatic stress symptoms but did not moderate the association between TBSA and post-traumatic stress symptoms.

Discussion

This study evaluated whether: (1) household stress moderated the association between burn injury variables and psychosocial functioning; (2) active coping moderated the association between burn injury variables and psychosocial functioning; and (3) coping moderated the association between stress and psychosocial functioning in pediatric burn survivors. The results did not support any of the proposed hypotheses. However, household stress was found to be significantly and positively associated with post-traumatic stress symptoms and active coping was significantly and positively correlated with global self-concept and youth-reports of youth social functioning. Follow-up analyses also found that avoidant coping was a significant predictor of post-traumatic stress symptoms. Finally, family income significantly predicted parent-reports of youth social functioning, such that higher income was associated with better social functioning.

Compared with previous studies, the current sample appeared to have more severe burn injuries as both TBSA and number of days hospitalized were greater than samples used in other studies. Additionally, the majority of youth experienced enough major life events to potentially impact their mental and physical health. However, participants in the present study appear to utilize more active coping strategies than the standardization sample. This may mean that the

sample was able to more effectively deal with stressors. Additionally, parents' scores on measures of daily hassles and major life events suggest that they did not experience more stress than other samples, thereby allowing them to more readily respond to any psychosocial difficulties their children may encounter. Also most participants had average or above average self-concept and social functioning equivalent or better than other samples of burn survivors. The only area in which youth appeared to have impaired adjustment was post-traumatic stress symptoms. Taken together, these findings suggests that, although participants in this sample had more severe burn injuries and youth may have experienced a large amount of major life events, overall they had psychosocial functioning relatively equivalent to healthy populations. Additionally, they appeared to utilize more adaptive coping strategies and had more supportive parents because they experienced low amounts of overall stress.

Comparison of participants and refusers revealed no significant differences between for demographic variables (e.g., age, gender). However, time since burn injury was greater for youth who participated versus those who refused. One possible explanation of this difference is that youth may not want to discuss their injury soon after it occurs. The fact that a few of the active refusers stated that they did not want to talk about their injury lends some support to this possibility. Additionally, less time since burn was associated with more post-traumatic stress symptoms. Therefore, some youth may have not wanted to participate because it was aversive to talk about their injury. It may be beneficial if future studies are longitudinal in an effort to observe shifts in psychosocial adjustment in burn survivors over time. This may help researchers and clinicians better understand the coping process and identify any periods related to better or worse functioning (e.g., return to school, change of seasons).

Preliminary analyses indicated that participants recruited from WPH burn camp had fewer post-traumatic stress symptoms than individuals recruited from the burn registry data or either outpatient clinic. This difference may exist because youth who attend burn camps may have better psychological adjustment (i.e., fewer traumatic memories of their burn injury) as a function of the social support that they receive during camp and in friendships established through camp experience. Similarly, youth who are experiencing more psychological difficulties following their injury (i.e., intrusive memories) may chose not to attend burn camp as it forces the individual to confront their injury and to socialize with other burn survivors as well. Future research should involve longitudinal designs to follow the psychosocial adjustment of patients over time, starting at the time of their injury. In doing so, this research also could assess whether psychosocial adjustment improves after attending burn camp, in particular. Additionally, it would be important to include measures that span a variety areas of psychosocial functioning (e.g., self-concept, post-traumatic stress symptoms, social functioning, depression, anxiety). Relatedly, future researchers should consider evaluating potential factors that promote or inhibit burn camp attendance.

In contrast with some previous research (e.g., Lawrence, 2007; Noronha & Faust, 2007; Rose & Blakeney, 2005; Tarnowski, 1994), most burn injury variables were not significantly associated with psychosocial outcomes in the current study. The only significant finding was that post-traumatic stress symptoms decreased as time since burn increased. Because burns (and their care) often are conceptualized as a traumatic event and additionally may be the result of another traumatic event (e.g., car accidents, house fires, explosions), it is expected that symptoms of PTSD would abate as patients processed their experience over time. Future research should consider exploration of youth post-traumatic stress symptoms related to their injury, associated

