THESIS

ADVERSE CHILDHOOD EXPERIENCES, EXECUTIVE FUNCTION, AND MALADAPTIVE BEHAVIORS IN CHILDREN INVOLVED WITH CHILD PROTECTIVE SERVICES

Submitted by

Isidro Carvalho

Department of Human Development and Family Studies

In partial fulfillment of the requirements

For the Degree of Master of Science

Colorado State University

Fort Collins, Colorado

Summer 2024

Master's Committee:

Advisor: Lisa Daunhauer

Stephen Aichele
Karen Barrett
Nathaniel Riggs
Pat Sample

ABSTRACT

ADVERSE CHILDHOOD EXPERIENCES, EXECUTIVE FUNCTION, AND MALADAPTIVE BEHAVIORS IN CHILDREN INVOLVED WITH CHILD PROTECTIVE SERVICES

Childhood traumatic events are common and frequently associated with maladaptive coping mechanisms which contribute to long-term harm. Yet few targeted treatment options exist to prevent maladaptive coping in children exposed to trauma. The purpose of this thesis is to identify if executive function may serve as a potential target for such interventions.

This thesis used a sample of 244 children – aged 6 to 18 years old – who were referred by the Larimer County Department of Human Services for trauma assessments. Participant trauma events, executive function, and maladaptive behavior data were used to determine if executive function moderated the established association between trauma events and maladaptive behavior development.

Results showed no significant interaction between trauma events and executive function when assessing for either maladaptive internalization or externalization. However, results indicated that executive function had a main effect on both internalization and externalization. This study emphasizes the need for further research on the associations between childhood trauma, executive function, and maladaptive behaviors. It is imperative that moderators of the association between childhood trauma and maladaptive behaviors are found so that new treatment options can be developed.

DEDICATION

To Sarah. I’m sorry I couldn’t protect you.

TABLE OF CONTENTS

Introduction

Traumatic events, such as abuse or neglect, cause individuals enduring psychological distress (Merrick et al., 2018). Childhood trauma is a common experience. The United States Department of Health and Human Services found that approximately 61.6% of surveyed adults from the general population reported having experienced at least one traumatic event in childhood (Merrick et al., 2018; n= 248,934). Although it is generally accepted that traumatic childhood experiences are commonplace, the extant literature raises important questions about the long-term impact of trauma on both the individual and society at large.

Felitti et al. (1998) first identified the long-term individual impact of childhood trauma. Felitti et al. (1998) found that exposure to childhood trauma was associated with (a) poorer physical and psychological health, (b) greater criminality, and (c) lower employment. However, further work should be done to identify the intermediary factors that link childhood trauma exposure to the adverse outcomes that were observed. Past research findings suggest intermediary factors, including health-supporting behaviors (Felitti et al., 1998) and their cognitive predecessors, executive function (Appelhans et al., 2021), predict the participant's physical and mental health outcomes. These findings indicate that the associations between ACEs and EF may be critical for the prevention of adverse psychological outcomes, such as maladaptive behaviors. Therefore, this project aims to identify the patterns of association between childhood trauma, executive function, and adverse psychological outcomes. These patterns will be identified by analyzing the potential role of executive function as a moderator of the association between childhood trauma and adverse psychological outcomes.

Ecological Systems Theory

When studying childhood trauma outcomes, it is crucial to understand how the child's environment contributes to traumatic experiences. The Ecological Systems Theory (EST), as proposed by Bronfenbrenner, provides a multifaceted framework to understand childhood development through a cultural and contextual lens (Eriksson et al., 2018). When applied to the study of childhood trauma, this

approach emphasizes the interactions between the child and their surroundings, including factors involved in traumatizing event(s) (Sattler & Font, 2018).

EST argues that childhood development is a product of its context (Bronfenbrenner & Cole, 1979). EST describes five central systems in childhood development. The individual system consists of the child's characteristics, including health, age, and identity. The child engages directly and bi-directionally with the the microsystem (Bronfenbrenner & Cole, 1979). The microsystem comprises the child's daily environments with which the child interacts frequently and includes the child's direct caregivers, immediate family, school, and close community. The child often spends a significant amount of time with members of the microsystem and is dependent on these members to fulfill their basic physical and psychological needs (Bronfenbrenner & Cole, 1979). The child's dependence on the members of the microsystem and the frequency of their interactions may explain why most perpetrators of childhood abuse and neglect are adult members of the child's microsystem (Herbert & Bromfield, 2019). Bronfenbrenner's theory also characterizes three broader categories: the mesosystem, exploring interconnections between the child's immediate environments such as school and home; the macrosystem, accounting for the broader societal and cultural contexts influencing the child's development; and the chronosystem, which accounts for the child's place in time including personal timeline events and historical events shaping developmental outcomes. The focus of this thesis will be the child's microsystem, as this is where most ACEs arise from, and the child's individual system, as this is where most of the negative outcomes of ACEs develop.

Outcomes Associated with Adverse Childhood Experiences

In their seminal work, Felitti et al. (1998) were the first to attempt to explain how traumatic events in the child's microsystem could impact the development of the child's individual system. They named these traumatic events adverse childhood experiences (ACEs) and defined them as childhood incidents of abuse and dysfunction. Utilizing an informant-reported questionnaire, the researchers assessed the physical health, psychological health, life outcomes, and traumatic childhood experiences of adults receiving clinical care in the U.S. (n= 9,508). The seven original ACEs identified by Felitti et al. (1998) were grouped into two categories: abuse and household dysfunction. Abuse ACEs included sexual, physical, and

psychological abuse. Household dysfunction ACEs included substance abuse in the home, watching the mother be abused by her husband, parental mental illness, and having an imprisoned family member. Three ACEs were later added: emotional neglect, physical neglect, and parental divorce.

Results indicated that adults affected by ACEs were more likely to (a) engage in criminal and delinquent activity, (b) experience poor physical health outcomes, (c) engage in maladaptive behaviors, and (d) experience poor psychological health outcomes (Felitti et al., 1998). Adults who experienced more ACEs in childhood were more likely to engage in criminal and delinquent activity. Additionally, adults affected by ACEs were also more likely to experience poor health outcomes, including obesity, cancer, lung diseases, and sexually transmitted diseases. Engagement in maladaptive behaviors and the development of psychiatric illnesses were also common. Additionally, adults who had experienced ACEs as children were at an increased risk of alcohol and substance use disorders, depression, and suicidality (Felitti et al., 1998).

Following Felitti et al.'s findings (1998), several other researchers began examining negative outcomes associated with ACEs. Dong et al. (2004) reexamined Felitti et al.'s (1998) ACE study data to analyze the prevalence of health risk factors in adults exposed to ACEs. Findings indicated that ACEs had a strong dose-response relationship to all the assessed health risk factors (2004; n= 17,337). These risks included smoking, physical inactivity, high BMI, depressed affect, and elevated anger, which were all associated with ischemic heart disease.

Both Felitti et al. (1998) and Dong et al. (2004) identified health risk factors as "missing links" between ACEs and adverse physical health outcomes. However, they failed to identify the underlying mechanisms. Later research on disease prevention found that less competent executive function played a significant role in the development of health risk factors contributing to the development of adverse physical health outcomes (Brock et al., 2011).

