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Relations Between Adverse Childhood Experiences and Current Maladaptive Beliefs in a College Sample

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Current Maladaptive Beliefs in a College Sample

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Abstract

Cumulative childhood trauma has been associated with both symptoms of post-traumatic stress disorder and depression. However, few studies have examined these relations with normative young adult populations nor have they explored the relation between childhood adversities and cognitive distortions as an outcome variable. The current study aimed to: 1) replicate and extend research on the relations between cumulative adversity, using a broad measure of adverse childhood experiences (ACEs; Felitti et al., 1998), which assesses both maltreatment (e.g., physical, sexual, emotional abuse and neglect) and exposure to elements of household dysfunction (e.g., caregiver substance use, witnessing maternal abuse), and mental health outcomes (i.e., symptoms of PTSD and depression) with a relatively high-functioning young adult sample of female college students, and 2) examine if the dose-response relation frequently found between ACEs and negative distress outcomes also existed with cognitive distortions, a common post-traumatic response and target of trauma-specific treatments that is rarely examined as an outcome variable. Participants (N = 252) were female undergraduate university students who were primarily white and reported a range of traumatic experiences. I hypothesized that increases in number of types of ACEs would be positively related to increases in post-traumatic stress and depressive symptoms, as well as the three domains of maladaptive cognitions on a measure of global beliefs, the Posttraumatic Maladaptive Beliefs Scale (PMBS; Vogt et al., 2012). Controlling for adverse experiences since age 18, results of hierarchical regression analyses supported the hypotheses and indicated greater endorsement of ACEs was positively related to increases in post-traumatic stress and depressive symptoms, as well as increases in all three domains of the PMBS: *Threat of Harm, Reliability & Trustworthiness of Others,* and *Self-Worth & Judgment*.

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Introduction

In the general field of traumatic stress studies, trauma has been specified and assessed across myriad domains, such as child maltreatment, interpersonal or domestic violence, and military traumas. Exposure to potentially traumatic experiences in childhood has been shown to be particularly impactful (e.g., Cloitre et al., 2009). However, exploration of the impact of childhood experiences has often been done in silos of individual trauma types (e.g., physical abuse, sexual abuse). One form of measurement, adverse childhood experiences (ACEs; Felitti et al., 1998), assesses exposure to multiple types of maltreatment (e.g., physical, mental, and emotional abuse and neglect) and household dysfunction (e.g., caregiver impairment, parental divorce) prior to the age of 18.

Exposure to multiple types of adverse childhood experiences has been shown to be relatively common, with exposure to a single abusive experience being the exception rather than the norm (Finkelhor, Ormord, Turner, & Hamby, 2005). The negative impact of multiple adversities is studied across many fields of research (e.g., public health, psychology, social work). Multiple exposures to adversity, often termed polyvictimization (Finkelhor et al., 2005), or cumulative adversity and cumulative trauma (e.g., Briere et al., 2008; Cloitre et al., 2009), is related to significant increases in the likelihood of developing psychopathology (e.g., Dong et al., 2004) and negative health outcomes (e.g., Felitti et al. 1998) in a stepwise pattern. Simply put, researchers continue to find that the greater number of types of trauma and adverse experiences endorsed, the more negative mental health and health outcomes (e.g., domains affected, severity) one reported experiencing. Maladaptive beliefs, or negative cognitions, are a common outcome after trauma and are important to study, as previous research has shown them to mediate the

relation between traumatic experiences and negative outcome (e.g., O'Dougherty-Wright, Crawford, & Del Castillo, 2009; Owens & Chard, 2001).

The current study addressed two aims: to replicate and extend research on the relations between exposure to cumulative adversity and mental health outcomes. First, I tested if exposure to adverse experiences in childhood (controlling for experiences during age 18 or older) would be related to negative traumatic distress symptoms in the familiar dose-response pattern (e.g., higher levels of exposure yields higher levels of outcomes) in a highly functioning sample of female college students. Second, I examined if the dose-response relation frequently found with negative symptom distress outcomes would also be found with cognitive distortions, a common post-traumatic response that is rarely examined as an outcome variable.

Before discussing the methodology, issues related to measurement of traumatic experiences, impact of exposure, cognitive theories of trauma are reviewed. Additionally, I highlight the importance of expanding this line of research with a broad conceptualization of traumatic exposure, as this study examined exposure to adverse experiences in childhood within a relatively high-functioning non-clinical female college sample.

Measurement of Traumatic Exposure

Research on the impact of trauma is primarily important due to the prevalence of exposure to traumatic experiences. Estimates of lifetime exposure to trauma are between 40 – 93% and vary based on the method, operational definition, scope (i.e., specific type of trauma) and measures used to assess trauma exposure (see Breslau & Kessler, 2001; Kilpatrick et al., 1993; Scott-Storey, 2011). According to one nationally representative sample, 69% of women were exposed to at least one traumatic event in their lifetime (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993).

Initially, when empirical investigation of traumatic stress began, traumas were investigated by specific type (e.g., impact of adult sexual violence). Now, research has shown that exposure to multiple traumatic events is common in those who have experienced trauma, as opposed to experiencing one event in isolation (e.g., Finkelhor et al., 2005; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). Another direction in which the field has expanded is the age and developmental period of exposure. Literature has now demonstrated that beyond victimization in adulthood, exposure to multiple traumatic events throughout childhood is also common (Finkelhor, Ormrod, & Turner, 2007; Scott-Storey, 2011). Studying the prevalence and impact of childhood traumatic events is especially important because of associated risk for re-victimization and associated outcomes (e.g., Finkelhor et al., 2007), which will be reviewed later.

Childhood trauma exposure has been measured in a variety of ways, with different operational definitions and theoretical conceptualizations of the scope of adverse experiences, and each measured with different samples. In the literature examining exposure to multiple events in childhood, these experiences have been examined using at least three different approaches (Grasso, Greene, & Ford, 2013): The ACEs Study (Felitti et al., 1998), polyvictimization (Finkelhor, Ormrod, Turner, & Hamby, 2005), and cumulative trauma exposure (e.g., Briere et al., 2008; Cloitre et al., 2009). All three approaches recognize that exposure to potentially traumatic events rarely occurs in isolation.

One of the earliest approaches to assessing exposure to multiple childhood adversities is the Adverse Childhood Experiences (ACEs) Study (Felitti et al., 1998), which developed from a public health approach. The ACEs Study initially collected longitudinal information from more than 17,000 young and mid-life adults beginning with a routine health screening at the California Kaiser Permanente Health Maintenance Organization. The original 11 questions assessing ACEs

was landmark in that it assessed multiple categories of child maltreatment and adversity as well as expanded the range of adverse experiences.

The ACEs Study is notable for not only including the typically examined categories of maltreatment (i.e., physical and sexual abuse), but for broadening the range of maltreatment assessed, including exposure to emotional abuse or neglect, and, most notably added categories of household dysfunction, such as exposure to domestic violence and living with an impaired caregiver (e.g., family mental illness and substance use disorder). The addition of these new categories was unique to the study of cumulative adversity because added the dimension of family context, as well as exposure to events that were not experienced directly by the child. Previous research had demonstrated the impact on children who witnessed domestic violence (e.g., Kolbo, Blakely, & Engleman, 1996) and continues to be an avenue of exploration today (e.g., Holt, Buckley, & Whelan, 2008; McDonald, Graham-Bermann, Maternick, Ascione, & Williams, 2016).

While the ACE study expanded the investigation of interpersonal events, it excluded non-interpersonal traumas (e.g., natural disasters, automobile accidents). It was an epidemiological study aimed to investigate the impact of childhood and adolescent negative interpersonal events the impact of which could potentially be reduced via public and private sector efforts (Anda & Brown, 2010).

Results of the ACEs study have yielded important findings about the cumulative impact of adverse childhood experiences (Anda & Brown, 2010). In this well-educated, middle-class adult sample, endorsement of ACEs was common, with two-thirds of participants reporting at least one ACE and more than 15% reporting experiencing 4 or more different types of ACEs (Anda & Brown, 2010). The findings of the ACEs study have since been replicated several

times. For example, the Centers for Disease Control and Prevention (2010) found similar results in a random sampling of adults across five states in the US. Overall, it is estimated that 50 – 75% of the population has experienced at least one ACE before the age of 18 (CDC, 2010; Dong et al., 2004; Felitti et al., 1998).

ACEs were also shown to be highly co-occurring. Individuals who endorsed one ACE (81 – 98%) reported at least one additional ACE category (Dong et al., 2004); in other words, persons who indicated exposure to one category of adverse childhood experience were 2 to 18 times more likely to endorse an additional category of exposure. In fact, most persons with one traumatic experience were exposed to two to four additional event categories in childhood (Dong et al., 2004). Additionally, some types of ACEs were interrelated. For example, witnessing domestic violence was highly associated with having a family member with substance abuse, and individuals who reported emotional abuse reported physical abuse at much higher rates than those who reported no emotional abuse (Dong et al., 2004).

In addition to demonstrating the high prevalence and interrelation between ACEs, exposure to adverse childhood events was importantly highly correlated with negative health outcomes – many of which are leading causes of morbidity and mortality in adulthood (Felitti et al., 1998). Several health problems and risk factors (e.g., cigarette smoking, obesity, alcoholism) and health conditions or diseases (e.g., heart disease, cancer, and hepatitis) were associated with ACE exposure. In addition to negative health outcomes, endorsement of exposure to events on the ACE questionnaire (Felitti et al., 1998) has also been linked to post-traumatic diagnosis of depression, bipolar disorder, dissociative symptoms, and risk of attempted suicide (e.g., Anda et al., 1999; Anda, Tietjen, Schulman, Felitti, & Croft, 2010; Chapman et al., 2004; Danese et al., 2009; Dube et al., 2001a; Dube et al., 2001b).

A dose-response relationship between number of types of adverse childhood experiences and greater risk for health risk behaviors and conditions (Felitti et al., 1998) demonstrates the cumulative effects of ACE exposure such that endorsement of negative outcomes increased with each ACE score. Cumulative adversity yielded higher negative outcomes; for example, individuals who reported at least 5 ACEs were 10 times more likely to report history of a suicide attempt than those without ACEs (Dube, 2001a).

ACE data is typically collected retrospectively from adults, but several studies have since examined ACEs using prospective follow-up data (e.g., Anda et al., 2007; Brown et al., 2010; Dube et al., 2009). The accumulation of literature supports that exposure to ACEs is associated with behavioral, health, and psychosocial problems later in life and is increasingly problematic as the number of ACEs endorsed increases.

An alternative approach to measurement of multiple experiences of trauma in childhood, poly-victimization (Finkelhor et al., 2005), was identified as a "neglected component in child victimization" research (Finkelhor et al., 2007). The initial sociological study assessed exposure by using a nationally representative sample of caregivers with children and adolescents (ages 2 – 17 years old; n = 2,030). This group of researchers uses a measured they developed, the Juvenile Victimization Questionnaire (JVQ; Finkelhor et al., 2005), to explicitly measure 34 types of childhood victimization experienced or witnessed within the past year. This measure includes both interpersonal and non-interpersonal events, but most published analyses to date have focused on interpersonal victimization.

Similar to analyses from the ACEs study, studies utilizing the JVQ (e.g., Finkelhor et al., 2005) examined the impact of the total number of victimization types. Results found that a cumulative count of experience types predicted the children's PTSD symptomology better than

any single type of victimization exposure alone (Finkelhor et al., 2005). Of children who reported a direct experience of victimization, 64.5% reported more than one type (Finkelhor, Turner, Hamby, & Ormrod, 2011).

A dose-response relationship between childhood exposure and negative psychosocial outcomes was also found using results of the JVQ. Almost 25% of this sample experienced four or more types of victimization, and were therefore categorized as poly-victims. Follow-up studies indicated these poly-victims were approximately 4 times more likely to be re-victimized within a year after the initial study. Nearly half these poly-victims experienced four or more event types in that one-year period and therefore were classified as persistent poly-victims (Finkelhor et al., 2007). Analyzed in a different way; when poly-victims were conceptualized as the 10% of children with the highest victimization scores, these poly-victims evidenced significantly more distress, non-interpersonal adversity, and higher household dysfunction (Finkelhor, Ormrod, & Turner, 2009).

In addition to studying the number of types of adversities experienced in childhood, researchers have utilized a developmental approach to examine cumulative lifetime exposure to traumatic stressors – meaning the impact of repeated exposure to a number of traumatic stressors over the lifespan, including childhood and adult victimization. Studies employing this perspective generally retrospectively survey adults about lifetime traumatic exposure. Results from a number of studies support a dose-response relationship between the number of traumatic stressors experienced and the severity of symptomology (e.g., PTSD, depression, substance abuse, interpersonal problems; Duckworth & Follette, 2011; Follette & Vijay, 2008).

Returning to the popular analysis of number of trauma types, there is further evidence that the number of types of interpersonal traumatic experiences across a lifetime correlate in a

dose-response pattern to number of affective, cognitive, psychosomatic, and interpersonal symptoms (Briere et al., 2008; Cloitre et al., 2009). When exposure began in childhood, adult symptoms were especially exacerbated (Ford, 2010). For example, adult survivors of cumulative childhood exposure demonstrate significant problems with emotion regulation (Ford & Smith, 2008; Ford, Stockton, Kaltman, & Green, 2006).

A survey of female college students reporting on several types of childhood exposure (Briere et al., 2008) upheld the dose-response relational pattern between number of types of childhood traumatic exposures and number of domains of symptoms (e.g., depression, avoidance, anxious arousal, anger-irritability). Symptom complexity was best predicted in this sample by cumulative trauma exposure. In a clinical sample (Cloitre et al., 2009), cumulative trauma exposure in childhood, but not adulthood, was associated with symptoms complexity in adults and children.

Research on trauma in adults has often been divided by gender with studies focusing on either male combat survivors or female survivors of sexual assault or intimate partner violence. Although many studies of childhood victimization have included both genders, literature has shown significant gender differences in posttraumatic reactions, such that women are more likely to endorse higher rates of negative outcomes of symptoms of PTSD and depression than men (e.g., Breslau, 2002; Frans, Rimmo, Aberg, & Fredrikson, 2005; Tolin & Foa, 2006). A meta-analysis (Brewin, Andrews, & Valentine, 2000) revealed the prevalence of this trend as the pattern was upheld in multi-gendered studies and single-gender comparisons. Therefore, this study will utilize an exclusively female sample, as their posttraumatic distress is likely greater than male survivors of childhood abuse.