events, and burn care treatment. TBSA or size of burn injury was used as a predictor variable in the present study, as previous research had found it to be related to psychosocial functioning (e.g., Smith, Barclay, Quesada, Sedowofia & Thompson, 1997; Stoddard, Norman, Murphy & Beardslee, 1989). However, the results of this study suggest that the size of the burn is not related to our particular measures of psychosocial adjustment. Perhaps other injury-related factors (e.g., whether burned on the face or not; degree of hypertrophic scarring) may play a more substantial role in psychosocial outcomes. Thus, it may be that the long-lasting effects of the burns (e.g., permanent scars, physical limitation) are crucial in psychosocial adjustment rather than the size of the burn at the time of injury. This is supported by a meta-analysis by Noronha and Faust (2007), which found that burn visibility was the strongest predictor of psychosocial adjustment in pediatric burn survivors. It is noteworthy that our sample did not afford an evaluation of this particular burn injury factor – visibility of scars – as the majority of the study sample (93%) had visible burn injuries.

Reviews have found that stress moderates the prevalence of mental illness (Banks & Kerns, 1996; Monroe & Simmons, 1991); however, in the current study, household stress did not moderate the relation between TBSA and psychosocial functioning. Scores on measures of daily hassles and major life events indicated that the amount of stress in the current sample was relatively low in comparison with other populations, which may be suggestive of social desirability in caregiver responses. Therefore it is possible that stress was not strongly linked with either TBSA or psychosocial functioning as the sample appears to be experiencing few difficulties. Alternatively, these results may stem from the fact that youth often receive considerable outside support (i.e., from family, medical team members, or friends) to help deal with their burns, which can buffer them from the effects that household stress may have on their

adjustment. The lack of significant correlation between TBSA and psychosocial functioning also likely impacted the moderation analysis from a statistical perspective (Fairchild & MacKinnon, 2009).

Despite the lack of a significant moderation effect, higher levels of stress were associated with more post-traumatic stress symptoms, which is congruent with previous research (Fairbank, Hansen, & Fitterling, 1991; La Greca, Silverman, Vernberg & Prinstein, 1996; Mol et al., 2005). However, in contrast with other studies (DuBois, 1992; von Weiss et al., 2002), stress was not significantly associated with other measures of psychosocial functioning. These discrepant findings may be due to the way in which stress was measured in this study compared with prior research. Researchers have found that daily hassles are better predictors of self-concept than major life events (Chamberlin & Zika, 1990; Libby & Glenwick, 2010). However, both major life events and daily hassles have been found to be associated with post-traumatic stress symptoms (Fairbank, Hansen, & Fitterling, 1991; La Greca, Silverman, Vernberg & Prinstein, 1996; Mol et al., 2005). The current study combined major life events and daily hassles in an attempt to fully characterize the family lives of the participants. Doing this may have masked any significant associations between daily hassles and self-concept while leaving intact the associations with post-traumatic stress symptoms. Therefore, future studies may wish to parse apart the effects of daily hassles and major life events on psychosocial functioning in pediatric burn survivors.

The study's findings that use of active coping strategies (e.g., trying to fix a problem) was associated with better psychosocial functioning (i.e., self-esteem and post-traumatic stress symptoms) is concordant with past research (Compas, 2012; La Greca et al., 1996; Meijer, Sinnema, Bijstra, Mellenbergh, & Wolters, 2002; Walker, Smith, Garber & Claar, 2005).

Specifically, these results add to previous literatures as they indicate that active coping strategies promote psychosocial adjustment in pediatric burn survivors, which previously had not been tested. Active coping may increase youths' self-concept as a function of the effectiveness of these strategies in successfully responding to difficulties or struggles. When youth experience success in solving problems, they may become more confident in their abilities, which in turn may enhance their self-concept. Additionally, youth who use more active coping strategies may have better self-esteem as they experience a lessened frequency or severity of chronic stressors that come from ineffective coping. Future research may wish to compare the perceived effectiveness of various types of coping strategies used in youth with and without burn injuries.