Research suggests that these adverse outcomes begin long before adulthood. Since Felitti et al.'s (1998) pioneering research, evidence from studies examining the effects of ACEs on young children and adolescents yielded results that were congruent with Felitti et al.'s adult outcomes. Findings indicated that

school-aged children who were exposed to ACEs were more likely to experience (a) poor physical health outcomes (Kalmakis & Chandler, 2015), (b) poor psychological health outcomes (Zarse et al., 2019), and (c) poor behavioral outcomes (n=6,495; Liming & Grube, 2018). Furthermore, a U.S. nationally representative sample of adolescents exposed to ACEs was more likely to experience (a) poor physical health outcomes, (b) poor psychological health outcomes, and (c) poor behavioral outcomes (n= 20,745; Hussey et al., 2006). These findings indicated that the development of adverse health outcomes was not an adult outcome of childhood trauma, but a slowly developing series of symptoms that began shortly after exposure to the ACE.

Later research on ACEs shifted from identifying adverse ACE outcomes to identifying potential targets for ACE-related interventions. This shift brought greater attention to the predictors of adverse ACE outcomes. Commonly studied predictors included the health-supporting behaviors identified by Felitti et al. (1998), such as maintaining a healthy weight as a predictor of long-term health outcomes (Javier et al., 2019), and the factors which mediated the association between ACEs and the development of these health-supporting behaviors such as the association between ACEs and poor nutritional intake (Javier et al., 2019).

Executive Function

Felitti et al. (1998) first identified health-supporting behaviors as the link between ACEs and their negative health outcomes, which then became a focus of research and scientific discussions. Health-supporting behaviors included healthy eating, delayed gratification, engagement in physical activity, avoidance of harmful substances, and use of healthy coping mechanisms (Felitti et al., 1998). It was theorized that children experiencing ACEs could have challenges developing these health-supporting behaviors as the microsystem was made unsafe due to the experience of trauma. Later studies revealed that executive function (EF) was significantly predictive of participant engagement in health-supporting behaviors (Appelhans et al., 2021; Hall et al., 2014). The attention of ACE research shifted from health-supporting behaviors to EF following this discovery.

EF refers to the cognitive processes that allow an individual to engage in goal-directed behaviors. These processes allow an individual to more effectively respond to novel situations and problems (Hall &

Marteau, 2014). EF is central to our ability to adapt to changes in our environment (Hall & Marteau, 2014), engage in behaviors that maintain our relationships with others (Miller et al., 2018), and partake in actions that help us reach goals (Doebel, 2020). Therefore, EF has played a central role in our development and survival as a species (Doebel, 2020).

Studies of EF and ACEs often use informant-reported measures of EF, such as the Behavior Rating Inventory of Executive Function, second edition (BRIEF-2; Appelhans et al., 2021; Hall et al., 2014; Thakur et al., 2020). The BRIEF-2 is a comprehensive measure of EF. The BRIEF-2 includes both a global and domain-specific assessment of EF in everyday life. The BRIEF-2 (Gioia et al., 2015) identifies nine specific domains of EF on its caregiver-report. These domains include Inhibit, Self-Monitor, Shift, Emotional Control, Working Memory, Initiate, Task-Monitor, Organization, and Plan/Organize for children ages 5 to 18 years. Studies using the BRIEF-2 to characterize children with trauma backgrounds have found significant deficits in EF. Studies using the BRIEF-2 to characterize outcomes for children with trauma backgrounds have found associations between ACE exposure and less competent EF scores (Thakur et al., 2020; den Kelder et al., 2018).

As an informant reported measure, the BRIEF-2 is a survey about the child's EF abilities in the everyday context (Gioia et al., 2015). Comparatively, lab assessments of EF often involve having the child participate in an activity or several activities that are associated with a particular domain of EF or a select number of domains of EF. Lab assessments are often limited to a single domain of EF or a limited number of domains of EF, often require hours of activity to complete, and often require both a specially trained facilitator and a specially trained assessor to determine the outcome of the lab assessment (Vazire, 2006). Lab assessments are also less reflective of the child's daily EF performance, as the tasks are often brief, performed in a controlled environment, and involve 1-on-1 help from the assessment facilitator (Daunhauer et al., 2017). Informant-reported measures of EF, such as the BRIEF-2, are often used for ACE studies with larger sample sizes due to the lower cost and time spent using surveys when compared to the more time-consuming method of lab assessment (Vazire, 2006). However, informant reported methods such as the BRIEF-2 may result in biases stemming from the caregiver's biases. The BRIEF-2 provides both global

and domain-specific measures of EF (Gioia et al., 2015) and has the advantage of providing an understanding of EF in everyday life. Comparatively, domain-specific measures of EF allow for the development of interventions that are more targeted to the individual EF needs of the studied population.

When discussing domain-specific EF-ACE literature, three EF domains are most studied: working memory, inhibition, and emotional control. Working memory is a process that allows a person to store small pieces of information for short periods to manipulate or update the information (Baddeley et al., 1992). Inhibition is a conscious form of behavior involving active disregard for irrelevant stimuli and allowing the individual to engage in behaviors appropriate to the goal (Moorselaar & Slagter, 2020). Emotional control involves two actions: inhibiting emotional expression and suppressing internal emotional experiences (Krause et al., 2003). Inhibition of emotional expression may involve regulating body language, facial expressions, and emotional behaviors. Suppression of internal emotional experiences may involve suppressing internal factors, such as feelings and emotional thoughts, or external factors, such as expression.

The Development of EF in Childhood

To understand the potential role of EF as a moderator of ACEs and maladaptive behaviors, one must first understand the development of EF in childhood. Proto versions of EF skills begin in infancy and toddlerhood (Garon et al., 2008; Zelazo, 2020). Through childhood and adolescence, the individual engages in activities that develop and strengthen connections between neural networks in the prefrontal cortex (PFC) of the brain (Zelazo, 2020). These activities often involve forms of play and learning that require finding solutions to new problems or resolving conflicting information (Garon et al., 2008; Zelazo, 2020). Through the frequent practice of EF skills in these activities and the maturation of the PFC, the neural networks that support these skills begin to differentiate, resulting in greater individualization of the domains of EF (Zelazo, 2020). In typical development, the child's engagement in novel play strengthens PFC connectivity, which regulates the child's hypothalamic-pituitary-adrenal (HPA) axis, calming the child's stress responses once the stressor is gone or the child is protected (Weber & Reynolds, 2004).

Comparatively, children who experienced ACEs were more likely to engage in play that focused on practicing their response to the specific ACE (D'elia et al., 2022). This play involves less novel problem-solving and, in turn, contributes to a less developed PFC with less differentiated and weaker EF than their typically developing peers (Zelazo, 2020). When faced with a stressor, the child may be unable to use their PFC to regulate their HPA axis. A lack of HPA axis regulation may cause the child to employ maladaptive behaviors to protect themselves or attempt to handle the stressor. Therefore, EF could be a moderating factor in the relationship between ACE exposure and maladaptive behavior development.

Working Memory

Working memory is a process that allows the temporary storage and manipulation of information (Baddeley et al., 1992). The literature on working memory supports the theory that ACE exposure leads to less competent EF. A longitudinal study of environmental risk factors was conducted to assess the impact of early childhood stress exposure on working memory development. The study included twins from the U.K. and New Zealand who received home visits through public healthcare programs (n= 2,232 U.K., n= 1,037 New Zealand; Danese et al., 2017). Danese et al. used the Cambridge Neuropsychological Test Automated Battery (CANTAB) to assess working memory. They found that twins who experienced a greater number of early childhood stressors were more likely to have deficits in working memory in childhood, adolescence, and adulthood. The presence of working memory deficits in adults and children with ACEs indicates that the mechanisms contributing to working memory deficits began in childhood and continued into adulthood. Further support for this conclusion came from domain-specific studies of ACEs and working memory deficits, which indicated that certain domains of ACEs were more predictive of developing working memory deficits in adults than others (assessed using the Digit-Span Backward Task; Hawkins et al., 2021; assessed using the CANTAB; Majer et al., 2010). This body of studies showed that (a) physical abuse (Majer et al., 2010), (b) emotional abuse (Majer et al., 2010), and (c) physical neglect (Hawkins et al., 2021; Majer et al., 2010) were associated with deficits in working memory.