As demonstrated, measurement of traumatic exposure has been controversial because of the variety of operational definitions, measurement instruments, and populations sampled. Some researchers have limited their scope of trauma assessment to events specified as traumatic in the *Diagnostic and Statistical Manual: 5th Edition (DSM-5;* APA, 2013*)* Criteria A of PTSD. Several adversity and victimization categories measured using ACE and JVQ items would not be considered traumatic stressors by *DSM-5* diagnostic criteria. However, as highlighted above, exposure to these events yielded significant sub-syndromal impact. This phenomenon of unmeasured or unidentified stressors is described in the literature as the "Criterion A problem" (Weathers & Keane, 2007a, 2007b).

Although this study aimed to investigate exposure to a broad range of trauma exposure categories, several potentially mediating and moderating variables were not assessed due to the complexity of analysis required. Research suggests a direct relation between the severity of the trauma and its psychological impact, indicating the trauma itself is a more powerful determinant of psychological harm than individual personality characteristics (Herman, 1997). Given the complexities of measuring traumatic exposure, researchers are aware that using a count of the number of types of adversities experienced is merely a proxy for estimating cumulative adverse exposure (Scott-Storey, 2011).

One of the aims of the proposed study was to replicate the findings of dose response relations between types of childhood trauma exposure and adult symptomology, while expanding the literature by using the broader operationalized definition of childhood adversity (ACEs), which includes indirect exposure to family violence and household dysfunction. Household dysfunction may be particularly salient for childhood assessment, but was not conceptualized when trauma assessment (and the diagnosis of PTSD) was initially derived for adult war

veterans. This study also expands the literature by returning to assessment of the general population (i.e., public health focus, similar to the ACEs approach) as traumatic exposure is approaching epidemiological rates, as opposed to focusing on exposure and impact in highly traumatized children (e.g., JVQ [Finkelhor et al., 2005a]; National Child Traumatic Stress Network [NCTSN] Core Data set [Pynoos et al., 2008])

Trauma Sequelae

Differential responses in children. This study examined the long-term impact of exposure to adverse events experienced in childhood, while controlling for events experienced after the age of 18. Developmental stages (e.g., age, maturity) may significantly impact the way an individual (i.e., child or adolescent) perceives and reacts to a particular traumatic experience (Pappagallo et al, 2004). Differential experiences of stressors may impact a child's memories, emotional reactions, behaviors, and capacity to organize the experience with greater complications in pre-verbal children, although these children retain implicit memories of the traumatic event (Rojas & Lee, 2004; Rothschild, 2000; van der Kolk, 2007).

Experiencing a traumatic event during childhood may interrupt normative development of competence and capacity for initiative, contributing to a negative self-image (Herman, 1997); this lack of developmental resolution may result in feelings of guilt and inferiority. For example, child sexual abuse can be particularly damaging to the survivor's sense of self and mastery (van der Kolk, 2007). Due to their cognitive level of development, children often internalize the traumatic experience, attributing much that happens to their own actions or thoughts, potentially blaming themselves for the trauma (van der Kolk, 2007). In a study of young females in Germany, those who experienced victimization in childhood had increased risk for developing depression and PTSD, whereas females who experienced victimization in adolescence (defined

as age 13+) primarily demonstrated elevated risk for PTSD (Maercker, Michael, Fehm, Becker, & Margraf, 2004). Adolescent responses may be more similar to those of adults than those of children based on their development of verbal skills and memory encoding processes (Maercker et al., 2004; Rojas & Lee, 2004). In line with this theory, cumulative trauma in childhood has been found to predict increasing symptom complexity in adults, whereas a sample of adults who experienced cumulative trauma in adulthood did not demonstrate that pattern (Cloitre et al., 2009). In addition to developmental considerations, family context likely contributes to the differential impact in youth, as evidenced by the ACE literature (e.g., Dong et al., 2004; Felitti et al., 1998).

Generally, abuse during childhood is often associated with problems in self-regulatory processes, creating psychological dysfunctions that may include disturbances of sense of self, poorly modulated affect, impulse control and insecurity, and uncontrollable feelings of fear, anxiety, rage, panic, anger and sadness in disproportionate amounts in response to even minor events (Horwitz, Spatz Widom, McLaughlin, & White, 2001; McFarlane & de Girolamo, 1996).

Traumatized children may also experience an additional sense of betrayal due to the fact their caregiver was unable to provide protection against the traumatic experience. According to van der Kolk (2005), approximately 80% of perpetrators of child maltreatment are the child's parents. Examination of "complex trauma" highlights the impact of instability in the home (e.g., caregivers with substance abuse or domestic violence; van der Kolk, 2005). Similar to the development of internalized beliefs of shame from maltreatment (Deblinger & Runyon, 2005), children whose parents neglect their emotional and physical needs may form detrimental internal schema about themselves (Waldinger, Toth, & Gerber, 2001). Maltreated children often

idealized their parents while neglected children may develop a sense that others are hurtful (Waldinger et al., 2001).

Therefore, trauma in childhood can result in long-term detrimental psychological and neurobiological changes that increase the individual's vulnerability to a range of psychiatric disorders that may develop in or persist through adulthood (Nemeroff, Bremner, Foa, Mayberg, North, & Stein, 2006; Yehuda & Bierer, 2007). Children who have experienced trauma are at an increased risk for psychopathology in comparison to adults. Psychological distress and disorders, such as depression, anxiety, affective instability, substance abuse, suicidality, and chronic interpersonal disorders can continue into adolescence and adulthood (Cohen, Mannarino, & Deblinger, 2006; Wethington et al., 2008). However, intervention in childhood soon after the trauma can be associated with significant positive changes before the maladaptive cognitions and behavioral and interpersonal patterns have solidified in adulthood (Hedtke et al., 2008). Early intervention to reduce symptoms of PTSD and accompanying disorders is crucial and can improve mental health trajectories for these at-risk children.

For some survivors, exposure to adverse events in childhood is only the beginning of a trajectory of victimization. The notion of re-victimization risk began within the realm of female sexual assault survivors (e.g., Arata, 2000; Messman-Moore & Long, 2000, 2003). Literature now recognizes a persistent pattern for survivors of several types of childhood victimization (Desai, Arias, & Thompson, 2002; Widom, Czaja, & Dutton, 2008).

Adult survivors of childhood traumas. After experiencing or witnessing a singular traumatic event, most adult survivors recover naturally over time (Bonanno, 2008; Foa, 1997). Many individuals are resilient and adaptive, continuing with normative functioning, and do not experience serious disruptions in job or social functioning (Bonanno, 2008). In particular,

individuals who experience a single incident trauma, have no pre-existing or comorbid diagnoses, and few psychological impairments are likely to recover naturally, without a need for intervention (Monson & Shnaider, 2014).

Although natural recovery is common, there is often immediate and profound distress after the experience (Kilpatrick, Veronen, & Resick, 1979). Individuals may differ in their response to and recovery from a traumatic experience due to individual characteristics (i.e., risk and resilience factors), characteristics of the event (e.g., severity, frequency, chronicity), and environmental factors (e.g., community context; Harvey, 1996).

As alluded to in the previous section, one of the most notable clinical outcomes from exposure to traumatic experiences is Postttraumatic Stress Disorder (PTSD). Posttraumatic stress disorder (PTSD) is a disorder of non-recovery after traumatization (Monson & Shnaider, 2014). Males are more likely to be exposed to particular types of trauma, such as assaultive violence, serious accidents and witnessing violence perpetrated on others (Breslau, 2002); however, women are four times more likely to develop PTSD when exposed to the same trauma as males (Foa, Keane, Friedman, & Cohen, 2009). Of victims that experienced rape, life threat, and physical injury, PTSD developed in almost 80% (Resnick et al., 1993). Many individuals, including child and adult survivors of abuse who do not meet full diagnostic criteria, still demonstrate symptomology and marked distress (e.g., Beck, Grant, Clapp & Palyo, 2009; Horwitz et al., 2001; O'Donnell & Creamer, 2004).

The current conceptualization of PTSD in *DSM-5* (APA, 2013) includes symptoms of cognitive (e.g., fearful thoughts), behavioral (e.g., avoidance behaviors), and physiological (e.g., autonomic arousal) features that interact with each other (Zayfert & Becker, 2007). Re-experiencing is defined as "spontaneous memories of the traumatic event, recurrent dreams

related to it, flashbacks or other intense or prolonged psychological distress," (American Psychiatric Association [APA], 2013). Avoidance is notable as it relates to "distressing memories, thoughts, feelings or external reminders of the event" (APA, 2013). Negative alterations in cognition may be represented in a variety of ways from persistent and distorted blame of self or others, estrangement from others and diminished interest in activities, and an inability to remember key aspects of the event. Marked alteration in arousal and reactivity is exhibited via "aggressive, reckless or self-destructive behavior, sleep disturbances, hypervigilance, or related problem" (APA, 2013).

In youth from at-risk samples, 90% of sexually abused children, 100% of children who witness parental homicide or sexual assault, 77% of youth who witnessed a school shooting, and 35% of urban children exposed to community violence develop PTSD (Hamblen, 2006). These results also support the notion that indirect exposure to violence can have detrimental effects and should therefore be measured and included in analyses.

Other common clinical outcomes, which may co-occur or exist without a diagnosis of PTSD, include symptoms of separation anxiety, generalized anxiety disorder, and depression, and risk of suicidal ideations and attempts (Cohen et al., 2006; Finkelhor at al., 2005b). Additional psychological reactions to trauma may include anger, dissociative reactions, social problems, and trauma-specific related difficulties (e.g., responses to trauma reminders; Foa & Rothbaum, 1997). Difficulties with attachment in adulthood and cognitive distortions (e.g., internal representation of self, preoccupation with danger) are also common adult outcomes of childhood trauma as found in a sample of college students (Browne & Winkelman, 2007). The target sample of this study were relatively high functioning female college students. Therefore, high rates of PTSD were not expected; however, given the prevalence of these alternate

outcomes of increased distress in those who have experienced trauma, increases were expected in other outcome variables, such as depression, anxiety, and perceived stress.

Theories of Psychological Responses to Traumatic Exposure

Common negative outcomes following traumatic exposure have been well documented, but there are multiple theories about how and why these problems result. One possible explanation for the development and maintenance of traumatic symptoms as a result of exposure to childhood adversity is negative cognitions. From a cognitive perspective, traumatic experiences often present the individual with information that is inconsistent with their current schema of themselves, others, and/or the world. Traumatic experiences often violate the "just-world thinking" pattern or assumption (Lerner, 1980). Most people have a pre-existing schema that the world is a just and fair place (i.e., good things happen to good people; bad things happen to bad people).

Often, traumatic experiences provide contradictory information that must be incorporated into the individual's schemata about the safety and trustworthiness of the world and its people. According to Piaget's (1962) theories, the individual must either assimilate or accommodate this new contradictory information. Information that is congruent with current schema and can be readily incorporated into the existing working model is assimilated, whereas discrepant information that requires an individual to modify the cognitive schema to explain this experience is accommodated. Traumatized individuals may also over-accommodate, changing beliefs to integrate the trauma into belief systems.

Several researchers have developed cognitive theories of traumatic impact – in other words, explanations of how traumatic experiences may have violated expectations, disturbing ones sense of self and safety (Epstein, 1991; Horowitz, 1976, 1986; Janoff-Bulman, 1992;

McCann & Pearlman, 1990). Considering the theories chronologically, McCann & Pearlman (1990) proposed a theoretical model of the domains affected by traumatic experiences as including safety, trust, power and control, intimacy, and esteem. These disruptions are theorized to cause troublesome emotions, thoughts, or images developing new or strengthen existing negative schemas (Cahill & Foa, 2007).

Ehlers and Clark's (2000) proposed cognitive model of PTSD includes individual differences in the appraisal of the trauma and/or its sequelae and individual differences in the nature of the memory for the event. The negative appraisals of the event are believed to maintain symptomatology (Ehlers & Clark, 2000). With multiple experiences of adversity, these cognitions may be reinforced.

Research has also investigated particular types of maladaptive thinking patterns that result from traumatic exposure. For example, Fischhoff (1975) proposed the theory of "hindsight bias," suggesting individuals view the traumatic situation differently after they have been removed from the traumatic situation. In reflecting upon the event, individuals create hypothetical situations and ruminate on think of how they "should have" chosen an alternative action to influence the outcome, although Fischhoff indicates the individual would not have known the outcome or consequences of the behavior at the time. This faulty, retrospective thinking pattern encourages rumination. This perspective is similar to the "happily ever after" scenario proposed by Monson & Friedman (2012), indicating traumatized individuals image an alternative action would have led to an alternative outcome.

Following a traumatic experience, individuals with anxiety and/or depression may be more likely to exhibit negative attention biases, such that more attention is devoted to perceiving threats and negative events than positive occurrences. This tendency has been demonstrated to be

an automatic process. Therefore, these individuals also underestimate their ability to cope with future negative events (van der Kolk, 2007).

As a result of additional traumatic experiences, trauma survivors may also develop learned helplessness, where they feel they cannot affect what happens to them. Many victims consider trauma an unavoidable fate and may experience these events as self-fulfilling prophecies as they consistently expect negative life outcomes (Herman, 1997). These feelings of vulnerability and of existing in an unsafe world may lead to subsequent traumatic experiences in the lives of the caregivers and/or their children, which creates perceived powerlessness (Kallstrom-Fuqua, Weston, & Marshall, 2004). Experiences of multiple traumas or re-victimization may be a mediator between child abuse and adult psychiatric disorders that typically develop in this population (Collishaw, Dunn, O'Connor, Golding, & the Avon Longitudinal Study of Parents and Children Study Team, 2007).

Perceptions of stigma, guilt, shame and self-blame negatively influence adult adjustment because pre-operational thinking can persist, allowing feelings of being ashamed, tainted and blameworthy to linger and affect the survivor's core beliefs about their worth as a person (Coffey, Leitenberg, Henning, Turner & Bennett, 1996; van der Kolk, 2007). These thoughts can emerge as depression, somatization, dissociation and anxiety in adults. Naturally, victims can develop an inability to trust others or form healthy relationships (Kallstrom-Fuqua et al., 2004).

Therefore, it is not unusual that victims of abuse report problems with intimate partner relationships, disturbed sexual functioning and difficulties in the parental role (DiLillo, 2001). As Herman (1997) describes, trauma survivors may feel desperate for nurturance or care and develop patterns of intense and unstable relationships that repeat the patterns associated with earlier victimization. Often unconscious habits of obedience make the person vulnerable to

people in power or authority and can make it difficult to establish safe and appropriate boundaries with others. As previously mentioned, this pattern is important to note because of the potential for adverse childhood experiences to increase risk for re-victimization in adulthood.

Post-traumatic cognitive schema. Research studies often focus on the development of clinical psychopathology as a result of exposure to traumatic events. It is also important to study how some trauma-related outcomes (e.g., maladaptive cognitions) may be potential risk factors contributing to the development and maintenance of psychopathology and other behavioral and emotional symptomology.