Although active coping is typically seen as mostly adaptive, a review by Compas (2012) noted that secondary or accommodative coping is more efficacious when stressors are less controllable. Given the uncontrollable nature of some of the stressors related to burn injuries (e.g., scars, physical limitations, peer teasing), it is possible that accommodative coping strategies may be better predictors of psychological adjustment. However, results from the current study do not support this line of thought. This may be because many frequently experienced stressors (e.g., stares, unwanted questions) are in fact controllable. Youth who directly address these problems (e.g., openly talking about their injury, asking people to stop staring) may feel better because they are capable of addressing the problem and subsequently experience fewer stressors in the future. Additionally, they may learn to discern which specific coping techniques work better than others (e.g., discussing their injury/scars with friends). Therefore, active coping strategies would best promote psychosocial adjustment.

Results from the present study also supported previous findings (Bryant, 1996; Bryant & Harvey, 1995) that the use of avoidant coping is associated with more post-traumatic stress

symptoms. Pediatric burn survivors who use avoidant coping strategies may be less compliant during medical procedures (e.g., dressing changes), which may result in the procedures taking more time and being more painful. Additionally, children using avoidant coping styles may be less likely to talk with friends or family about their burn injury or have a tendency not to acknowledge that they have any traumatic memories about their burn. They are then negatively reinforced for not thinking about their injury or treatment, which can increase post-traumatic stress symptoms. Furthermore, youth who use avoidant coping styles may not seek help if they are having difficulties dealing with the effects of their injury. This may then result in greater incidence of post-traumatic stress disorder.

An unexpected finding of this study was that income was a significant predictor of parent-reports of youth social functioning throughout all three aims. Although unanticipated, this finding is consistent with previous research (Browne-Yung, Ziersch, & Baum, 2013; Rankin & Quane, 2002). These studies have found that youth from families with lower SES have less social capital (i.e., access to resources through their social network), which results in poorer quality social relationships. Rankin and Quane (2002) proposed a model that suggests that the family's background impacts family management practices, which consequently impacts youth peer groups. Therefore, lower income may predict parent reports of worse social functioning because children have fewer opportunities to diversify their peer groups. Youth may not perceive their peers as problematic, but parents, as an outside observer, may be more sensitive to the social difficulties resulting from their child's friend groups. Future research may wish to explore whether there are differences in parent-reports of youth social functioning between pediatric burn survivors and non-injured peers.

When interpreting the findings of the current study, there are some limitations that must be noted. First, the size of the sample analyzed was smaller than what was needed to detect large effect sizes. Slower-than-anticipated recruitment due to unforeseen problems (e.g., low response rate from mailings, difficulties having participants return packets) resulted in the small sample size. Because of the small sample, the risk of making a type 2 error is greater, and the non-significant findings may be due to the study being underpowered (Cohen, 1992). Indeed, in multiple analyses, there were associations that were trending towards significance or had regression coefficients indicating small to medium effect sizes. Given that this study had a sample size that was smaller than needed to detect large effects, it is possible that many associations may be statistically significant if more participants had been recruited and statistical power thereby increased. To address this in future studies, it would be important to initially recruit from multiple sites, and to recruit participants while they still have regular visits to the outpatient burn clinic.

Second, general measures of stress, coping, and self-concept were used as opposed to measures that were specific to burn injuries. Therefore, some of the results may not be true tests of the hypotheses; rather, they may assess how youth cope with problems in general as opposed to burn-specific stressors. Indeed, the fact that the strongest associations existed between general measures of coping and self-concept suggest that this may be the case. Future research should utilize measures that evaluate burn-specific predictors and psychosocial outcomes.

Third, the study is cross-sectional and therefore it is not possible to draw causal inferences. Specifically, it is not possible to know if deficits in psychosocial functioning preceded burn injuries. There is some evidence to suggest that youth with more family stress and poorer psychosocial functioning may be more prone to sustain burn injuries (Liao & Rossignol,

2000; Petridou et al., 1998). Therefore, it is possible that deficits in psychosocial functioning may have actually preceded the burn injury instead of following it. Future studies may wish to use longitudinal approaches to examine potential causal relations between the predictor and outcome variables. Additionally, it may be beneficial to compare the psychosocial functioning of youth whose injuries were the result of accidents (e.g., spilled water) versus fire-risk behaviors (e.g., playing with fire or accelerants).