Inhibition

As with working memory, studies of ACEs identified a strong positive association between general exposure to ACEs and the development of deficits in inhibition (Bounoua & Sadeh, 2022; Carvalho et al., 2018). Inhibition is a conscious form of inhibition involving active disregard for irrelevant stimuli, which allows the individual to engage in behaviors appropriate to the goal (Moorselaar & Slagter, 2020). A history of childhood maltreatment was positively associated with inhibition deficits in U.S. adults (n= 110; assessed using the Color-Word Interference Test; Bounoua & Sadeh, 2022). Similar associations between inhibition and maltreatment were found in Brazilian children ages 8-12 years (n= 30). These children scored significantly less competently on assessments of inhibition than children who had not experienced maltreatment (n= 25; assessed using the parent-report version of the Child Behavioral Checklist; Carvalho et al., 2018). As with working memory, inhibition deficits in adults and children with ACEs indicate that deficits in inhibition likely began in childhood and persisted into adulthood.

Similar to working memory, inhibition deficits were more strongly associated with a specific ACE. Moreno-Manso et al. (2022) observed that childhood neglect was specifically predictive of deficits in inhibition in children ages 7 to 16 with neglect histories (n = 15) in comparison to those who had experienced other ACEs (n = 39; EF was assessed using the Five Digits Test).

Emotional Control

Emotional control involves two actions: inhibiting emotional expression and suppressing internal emotional experiences (Krause et al., 2003). Inhibition of emotional expression may involve regulating body language, facial expressions, and emotional behaviors. Suppression of internal emotional experiences may involve suppressing internal factors, such as feelings and emotional thoughts, or suppression of volitional expressive responses. Deficits in emotional control were also common in adults who had experienced ACEs. Researchers found that adults who had experienced childhood maltreatment showed more signs of emotional control deficits than adults who did not experience childhood maltreatment (assessed using the self-report Difficulties in Emotional Regulation Scale; Klumparendt et al., 2019). A series of studies examining ACEs and emotional control in adolescents found similar results. In this

longitudinal work, community-based adolescents exposed to ACEs demonstrated disruptions in emotional control (assessed using the parent-report Behavior Rating Inventory of Executive Function; n = 606; Heleniak et al., 2015). As with working memory and inhibition, emotional control deficits in children and adults indicate that these symptoms likely begin in childhood and remain through adulthood.

Unlike working memory and inhibition, a study of adolescents found that all types of childhood maltreatment were predictive of deficits in emotional control (Heleniak et al., 2015). These included physical, sexual, and emotional abuse. Studies of other ACEs showed similar results, with emotional neglect (assessed using the self-report White Bear Suppression Inventory; Krause et al., 2003), physical neglect, and polyvictimization (assessed using the parent-report Children's Emotion Management Scale; Cabecinha-Alati et al., 2021) being associated with deficits in emotional control.

Other Executive Function Domains

Working memory, inhibition, and emotional control were the most frequently addressed EF in the ACE literature. However, a number of other EF are assessed by researchers using the informant-reported BRIEF-2 (Gioia et al., 2015), which identifies nine domains of EF. The domains include Inhibit, Self-Monitor, Shift, Emotional Control, Working Memory, Initiate, Task-Monitor, Organization, and Plan/Organize. Although working memory, inhibition, and emotional control/control were frequently studied, few studies discussed the other six domains individually in relation to ACEs.

Shifting (sometimes described as cognitive flexibility or set shifting) is an EF that allows the individual to shift (attention/focus) between tasks (Lund et al., 2020). Shifting was sometimes assessed in studies of maltreated children (ages 0-18) (Lund et al., 2020). A systematic review of EF-ACE literature found that children exposed to ACEs were more likely to have deficits in shifting in most of the included studies (Lund et al., 2020). The size of this effect ranged significantly from moderate (d = .46) to extremely large (d = 1.09) in studies that found significant results. However, these studies often employed various methods of assessing shifting, including self-reports, parent reports, and in-lab neuropsychological

assessments, which may call into question the validity of comparing the results of the included studies, especially when the inconsistency of their findings is taken into account (Lund et al., 2020).

Maladaptive Behaviors

Maladaptive behaviors interfere with an individual's ability to act within their self-interest. There are two widely recognized categories of maladaptive behaviors: internalizing and externalizing maladaptive behaviors. Internalizing maladaptive behaviors encompass all maladaptive processes directed toward the self. Depression, self-harm, suicidality, excessive worrying, social withdrawal, and somatosensory symptoms are the most common internalizing experiences in children and adolescents (Keane & Loades, 2017). Comparatively, externalization occurs when the maladaptive processes are directed toward the environment and/or other individuals within the environment of the externalizing individual. Common externalizing behaviors include physical aggression, destruction of property, bullying, verbal aggression, and defiance (Wetherill et al., 2018).

Studies have identified maladaptive behaviors in three central ways: informant reports, lab observations, and historical records. Informant-report questionnaires – such as the Child Behavior Checklist (CBCL) - are often used in studies involving children for the same reasons cited for EF informant reports. In studies involving children, self- and informant-reports of maladaptive behavior involve providing either the participant, caregiver, or teacher a questionnaire regarding the child's behavior. The CBCL is a caregiver-report questionnaire provided to caregivers which contains 99 items. Two forms of the CBCL exist: one for children between the ages of 1.5 and 5 years old, and one for children between the ages of 6 and 18 (Achenbach and Rescorla, 2001). Self- and informant-reports of maladaptive behaviors often take less time and require fewer trained personnel to administer, allowing for larger sample sizes surveyed at a lower cost (Vazire, 2006). Comparatively, lab reports are more expensive than informant-reports but result in less self-report bias when compared to self- and informant-reports. Lastly, historical records, such as criminal records and hospitalization records may be used to identify some maladaptive behaviors. Criminal records may be used to identify a history of externalizing behaviors, such as aggression (Ruhland et al., 2020). Hospitalization records may be used to identify both externalizing behaviors (such as physical

aggression) and internalizing behaviors (such as depression; Prina et al., 2015). However, historical records are often difficult to obtain for research and can lack information regarding the nature and valence of maladaptive behaviors. As a result, studies which use historical records as a measure of maladaptive behaviors often focus on a single category of maladaptive behavior, such as criminality (Ruhland et al., 2019) or a particular diagnosis (Prina et al., 2015).

Studies of maladaptive behaviors may also vary in the way that maladaptive behaviors are defined. Maladaptive behaviors can be defined at the global level, often divided into either one global category of maladaptive behavior (Pechtel & Pizzagalli, 2013), or two categories of internalizing and externalizing behaviors (Achenbach & Rescorla, 2001). Maladaptive behaviors may also be divided into specific domains, such as diagnostic domains (Prina et al., 2015) or symptom domains (Carlson et al., 2022). The CBCL comprises of two global, eight symptom domain, and six diagnostic domain measures of maladaptive behaviors (Achenbach & Rescorla, 2001). Global measures include internalizing maladaptive behaviors and externalizing maladaptive behaviors. The eight domain measures include anxious/depressed, depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, and aggressive behavior. Lastly, the six diagnostic measures include affective problems, anxiety problems, somatic problems, ADHD, oppositional defiant problems, and conduct problems (Achenbach & Rescorla, 2001). With elevated ACE scores, it can be assumed that children involved with CPS likely experience neurodevelopmental issues in their PFC and HPA axis, leading to an increased risk of maladaptive behaviors.