One reason maladaptive cognitions are important to investigate as an outcome variable is because the diagnostic criteria for Post-Traumatic Stress Disorder (PTSD) in the *DSM-5* (APA, 2013) now recognizes and includes "negative alterations in cognitions and mood associated with the traumatic event(s)" as a symptom class. Individuals must endorse two or more of these cognitive or mood changes to receive a diagnosis. Beliefs related to negative perception of self, the world, and others are included in two of these subcategories (APA, 2013). Maladaptive cognitions may exist in individuals with PTSD as well as those with subclinical symptoms (Dong et al., 2004).

As previously explained, trauma-related schema have been examined as mediators and moderators (protective factors) that may impact the development or severity of PTSD. Much of the following literature on post-traumatic cognitions focuses on adult female survivors of rape or intimate partner violence (e.g., Resick & Schnicke, 1992; Wenninger & Ehlers, 1998). Little to no research to date has examined cognitions in child survivors of trauma, likely due to difficulties with children reliably accurately reporting on their cognitive processes. Therefore, one limitation of the existing literature on the impact of cognitions on trauma victims'

functioning is that the target population of these studies (adult survivors of childhood or adult trauma, often treatment-seeking or clinical populations) may not be reporting (exclusively) about the impact of childhood trauma. Although a developmental approach has been utilized examining exposure to traumatic events, this perspective has been widely neglected in regard to posttraumatic cognitions.

Owens and Chard (2001) surveyed adult female survivors of sexual assault and found strong significant correlations between PTSD severity and Personal Beliefs and Reactions Scale (PBRS; Mechanic & Resick, 1993) subscale scores of safety, trust, power, esteem, intimacy, beliefs, undoing, and self-blame. These scores were negatively correlated in that greater severity of PTSD symptoms were associated with more distorted cognitive schema, where lower scores on the PBRS indicating higher more disruptive cognitive schema. They also found PTSD severity to be significantly negatively correlated with the World Assumption Scale (WAS; Janoff-Bulman, 1989) Worthiness of Self Scale, which assesses self-worth, luck, and self-control (Janoff-Bulman, 1989; Owens & Chard, 2001).

When Owens and Chard (2001) analyzed relationships between cognitive distortions and event characteristics, the only significant finding was a correlation between penetration (sexual abuse) and trust and power, as indicated on the PBRS and worthiness of self from the WAS. Additionally, higher levels of sexual victimization has been shown to predict higher levels of negative cognitions (Thompson & Kingree, 2010). In other words, beliefs (e.g., safety, trust, power, esteem, intimacy, self-blame) have been shown to be related to trauma history and PTSD severity (Owens & Chard, 2001). In another study, O'Dougherty-Wright and colleagues (2009) found maladaptive beliefs to mediate the relation between (traumatic) emotional abuse and negative outcomes in college students who experienced childhood trauma.

Trauma-related appraisals have also been shown to relate to the development of maladaptive coping strategies, such as engaging in avoidant behavior or attempting to avoid trauma-related triggers; cognitive distortions have been found to maintain PTSD (Ehlers & Clark, 2000; Hyland, Shevlin, Adamson, & Boduszek, 2013). Some cognitive variables that have significantly predicted PTSD include cognitive processing style (mental defeat/confusion), appraisal of sequelae (symptoms, perceived negative responses of others), beliefs about self and world, and maladaptive control strategies (avoidance/safety seeking; Dunmore, Clark, & Ehlers, 2001).

Thus, PTSD treatments recognize the persistence of cognitive distortions as a maintenance factor for the disorder and focus on addressing them as a target of the intervention. Evidence-based treatments, such as Cognitive Behavioral Therapy, Cognitive Processing Therapy, and Prolonged Exposure aim to reduce and eliminate such cognitive distortions, and cognitive change has been shown to predict symptom reduction for PTSD in cognitive therapy (Kleim et al., 2013). Vogt and colleagues (2010) urge continued research examining maladaptive beliefs in post-trauma recovery, including their presence in the absence of psychopathology.

Despite the focus in the literature on cognitive outcomes of survivors of adult trauma (e.g., rape, domestic violence), a study of adult women seeking treatment for recent intimate partner violence demonstrated that partner violence did not mediate the relation between childhood maltreatment and cognitive distortions (Gobin et al., 2013). These results suggest that childhood experiences remain influential in adult functioning despite traumatic experiences in adulthood. Therefore, this study focused on the impact of childhood maltreatment by controlling for physical, sexual, and emotional abuse exposure that occurred at age 18 or later.

Measurement of cognitions. As referenced in studies above, some of the first measures of cognitive distortions utilized in trauma research include the WAS (Janoff-Bulman, 1989) and

PBRS (Mechanic & Resick, 1993). The next popular measurement to emerge was the Posttraumatic Cognitions Inventory (Foa, Ehlers, Clark, Tolman, & Orsillo; 1999), which remains in use today. In 2003, Pearlman released the Trauma and Attachment Belief Scale (TABS), the newest version of the Trauma Symptoms Inventory (TSI) Belief Scale (Pearlman & MacIan, 1995). Coming from the cumulative trauma perspective, Briere (2000) developed the Cognitive Distortions Scale (CDS). Most recently, the Posttraumatic Maladaptive Beliefs Scale (PMBS: Vogt, Shipherd, & Resick, 2010) was developed as a measure of global cognitions hypothesized to develop following traumatic exposure. This measure incorporated recent research on the development of posttraumatic cognitions to update the PBRS and resolve the problem of most existing measures, which confounded situational and global meanings (Park, 2010). Prior to the development of the PMBS, the only global measures of cognitive distortions in existence were from the 1980s: WAS, Scale to Assess Worldviews (Ibrahim & Kahn, 1987), and select scales of the Just World Scale (Lerner, 1980). This new measure improved upon (and remains highly correlated with) previous measures to assess global perspectives of domains that are often affected by trauma but does not tie their presence directly to a specific experience.

Current Study

As described above, the majority of studies exploring the impact of exposure to multiple types of traumatic events target relatively small subsamples of the population, collecting data from middle-class adults or high-risk children living in low socioeconomic areas and/or experiencing out of home placement (e.g., Felitti et al., 1998; Finkelhor, Ormrod, Turner, & Hamby, 2005; Greeson et al., 2013). The current study tested the cumulative adversity theory of the impact of adverse childhood experiences and extended generalizability by examining if a dose-response relationship between types of ACEs and psychiatric distress also exists with this

sample of highly-functioning individuals (i.e., female college students). This sample represented a larger segment of the population, young adults who may experience adverse childhood experiences, yet are resilient enough to attend a state university.

Several studies have correlated high levels of exposure to adverse childhood experiences with negative outcomes (e.g., Felitti et al., 1998) and others have examined the relations between maladaptive beliefs and PTSD (e.g., Dunmore et al., 2001; Nixon, Resick, & Nishith, 2004). This study expands on current literature with its aim to evaluate the number of different types of adverse childhood experiences and their association with maladaptive beliefs in a non-clinical college-aged normative sample. Cognitive theory posits maladaptive beliefs following traumatic exposure are integral to the maintenance of other post-traumatic symptoms (e.g., anxiety, depression) and impaired functioning. As explained above, several studies have implicated maladaptive cognitions as a mediator between trauma exposure and distress; however, there is limited literature on cognitive distortions as an outcome variable. This study aims to explore if cognitive distortions follow the same dose-response relational pattern (as between psychological symptomatic distress and PTSD criteria) with adverse childhood experiences, particularly using an assessment that includes elements of household dysfunction.

Given that adverse childhood experiences have previously been found to be correlated with *DSM-IV* PTSD criterion (e.g., Felitti et al., 1998) and distorted cognitions have been added to the *DSM-5* as a symptom class (APA, 2013) in PTSD diagnosis, I predicted adverse childhood experiences and maladaptive beliefs would be positively correlated. I hypothesized a dose-response relationship between types of adverse childhood experiences in childhood and distorted cognitions in a female college sample, such that endorsement of a number of types of adverse childhood experiences (as measured by the Adverse Childhood Experiences questionnaire; ACE;

Felitti et al., 1998) would be positively related to elevated rates of maladaptive beliefs (as assessed with the Posttraumatic Maladaptive Beliefs Scale [PMBS; Vogt et al., 2012] subscales: Threat of Harm, Self-Worth and Judgment, and Trustworthiness and Reliability of Others).

Thus, the current study examined two aspects of the relation between adverse childhood events and current outcomes of symptomatic stress and maladaptive beliefs in university women. First, I examined if an increase in exposure to different types of adverse childhood experiences would predict greater symptomatic expression to extend and test the applicability of the cumulative adversity theory (dose-response relationship) in this relatively high-functioning young adult sample. Second, I tested if a dose-response relationship would exist between adverse childhood experiences and current maladaptive beliefs.

Method

Participants and Procedure

There were 252 female undergraduate students who participated in this study. The majority (78.2%) of the sample identified as college freshmen. Participants were between 18-39 years old (M_{age} = 19.2; *SD* = 2.0). The sample was ethnically and economically representative of the participant recruitment population: 85.3% White/Caucasian; 6% Black/African American; 4.8% Asian; 2.8% American Indian; and 1.2% other; with 4% of participants who did not respond to racial identification. Participants were able to endorse multiple racial/ethnic categories and 3.6% of participants identified with more than one ethnic category. As assessed with a separate question, 9.6% of the sample identified as Hispanic/Latina. Participants were undergraduate students enrolled in General Psychology at the University of Arkansas in 2016, whose participation in an online survey was requested via the University psychology experiment website, Sona Systems.

The survey for this study, designed in SurveyMonkey, was launched online in Sona Systems and entitled "College Student Questionnaire." Only students enrolled in General Psychology at the University of Arkansas who identified as female were able to access the survey. The study was approved by the Institutional Review Board at the University of Arkansas. Prior to accessing the survey, participants electronically signed an informed consent document (see Appendix). The informed consent form contained a description of the study, a reminder that the participants' information would be kept confidential, and that they could discontinue the study at any time without penalty. Participants were required to submit their name as an electronic signature before beginning the survey. After the consent form was signed, the web-form automatically redirected participants to another webpage containing the survey to ensure confidential data was not identifiable. Participants who signed the consent form to begin the survey, which was estimated to take between 30-45 minutes to complete, were awarded one (1) credit hour toward fulfillment of their research participation requirement for the course. The survey assessed current functioning prior to assessing adverse childhood experiences to reduce the likelihood of response bias.

Measures

Measures can be found in the Appendix in the order they were completed in the protocol. Participants completed measures that provided demographic information, history of adverse childhood experiences, current cognitive schema, and psychological symptomology. This study was part of a larger research project that assesses general physical and mental health outcomes, perceived stress, and resilience following lifetime history of interpersonal trauma.

Demographic information was obtained using a 14-item author-created form assessing current age, year in university studies, racial and ethnic identification, current relationship status,

current employment status, and family history (e.g., people in the home during childhood, number of siblings, education/financial status of parents).

Predictor Variables.

***Adverse childhood experiences*.** History of adverse childhood experiences was assessed using the Adverse Childhood Experiences questionnaire (ACE; Felitti et al., 1998). The ACE is a 10-item self-response questionnaire using dichotomous responses (*yes/no*). Sum scores, referred to as ACE scores, range from 0 – 10 indicating the number of types of adverse childhood experiences, as opposed to the number or frequency of any specific adverse experiences.

The ACE questionnaire used in this study assesses 10 domains of adversity: 5 relate to maltreatment (psychological, physical, sexual abuse, and physical and emotional neglect) and 5 relate to household dysfunction (witnessing violence against mother; living with a household member that abused substances, was imprisoned, had a mental illness or attempted suicide; and the loss of a parent by death or divorce; Dong et al., 2004).

Although the ACE questionnaire is widely used and has provided strong predictive validity of negative outcomes, very few studies have been conducted to evaluate its psychometric properties (Dube et al., 2004). Ritacco and Suffla (2012) conducted such analyses using the ACE measure in South Africa. They found test-retest reliabilities with the kappa coefficients for each type of adverse childhood experience between .55 and .77.

Edwards and colleagues (2001) tested the convergent validity of the ACE questionnaire with previous self-reports of child sexual abuse. Results showed a positive and significant correlation between self-reports of abuse on the ACE questionnaire and previous medical records (Edwards et al., 2001). This study also demonstrated the reliability of adult retrospective reporting of childhood adverse events.

Reliability and validity of the ACE translated into German was assessed with 301 participants comprised of psychiatric inpatients, students, and control subjects from the general population (Wingenfeld et al., 2010). Wingenfeld and colleagues (2010) assessed convergent validity with the Childhood Trauma Questionnaire (CTQ; Bernstein et al 1994) and found these measures were highly correlated (r = .84, p = 0.001), indicating good construct validity.

***Adult adverse experiences*.** In order to determine exposure to adverse experience at different time periods, I adapted the format of the ACE questionnaire (Felitti et al., 1998) to concurrently evaluate two developmental periods. There were checkboxes next to each ACE question for participants to indicate whether they experienced that ACE category prior to age 18 and/or during/after age 18. Exposure to adverse experiences during/after age 18 was collected in attempt to control for traumatic exposure that did not occur in childhood. Dichotomous (yes/no) responses to experiences during/after age 18 of physical, sexual, and emotional abuse from the first three items of the ACE questionnaire (Felitti et al., 1998) were used to create a variable of adult adverse experiences (range 0 – 3). A sum score was used with adult adverse experiences to maintain the focus on the multiplicity of events. Only the ACE questions assessing emotional/verbal abuse, physical abuse, and sexual abuse were included as covariates, as the other ACE categories (e.g. emotional/physical neglect, witnessing domestic violence, impaired caregiver) are less applicable to adults 18 and older in college.

Outcome Variables.

***Posttraumatic symptoms*.** Posttraumatic symptoms were assessed using the Posttraumatic Checklist for DSM-5 (PCL-5; Weathers et al., 2013). The PCL-5 is a 20-item self-report questionnaire that assesses the 20 symptoms of PTSD. The PCL-5 is considered a gold standard measurement of posttraumatic symptomology when used as a structured clinical interview. The

self-report rating scale is 0-4 for each symptom. The PCL-5 yields total symptom severity scores. The range is 0 – 80, and a preliminary cut-point suggestion for clinical symptomology of 33. If a clinically significant number of symptoms is present in each cluster, participants have provisional PTSD diagnoses. The PCL has been validated against the Clinician Administered PTSD Screener (CAPS; Blake et al., 1990). The PCL-5 was adapted from previous versions of the checklist. It has been one of the most widely used self-report measures of PTSD (Blevins, Weathers, Davis, Witte, & Domino, 2015). In studies examining psychometric properties of the PCL-5 with trauma-exposed college studies, there was strong internal consistency (alpha = .94), test-retest reliability (*r* = .82) and convergent (*rs* = .74 - .85) and discriminant (*rs* = .31 – 60) validity and confirmatory factor analysis indicated adequate fit with the *DSM-5* four-factor model (Blevins et al., 2015).