Finally, due to the nature of the population being studied, a convenience sample was used. The individuals who took the time to participate in the study may have better overall functioning and less stressful environments compared with those who refused. In fact, perhaps families who do not follow up for their child's medical care in clinics, and thus could not be recruited for this study, are the ones who experience barriers and struggles (e.g., transportation issues) as a function of more stressful home environments. Additionally, homogeneity on some of the demographic variables (e.g., majority of participants were Caucasian) suggests that a sampling bias may be present and therefore results may have limited generalizability. To avoid this in future studies, researchers should sample a wider variety of individuals.

Although the original hypotheses were not supported, the current study has many strengths. First, this study explicitly studied stress and coping in pediatric burn survivors. Previous research had examined stress (DeLongis et al., 1988; von Weiss et al., 2012) and coping (Compas, 2012) in other pediatric chronic illness populations, but it was not known if similar effects would be found in burn populations. Furthermore, the current study investigated whether or not stress or coping acted as moderators in pediatric burn populations, which previously had not been investigated. This study also used both parent- and youth-reports of predictor and outcome variables. Previous studies relied almost exclusively on youth-reports of stress, coping,

or psychosocial functioning (e.g., Libby and Glenwick's 2010), which may have resulted in problems associated with shared-informant variance (e.g., increased likelihood of finding significant relations between variables that might not otherwise exist). Finally, this study recruited participants from multiple sites (i.e., WPH burn camp, WPH outpatient burn clinic, NCH outpatient burn clinic, WPH burn registry database). Therefore, a wider variety of participants (e.g., different treatment experiences, geographical location) were able to be included. Indeed, with regard to characteristics of burn injuries (e.g., TBSA, days in hospital, time since injury), our sample generally was congruent with those in previous psychological studies with pediatric burn survivors.

In conclusion, this study built on previous knowledge about predictors of psychosocial functioning in pediatric burn survivors. The main findings of this study were that family income, stress, and coping were significantly related to psychosocial functioning in pediatric burn survivors. Greater household stress and use of avoidant coping were significantly associated with more post-traumatic stress symptoms, use of active coping predicted global self-concept, and lower family income was linked with lower parent-reports of social functioning. These findings begin to fill a notable gap in the knowledge regarding psychological adjustment in pediatric burn survivors. However, more research is needed before recommendations can be made regarding the potential utility of psychological interventions in burn survivors.

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Table 1

Participant Demographics

Variables (<i>N</i> = 40)		n (%)
Gender	Male	26 (65%)
Race	Caucasian	36 (90%)
	African-Am.	1 (2.5%)
	Asian-Am.	1 (2.5%)
	Bi-Racial/Mixed Race	1 (2.5%)
	Other	1 (2.5%)
Father Education	Some High School	1 (2.9%)
	High School Graduate	17 (48.6%)
	Some College/Vocational School	10 (5.7%)
	Bachelor's Degree	2 (5.7%)
	Master's/Doctoral Degree	5 (14.3%)
Mother Education	High School Graduate	11 (28.2%)
	Some College/Vocational School	19 (48.7%)
	Bachelor's Degree	5 (12.8%)
	Master's/Doctoral Degree	4 (10.3%)
Parent Marital Status	Never Married/Single	7 (17.5%)
	Divorced/Single	6 (15%)
	Married to Bio Parent	18 (45%)
	Remarried to Step-Parent	5 (12.5%)
	Living with BF/GF	3 (7.5%)
	Widowed	1 (2.5%)

Table 2

Descriptive statistics

	Mean	SD	Min	Max
Active Coping ^b	2.67	0.68	1.25	3.96
Youth Hassles ^c	61.29	45.41	0	171
Youth Major Life Events ^d	217.62	213.5	0	1073
Parent Hassles ^e	82.83	89.96	0	373
Parent Major Life Events ^f	193.93	153.91	0	699
Household Stress Severity ^g	-.01	2.41	-3.77	6.49
Global Self-Concept ^h	53.16	10.83	20	78
Post-Traumatic Stress Symptoms ⁱ	17.69	17.14	0	55
Youth Social Functioning – Parent Report ^j	4.68	12.02	0	61
Youth Social Functioning – Youth Report ^k	1.67	3.56	0	17