The development of maladaptive behaviors can be understood through a neurodevelopmental stress response model. If an individual were actively threatened, the types of behavior commonly viewed as maladaptive behaviors, including fighting (an externalization response), fleeing (an internalization response), or freezing (an internalization response; Perry et al., 1995) would be considered adaptive responses to a threat. The HPA axis prepares the body to react to physical and emotional stressors (Perry et al., 1995). Infants and young children may not be physically capable of fighting or even fleeing a given situation. Instead, these internalizing and externalizing behaviors may serve to attract a caregiver who can

then protect the child (Murphy et al., 2022). However, when the child's attempts do not attract the caregiver (neglect), when the caregiver is the source of the stressor (abuse), and/or when the stressor is not something that the caregiver can protect the child from (familial dysfunction or environmental stressors), the threatened feeling does not dissipate (Murphy et al., 2022). The child can feel unsafe or unprotected by the microsystem that they are biologically predisposed to depend on. This lack of protection in the face of a threat causes the child's HPA axis to stay activated more consistently, causing the child to misinterpret typical environmental inputs as threatening and causing the child to react to typical situations as if they were threats, through internalization and externalization (Weber & Reynolds, 2004).

When the neurodevelopmental stress response model is taken into consideration with the EF development theory of play, it can be proposed that a child who cannot depend on their caregiver for safety engages less frequently in varied problem-solving play. This lack of varied problem-solving play then leads to lower development of EF in the PFC, resulting in less emotional regulation and greater sensation of threat. When the child has not developed the PFC capacity needed to regulate their emotions, even mild threats can feel overwhelming, causing the child to seek any means of regulation – including maladaptive behaviors – to reduce their sensation of overwhelm (D'elia et al., 2022; Murphy et al., 2022; Weber & Reynolds, 2004; Zelazo, 2020).

Maladaptive Behaviors and Adverse Childhood Experiences

The pioneering study conducted by Felitti et al. (1998) supported this theory by identifying multiple internalizing maladaptive behaviors associated with ACE exposure. These behaviors included depression, anxiety, and suicidal ideation. However, the study did not assess the potential connection to externalizing behaviors. Later studies of maladaptive behaviors and ACEs served to both support Felitti et al.'s (1998) findings on internalizing behaviors (e.g., Muniz et al., 2019) and bring to light the association between ACEs and externalizing behaviors (e.g., Kysar-Moon, 2022).

Research linking EF and ACEs often used adult retrospective data. Comparatively, research involving maladaptive behaviors and ACEs was primarily conducted with pediatric and adolescent samples.

Studies of children (ages 0-18) have found that sexual abuse (Muniz et al., 2019), parental mental illness (Bevilacqua et al., 2021; Lew & Xian, 2019), divorce (Lew & Xian, 2019), and household dysfunction (Bevilacqua et al., 2021) were associated with internalizing symptoms. Comparatively, emotional abuse, household member incarceration, physical abuse, emotional neglect, and household violence were associated with externalizing symptoms (Muniz et al., 2019). Household substance use was associated with internalizing (Lew & Xian, 2019) and externalizing behaviors (Muniz et al., 2019). One study did not find that the type of ACE determined the severity of internalizing or externalizing behaviors when assessing the impact of the interaction between ACEs and socioeconomic status (SES; Anderson et al., 2022). However, this study did not control for the effect of SES on ACEs, making it difficult to compare these results to the results found by Bevilacqua et al. (2021), Lew & Xian (2019), or Muniz et al. (2019). The majority of studies of ACEs and maladaptive behaviors with pediatric samples focused on a single ACE and an associated maladaptive behavior. Very few studies were found to compare associations between individual ACEs and maladaptive behaviors.

Maladaptive Behaviors, Adverse Childhood Experiences, and Executive Function

As the ACE-EF association and the ACE-maladaptive behaviors association became more well-established in the field, research began delving into the interplay between these two associations. EF is an established predictor of maladaptive behaviors. In the general populations, research findings indicate that EF deficits are associated with externalizing behaviors in children and adolescents (Conley et al., 2023; Reynolds et al., 2019; Yang et al., 2022) and internalizing behaviors across the lifespan (Quistberg & Mueller, 2020; Yang et al., 2022), including the development of disordered eating (Steward & Berner, 2020) and addictions (Lechner et al., 2019).

Taken as a whole, extant research has demonstrated that ACEs have associations with EF deficits as well as maladaptive behavior. Despite the support for the ACE, EF, and maladaptive behavior associations in the literature, few studies have studied the potential associations between these three factors combined. A study examining ACEs in young adults found that participants who experienced a high number

of ACEs while demonstrating high aggression (an externalizing behavior), struggled more with sustained attention, had less efficient EF processing, and experienced diminished error monitoring when compared to individuals without ACEs when performing task-based assessments of EF (n=42; Xue et al., 2017). A similar study examined ACEs, EF, and substance use with adult prisoners in Istanbul, using the Trail Making Test to assess psychomotor speed, visuospatial searching, and set switching. Results indicated that a combined effect of childhood abuse and deficits in EF predicted substance use and self-harm, but the individual effect of EF deficits did not (Taşören, 2017). Studies of children have also been conducted. Wei and Lü assessed 952 youth ages 11 to 15 years attending school in one region in China. All youth participants completed self-reported measures of EF, trauma, and behavior. The researchers found that EF mediated the relationship between trauma and both externalizing and internalizing behavior (2023). (2023). As seen above, the literature surrounding the potential ACE-EF-maladaptive behavior association is minimal. This literature also lacks consideration for the potential patterns of association between individual ACEs, domains of EF, and maladaptive behaviors.

Gaps in the Literature

Previous research has demonstrated the need for a more nuanced understanding of the relationship between EF and maladaptive behaviors in children with a history of ACEs. In children and adolescents, there is strong evidence for the association between ACEs and EF deficits, as well as even stronger evidence for the association between ACEs and maladaptive behaviors. However, only one study considered the potential intersections between these two established associations. Horn et al. (2018) studied the effect of polyvictimization on externalizing behaviors, assessed using the CBCL, in preschool-aged children living in foster care (n = 84). The study tested the role of EF, assessed using the NEPSY neurodevelopmental test, a global measure of EF, as a potential moderator of this association. Results indicated that polyvictimized children only developed an increased risk of externalizing problems when their EF deficit was greater than 1.62 standard deviations below the mean (Horn et al., 2018). Children who scored at or above the mean on the assessment of EF had no association between polyvictimization and externalization. Therefore, a greater

number of studies are needed to investigate the potential combined associations between ACEs, EF, and maladaptive behaviors.