***Depressive symptoms*.** The Patient Health Questionnaire (PHQ; Spitzer, Kroenke, Williams, & the Patient Health Questionnaire Primary Care Study Group, 1999) is a self-report questionnaire that assesses 8 disorders. The PHQ was adapted from the original Primary Care Evaluation of Mental Disorders (PRIME-MD; Spitzer et al., 1994). This measurement was developed to aid clinicians in primary care settings in diagnosing mood, anxiety, and somatoform disorders. Validation studies have shown good agreement between PHQ diagnoses and those of independent mental health professionals (Spitzer et al., 1999). PHQ diagnoses have been shown to be correlated with greater functional impairment, disability days, and health care use than those without diagnoses (Spitzer et al., 1999). Subsections of the PHQ may be used independently to assess each disorder.

One subsection, labeled the PHQ-9, is comprised of nine questions assessing frequency (0 = Not at all; 1 = Several days; 2 = More than half the days; 3 = Nearly every day) of

experiencing symptoms of depression in the last two weeks. Scores of the PHQ-9 were summed to yield a total score indicative of depressive symptoms (range 0 – 27). Scores of 5, 10, 15, and 20 represent cut-points for mild, moderate, and moderately severe, and severe depression respectively as derived from samples of primary care patients (Spitzer et al., 1994). PHQ-9 responses can also be scored to indicate provisional diagnoses based on *DSM-5* criteria. In this study, sum scores on the PHQ-9 were used as indicators of severity of depressive symptoms.

Within the original PHQ used in this study, there are seven questions related to the frequency (*0 = Not at all; 1 = Several days; 2 = More than half the days)* of anxiety symptoms experienced over the previous four weeks. Scores can be calculated to derive provisional diagnoses of a non-specified anxiety disorder. Given that this sample was not expected to have scores in the clinical range, sum scores were used as relative indicators of severity of anxious distress, although normative scores were not available for comparison with clinical or general samples.

***Maladaptive beliefs*.** The Posttraumatic Maladaptive Beliefs Scale (PMBS) is a self-report measure developed by Vogt, Shipherd, and Resick (2012) to measure maladaptive beliefs about current life circumstances that may occur after trauma. In contrast to other existing measures which assess beliefs directly related to a specific traumatic event, this measure assesses global perceptions about the world, self, and others. Items are rated using a 7-point Likert-type response scale, ranging from 1 (*not at all true for you*) to 7 (*completely true for you).* Eight of the 15 items are reverse-coded. A total or full score can be derived as a sum score of all responses.

Items also can be scored to yield three distinct subscale scores representing unique domains of beliefs: *Threat of Harm*, *Self-Worth and Judgment*, and *Reliability and Trustworthiness of Others*. *Threat of Harm* (TH) assesses extent to which participants perceive

the world is a dangerous or threatening place. *Self-Worth and Judgment* (SWJ) assesses the extent to which participants perceive their ability to manage the challenges of daily life. *Reliability and Trustworthiness of Others* (RTO) assesses the extent to which participants perceive others can be trusted in interpersonal relationships (Vogt et al., 2012). Each subscale is comprised of scores from five questions. Subscale scores are calculated from the sum of the responses in those domains and divided by five (i.e., the number of questions in each subscale). Higher scores on the PMBS indicate greater cognitive distortions (Vogt et al., 2012). In this study, subscale scores were used to examine each domain of maladaptive cognitions.

The PMBS was developed using items drawn from a pre-existing measure with evidence of high reliability and validity, the Personal Beliefs and Reaction Scale (PBRS; Mechanic & Resick, 1993), which was developed to address a broad range of beliefs regarding current life circumstances and beliefs related to a specific traumatic event. Vogt and colleagues (2012) computed classical test-oriented item and scale characteristics for this measure to ensure a content-saturated measure.

Internal consistency reliability was tested using 294 women with histories of interpersonal violence. The sample was normally distributed and yielded α of .82 for the PMBS full scale with item-total correlation values averaging .41 for all items. The Threat of Harm subscale had an internal consistency reliability rating of .76 with high item-total correlations ranging from .45 to .67. Self-Worth and Judgment had internal consistency reliability of .71 with item-total correlations from .42 to .53. The Reliability and Trustworthiness of Others scale had internal consistency reliability of .72 and item-total correlations ranging from .40 to .55. Correlations among the subscales ranged between r = .33 and .43 (Vogt et al., 2012).

Convergent validity for the PMBS was established in comparison to the psychometrically sound World Assumptions Scale (WAS; Janoff-Bulman, 1989), which measures general assumptions about the world. Significant correlations ($p < .05$) were found between the WAS *Benevolence of the World* subscale and the three subscales (from $r = -.32$ to $-.46$) and full score of PMBS ($r = -.52$). Scores were negatively correlated because high scores on the WAS indicate evidence of low maladaptive cognitions whereas high scores on the PMBS reflect high levels of maladaptive cognitions. Similar results were found correlating the WAS *Self-Worth* subscale and the three PMBS subscales (from $r = -.36$ to $-.69$) and full scale ($r = -.65$). Convergent validity was further established in comparison to the Fear of Intimacy Scale (FOI; Descutner & Thelen, 1991) where a positive correlation was found ($r = .29$ to $.51$ for PMBS subscales and .49 for the full scale), as well as the Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995; Blake et al., 1997) with scores between $r = .33$ and .41 correlating CAPS with PMBS subscales and .49 with the full measure ($p < .05$: Vogt et al. 2012).

Discriminant validity for the PMBS was established using the Quick Test (Ammons & Ammons, 1962). Raw IQ and PMBS were not significantly correlated with r values ranging from .02 to .05 among the full and subscale scores indicating no relationship between scores from these measurements. In comparison to the Schedule for Nonadaptive and Adaptive Personality Negative Temperament (Clark, 1993), which assess trait dimensions of personality disorders, correlations with PMBS ranged from modest ($r = .24$) to moderate ($r = .40$), providing further evidence for discriminant validity (Vogt et al., 2012).

To date, few other studies have utilized the PMBS (Fleming & Resick, 2016; Jones, 2016; Swartout, 2011). Similar to the convergent validity studies above, results of a study by Swartout with 476 female college students found a moderately strong correlation ($r = -.57$, $p <$

.001) between the PMBS and the WAS (Swartout, 2011). In a recent study of female adult literacy learners (Jones, 2016), an adapted version of the PMBS was administered before and after a literacy group. Jones (2016) did not directly report correlations with PMBS results, but identified themes of posttraumatic growth within the participants' stories. Fleming and Resick (2016) utilized the PMBS in their study of dissociation in female survivors of intimate partner violence. Results suggested significant indirect effects of cognitive distortions on the relations between current sexual aggression and trait dissociation, as well as on the relations between current psychological abuse/injury and PTSD-related dissociation (Fleming & Resick, 2016). The PMBS has thus far only been utilized with exclusively female samples.

Data Analysis

All analyses were conducted using Statistical Package for the Social Sciences, Version 22.0 (SPSS; IBM Corporation, 2013). To determine the sample size needed to detect a relation if one is present, a power analysis using G-Power 3.1.9.2 (Faul, Erdfelder, Buchner, & Lang, 2009) was conducted. An a priori effect size of .08 was determined based on prior findings where endorsement of exposure to abuse in childhood was related to negative mental health outcomes (e.g., O'Dougherty-Wright et al., 2009). This effect size of .08, power level of .95, number of predictors (2), and probability level of .05 was entered into a power analysis on an a priori basis. This calculation determined a sample size of 197 was needed. The sample size of 252 obtained exceeded the minimum requirement.

Assumption checking. Assumptions for conducting multiple linear regression were tested. Depression was the only variable with missing data; six cases (2%) were missing at least one response on the PHQ-9 and therefore depression scores were not calculated for those

individuals. Data appeared to be missing at random; therefore, no imputation techniques were used to accommodate missing data. No suppressor variables were found.

No univariate outliers were identified via histograms nor scatterplots. Bivariate scatterplots between predictor and outcome variables were also visually examined and no outliers were visibly notable. Additionally, with the use of a $p < .001$ criterion for Mahalanobis distance, no outliers among the cases were found. Bivariate scatterplots between the predictor and outcome variables also suggested linear relations, as further confirmed using LOESS curve estimates fitting 95% of the data as a visual guide.

As anticipated, most variables were not normally distributed (skewed right), as evidenced by their histograms with skewness and kurtosis statistics (each divided by their respective standard error values) exceeding the recommended levels of accepted normality. Non-normality was also evidenced in viewing normal probability plots of residuals for each variable.

Given that the variables were skewed right, the normality of each variable was explored after the following transformations: inverse [$1/(x+1)$], square root, and logarithmic [$\log10(x + 1)$]. Adding a value of one before performing the inverse and log transformations eliminated errors of division by zero. All variables became closest to normal based on visual assessment and skewness and kurtosis statistics when a square root transformation was applied. All outcome variables were within normal range (skewness < 2 and kurtosis < 4). Both predictor variables (childhood ACE and adult adverse experiences) became more normally distributed, but skewness and kurtosis variables remained outside of the preferred range. Multiple linear regression analyses performed with these transformed variables yielded the same results as non-transformed data. Therefore, results found using non-transformed data are presented, as it reduces the complications in interpreting the results.

Collinearity diagnostics indicated no cause for concern. The correlation between childhood ACEs and adult adverse experiences is $r = 0.40$. Tolerance and Variation Inflation Factors (VIF) of 1.0 indicate low multicollinearity. Durbin-Watson d = 1.84 indicates no autocorrelation between the two predictor variables. Lastly, bivariate scatterplot did not evidence homoscedasticity.

Additionally, demographic variables of age, college status classification, relationship status, employment status, and parental income were compared to the predictor and outcome variables to explore if potentially influential relations existed. Correlations ranged from absolute values of 0.005 to 0.204 and none were significant.

Analytic plan. Since the study aimed to examine the relation between posttraumatic outcomes and adverse experiences in childhood, responses indicative of traumatic events experienced at the age of 18 or older were controlled for during data analyses by entering them as covariates in the first step of the hierarchical regressions. The purpose of the first set of analyses was to examine if and how an increase in exposure to different types of adverse childhood experiences predicted greater symptomatic expression in this relatively high functioning sample.

In the first set of analyses, adult adverse experiences (range 0 – 3) were entered on the first step of a hierarchical linear regression with ACE score (i.e., number of trauma types endorsed prior to the age of 18) entered as the predictor variable on the second step and regressed on post-traumatic symptoms (i.e., symptoms of PTSD, depression) in two separate regression analyses. As explained above, total symptom severity scores were utilized to demonstrate symptom outcome as a continuous range, as opposed to discrete categorization of

disorders, since neither clinical levels nor many provisional diagnoses were expected for this sample.

A second set of analyses were conducted to explore the relations between ACEs and posttraumatic maladaptive cognitions, controlling for experiences at age 18 and beyond. In these analyses, adult adverse experiences were entered in the first step of a hierarchical linear regression with ACE score entered as the predictor variable on the second step and regressed on each subscale of the PMBS (i.e., *Threat of Harm, Self-Worth and Judgment*, and *Reliability of Trustworthiness of Others*) in three separate regression analyses.

Given that five separate analyses were conducted, overall model statistics were evaluated by an omnibus effect size criterion of $p < .01$. Independent contributions in each model were evaluated at the standard criterion of $p < .05$.

Results

Descriptive Statistics

Adverse Childhood Experiences. As expected, endorsement scores for types of trauma exposure in the sample, as assessed via the Adverse Childhood Experiences questionnaire (ACEs; Felitti et al., 1998), ranged from no experiences to many (i.e., 0 – 10) types of adverse experiences (see Table 1). The mean number of trauma types experienced was 1.69 (*SD* = 2.09) with a median score of 1. The modal response was 0 with 40.5% of participants (i.e., modal response) reporting no experiences of adversities in childhood. The majority of the sample (73.4%) endorsed experiencing fewer than three adverse experience categories as 32.9% endorsed exposure to only one or two adverse experience categories. In studies of highly traumatized populations (e.g., youth in out-of-home placements), clinically significant outcomes

have been generally associated with endorsement of 4 or more ACEs. In this college student sample, only 16.8% of participants reported exposure to 4 or more trauma types.

Overall, participants reported experiencing a diverse range of types of maltreatment (i.e., emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect) and/or household dysfunction (i.e., divorce, witnessing domestic violence, household member using alcohol or substances, experiencing mental illness, or been incarcerated). The most commonly endorsed adverse experience was emotional abuse (33.7% of the total sample), followed by parental divorce or separation (26.6%), and emotional neglect (23.4%). See Table 2 for frequency distributions. Approximately 17.9% of the sample endorsed experiencing physical abuse in childhood and 10.3% of participants endorsed experiencing sexual abuse before the age of 18.

Of the 59.5% of the sample who endorsed at least one traumatic event (n = 150), 74% endorsed at least one type of maltreatment experience and 73.3% experienced at least one category of household dysfunction. Given the high proportion of the sample who report no ACEs, frequency distributions were recalculated for the subset of participants who experienced at least one ACE category (see Table 2). Within this subset of the sample, 21.3% endorsed experiencing at least two types of maltreatment experiences and two types of household dysfunction. For participants who endorsed exposure to at least 4 ACEs, the most commonly endorsed categories were emotional abuse, emotional neglect, physical abuse, and parental divorce.

Table 1

Adverse Childhood Exposure (ACE) Score Distribution of Total Sample (N = 252)

ACE Score	*n*	Percent
0	102	40.5
1	49	19.4
2	34	13.5
3	25	9.9
4	14	5.6
5	12	4.8
6	5	2.0
7	4	1.6
8	5	2.0
9	1	0.4
10	1	0.4

Table 2

Frequency of Adverse Childhood Experiences, by ACE Type as a Function of Total ACE Score

Type of Adverse Childhood Exposure	Percent of Total Sample (*N* = 252)	Percent of Subsample with ≥ 1 ACE (*n* = 150)	Percent of Subsample with ≥ 4 ACEs (*n* = 42)
Maltreatment			
Emotional Abuse	33.7	56.7	88.1
Physical Abuse	17.9	30.0	66.7
Sexual Abuse	10.3	17.3	38.1
Emotional Neglect	23.4	39.3	78.6
Physical Neglect	5.2	8.7	28.6
Household Dysfunction			
Parental Divorce	26.6	44.7	64.3
Witness Domestic Violence	9.9	16.7	57.1
Caregiver Substance Abuse	16.7	28.0	52.4
Caregiver Mental Illness	19.0	32.0	52.4
Caregiver Imprisonment	6.0	10.0	28.6

Adult Adverse Experiences. The majority of the sample (83.7%) reported no exposure to adult adverse experiences of emotional, physical, and sexual abuse. Approximately 16.3% of the sample endorsed experiencing at least one adult adverse experience. The mean number of adult adverse experiences (range 0-3) was 0.23 (*SD* = 0.60). Only 15.1% of the sample endorsed

exposure to emotional abuse after becoming 18 years old, with 4.4% of the sample endorsing physical abuse, and 3.6% of the sample endorsing sexual abuse.