^aCronbach's alpha^b*Children's Coping Strategies Checklist (CCSC)*^c*Children's Hassles Scale (CHS)*^d*Coddington Life Events Scale for Adolescents (CLES-A)*^e*Weekly Stress Inventory (WSI)*^f*Social Readjustment Rating Scale (SRRS)*^gMean z-scores for parent and youth major life events (*SRRS* & *CLES-A*) and daily hassles (*WSI* & *CHS*)^h*Piers-Harris Self-Concept Scale – 2nd edition (PH-2)*ⁱ*Children's Revised Impact of Events Scale – 13 items (CRIES)*^j*Living with a Chronic Injury Scale – Youth Version (LCI-Y)*^k*Living with a Chronic Injury Scale – Parent Version (LCI-P)*

Table 3

Bivariate Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	---											
2. Age	-.06	---										
3. Income	-.07	.20	---									
4. TBSA	-.18	-.15	-.22	---								
5. Time Since Burn	.08	.14	.18	.03	---							
6. Household Stress	.37*	.11	-.25	-.08	.12	---						
7. Active Coping	.05	-.01	-.06	-.01	.01	.02	---					
8. Avoidant Coping	.11	-.12	-.16	.08	.09	.31	.59**	---				
9. Self-Concept	-.06	-.33*	.09	.16	-.04	-.36*	.46**	.04	---			
10. LCI-Y	.17	.31	.21	-.21	.32	-.23	.28	.03	.14	---		
11. LCI-P	.11	.18	.42**	-.22	.30	-.14	-.18	-.14	.26	.41*	---	
12. PTSS	.08	-.32	-.18	.05	-.33*	.25	.19	.37*	-.19	-.37*	-.58**	---

Note: * $p < .05$, ** $p < .01$

Table 4

*Household Stress Moderating the Association between TBSA and Psychosocial Functioning***4.1 Predicting Self-Concept (N = 33)**

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			3.16 (1, 32)	.061
Age	-.30	-1.78		
<u>Step 2</u>			2.14 (3, 30)	.094
TBSA	.10	.59		
Household Stress	-.28	-1.66		
<u>Step 3</u>			1.65 (4, 29)	.073
Household Stress X TBSA	.11	.56		

*Note: * $p < .05$, ** $p < .01$* **4.2 Predicting Youth-Report Social Functioning (N = 31)**

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			1.15 (2, 29)	.009
TBSA	-.20	-1.13		
Household Stress	-.18	-1.00		
<u>Step 2</u>			.76 (3, 28)	.000
Household Stress X TBSA	.05	.237		

*Note: * $p < .05$, ** $p < .01$*

4.3 Predicting Social Functioning – Parent Report (N = 32)

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			9.04 (1, 31)**	.201
Income	.48**	3.01		
<u>Step 2</u>			3.03 (3, 29)*	.160
TBSA	-.11	-.65		
Household Stress	-.05	-.30		
<u>Step 3</u>			2.32 (4, 28)	.141
Household Stress X TBSA	.12	.61		

Note: * $p < .05$, ** $p < .01$

4.4 Predicting Post-Traumatic Stress Symptoms (N = 33)

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			2.43 (2, 31)	.080
TBSA	.06	.37		
Household Stress	.37*	2.18		
<u>Step 2</u>			1.57 (3, 30)	.049
Household Stress X TBSA	-.01	-.06		

Note: * $p < .05$, ** $p < .01$

Table 5

*Coping Moderating the Association between TBSA and Psychosocial Functioning***5.1 Predicting Self-Concept (N = 34)**

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			3.01 (1, 33)	.056
Age	-.29	-1.74		
<u>Step 2</u>			4.80 (3, 31)**	.251
TBSA	.13	.85		
Active Coping	.47**	3.17		
<u>Step 3</u>			3.61 (4, 30)*	.235
Active Coping X TBSA	.09	.59		