This review has clearly identified a gap in the literature. A plethora of research on children with an ACEs history has focused on two of the following three factors: ACEs, EF, or maladaptive behaviors. Few of the studies assessed the associations between all three factors of interest, but an understanding of these associations may be critical to the diagnosis and prevention of maladaptive behaviors. One study that did cover all three factors used self-report data for their trauma measure and involved adolescent participants, resulting in an increased risk of self-report bias (Wei & Lu, 2023). A greater understanding of these larger patterns will open doors for the development of interventions with target EF deficits to reduce or prevent maladaptive behaviors in CPS-involved children who have been exposed to ACEs. To fill this gap, the proposed study will analyze the association between ACE exposure, a caregiver-reported global measure of EF, and a global measure of maladaptive behaviors.

Another gap in the literature regarded the use of retrospective data from adults to identify ACEs (Dong et al., 2004; Felitti et al., 1998; Hawkins et al., 2021; Majer et al., 2010; Merrick et al., 2018). Childhood memories are notoriously malleable and fluid, causing them to blur together when recalled in adulthood (Peterson, 2021). This calls into question their accuracy when recalled and reported in adulthood (Peterson, 2021). Despite the unreliability of childhood memory recall in adulthood, only a few studies of ACEs used prospective methods for identifying ACEs. By using prospective data to identify ACEs in contrast to retrospective reports based on individuals' memories, this study seeks to utilize this methodology improvement to characterize associations more accurately between the variables of interest.

Moderation Analysis

This study will use a moderation analysis. A moderation analysis is a conceptual model in which one variable (the moderator variable) affects the strength of the association between the independent variable and the dependent variable. In this analysis, EF will serve as the moderator variable. Adverse

childhood experiences will serve as the independent variable, and maladaptive behaviors will serve as the dependent variable.

Moderation analysis cannot be used to infer a causal relationship. Rather, moderation analysis can be used to better understand the impact a moderator variable may have on the strength of a pre-identified association between two other variables.

Research Questions

This study will examine patterns of informant-reported EF in everyday life for children with an ACEs history to discover:

(1) Does EF moderate the relationship between the number of trauma events (independent variable) and maladaptive behaviors (dependent variables)?

Hypothesis 1: EF abilities will moderate the association of trauma events with internalizing and externalizing behaviors, such that there will be a weaker association between trauma events and behavioral tendencies in children with more competent EF abilities.

(2) Do participant characteristics, i.e., number of placements outside the home, age, sex, and race/ethnicity moderate the association between the number of trauma events (independent variable) and (dependent variables)?

Hypothesis 2: Numbers of placements will moderate the association of trauma events with internalizing and externalizing behavior, such that there will be a weaker association between trauma and behavioral tendencies in children with fewer placements in comparison to children with more placements.

Methods

Study Design

Participants

This study will use quantitative data collected from a convenience sample of children and youth assessed at an outpatient clinical center associated with Colorado State University (CSU), which conducted trauma assessments for the study participants following a referral from the Larimer County Department of Human Services (DHS). All children referred to the CSU Trauma and Resilience Assessment Center (CTRAC) by DHS were involved with CPS at the time of assessment. Inclusion criteria were being 6-18 years of age with a completed CBCL, BRIEF-2 caregiver report, and having an NCTSN Trauma Checklist indicating 1 or more trauma events. Children not meeting these criteria were excluded from this study.

Procedures

Assessments were conducted by a licensed marriage and family therapist (LMFT). The type of formal assessments depended on the nature of the referral, the child's age, and the child's comfort. Only data from the DHS referral and caregiver reports were used for the study questionnaires. Caregiver reports were completed by biological parents, kinship carers, adoptive parents, or foster parents. As part of the DHS referral, social workers and case workers from DHS initially completed an internal questionnaire regarding the participant's previous experiences with childhood abuse, neglect, and household dysfunction. Caregivers completed the behavior and EF measures before the child's assessment or during the child's assessment appointment. Depending on their referral recommendations, children also participated in additional assessments (e.g., visual-motor integration) during the visits that were not included in this project.

Measures

Child Demographics. Information about the child's race/ethnicity, sex, and number of placements outside of the home was provided by the county.

Trauma Events. To capture trauma event exposure for study participants, the trauma history domain of the NCTSN Trauma Checklist was used. the NCTSN Trauma Checklist was completed by the

participant's social worker or case worker and provided by DHS. The trauma events/types domain of the NCTSN domain contains 10 items, plus an "Other" item which was not counted towards the final score. For this project, the trauma event score was obtained by assigning each type of trauma event endorsed a score of one point and summing these items for a total possible range between 0 and 10 points. Higher trauma event scores indicated a greater number of trauma events experienced. This score reflected trauma event exposure and served as an independent variable.

There was a risk of low variability in the trauma event data given that the local DHS prefers an overall NCTSN score of 6 or greater on the NCTSN Trauma Checklist when making outside referrals for outside trauma assessments. Additionally, the trauma events domain is only one of four other NCTSN Trauma Checklist domains, which also include behavior, emotion/mood, and relational/attachment challenges.

The Behavior Rating Inventory of Executive Function 2 (BRIEF-2). The BRIEF-2 is an informant-report questionnaire measuring EF in children and adolescents between 5 and 18 years old (Gioia et al., 2015). The BRIEF-2 has shown adequate psychometrics, including reliability and validity in diverse populations (Gioia et al., 2015). This included strong test-retest reliability, high internal consistency, strong convergent validity, and strong discriminant validity (Gioia et al., 2015).

The questionnaire includes 63 items that informants rated on a Likert scale of 0 =never, 1= sometimes, or 2= always. on nine subscales of EF. These subscales include Inhibit, Self-Monitor, Shift, Emotional Control, Working Memory, Initiate, Task-Monitor, Organization, and Plan/Organize. Raw scores are converted into age-normed T-scores. The BRIEF-2 also contains an overall measure of EF, the Global Executive Composite (GEC; a total T-score reflecting performance on the nine subscales), which will be used for this project. On the BRIEF-2, higher scores are indicative of more EF challenges.

The Child Behavioral Checklist (CBCL). The CBCL for school-aged children and adolescents is an assessment of emotional and behavioral problems in children and teenagers between the ages of 6 and

18 (Achenbach & Rescorla, 2001). The CBCL has shown high test-retest reliability, convergent validity, and discriminant validity in diverse populations (Achenbach & Rescorla, 2001). The informant-report questionnaire includes 113 items that evaluate internalizing behaviors and externalizing behaviors. These behaviors are categorized into 8 Syndrome Scales. These scales include aggressive behavior, anxious/depressed, attention problems, rule-breaking behavior, somatic complaints, social problems, thought problems, and withdrawn/depressed. The CBCL further separates the Syndrome Scales into two broader scales: internalizing and externalizing behaviors. Internalizing behaviors include the anxious/depressed, withdrawn/depressed, and somatic complaints domains. Externalizing behaviors include the rule-breaking and aggressive behavior domains. Raw scores are converted to Syndrome Scale scores by comparing the raw score to a normative sample for the child's age using a normal distribution. This study will use T-scores from the Internalizing and Externalizing scales as the dependent variables.

Analytical Power

There were 244 participants in this study. An a priori power analysis was conducted with G*Power (version 3.1.9.7; Faul et al., 2007). It was determined that the minimum sample size required to achieve 80% power to identify a small effect with a significance criterion of $\alpha = .05$ was $n = 43$ for linear multiple regression. The study's final sample of 244 participants surpasses the required sample size.

Data Analytic Plan

Multiple regression moderation analyses were used to analyze the relationship between CBCL T-scores for internalizing behaviors, CBCL T-scores for externalizing behaviors, BRIEF-2 GEC for overall EF, number of trauma events, and other participant characteristics (number of placements, age, sex, and race/ethnicity). All analyses were conducted using the Statistical Product and Service Solutions (SPSS) software package version 29 (IBM Corp., 2022) with the PROCESS macro, v. 4.3.1 (Hayes, 2024). Linear regression analyses. Descriptive statistics (*M,* SD) were also obtained for each study variable.