Similar to previous research, this sample demonstrated a moderate correlation (r = .40) between childhood ACE score and experiences of emotional, physical, and sexual abuse during or after the age of 18. Of the subset of the women who endorsed exposure to at least one ACE (n = 150), 24.7% endorsed exposure to at least one of the adult adverse experiences. Only 4% of participants who reported no ACEs endorsed experiencing any adverse experiences since the age of 18. Results of independent samples t-test and linear regression analyses, $t(250) = 3.37$, p = .001, indicate that individuals who experienced at least one ACE were significantly more likely to experience adult adverse events. Table 3 presents the distribution of number of types of adult adverse experiences and Table 4 shows the frequency of endorsement for each type of adult adverse experience.

Table 3

Adult Adverse Experiences Score Distribution

Number of Adult Adverse Experiences	Percent of Total Sample (N = 252)	Percent of Subsample with 0 ACEs (n = 102)	Percent of Subsample with ≥ 1 ACE (n = 113)	Percent of Subsample with ≥ 4 ACEs (n = 42)
0	83.7	96.1	75.3	57.1
1	11.9	2.0	18.7	23.8
2	2.0	0.0	3.3	11.9
3	2.4	2.0	2.7	7.1

Adult adverse experiences included in count: physical abuse, sexual abuse, emotional abuse

Table 4

Frequency of Adult Adverse Experiences, by Type

	Percent of Total Sample (N = 252)	Percent of Subsample with 0 ACEs (n = 102)	Percent of Subsample with ≥ 1 ACE (n = 150)
Emotional Abuse	15.1	3.9	22.7
Physical Abuse	4.4	2.0	6.0
Sexual Abuse	3.6	2.0	4.7

Depressive symptoms. The majority of the sample reported relatively low levels of depressive symptoms via the PHQ-9 (sum score M = 5.92, SD = 5.22 [Range 0 – 27]). Specifically, 77.4% of the total sample indicated mild or no depressive symptoms (i.e., total score < 10), 13.9% reported Moderate symptoms (i.e., sum score 10 – 14), 3.6% Moderately Severe (i.e., sum score 15 – 19), and 2.8% Severe (i.e., sum score ≥ 20). According to *DSM-5* criteria 9.9% of the sample met the diagnostic threshold for Major Depressive Disorder (i.e., a total of at least 5 depressive symptoms including depressed mood and/or loss of interest or pleasure) and another 5.2% indicated symptoms of an Unspecified Depressive Disorder (i.e., between 2-4 depressive symptoms, including depressed mood and/or loss of interest or pleasure).

The most frequently endorsed depressive symptoms, occurring at least more than half the days, were feeling tired or having low energy (33.7% of the total sample), sleeping difficulties (e.g., too much or too little; 26.6%), and recent change in appetite (20.5%; see Table 4). Approximately 9.1% of the total sample indicated recent thoughts they would be better off dead or thoughts of hurting themselves. Also of note, more than 10% of the sample endorsed feeling down and depressed much or most of the time, and having little interest or pleasure in doing things. See Table 5 for frequency of elevated symptoms (endorsement rates of scores above 2) of depression as a function of ACE score.

Of the subset of the sample who endorsed at least one traumatic event (n = 148), the average PHQ-9 score was 6.84 (SD = 5.78), which is indicative of Mild depressive symptoms. However, within the subsample of individuals who reported no exposure to ACEs (n = 98), the average PHQ-9 score was 4.52 (SD = 5.79), which is below the threshold for Mild depressive symptoms (score 6 – 10). Results of an independent samples t-test, $t(244) = -3.79$, $p < .001$, indicate significant differences between scores for those who reported no ACEs and those who endorsed at least one ACE. Similarly, for individuals with at least one ACE, the frequency of endorsing feeling down and depressed much or most of the time, and having little interest or pleasure in doing things, was higher than the total sample (11.2%) at 13.3%.

The average score for those who endorsed at least 4 ACEs was 9.76 (SD = 6.25), which approaches the cut-off score (10) for Moderate depressive symptoms. Cronbach's alpha of .88 indicates strong inter-item reliability for the 9-item measure.

Table 5

Depression Symptoms: Frequency of Elevated[a] Symptoms on the PHQ-9

Depressive Symptoms	Percent of Total Sample (N = 252)	Percent of Subsample with 0 ACEs (n = 102)	Percent of Subsample with ≥ 1 ACE (n = 150)
Little interest or pleasure in doing things	11.2	7.9	13.3
Feeling down, depressed, or hopeless	11.5	5.9	15.3
Sleeping too much/too little	26.6	16.7	33.3
Feeling tired or having little energy	33.7	24.5	40.0
Poor appetite or overeating	20.5	13.0	25.5
Feeling bad about self	17.6	12.9	20.8
Trouble concentrating	16.3	11.8	19.3
Moving slowly or overly fidgety/restless	5.2	4.9	5.3
Thoughts of suicide or self-harm	9.1	3.0	7.3

[a]Elevated = Endorsed experiencing the symptom at least More than Half the Days

Posttraumatic symptoms. Overall, this sample did not report clinical levels of posttraumatic symptoms based on PCL-5 scores. Within a possible range of 0 – 80, average sum scores were 19.79 (*SD* = 15.24). The most commonly endorsed symptoms included trouble falling or staying asleep; difficulty concentrating (both of which resemble symptoms of depression); and repeated, unwanted, or disturbing memories; avoiding memories, thoughts, or feelings; and feeling upset by reminders, which most closely relate to symptoms of posttraumatic stress disorder. See Table 6 for frequency of elevated, scores above 2, symptoms of posttraumatic distress as a function of ACE score. The upper quartile score of 29 indicates non-clinical symptoms of PTSD for the majority of the sample.

For the subset of the sample who endorsed at least one ACE, the mean score was 22.95 (*SD* = 15.88). These scores are significantly different, $t(241.5), = -4.27$, $p < .001$, Cohen's $d = 0.54$, from the subset of the sample who denied exposure to any ACEs (*M* = 15.13; *SD* = 12.99). Cronbach's alpha for this sample was .94 indicating strong inter-item reliability across the 20 items.

Table 6

PTSD Symptoms: Frequency of Elevated[a] Symptoms on the PCL-5

	Percentage of Total Sample (N = 252)	Percentage of Subsample with 0 ACEs (n = 102)	Percentage of Subsample with ≥ 1 ACEs (n = 150)
Cluster B: Intrusive Thoughts			
Repeated memories	44.5	33.7	51.0
Repeated dreams	25.0	15.7	31.3
Flashbacks/Reliving	27.8	17.6	34.7
Upset by triggers	37.5	26.7	44.7
Physical reactions to triggers	22.2	12.7	28.7
Cluster C: Avoidance			
Avoid memories, thoughts, feelings	38.8	27.7	46.3
Avoid external reminders	33.3	24.5	39.3
Cluster D: Negative alterations in cognition/mood			
Trouble remembering event	21.9	15.7	26.2
Strong negative beliefs	24.6	22.5	26.0
Blaming self	32.7	24.5	38.3
Respond with fear, horror, anger	27.4	15.7	36.0
Loss of interest	21.4	13.7	26.7
Feeling distant	33.5	29.4	36.2
Dysthymia (Lack of positive feelings)	24.7	16.8	30.0
Cluster E: Alterations in arousal and reactivity			
Irritable behavior	24.6	14.7	31.3
Too many risks	10.3	6.9	12.7
Hypervigilant (Watchful/on guard)	25.4	24.5	26.0
Hyperarousal (Jumpy/easily startled)	22.6	17.6	26.0
Difficulty concentrating	45.2	26.3	51.3
Trouble falling/staying asleep	45.2	26.3	51.3

[a]Elevated = Score above 2 (Moderate) on scale of 0 – 4

Posttraumatic maladaptive beliefs. In general, the overall sample reported relatively low levels of maladaptive beliefs about the world, others, and themselves, indicating neutral beliefs (i.e., neither negative nor positive views) on the Posttraumatic Maladaptive Beliefs Scale (Vogt et al., 2012). Within a possible range of 7 – 105, the mean total sum score for the PMBS in

this total group is 39.00 (*SD* 11.94). Given that the midpoint of possible total scores is 49, a mean score lower than the midpoint indicates beliefs are overall more positive than negative.

Patterns of mean scores were similar across all 3 subscales, with mild endorsement (higher endorsement indicating more negative beliefs) of most items on a Likert scale of 1 – 7 [*M Threat of Harm* = 2.69 (*SD* = 0.95), *M Reliability/Trustworthiness of Others* = 2.61 (*SD* = 1.03), *M Self Worth and Judgment* = 2.5 (*SD* = 0.99)]. Beliefs with stronger endorsement were related to the dangerousness of the world (*M* = 4.46, *SD* = 1.48) and the inability to comfort oneself when upset (*M* = 3.77, *SD* = 4.00), whereas beliefs with the weakest endorsement were related to the inability to protect oneself (*M* = 1.65, *SD* = 1.00) and not feeling safe anywhere (*M* = 1.68, *SD* = 1.00). Overall, participants' beliefs are within an adaptive range.

Mean scores were significantly different between participants who endorsed no ACES and those who endorsed one or more ACEs for two subscales: *Reliability & Trustworthiness of Others, t*(250) = -3.22, *p* = .001, and *Self-Worth & Judgment, t*(242) = -2.41, *p* = .017, but not for *Threat of Harm* (*p* = .139). For *Threat of Harm,* the mean for participants who reported no ACEs was 2.58 (*SD* = 0.86) whereas participants with at least one ACE was 2.76 (*SD* = 1.0). Comparatively, mean scores for RTO and SWJ for participants who endorsed no ACEs were 2.36 (*SD* = 0.92) and 2.32 (*SD* = 0.86) respectively and mean scores for participants with at least one ACE were 2.78 (*SD* = 1.07) and 2.62 (*SD* = 1.06) respectively.

Reliability statistics for the PMBS were conducted. Cronbach's alpha for the full scale with this sample was .85. This is comparable to α = .82 reported by Vogt and colleagues (2012) in the development study. Scale statistics were similarly comparable. Cronbach's alpha for *Threat of Harm, Reliability and Trustworthiness of Others,* and *Self-Worth and Judgment* were .70, .77, and .77 respectively, as compared to .76, .72, and .71 as found with the original sample.

See Table 7 for a full correlation matrix of all predictor and outcome variables.

Table 7

Correlation Matrix of Predictor and Outcome Variables

Measure	1	2	3	4	5	6	7
1. ACE	1.00						
2. Adult adverse	.40**	1.00					
3. PHQ-9	.40**	.21**	1.00				
4. PCL-5	.46**	.28**	.66**	1.00			
5. PMBS-TH	.22**	.06	.44**	.50**	1.00		
6. PMBS-RTO	.29**	.17**	.26**	.34**	.48**	1.00	
7. PMBS-SWJ	.26**	.13*	.51**	.55**	.51**	.42**	1.00

*$p < .05$ **$p < .01$

Note: ACE = Adverse Childhood Experiences; PHQ-9 = Patient Health Questionnaire – 9 (Depression scores); PCL-5 = Posttraumatic Checklist for DSM-5 (PTSD symptoms); TH = Threat of Harm subscale on PMBS; RTO = Reliability & Trustworthiness of Others subscale on PMBS; SWJ = Self-Worth & Judgment subscale on PMBS

Testing and expanding dose-response theory with young adult sample

Depressive symptoms. ACEs before age 18 and adult averse experiences (physical, sexual, and emotional abuse) during/after 18 were both independently correlated with current depression scores (PHQ-9) at $r = .40$ and $r = .21$, respectively. In the first step of the hierarchical regression, adult adverse experiences explain approximately 4.5% of the variance of depression: $F(1, 244) = 11.48$, $p = .001$, 95% confidence interval (CI) for B [0.80 – 3.01], $R^2 = .045$. In step 2, the full model including adult adverse experiences and childhood ACE score, $F(1,243) = 23.24$, $p < .001$, 95% CI for B [0.62 – 1.26], $R^2 = .16$. R^2-change = .116 indicates that the addition of childhood ACE score independently explains 11.6% of the variance in depression scores. Table 8 displays the unstandardized regression coefficients (B), t-statistics, and semi-partial correlations (sr_1^2), R^2 for each step of the model.

Posttraumatic disorder symptoms. The full model, including ACEs and adult adverse experiences, yielded $R^2 = .17$, F(1, 243) = 23.24, $p < .001$, R^2 value of .12. PTSD symptoms (PCL-5 sum scores) were correlated with childhood ACEs at $r = .46$ and with adult adverse experiences at $r = .28$. In step one of the hierarchical regression, with PTSD symptoms regressed on adult adverse experiences, $F(1, 250) = 20.88$, $p < .001$, $R^2 = .08$. After controlling for adult adverse experiences, childhood ACE scores accounted for an additional 14.5% of variance. The full model, $F(1, 249) = 35.51$, $p < .001$, $R^2 = .22$ accounts for 22% of the total variance of PTSD symptoms. See Table 8 for the unstandardized regression coefficients (*B*), *t*-statistics, and semi-partial correlations (sr_1^2), R^2 for each step of the model.

Table 8

Hierarchical Regression Analyses Predicting Depression and PTSD from ACE Score and Adult Adverse Experiences

	Depression (PHQ-9 Scores)				PTSD (PCL-5 Scores)			
	β	*t*	sr^2	R^2	β	*t*	sr^2	R^2
Step 1				.045				.077
Adult Adverse	.21	3.39**	.045		.28	4.57***	.08	
Step 2				.161				.222
Adult Adverse	.42	0.72	< .01		.11	1.80	.01	
ACE Score	.94	5.79***	.116		.42	6.81***	.15	

*$p < .05$, **$p < .01$, ***$p < .001$

Patterns of maladaptive cognitions

Each domain of maladaptive cognitions was entered into separate regression analyses. Adult adverse experiences were correlated with PMBS *Threat of Harm* at $r = .06$, while childhood ACE score and *Threat of Harm* were correlated at $r = .22$. Step one of the model with *Threat of Harm* regressed on adult experienced was not significant: $F(1, 250) = .819$, $p = .366$, $R^2 = .003$. The full model including both adult adverse experiences and childhood ACEs yielded

$F(1, 249) = 6.55$, $p = .002$, $R^2 = .05$. The R^2-change of .047 indicates an additional 4.7% of variance was explained by the independent contribution of childhood ACEs. Table 9 displays the unstandardized regression coefficients (*B*), *t*-statistics, and semi-partial correlations (sr_1^2), R^2 for each step of the model.