Note: * $p < .05$, ** $p < .01$ **5.2 Predicting Social Functioning – Youth Report (N = 31)**

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			1.67 (2, 29)	.042
TBSA	-.20	-1.13		
Active Coping	.25	-1.00		
<u>Step 2</u>			2.0 (3, 28)	.088
Active Coping X TBSA	-.27	.237		

Note: * $p < .05$, ** $p < .01$

5.3 Predicting Social Functioning – Parent Report (N = 33)

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			9.27 (1, 32)**	.200
Income	.47**	3.04		
<u>Step 2</u>			3.23 (3, 30)*	.168
TBSA	-.11	-.63		
Active Coping	-.11	-.66		
<u>Step 3</u>			2.40 (4, 29)	.145
Active Coping X TBSA	-.07	-.43		

Note: * $p < .05$, ** $p < .01$

5.4 Predicting Post-Traumatic Stress Symptoms (N = 34)

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			.31 (2, 32)	.000
TBSA	.05	.30		
Active Coping	.13	.74		
<u>Step 2</u>			.59 (3, 31)	.000
Active Coping X TBSA	.19	1.07		

Note: * $p < .05$, ** $p < .01$

5.5 Predicting Post-Traumatic Stress Symptoms (N = 34)

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			1.41 (2, 32)	.000
TBSA	.03	.15		
Avoidant Coping	.28	1.66		
<u>Step 2</u>			.94 (3, 31)	.000
Avoidant Coping X TBSA	.05	.26		

Note: * $p < .05$, ** $p < .01$

Table 6

*Active Coping Moderating the Association between Stress and Psychosocial Functioning***6.1 Predicting Self-Concept (N = 35)**

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			3.70 (1, 34)	.072
Age	-.31	-1.92		
<u>Step 2</u>			6.33 (3, 31)**	.313
Household Stress	-.27	-1.92		
Active Coping	.46**	3.25		
<u>Step 3</u>			6.20 (4, 31)**	.373
Active Coping X Household Stress	.28	2.01		

*Note: * $p < .05$, ** $p < .01$* **6.2 Predicting Social Functioning – Youth Report (N = 33)**

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			2.04 (2, 31)	.060
Household Stress	-.19	-1.15		
Active Coping	.29	1.71		
<u>Step 2</u>			1.43 (3, 30)	.037
Active Coping X Household Stress	-.09	-.53		

*Note: * $p < .05$, ** $p < .01$*

6.3 Predicting Social Functioning – Parent Report (N = 34)

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			5.59 (1, 33)*	.119
Income	.38**	2.36		
<u>Step 2</u>			2.13 (3, 31)	.09
Household Stress	.01	.03		
Active Coping	-.16	-.99		
<u>Step 3</u>			1.55 (4, 30)	.06
Active Coping X Household Stress	-.01	-.06		

Note: * $p < .05$, ** $p < .01$

6.4 Predicting Post-Traumatic Stress Symptoms (N = 35)

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			1.78 (2, 33)	.043
Household Stress	.24	1.46		
Active Coping	.19	1.16		
<u>Step 2</u>			1.36 (3, 32)	.030
Active Coping X Household Stress	.19	-.76		

Note: * $p < .05$, ** $p < .01$

6.5 Predicting Post-Traumatic Stress Symptoms (N = 34)

	β	t	$F(df)$	Adj. R^2
<u>Step 1</u>			3.42 (2, 33)*	.121
Household Stress	.14	.83		
Avoidant Coping	.35*	2.11		
<u>Step 2</u>			3.01 (3, 31)	.147
Avoidant Coping X Household Stress	.26	1.41		

Note: * $p < .05$, ** $p < .01$

Figure 1. Aim one moderation analysis. This figure illustrates the design of the moderation analysis in aim one.

Figure 2. Aim two moderation analysis. This figure shows the moderation analysis in aim two.

Figure 3. Aim three moderation analysis. This figure demonstrates the moderation analysis in the third aim.

Figure 4. Interaction of household stress by active coping. This figure shows how high levels of active coping mitigate the effect of household stress on global self-concept.