Results

Preliminary Analyses

The preliminary analyses revealed that approximately half of the participants (52.5%) were male, and most were white (62.6%). On average, study participants experienced 3.28 placements (SD = 6.78). The mean age at the time of assessment was 12.39 years (SD = 3.15). The majority of families reporting indicated an annual income range of $40,000 to $54,999; however, less than half of the participant families completed this item. These data are summarized in Table 1, which presents descriptive statistics for participant characteristics.

Regarding key study measures, the mean number of trauma events was 5.45 (*SD* = 1.75). The mean score on the BRIEF-2 Global Executive Composite was 65.29 (*SD* = 13.04). This score indicates that the study sample, on average, demonstrated potentially clinically elevated challenges of EF as defined by the BRIEF-2 manual (Gioia et al., 2015). The mean internalizing and externalizing scores on the CBCL were 63.86 (SD = 10.90) and 63.86 (*SD* = 11.17), respectively. These scores indicate that, on average, the study sample demonstrated typical levels of maladaptive behavior, given the clinical-level cutoff is $\geq$ 70 on the Syndrome Scales, with scores of 65-69 indicative of borderline elevations (Achenbach & Rescorla, 2001). Descriptive statistics for key variables are presented in Table 2.

Correlation analyses were conducted to better understand the nature of the associations between the variables of interest for this thesis. A Spearman's correlation indicated that the number of placements was significantly positively associated with GEC scores (r_s (240) = .14, p = .031) and externalization (r_s (240) = .15, p = .021). A Pearson's correlation indicated that age was positively associated with internalization (r(239) = .14, p = .031). A Spearman's correlation indicated that externalization was associated with GEC scores (r_s (244) = .73, p < .001) and internalization (r(244) = .60, p < .001). Finally, a Spearman's correlation indicated that internalization was associated with GEC scores (r_s (244) = .57, p < .001). The results of these analyses can be found in Table 3.

Does EF Moderate the Relationship between Trauma and Maladaptive Behaviors?

A regression analysis indicated that EF (r^2 = .55, F (3,240) = 105.81, p < .001) was predictive of significant variation in externalizing behavior. However, the interaction of EF and trauma events was not

significantly predictive of variation in externalizing behavior (b = -.01, SE = .03, p = .718) and the level of EF did not significantly moderate the relationship between trauma events and externalizing behavior. A main effect of EF on externalizing behavior was found (b = .63, SE = .03, p < .001). Therefore, participants with more competent EF engaged in less externalizing behavior and the level of EF abilities did not significantly affect the relationship between trauma events and externalizing behavior in this sample (see Table 4 for details).

A regression analysis also found that EF (r^2 = .37, F(3,240) = 39.01, p < .001) was predictive of significant variation in internalizing behavior, but the interaction between trauma events and level of EF ability was not. Furthermore, the level of EF was significantly predictive of variation in internalizing behavior (b = .50, SE = .05, p < .001).

Overall, the results of these analyses indicated that more competent EF predicted lower levels of maladaptive behavior in both the domains of internalizing and externalizing behavior. However, the analyses did not support the hypothesis that EF is a moderator of the association between exposure to trauma and reports of maladaptive behaviors.

Do Participant Characteristics Moderate the Association between Trauma Events and Maladaptive Behaviors?

Regarding externalizing behavior and participant characteristics, the regression analysis did not indicate that participants' age (r^2 = .02, F(3, 235) = 1.46, p = .227), sex (r^2 = .13, F(3, 236) = 1.35, p = .259), or race/ethnicity (r^2 = .16, F(9,230) = .67, p = .732) predicted significant variation. Number of placements (r^2 = .04, F(3, 236) = 3.75, p = .012) was predictive of variation in externalizing behavior, but the interaction of trauma events and number of placements (b = -.01, SE = .07, p = .868) was not predictive of variation in externalizing behavior. However, there was a significant main effect for the number of placements on externalization (b = .35, SE = .12, p = .003). Therefore, more participant placements outside the home were associated with higher levels of externalizing behavior, but the number of trauma events did not influence this association (see Table 5).

Regarding internalizing behavior, the regression analysis did not indicate that age (r^2 = .02, F(3,235) = 2.28, p = .080), gender (r^2 = .00, F(3,236) = .22, p = .880), number of placements (r^2 = .02, F(3,236) = 2.43, p = .066), or race/ethnicity (r^2 = .03, F(9,230) = .67, p = .732) predicted significant variation. None of the interaction terms assessed were significant. Consequently, more participant placements were not associated with higher levels of internalizing behavior, nor did the number of trauma events affect the association between placements and internalizing behavior (see Table 6).

Taken as a whole, the participant characteristics regression analyses supported the association between the number of placements and externalizing behavior, while neither the number of placements or other selected participant characteristics predicted internalizing behavior. Furthermore, the number of trauma events did not serve as a moderator for the association between the number of placements for either externalizing or internalizing behavior, respectively.

Discussion

The intention of this thesis was to investigate the potential role of moderators in the established association between exposure to traumatic childhood events and the development of maladaptive behaviors for children and youth involved with child protection services. There were no significant interaction effects in this study that could indicate a significant moderation effect of demographic variables or EF on the association between trauma events and maladaptive behaviors. However, a few main effects were found to be significant. The main effects of EF on internalizing and externalizing behaviors were found to be significant, with more challenges in EF predicting higher internalizing and externalizing behaviors. Additionally, the participants' number of placements was found to significantly predict variation in externalizing behaviors, indicating that participants with higher numbers of placements also experienced greater challenges with externalizing behavior. To the best of current knowledge, this is the first study to examine whether EF abilities moderate trauma exposure and maladaptive behavior in a large U.S. sample of children and youth involved with child protection services.

Understanding Findings Regarding EF as a Moderator between Trauma Exposure and Maladaptive Behavior

Regarding results examining the moderating role of EF, the results that demonstrated that EF did not moderate maladaptive behavior were inconsistent with current findings in the field. Both Wei and Lu (2023) and Horn et al. (2018) found associations between trauma exposure and maladaptive behaviors. Wei and Lu (2023) found that EF mediated the relationship between childhood trauma and both externalizing behaviors and internalizing behaviors. Horn et al. (2018) found EF moderated behavior outcomes, noting that polyvictimized children developed an increased risk of externalization when they experienced an EF deficit greater than 1.62 standard deviations below the mean. Given the paucity of extant research examining associations of EF with childhood trauma and behavioral outcomes, the findings from both Wei and Lu (2023) and Horn et al. (2018) should be viewed as preliminary. Although the findings of the present study did not support moderation findings for EF, this project did provide further support for the extant literature, which stated that EF is a predictor of both internalizing behavior (Quistberg & Mueller, 2020; Yang et al., 2022) and externalizing behavior (Conley et al., 2023; Reynolds et al., 2019; Yang et al., 2022).

Furthermore, the preliminary studies investigating EF, trauma events, and maladaptive behaviors featured methodological choices that may explain the difference in results compared to this project. Wei and Lu (2023) used youth self-reported measures for trauma events, increasing the risk of self-report bias on the one hand and, on the other hand, potentially highlighting abuse not reported to child protection services. Comparatively, both the present study and Horn et al. (2018) used data provided by child protective services, potentially reducing self-report bias and possibly missing trauma events.