Childhood and adult adverse experiences were correlated with PMBS *Reliability and Trustworthiness of Others* with $r = .17$ and .29, respectively. After step 1, with adult adverse experiences in the equation, $R^2 = .03$, $F(1, 250) = 7.46$, $p = .007$. After step 2, with childhood ACE score added to the prediction of *Reliability and Trustworthiness of Others*, $R^2 = .087$, $F(1, 249) = 11.88$, $p < .001$. Addition of childhood ACE score to the equation with adult adverse experiences resulted in a significant increment of .058 in R^2 (See Table 9).

Self-Worth and Judgment subscale scores on the PMBS were correlated with adult adverse experiences at $r = .13$ and with childhood ACEs at $r = .26$. The first step of the model examining the independent contribution of adult adverse experiences was not significant: $F(1, 250) = 4.43$, $p = .036$. The full model, including adult adverse experiences and childhood ACEs was significant: $F(1, 249) = 8.86$, $p < .001$, $R^2 = .06$. R^2-change of .059 demonstrates that childhood ACE score explained an additional 5.9% of variance in *Self-Worth and Judgment* score (See Table 9).

Further exploration of relations with the total PMBS scores were also conducted, with adult adverse experiences entered on the first step and ACE score entered into the second step of a linear regression with the total PMBS score as the outcome variable. The total PMBS score was correlated with adult adverse experiences at $r = .15$ and with ACEs at $r = .32$. The first step of the model examining the independent contribution of adult adverse experiences was significant, $F(1, 250) = 5.83$, $p = .016$ and accounted for 2.3% of the total variance of PMBS

total score. After adding ACE score to the model, the relation between adult adverse experiences and total PMBS score was no longer significant (p = .69). The full model including adult adverse experiences and ACEs was significant: $F(1, 249) = 22.06$, $p < .001$. R^2-change of .08 indicates that ACEs accounted for 8% of the total variance of PMBS total score with both predictors accounting for 10.2% of the variance.

Table 9

Hierarchical Regression Analyses Predicting PMBS Subscale Scores from ACE Score and Adult Adverse Experiences

	Threat of Harm				Reliability & Trustworthiness of Others				Self-Worth & Judgment			
	β	*t*	sr^2	R^2	β	*t*	sr^2	R^2	β	*t*	sr^2	R^2
Step 1				.003				.029				.017
Adult Adverse	.06	0.91	<.01		.17	2.73**	.03		.13	2.11*	.02	
Step 2				.050				.087				.066
Adult Adverse	-.04	-0.57	<.01		.06	0.96	<.01		.03	0.51	< .01	
ACE Score	.24	3.50**	.05		.26	3.98***	.06		.24	3.62***	.05	

*p < .05, **p < .01, ***p < .001

Exploratory Analyses

Anxiety symptoms. Additional analyses were conducted to explore post-hoc hypotheses. The first was an exploration of symptoms of anxiety as an outcome variable. This variable was missing data for several participants, yielding $n = 191$ in these analyses. The original PHQ does not yield norm-based severity scores for anxiety. Sum scores for seven anxiety-related questions range from 0 – 14. The mean sum score for this sample was 5.6 ($SD = 5.0$). Overall, this sample indicated mild symptoms of anxiety (i.e., experiencing some symptoms, several days in the last 4 weeks). The most commonly endorsed symptoms were related to feeling nervous, on edge, or worrying, and feeling annoyed or irritable. Approximately 7.6% of the sample endorsed experiencing at least 5 (of the 7 listed) symptoms of anxiety more than half the days over the last 4 weeks, which would be consistent with a provisional diagnosis of an anxiety-related disorder.

Within the subset of the sample that endorsed exposure to at least one ACE, the mean anxiety score was 6.07 ($SD = 2.83$). This was significantly different, $t(189) = -2.65$, $p = .009$, from individuals who reported no ACEs ($M = 4.96$; $SD = 2.82$).

Hierarchical linear regression was performed with adult adverse experiences entered as a predictor on the first step, ACE score entered on the second step, and anxiety sum score as the outcome variable. Symptoms of anxiety were correlated with adult adverse experiences at $r = .11$ and with childhood ACEs at $r = 0.28$. The first step of the model examining the independent contribution of adult adverse experiences was not significant: $F(1, 189) = 2.09$, $p = .15$. The full model, including adult adverse experiences and adverse childhood experiences was significant, $F(1, 188) = 13.51$, $p < .001$, $R^2 = .08$. R^2-change of .07 indicates that childhood ACE score independently explains approximately 7% of variance in symptoms of anxiety.

Cognitions as mediators. Cognitive variables have been explored in previous studies (e.g., O'Dougherty-Wright et al., 2009; Owens & Chard, 2001) as mediators of other negative outcomes (e.g., PTSD, depression). All three domains of PMBS were entered into a mediation model (model 4) between ACEs and each other outcome variable using Hayes' PROCESS macro version 2.16 for SPSS (Hayes, 2013) with bootstrapping of 1000.

In this sample, a model including all three subscales of maladaptive cognitions as mediators between childhood ACEs and PTSD symptoms was significant, $F(4, 247) = 53.54$, $p < .001$, $R^2 = .46$. As previously demonstrated, ACE score was a significant predictor of each PMBS domain. Both *Threat of Harm* ($b = 0.44$, bootstrapped 95% CI [0.18, 0.90]) and *Self-Worth and Judgment* ($b = 0.64$, bootstrapped 95% CI [0.26, 1.18]) were significant partial mediators of this relation. *Reliability and Trustworthiness of Others* ($b = -0.07$; bootstrapped 95% CI [-0.36, 0.20]) was not a significant mediator between ACEs and PTSD. A direct effect of 2.34, $t(251) = 6.51$, $p < .001$, remained significant between ACEs and PTSD symptoms.

Similar results were obtained when the three maladaptive cognition domains were entered as mediators in a model with ACEs and depressive symptoms, $F(4, 241) = 35.34$, $p < .0001$, $R^2 = .37$. The subscales of *Threat of Harm* ($b = 0.13$; bootstrapped 95% CI [0.04, 0.25]) and *Self-Worth and Judgment* ($b = 0.22$; bootstrapped 95% CI [0.10, 0.42]) partially mediated the relation between ACEs and depressive symptoms, whereas *Reliability and Trustworthiness of Others* ($b = -0.06$; bootstrapped 95% CI [-0.16, 0.02]) did not significantly mediate the relation. A direct effect of 0.70, $t(245) = 5.21$, $p < .001$, remained significant between ACEs and symptoms of depression.

Elevated ACEs. The seven participants who endorsed experiencing 8 or more ACEs are statistically outliers because their ACE score is greater more than three standard deviations from

the mean ACE score of 1.69 (SD = 2.09). However, these seven individuals were included in analyses to capture the full range of exposure to adverse childhood experiences in this sample. Exploratory analyses demonstrated similar results when these seven participants were removed. However, relations between childhood ACEs and Self-Worth and Judgment notably changed. Without outliers included, the correlation between these variables increased and regression analyses indicated ACEs accounted for a larger percentage of variance in this maladaptive cognition. This finding suggests that the removed participants endorsed less maladaptive beliefs, despite their higher number of ACEs. Further investigation on the relatively small subset of high-functioning emerging adult populations is warranted to understand those participants' scores.

Discussion

Results of data analyses supported both hypotheses. First, symptoms of PTSD and depression were related to adverse childhood experiences (ACEs), after controlling for adult adverse experiences, in a dose-response pattern in this relatively high-functioning young adult sample of female college students. Second, maladaptive beliefs were also related to ACEs, after accounting for the minimal impact of adult adverse experiences, in a similar dose-response pattern.

Testing and expanding dose-response theory with a young adult sample

The first hypothesis fills a gap in and extends the literature by adding much needed data on adverse childhood experiences in college students (i.e., a relatively high functioning young adult sample). Many studies have explored the impact of adverse experiences with highly traumatized and maltreated samples of children (e.g., youth in foster care; Greeson et al., 2013; Pynoos et al., 2008), general middle-aged adult outpatient health outcome samples (e.g., Dong et al., 2001; Felitti et al., 1998) and clinical adult samples (e.g., female survivors of rape, treatment-

seeking samples; e.g., Cloitre et al., 2009; Resick & Schnicke, 1992). The few studies that assessed traumatic exposure in college samples either examined individual categories of trauma exposure (Runtz, 2002) or broadly assessed exposure across the lifespan and included non-interpersonal traumatic exposure (Rutter, Weatherill, Krill, Orazem, & Taft, 2013; Anders, Frazier, & Shallcross, 2012; Flood, McDevitt-Murphy, Weathers, Eakin, & Benson, 2009), and reported on physical health outcomes. Khrapatina (2016) explored ACEs within a college student sample, but focused exclusively on physical health outcomes. The present findings demonstrate that in this sample of relatively high functioning emerging adults, those who endorsed adverse childhood experiences also endorse negative psychological outcomes, therefore establishing evidence that a relation between ACEs and post-traumatic outcomes exists within a young adult population.

The relations between ACE score and other outcome variables were linear. This finding demonstrates that ACEs and outcomes are related in a dose-response, stepwise pattern. Therefore, there is an increase in the severity of the outcome variable (i.e., depression, PTSD) for each additional ACE item endorsed.

Within this sample, reporting rates of traumatic exposure were similar to national averages from community samples, as reported in retrospective reports in adult community samples (e.g., Anda & Brown, 2010; Edwards et al., 2003). Almost half (40.5%) of the respondents in this sample reported they had experienced no adverse childhood events, a finding that is similar to other ACE studies. In a recent study examining ACEs and health outcomes in college students, (Khrapatina, 2016), approximately 25% of the sample reported no exposure to any ACE and another 23% indicated only one ACE experience. Anda and Brown (2010) found

approximately two-thirds of their adult sample retrospectively reported experiencing at least one ACE, which is similar to the almost 60% endorsement rate in this sample.

Although not a primary investigatory aim of this study, rates of reported experience by type were also similar to those found in previous ACE studies. For example, Edwards and colleagues (2003) found that approximately 25% of women endorsed experiencing sexual abuse, 20% endorsed physical abuse, and 15% endorsed witnessing maternal battering before age 18, as compared to approximately 10%, 18%, and 10% respectively in this sample. The lower rate of endorsement of sexual assault in this sample may be attributable to stigma perceived by the young adults in this sample as compared to the potentially more developmentally mature adult respondents for Edwards and colleagues (2003), related to sample characteristics of their study, age cohort differences, or perhaps lower rates of incidents found in this study are influenced by a cultural increase in public attention to child maltreatment.

Endorsement rates for adult adverse experiences were also similar to rates reported from a nationally representative college sample (American College Health Association [ACHA], 2016), as well as a recent campus-wide ACHA representative sample from the University of Arkansas (UA; ACHA, 2014). These samples included both males and females and the distribution of respondents in each academic year was representative of the proportion of undergraduate and graduate students. Approximately 3% of the UA sample endorsed experiencing physical assault, and 3% endorsed attempted sexual penetration in the last 12 months, which is comparable to the national college sample endorsement of 2.7% and 2.4% respectively. Comparatively, 4.4% of participants in the current sample reported experiencing physical assault and 3.6% endorsed experiencing sexual abuse since the age of 18. In this study, participants were asked about adult adverse experiences that occurred since their 18th birthday

and participant age range varied from 18 – 39 years (M_{age} = 19.2; *SD* = 2.0); the assessment range was broader than the last 12 months.

Given the large percentage of this sample who reported no exposure to ACEs in this sample, it was unsurprising that the total sample mean scores on outcome measures were not in the clinically significant range. Outcome variables statistics were also comparable to those reported in the national and locally representative samples (ACHA, 2016; ACHA, 2014). Only 10.3% of the University of Arkansas sample self-reported experiencing symptoms of depression in the last 2 weeks on the ACHA questionnaire (ACHA, 2014), as compared to 9.9% of this sample who met criterion for probable Major Depressive Disorder on the PHQ-9. Approximately 32% of participants in the national sample (ACHA, 2016) and 28% of the UA sample reported sleep problems (ACHA, 2014), whereas approximately 27% of this sample indicated sleeping too much or too little. PTSD symptoms and cognitive variables were not assessed in the ACHA studies.

Results of the first set of analyses also demonstrated the importance of household context. The utilization of ACEs, a broader conceptualization of traumatic experiences, with this college sample adds to the literature by demonstrating that exposure to experiences of household dysfunction (e.g., impaired caregiver) can have lasting effects beyond childhood. This expands on previous findings (e.g., Briggs et al., 2012; Greeson et al., 2013), which have implicated the negative impact of caregiver impairment, such as substance use, and can lead to increased risk for maltreatment, potential neglect, and therefore detrimental outcome in youth. Even though the current sample reported lower rates of exposure to household dysfunction, changes in young adult internalizing variables (e.g., depression, cognitive patterns) were still present across various level of ACEs. Therefore the moderate correlations between ACE exposure and mental health

outcomes support the notion that childhood ACEs are impactful even in small doses, as approximately 40% of the sample reported no exposure to any ACEs.

Patterns of maladaptive cognitions

More importantly, the second hypothesis was supported: maladaptive cognitions increase linearly in a dose-response pattern to increases in exposure to adverse childhood experiences. All three subscales of maladaptive beliefs (*Threat of Harm, Reliability & Trustworthiness of Others,* and *Self-Worth & Judgment)* were significantly related to endorsement of childhood ACEs. These findings were statistically significant ($p < .01$) even after controlling for any influence from adult adverse experiences. This suggests that exposure to multiple adverse childhood experiences may be related to the development of maladaptive schema related to several domains, including the world, others and oneself. These same patterns were found with the total PMBS score, demonstrating that adverse experiences are also related to overall levels of maladaptive cognitions.

This set of findings is particularly meaningful as it contributes to the literature in several ways. First, it indicates that maladaptive beliefs develop in a similar, linear pattern to the development of other negative outcomes that are commonly explored as post-traumatic outcomes (e.g., PTSD, depression). The similarity between development patterns of maladaptive cognitions and other PTSD symptoms supports the recent addition of cognitive distortions to the theory and measurement of PTSD symptom patterns in the *DSM-5* (APA, 2013).

Second, the use of maladaptive cognitions as an outcome variable in analyses is relatively unique, as many studies have previously utilized maladaptive cognitions as mediator variables to explain rates of PTSD (e.g., O'Dougherty-Wright, et al., 2009; Owens & Chard, 2001). This exploration of the direct relation between ACE exposure and maladaptive cognitive beliefs

indicates that young adults' global attributes and views of the world may be susceptible to influence from adverse childhood experiences. Given that other studies (e.g., Foa & Rauch, 2004; Owens & Chard, 2001) have demonstrated the important impact of cognitions, such as their relation to decreases in PTSD symptoms (e.g., physiological arousal, hypervigilance) across treatment, it is especially important to consider the factors, such as adverse childhood experiences, which may influence such beliefs.