However, Horn et al. (2018) had only foster parents complete reports of maladaptive behaviors, resulting in only one perspective on the child's behavior. Comparatively, the present study included perspectives from a variety of types of caregivers. These caregivers ranged in their relationships with the participants, from foster parents to kinship placement caregivers to biological parents, and currently the database contains no information regarding the potential role of these caregivers. Therefore, caregivers may experience biases that may influence how they respond to questionnaires, especially questionnaires with

sensitive items regarding their child's conduct. Negative sentiment override, savior complexes, and other pre-existing biases may influence how caregivers report on their child's behaviors. The role of informants is a methodological choice that has not been thoroughly explored in the extant literature.

Another potential reason for the significant difference in results from the extant literature could potentially be the overlap in items between the BRIEF-2 and the CBCL. For example, both the BRIEF-2 and CBCL measure emotional and general impulsivity with similar items on each questionnaire. Additionally, the average participant in this study had potentially clinically significant scores on the BRIEF-2 GEC score (Gioia et al., 2015). This was consistent with previous findings in the literature regarding trauma exposure in children. The low number of participants with BRIEF-2 GEC scores in the typical range limits our findings for this thesis. These elevated scores were likely a product of the DHS referral system, which requires that potential participants experience a significant impact of trauma to be referred to the CTRAC program. This limitation is also unique to this thesis when compared to the Wei and Lu (2023) and Horn et al. (2018) studies, as neither of the cited studies restricted recruitment by perceived severity of trauma effect.

Although the variables and models were similar between the present study, Wei and Lu (2023), and Horn et al. (2018), this thesis built on their methods. Wei and Lu (2023) used retrospective self-reports in their measure of traumatic events, whereas Horn et al. (2018) used child welfare records to measure trauma events. The approach Wei and Lu (2023) chose increases the risk of self-report bias. Similar to Horn et al. (2018), this thesis sought to avoid this issue by using trauma data provided directly by caseworkers, who themselves have access to the results of the DHS investigations and legal proceedings associated with the participating child.

Lastly, Horn et al. (2018) used a sample of very young children, focusing the applications of their findings to a narrow portion of the population of children affected by trauma. Comparatively, Wei and Lu (2023) used an adolescent population, once again restricting their scope. This thesis sought to remedy this issue by expanding the population to include school-aged children. Therefore, the more inclusive range of

ages in the present study might also have contributed to the difference in results from those reported by Wei and Lu (2023) and Horn et al. (2018).

Understanding Findings Regarding Participant Characteristics as a Moderator of Maladaptive Behavior

Demographic differences between Wei and Lu (2023), Horn et al. (2018), and the sample for this project may also have contributed to significant differences in results examining participant characteristics. Both Wei and Lu (2023) and Horn et al. (2018) used restricted age boundaries for their study There were also significant cultural differences between the sample in this thesis and the sample used by Wei and Lu (2023). Wei and Lu (2023) studied a racially homogenous population of Chinese adolescents. Comparatively, this thesis and Horn et al. (2018) had samples that were primarily white but also included a variety of racial groups. Lastly, Wei and Lu (2023) used a general school sample. Horn et al. (2018) examined children in foster care, and the present study used a sample involved with child protective services referred for clinical services. Sex was not significantly different between the three studies, with all three studies being nearly even in participant sex distribution between males and females. Neither Horn et al. (2018) nor Wei and Lu (2023) discussed the number of home placements the child had experienced. Comparatively, this thesis sought to identify the potential role of number of home placements on the child's maladaptive coping mechanisms, shining light on a potentially significant factor in maladaptive coping development.

There may also have been circumstances affecting the use of number of placements as a variable. Children with significant externalizing behaviors often experience a high number of placements as foster caregivers may be unprepared to support a child with significant externalization (Vreeland et al., 2020). Children are also more likely to experience externalization symptoms following repeated placement changes (Hindt & Leon, 2022). These factors may explain why there was a significant model effect for the model with an externalizing outcome, but not for the model with an internalizing outcome. With temporal information regarding placement and externalization, we may have been able to better identify which variables are influencing the other.

Study Limitations

This study faced numerous limitations. As mentioned, this thesis was potentially affected by caregiver report biases. The use of caregiver reports regarding the child's behavior and EF may have been influenced by several personal biases held by caregivers, ranging from savior complexes to negative sentiment override. When caregivers have their own biases towards their child's behavior (i.e., wanting to demonstrate how the child has successfully changed in their care or wishing to paint the child as the source of household distress), this can be reflected in their reports of the child's behavior. As a result, future studies should seek to methodically examine differences in the various roles (e.g., biological parent, kinship caregiver, or foster parent) in informant reporting for this population to better understand any associated risk related to caregiver report biases. Future studies should either avoid caregiver-reported data – as Wei and Lu (2023) did - or control for the relationship between the caregiver and the child through statistical means. However, due to this population's vulnerable nature, the best approach to this problem is still widely debated.

Lastly, the significant overlap in items between the CBCL and BRIEF-2 likely also served as a limitation for this study, obscuring potentially significant effects. Future studies should seek to avoid having moderators and outcomes with similar items in their questionnaires. Other limitations to the current project include using a broad age range and cross-sectional data that does not allow for measurement of change over time. Furthermore, the local country child protection services generally only referred cases to the clinic used for this study when children had higher levels of trauma concerns, including behaviors and emotions, not just trauma events. Given the limitations listed here and the methodological differences between this study and the extant literature, the differences in results between this thesis and those found in the extant literature can be better understood.

Conclusions

This study showed that less competent EF is associated with increased internalizing and externalizing behavior. This study also found evidence that a greater number of placements outside of the home were associated with increased externalizing behavior However, this study did not identify either EF

or any demographic factors as significant moderators of the association between childhood trauma and maladaptive coping. Childhood trauma is a common event, one which contributes to significant harm for both the affected child and society (Felitti et al., 1998; Merrick et al., 2018). Future study is needed to better understand the specific ways in which childhood trauma, executive function, and maladaptive behaviors interact. Until a greater understanding of potential moderators is established, it is recommended that clinicians continue to support child clients who have experienced traumatic events by providing them with coping resources to reduce the use of maladaptive coping mechanisms. Age-appropriate mindfulness techniques have been found to effectively support child survivors in reducing maladaptive coping (Perry-Parrish et al., 2016).

Tables

Table 1

Characteristics of the study sample

Variables	Frequency	Percentage	Mean (SD)	Minimum	Maximum	Valid N
Sex						240
Male	128	53.3				
Female	112	46.7				
Race						240
White	153	62.6				
Hispanic	70	29.2				
Black	12	5				
Asian	2	1.3				
Household annual income						64
Under $10,000	11	4.5				
$10,000-$24,999	15	6.1				
$25,000-$39,999	11	4.5				
$40,000-$54,999	17	7.0				
$55,000-$69,999	4	1.6				
$70,000-$84,999	2	.8				
$85,000-$99,000	0	0				
Over $100,000	4	1.6				
Number of placements			3.28 (6.78)	0	44	240
Age at time of assessments			12.39 (3.15)	6.25	17.93	239

Note. Participants were required to select a single category of race/ethnicity that best described their identity. Participant household annual income is reported as gross income per year. Age is reported in years. The Larimer County Department of Human Services provided all demographic information.