Third, the utilization of the PMBS measure (Vogt et al., 2012) is important as it assesses a global perspective of trauma-related cognitions, as opposed to previous measures (e.g., PTCI), which confound both specific and global measurements of trauma. This study adds to the small, yet growing number of studies (e.g., Fleming & Resick, 2016) that used the PMBS with female samples. Having found strong correlations between PMBS subscale scores, ACEs, and other outcome variables (PTSD and depression symptoms) supports its utilization and has the added benefit of being brief, with its 15-question format, which increases ease of administration and potentially increases the range of ideal settings for assessment.

Interestingly, relations between PTSD symptoms and maladaptive beliefs were stronger in this sample than the original sample used in the development of the PMBS measure (Vogt et al., 2012). In the initial development studies of the PMBS (Vogt et al., 2012), all three domains were correlated with PTSD symptoms as assessed by the clinician administered PTSD scale (CAPS-5; Weathers et al., 2013). PTSD symptoms were correlated with *Threat of Harm* at r = .46, *Reliability & Trustworthiness of Others* at r = .18, and *Self-Worth & Judgment* at r = .27. Correlations in this study with PTSD symptoms (PCL-5) and ACEs, which includes elements of household dysfunction in the context of childhood, noted even stronger relations between variables. In this sample, PTSD symptoms were correlated to *Threat of* Harm at r = .50,

Reliability & Trustworthiness of Others at $r = .34$, and *Self-Worth & Judgment* at $r = .55$. These findings suggest an added benefit of assessing this broader range of adverse childhood experiences that includes household dysfunction.

Although the primary aim of the study was to explore the relations of common post-traumatic distress symptoms with adverse childhood experiences, it was important to consider and control for experiences that occurred after childhood and adolescence. By controlling for young adult experiences of physical, sexual, and emotional abuse, the unique contribution of ACEs could be explored. *Threat of Harm* scores were not independently related to adult adverse experiences, although scores in this domain were related to endorsement of exposure to adverse childhood experiences. This suggests that this domain of beliefs in young adulthood are not related to exposure to experiences since age 18. Given the low incident rates of adult adverse experiences, further investigations with a larger sample would be needed to draw conclusions about the potential impact of these young adult experiences.

In the first step of analyses, considering the influence of adult adverse experiences alone, significant relations were shown with *Reliability & Trustworthiness of Others* and *Self-Worth & Judgment.* However, after adding ACEs, neither relation of posttraumatic symptoms with adult adverse experiences remained significant. These findings demonstrate that it was the adverse childhood experiences that accounted for differences in levels of maladaptive cognitions. Additionally, it was rare that a participant endorsed an adult adverse experience without endorsing adverse childhood experiences (4% of those reporting no ACEs). Therefore, adult adverse experiences likely served to confirm the beliefs developed in childhood.

Results were consistent with the hypotheses and support existing findings in the literature that adverse childhood experiences (ACEs) account for a larger percentage of variance in

posttraumatic outcomes than adult adverse experiences (Cloitre et al., 2009; Gobin et al., 2013). A previous study comparing various forms of interpersonal violence found experiences of interpersonal violence in adulthood to mediate the association between childhood physical abuse and adult PTSD (Becker, Stuewig, & McCloskey, 2010). Further analyses with the current sample are warranted to explore the nature of these relations. Results of the current study demonstrated that childhood ACEs significantly predict changes in posttraumatic outcomes, independent of the contribution of adult adverse experiences of emotional, physical, and sexual abuse.

Sample characteristics

Results of this study should be interpreted in context. Primarily, some sample characteristics are important to note. The sample was demographically representative of the University of Arkansas student body: For example, 85.3% of the current sample self-identified as being at least part White/Caucasian as compared to 82.6% who identified as White in the 2014 University of Arkansas sample (ACHA, 2014). This number is also in line with University of Arkansas enrollment statistics of all enrollees in Fall 2016 (University of Arkansas Office of Institutional Research and Assessment, 2016) where 74.8% only identified as being Caucasian.

The age of the current sample ($M_{age} = 19.2$) was particularly influenced by the study criterion that limited participation to undergraduate students enrolled in General Psychology, who tend to be earlier in their undergraduate careers. University of Arkansas is a mid-Southern institution; therefore a sample from this population may not be generalizable to other undergraduate universities in the United States. Regardless, it is important to note that no demographic variables assessed as covariates in this study were found to significantly affect findings.

Exploratory Findings

This study utilized the original PHQ (Spitzer et al., 1999) in which anxiety-related questions do not yield standardized severity scores. Therefore, it was not possible to compare the results of anxious distress to population norms. Consequently, relations between ACEs and anxiety were examined as exploratory analyses. Results showed that increases in ACE scores yielded increases in symptoms of anxiety in the same linear dose-response pattern as noted between ACEs and increased severity of depressive symptoms.

Approximately 7.6% of this sample endorsed rates of anxiety consistent with a provisional diagnosis of an anxiety-related disorder, which is relatively lower than those found in a national survey of college students (NCHA, 2016). It was expected that these scores were also in the non-clinical range, given the academic level of the sample and scores on other outcome measures. However, within a national sample of voluntary participants, almost 20% of females self-reported receiving a diagnosis and/or treatment for an anxiety-related disorder in the prior 12 months, and 29% indicated experiencing overwhelming anxiety within the last two weeks (NCHA, 2016).

Statistically, participants who endorsed eight or more ACEs are outliers, in comparison to the majority of the sample. It is notable that these seven participants endorsed lower levels of maladaptive beliefs, despite their higher endorsement of ACEs. Given that these respondents comprise 2.7% of the total sample, broad conclusions cannot be drawn. Upon further investigation, the lower scores were related two three individual participants. Therefore, several factors related to individual variation may be possible, such as current or previous counseling or trauma treatment, protective factors during childhood, or perhaps response bias and denial from

these select participants. Further investigation with larger sample is warranted to explore outcomes for individuals who endorse high number of ACEs.

Limitations

As with most online studies, a brief description of the study was available to view online prior to providing consent to participate. Therefore, self-selection bias is possible such that individuals with more severe symptoms of post-traumatic distress (e.g., avoidance) opted to decline participation in a study that assesses adverse childhood experiences or respond defensively within the protocol.

Measurement. In this particular administration of survey questions, adverse experiences were simultaneously assessed for both the period of childhood (before age 18) and adulthood (since turning 18). However, this multiple checkbox administration could have yielded potentially misleading wording for item three in particular. This question asked, "Did an adult or person at least 5 years older than you ever touch or fondle you or have you touched their body in a sexual way?" This item could potentially be interpreted to indicate consensual sex with another adult after the participant was 18 years old. However, only 1% of the population endorsed this experience occurring after turning 18 years old. This rate of endorsement is consistent with expected rates for sexual assault (reported at 3% for the last 12 months from UA students in the ACHA sample [2014] sample). This contrasts with the much higher rates of adult consensual activity in college students (reported by 66% of UA students in the ACHA sample [2014]). Therefore, it is assumed that this question was interpreted as intended, to represent non-consensual sexual activity in adulthood. This suggests improvement in wording for assessment of adult maltreatment experiences in future administrations.

The design used in this study was correlational. Therefore, without a longitudinal or experimental design, no causal inferences could be drawn. Assessment of ACEs was also retrospective, which may be influence to memory biases. However, the reliability of retrospective reporting of ACEs has been demonstrated (Edwards et al., 2001). In future research, longitudinal and prospective studies with temporal precedence established would further demonstrate the reliability of these results.

Analysis. Some items in the ACE questionnaire are relatively subjective and therefore require participants to interpret their childhood environment. For example, item four states, "No one loved or supported me." This is not problematic for assessment of ACEs because with traumatic experiences, it is often the person's appraisal of the event or situation that contributes to thoughts and feelings about it (Cohen et al., 2006; Martin, Cromer, DePrince, & Freyd, 2013). However, the manner in which participants respond to ACE questions may also be similar to how they respond to questions related to maladaptive beliefs in the PMBS, such as "Other people can be genuinely loving toward me," given that both assess perceptions.

It is possible that verbal similarity in question-wording and cognitive bias influenced a correlation. No correlation between ACEs and PMBS items was above r = .30, which demonstrates a lack of multicollinearity between variables. It is theoretically and statistically impossible to determine from the results of this study if the variance accounted for is due to the similarity of question wording or influence of cognitive patterns (that is, if maladaptive cognitions influenced the way participants answered those particular ACE items, or if those ACE experiences contributed to development of those maladaptive cognitions).

Future Directions

Exploration of these initial relations between ACEs and outcome variables, with particular attention to maladaptive beliefs, was the primary intention of this first independent study. To continue my program of research with further studies, I would like to include assessment of domestic violence experiences (i.e., emotional abuse by a partner), which could be assessed as an additional type of adverse adult experience or an independent mediator variable. I would predict that exposure to domestic or intimate partner violence would be highly correlated with ACEs, as the other adult adverse experiences were, and therefore account for little independent variance in outcome variables. However, this is a question to be empirically tested.

Another potential moderator worth exploration in future studies may be other factors that influence outcome, such as resilience (e.g., access to a supportive adult). Although a child may have been exposed to toxic adult figures via household dysfunction, later outcomes may be influenced by positive, protective factors. Previous research has demonstrated resilience as a moderating factor between traumatic exposure and post-traumatic outcomes (Agaibi & Wilson, 2005; Wingo et al., 2010; Wrenn et al., 2011); however, I would like to explore if the variables interact similarly in this young adult, high functioning sample, and if resilience factors are similarly impactful in protection against development of maladaptive beliefs.

In this study, the ACE questionnaire was selected in contrast to other measures of common childhood maltreatment, for its breadth in assessing interpersonal traumatic experiences and maltreatment and capture the number of types of experiences. The ACE questionnaire enabled exploration of the impact of cumulative exposure to multiple domains of maltreatment and included elements of indirect exposure via household dysfunction. Future studies could also compare various trauma assessments (e.g., Life Events Checklist [LEC-5; Weathers et al., 2013]

in childhood, Juvenile Victimization Questionnaire [JVQ; Finkelhor et al., 2005]) and methods of measurement (e.g., frequency, perceived severity, appraisal, or betrayal) to each other to determine the differential impact of various forms of measurement of exposure to childhood trauma.

Similarly, participants were not asked to self-evaluate the impact of their adverse exposure in this study. Aims of this particular study were not to examine the impact of different trauma types nor compare exposures to suggest differential impact of different types of trauma. Future studies that seek to evaluate the impact of different types of events may benefit from surveying participants on their perceptions of which event(s) or the degree to which they led to the development of their beliefs.

Overall, results indicate that experiencing more types of adverse childhood experiences (i.e., domains of potentially traumatic experiences) yields increased severity of negative outcomes such as post-traumatic distress, depression, and maladaptive cognitions related to threat of harm, self-worth and judgment, and reliability and trustworthiness of others in a young adult college sample. These findings may suggest utilization of assessment of ACEs, as well as cognitions, in college student mental health clinics to inform treatment.

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Appendix

UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

February 5, 2016

MEMORANDUM

TO:	Ilana Berman Patricia Petretic
FROM:	Ro Windwalker IRB Coordinator
RE:	New Protocol Approval
IRB Protocol #:	15-12-406
Protocol Title:	*Relations Between Adverse Childhood Experiences and Current Maladaptive Beliefs in a College Sample*
Review Type:	☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB
Approved Project Period:	Start Date: 02/05/2016 Expiration Date: 02/04/2017

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (https://vpred.uark.edu/units/rscp/index.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 200 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or irb@uark.edu.

UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

April 11, 2016

MEMORANDUM

TO:	Ilana Berman Patricia Petretic
FROM:	Ro Windwalker IRB Coordinator
RE:	PROJECT MODIFICATION
IRB Protocol #:	15-12-406
Protocol Title:	*Relations Between Adverse Childhood Experiences and Current Maladaptive Beliefs in a College Sample*
Review Type:	☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB
Approved Project Period:	Start Date: 04/11/2016 Expiration Date: 02/04/2017

Your request to modify the referenced protocol has been approved by the IRB. **This protocol is currently approved for 400 total participants.** If you wish to make any further modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

Please note that this approval does not extend the Approved Project Period. Should you wish to extend your project beyond the current expiration date, you must submit a request for continuation using the UAF IRB form "Continuing Review for IRB Approved Projects." The request should be sent to the IRB Coordinator, 109 MLKG Building.

For protocols requiring FULL IRB review, please submit your request at least one month prior to the current expiration date. (High-risk protocols may require even more time for approval.) For protocols requiring an EXPEDITED or EXEMPT review, submit your request at least two weeks prior to the current expiration date. Failure to obtain approval for a continuation *on or prior to* the currently approved expiration date will result in termination of the protocol and you will be required to submit a new protocol to the IRB before continuing the project. Data collected past the protocol expiration date may need to be eliminated from the dataset should you wish to publish. Only data collected under a currently approved protocol can be certified by the IRB for any purpose.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or irb@uark.edu.

TITLE: Relations between Adverse Childhood Experiences and Current Maladaptive Beliefs in a College Sample

INVESTIGATORS:
Ilana S. Berman, B.A.
Patricia Petretic, Ph.D.
University of Arkansas
College of Arts and Sciences
Department of Psychological Science
202-A Memorial Hall
Fayetteville, AR 72701
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ADMINISTRATOR:
Iroshi (Ro) Windwalker, CIP
Research Compliance
109 MLKG Building
University of Arkansas
Fayetteville, AR 72701
(479) 575-2208
irb@uark.edu

DESCRIPTION: As a voluntary participant, you will be among approximately 200 female undergraduate students who will be asked to provide information about your experiences of potentially stressful events in childhood, current physical and mental health, and thoughts and feelings regarding yourself, others, and the world. This study is designed to investigate how life events are related to subsequent psychosocial outcomes in adulthood. This information will be obtained by having you complete a questionnaire online through Survey Monkey. The questionnaire should take about forty-five (45) minutes to complete.

RISK OF PARTICIPATION: On rare occasions, a few individuals may find some of the questions to be difficult to complete due to experiences in their own personal history. If you find a question to be distressing, you may skip it without penalty. You may also contact Ilana S. Berman, B.A., the primary investigator (479-575-5803, isberman@uark.edu) at any time.

BENEFITS: Your participation in this study will not provide any direct benefits to you. After successful completion of the study, you will be compensated with one (1) credit hour of voluntary research participation toward the course requirement for General Psychology. However, there are several indirect benefits to your participation in this study. The results of this study will help provide important information about how past and current experiences may impact later adjustment and functioning.

VOLUNTARY PARTICIPATION AND RIGHT TO WITHDRAW: Your participation in this research is completely voluntary and you are free to discontinue the survey at any time.

CONFIDENTIALITY: Your consent form will be kept separate from the completed questionnaire. Only a code number will be recorded with questionnaire and it will not be associated with your name in any way. All information will be recorded anonymously and will be held confidential to the extent allowed by law and University policy. Results from the research will be reported as aggregate or group data.

INFORMED CONSENT: I have read the description, including the nature and purposes of this study, the procedures to be used, the potential risks and benefits, as well as the option to withdraw from the study at any time. I have had any questions regarding the study answered, and I believe I understand what is involved. My completion of the survey indicates that I freely agree to participate in this research study.

_____ _____

Name Date

IRB #15-12-406
Approved: 02/05/2016
Expires: 02/04/2017

TITLE: Relations between Adverse Childhood Experiences and Current Maladaptive Beliefs in a College Sample

INVESTIGATORS:
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Patricia Petretic, Ph.D.
University of Arkansas
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ADMINISTRATOR:
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109 MLKG Building
University of Arkansas
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_____ _____

Name Date

IRB #15-12-406
Approved: 04/11/2016
Expires: 02/04/2017

College Student Questionnaire

Demographics

* 1. What is your sex?

- ◯ Female
- ◯ Male
- ◯ Other (please specify)

1

College Student Questionnaire

Demographics

* 1. How old are you currently?

2. What is your ethnicity?

- [ ] Asian
- [ ] White/Caucasian
- [ ] Black/African American
- [ ] American Indian
- [ ] Other (please specify)

3. Are you of Latina or Hispanic origin?

- ( ) Yes
- ( ) No

4. What is your college status?

- ( ) Freshman
- ( ) Sophomore
- ( ) Junior
- ( ) Senior
- ( ) Other (please specify)

5. Which of the following best describes your current relationship status?

- ◯ Single
- ◯ In a relationship, not living together
- ◯ In a relationship (not married), living together
- ◯ Married
- ◯ Widowed/Separated/Divorced

6. Are you employed beyond being a student?

- ◯ Full time (35 hours or more)
- ◯ Part-time (1 - 34 hours), including work study
- ◯ Not otherwise employed

3

College Student Questionnaire

Family History

1. Who lived in the home with you for the majority of the time you were growing up? (Birth - 18) Check all that apply.

- [ ] Biological Mother
- [ ] Step-mother / Parent's female romantic partner / Female caregiver
- [ ] Foster mother
- [ ] Biological Father
- [ ] Step-father / Parent's male romantic partner / Male caregiver
- [ ] Foster father
- [ ] Biological Sibling(s)
- [ ] Half sibling(s)
- [ ] Step-sibling(s)
- [ ] Grandmother
- [ ] Grandfather
- [ ] Aunt
- [ ] Uncle
- [ ] Cousin
- [ ] Other family member(s) not described above (Please describe below)
- [ ] Non-relative not described above (Please describe below)
- [ ] Pet(s)

Other (please specify)

2. How many siblings do you have? (Whomever you consider to be a sibling, even if not 100% biologically related)

- ◯ 0
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4+

3. Compared to your siblings (who lived in the home with you), are you the:

- ◯ Oldest
- ◯ Middle
- ◯ Youngest
- ◯ Not applicable (no siblings)

4. How much education does/did your mother (figure) have?

- ◯ Didn't go to high school
- ◯ Some high school
- ◯ High school graduate or GED
- ◯ Some college or technical school
- ◯ College graduate or higher
- ◯ Don't know / Not applicable (no mother figure)

5. How much education does/did your father (figure) have?

- ◯ Didn't go to high school
- ◯ Some high school
- ◯ High school graduate or GED
- ◯ Some college or technical school
- ◯ College graduate or higher
- ◯ Don't know / Not applicable (no father figure)

6. Please estimate your family's average annual income (to the best of your abilities) while you were living at home (Birth - 18).

- ◯ Less than $20,000
- ◯ Between 20,000 and 49,000
- ◯ Between 50,000 and 74,000
- ◯ Between 75,000 and 100,000
- ◯ Between 100,000 and 200,000
- ◯ Above 200,000

7. How many people lived off this income?

6

College Student Questionnaire

PHQ 1 - 2

1. During the LAST 4 WEEKS, how much have you been bothered by any of the following problems?

	Not bothered	Bothered a little	Bothered a lot
Stomach pain	○	○	○
Back pain	○	○	○
Pain in your arms, legs, or joints (knees, hips, etc.)	○	○	○
Menstrual cramps or other problems with your periods	○	○	○
Pain or problems during sexual intercourse	○	○	○
Headaches	○	○	○
Chest pain	○	○	○
Dizziness	○	○	○
Fainting spells	○	○	○
Feeling your heart pound or race	○	○	○
Shortness of breath	○	○	○
Constipation, loose bowels, or diarrhea	○	○	○
Nausea, gas, or indigestion	○	○	○

2. Over the LAST 2 WEEKS, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	○	○	○	○
Feeling down, depressed, or hopeless	○	○	○	○
Trouble falling or staying asleep, or sleeping too much	○	○	○	○
Feeling tired or having little energy	○	○	○	○
Poor appetite or overeating	○	○	○	○
Feeling bad about yourself -- or that you are a failure or have let yourself or your family down	○	○	○	○
Trouble concentrating on things, such as reading the newspaper or watching television	○	○	○	○
Moving or speaking so slowly that other people could have noticed -- Or the opposite -- being so fidgety or restless that you have been moving around a lot more than usual	○	○	○	○
Thoughts that you would be better off dead or of hurting yourself in some way	○	○	○	○

College Student Questionnaire

PHQ 3

1. In the LAST 4 WEEKS, have you had an anxiety attack -- suddenly feeling fear or panic?

- ◯ No
- ◯ Yes

9

College Student Questionnaire

PHQ 3b - 4

1. Please answer the following questions about your anxiety attack(s).

	No	Yes
Has this ever happened before?	○	○
Do some of these attacks come suddenly out of the blue -- that is, in situations where you don't expect to be nervous or uncomfortable?	○	○
Do these attacks bother you a lot or are you worried about having another attack?	○	○

2. Think about your last bad anxiety attack.

	No	Yes
Were you short of breath?	○	○
Did your heart race, pound, or skip?	○	○
Did you have chest pain or pressure?	○	○
Did you sweat?	○	○
Did you feel as if you were choking?	○	○
Did you have hot flashes or chills?	○	○
Did you have nausea or an upset stomach, or the feelings that you were going to have diarrhea?	○	○
Did you feel dizzy, unsteady, or faint?	○	○
Did you have tingling or numbness in parts of your body?	○	○
Did you tremble or shake?	○	○
Were you afraid you were dying?	○	○

College Student Questionnaire

PHQ 5

1. Over the LAST 4 WEEKS, how often have you been bothered by feeling nervous, anxious, on edge, or worrying a lot about different things?

- ◯ Not at all
- ◯ Several days
- ◯ More than half the days

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College Student Questionnaire

PHQ 5b

1. Over the LAST 4 WEEKS, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days
Feeling restless so that it is hard to sit still	○	○	○
Getting tired very easily	○	○	○
Muscle tension, aches, or soreness	○	○	○
Trouble falling asleep or staying asleep	○	○	○
Trouble concentrating on things, such as reading a book or watching TV	○	○	○
Becoming easily annoyed or irritable	○	○	○

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College Student Questionnaire

PHQ 6

1. Please answer the following questions about eating.

	No	Yes
Do you often feel that you can't control WHAT or HOW MUCH you eat?	○	○
Do you often eat, within any 2-HOUR PERIOD, what most people would regard as an unusually LARGE amount of food?	○	○
Do you often eat, within any 2-hour period, what most people would regard as an unusually large amount of food?	○	○

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College Student Questionnaire

PHQ 7 - 8

1. In the LAST 3 MONTHS have you done any of the following in order to avoid gaining weight?

	NO	YES
Made yourself vomit?	○	○
Took more than twice the recommended dose of laxatives?	○	○
Fasted -- not eaten anything at all for at least 24 hours?	○	○
Exercised for more than an hour specifically to avoid gaining weight after binge eating?	○	○

2. IF you checked "Yes" to any of these ways of avoiding gaining weight, were any as often, on average, as twice a week?

- ○ No
- ○ Yes
- ○ Not applicable

College Student Questionnaire

PHQ 9

1. Do you ever drink alcohol (including beer or wine)?

- ◯ No
- ◯ Yes

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College Student Questionnaire

PHQ 10

1. Have any of the following happened to you MORE THAN ONCE in the LAST 6 MONTHS?

	No	Yes
You drank alcohol even though a doctor suggested that you stop drinking because of a problem with your health	○	○
You drank alcohol, were high from alcohol, or hung over while you were working, going to school, or taking care of children or other responsibilities	○	○
You missed or were late for work, school, or other activities because you were drinking or hung over	○	○
You had a problem getting along with other people while you were drinking	○	○
You drove a car after having several drinks or after drinking too much	○	○

College Student Questionnaire

PHQ 11

1. If you checked off ANY problems thus far on the questionnaire, how DIFFICULT have these problems made it for you to do your work, take care of things at home, or get along with other people?

- ◯ Not difficult at all
- ◯ Somewhat difficult
- ◯ Very difficult
- ◯ Extremely difficult

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College Student Questionnaire

PMBS

Please rate the following statements on a scale from 1 (NOT AT ALL TRUE for you) to 7 (COMPLETELY TRUE for you)

* 1. I don't feel safe anywhere anymore

(Not at all true)						(Completely true)
1	2	3	4	5	6	7
○	○	○	○	○	○	○

* 2. Other people can be genuinely loving toward me

(Not at all true)						(Completely true)
1	2	3	4	5	6	7
○	○	○	○	○	○	○

* 3. I am a good person.

(Not at all true)						(Completely true)
1	2	3	4	5	6	7
○	○	○	○	○	○	○

* 4. The world is very dangerous

(Not at all true)						(Completely true)
1	2	3	4	5	6	7
○	○	○	○	○	○	○

* 5. I don't trust anyone anymore.

(Not at all true)						(Completely true)
1	2	3	4	5	6	7
○	○	○	○	○	○	○

* 6. It is possible for me to have close and loving feelings with other people.

(Not at all true)						(Completely true)
1	2	3	4	5	6	7
○	○	○	○	○	○	○

* 7. I trust my own judgment.

(Not at all true) 1	2	3	4	5	6	(Completely true) 7
○	○	○	○	○	○	○

* 8. I avoid other people because they might hurt me.

(Not at all true) 1	2	3	4	5	6	(Completely true) 7
○	○	○	○	○	○	○

* 9. I have lost respect for myself.

(Not at all true) 1	2	3	4	5	6	(Completely true) 7
○	○	○	○	○	○	○

* 10. I don't feel confident that I can make good decisions for myself.

(Not at all true) 1	2	3	4	5	6	(Completely true) 7
○	○	○	○	○	○	○

* 11. Some people can be trusted.

(Not at all true) 1	2	3	4	5	6	(Completely true) 7
○	○	○	○	○	○	○

* 12. Because I don't feel able to protect myself, I have lost my sense of freedom.

(Not at all true) 1	2	3	4	5	6	(Completely true) 7
○	○	○	○	○	○	○

* 13. I feel as though I can depend on other people.

(Not at all true) 1	2	3	4	5	6	(Completely true) 7
○	○	○	○	○	○	○

* 14. Most people are basically caring.

(Not at all true) 1	2	3	4	5	6	(Completely true) 7
○	○	○	○	○	○	○

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* 15. I comfort myself very well when I'm upset.

(Not at all true)						(Completely true)
1	2	3	4	5	6	7
○	○	○	○	○	○	○

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College Student Questionnaire

PCL-5

In the PAST MONTH, how much were you bothered by:

1. Repeated, disturbing, and unwanted memories of a stressful experience?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

2. Repeated, disturbing dreams of a stressful experience?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

3. Suddenly feeling or acting as if a stressful experience were actually happening again (as if you were actually back there reliving it)?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

4. Feeling very upset when something reminded you of a stressful experience?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

5. Having strong physical reactions when something reminded you of a stressful experience (for example, heart pounding, trouble breathing, sweating)?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

6. Avoiding memories, thoughts, or feelings related to the stressful experience?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

7. Avoiding external reminders of a stressful experience (for example, people, places, conversations, activities, objects, or situations)?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

8. Trouble remembering important parts of a stressful experience?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

10. Blaming yourself or someone else for a stressful experience or what happened after it?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

12. Loss of interest in activities that you used to enjoy?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

13. Feeling distant or cut off from other people?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

14. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

15. Irritable behavior, angry outbursts, or acting aggressively?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

16. Taking too many risks or doing things that could cause you harm?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

17. Being "superalert" or watchful or on guard?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

18. Feeling jumpy or easily startled?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

19. Having difficulty concentrating?

Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

20. Trouble falling or staying asleep?

◯ Not at all ◯ A little bit ◯ Moderately ◯ Quite a bit ◯ Extremely

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College Student Questionnaire

ACE

While you were growing up, DURING YOUR FIRST 18 YEARS OF LIFE...

1. Did a parent or other adult in the household often

	Before age 18	After age 18
Swear at you, insult you, put you down, or humiliate you?	☐	☐
Act in a way that made you afraid that you might be physically hurt?	☐	☐

2. Did a parent or other adult in the household often

	Before age 18	After age 18
Push, grab, slap, or throw something at you?	☐	☐
Ever hit you so hard that you had marks or were injured?	☐	☐

3. Did an adult or person at least 5 years older than you ever

	Before age 18	After age 18
Touch or fondle you or have you touch their body in a sexual way?	☐	☐
Try to or actually have oral, anal, or vaginal sex with you?	☐	☐

4. Did you often feel that

	Before age 18	After age 18
No one in your family loved you or thought you were important or special?	☐	☐
Your family didn't look out for each other, feel close to each other, or support each other?	☐	☐

5. Did you often feel that

	Before age 18	After age 18
You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?	☐	☐
Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?	☐	☐

6. Were your parents ever separated or divorced?

- ◯ No
- ◯ Before age 18
- ◯ After age 18

7. Was your mother or stepmother

	Before age 18	After age 18
Often pushed, grabbed, slapped, or had something thrown at her?	☐	☐
Sometimes or often kicked, bitten, hit with a fist, or hit with something hard?	☐	☐
Ever repeatedly hit over a least a few minutes or threatened with a gun or knife?	☐	☐

8. Did you live with anyone who was a problem drinker or alcoholic who used street drugs?

- ☐ Before age 18
- ☐ After age 18

9. Was a household member depressed or mentally ill or did a household member attempt suicide?

- ☐ Before age 18
- ☐ After age 18

10. Did a household member go to prison?

- ☐ Before age 18
- ☐ After age 18