Table 2

Descriptive Statistics for Key Variables

Variables	Mean (SD)	Minimum	Maximum	Valid N
Trauma events	5.45 (1.75)	1	10	244
Global executive composite	65.29 (13.04)	37	96	244
Internalizing	63.08 (10.90)	33	87	244
Externalizing	63.86 (11.17)	33	87	244

Note. A sum of reported trauma events for each participant was calculated from the NCTSN Trauma Checklist. T-scores from the global executive composite of the BRIEF-2 caregiver report represent executive function on this table. Lastly, T-scores from the internalizing and externalizing measures of the CBCL represent maladaptive behaviors.

Table 3

Correlations for All Continuous and Ordinal Variables

	Trauma	GEC	Internalizing	Externalizing	Age	Number of placements	Sex
Trauma	-						
p-value	-						
GEC	-.05 (r_s)	-					
p-value	.398	-					
Internalizing	.01 (r_s)	.57 (r_s)	-				
p-value	.873	<.001*	-				
Externalizing	.03 (r_s)	.73 (r_s)	.60 (r_s)	-			
p-value	.639	<.001*	<.001*	-			
Age	-.01	.05	.14	.10	-		
p-value	.902	.411	.031*	.115	-		
Number of placements	.08	.14 (r_s)	.06 (r_s)	.15 (r_s)	.01	-	
p-value	.902	.031*	.344	.021*	.944	-	
Sex	.04	-.13	.04	-.10	.08	.07	-
p-value	.528	.054	.566	.110	.195	.292	-

Note. * Indicates a significant effect. (r_s) indicates Spearman's rho; all other correlations are Pearson correlations, except analyses involving sex were point biserial analyses. A sum of reported trauma events for each participant was calculated from the NCTSN Trauma Checklist. T-scores from the global executive composite of the BRIEF-2 caregiver report represent executive function in this table. Lastly, T-scores from the internalizing and externalizing measures of the CBCL represent maladaptive behaviors.

Table 4

Results for EF Moderation Analysis

Analysis	b	SE	p-value	r^2	F	df1	df2
Externalizing behavior			< .001*	.55	105.81	3	240
Constant	63.85	.49	< .001*				
Main effect trauma	.53	.29	.068				
Main effect GEC	.63	.04	< .001*				
Interaction trauma x GEC	.01	.03	.718				
Internalizing behavior			<.001*	.37	39.01	3	240
Constant	63.06	.56	< .001*				
Main effect trauma	.26	.37	.477				
Main effect GEC	.50	.05	<.001*				
Interaction trauma x GEC	-.02	.03	.482				

Note. * indicates a significant effect. A sum of reported trauma events for each participant was calculated from the NCTSN Trauma Checklist. T-scores from the global executive composite of the BRIEF-2 caregiver report represent executive function on this table. Lastly, T-scores from the internalizing and externalizing measures of the CBCL represent maladaptive behaviors.

Table 5

Results for Demographic Factors Moderation Analysis with Externalizing Outcome

Variable	b	SE	p-value	r^2	F	df1	df2
Age			.227	.02	1.46	3	235
Constant	63.79	.73	< .001*				
Main effect trauma	.32	.37	.392				
Main effect age	.4	.23	.079				
Interaction	-.15	.11	.173				
Sex			.220	.02	1.48	3	235
Constant	64.60	1.02	< .001*				
Main effect trauma	-.32	.47	.500				
Main effect sex	-1.76	1.45	.227				
Interaction	1.25	.83	.135				
Placement			.012	.043	3.75	3	236
Constant	63.84	.71	< .001*				
Main effect trauma	.15	.35	.670				
Main effect placement	.35	.12	.003*				
Interaction	-.02	.07	.799				
Race/Ethnicity			.732	.026	.68	9	230
Constant	62.96	.92	< .001*				
Main effect trauma	.31	.54	.572				
Main effect: White	1.82	1.65	.271				
Main effect: Hispanic	-.74	9.07	.935				
Main effect: Black	5.64	3.49	.108				
Main effect: Asian	9.46	8.73	.279				
Interaction: White	-.10	.91	.913				
Interaction: Hispanic	-1.31	4.03	.746				
Interaction: Black	-1.77	3.10	.569				
Interaction: Asian	-.71	3.24	.828				

Note. * Indicates a significant effect. A sum of reported trauma events for each participant was calculated from the NCTSN Trauma Checklist. T-scores from the global executive composite of the BRIEF-2 caregiver report represent executive function in this table. Lastly, T-scores from the internalizing and externalizing measures of the CBCL represent maladaptive behaviors.

Table 6

Results for Demographic Factors Moderation Analysis with Internalizing Outcome

Variable	b	SE	p-value	r^2	F	df1	df2
Age			.080	.02	2.28	3	235
Constant	63.04	.71	< .001*				
Main effect trauma	.05	.41	.905				
Main effect age	.49	.20	.014*				
Interaction	.01	.12	.965				
Sex			.865	.00	.24	3	238
Constant	62.88	.91	< .001*				
Main effect trauma	-.28	.50	.574				
Main effect sex	.38	1.43	.788				
Interaction	.63	.82	.443				
Placement			.066	.02	2.43	3	236
Constant	63.13	.71	< .001*				
Main effect trauma	-.02	.41	.957				
Main effect placement	.22	.11	.045*				
Interaction	-.05	.07	.461				
Race/Ethnicity			.984	.01	.26	9	230
Constant	62.91	.90	< .001*				
Main effect trauma	.13	.53	.808				
Main effect: White	.52	1.62	.749				
Main effect: Hispanic	-3.47	8.93	.698				
Main effect: Black	2.48	3.44	.471				
Main effect: Asian	.62	8.59	.943				
Interaction: White	-.27	.90	.769				
Interaction: Hispanic	.87	3.97	.827				
Interaction: Black	2.21	3.06	.470				
Interaction: Asian	-3.23	3.19	.313				

Note. * Indicates a significant effect. A sum of reported trauma events for each participant was calculated from the NCTSN Trauma Checklist. T-scores from the global executive composite of the BRIEF-2 caregiver report represent executive function in this table. Lastly, T-scores from the internalizing and externalizing measures of the CBCL represent maladaptive behaviors.

References

Achenbach, T. M., & Rescorla, L. A. (2001). *Manual for the ASEBA school-age forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, and Families.

Amini-Tehrani, M., Nasiri, M., Jalali, T., Sadeghi, R., Mehrmanesh, M., & Zamanian, H. (2023). Relational adverse childhood experiences questionnaire: Development and retrospective validation among young Iranian people. *Current Psychology, 42*(7), 5306–5321. https://doi.org/10.1007/s12144-021-01874-6

Anderson, A. S., Siciliano, R. E., Henry, L. M., Watson, K. H., Gruhn, M. A., Kuhn, T. M., Ebert, J., Vreeland, A. J., Ciriegio, A. E., Guthrie, C., & Compas, B. E. (2022). Adverse childhood experiences, parenting, and socioeconomic status: Associations with internalizing and externalizing symptoms in adolescence. *Child Abuse & Neglect*, *125*, 105493. https://doi.org/10.1016/j.chiabu.2022.105493

Appelhans, B. M., Thomas, A. S., Roisman, G. I., Booth-LaForce, C., & Bleil, M. E. (2021). Preexisting executive function deficits and change in health behaviors during the COVID-19 pandemic. *International Journal of Behavioral Medicine, 28*(6), 813–819. https://doi.org/10.1007/s12529-021-09974-0

Baddeley, A. (1992). Working Memory. *Science, 255*(5044), 556–559. https://doi.org/10.1126/science.1736359

Bevilacqua, L., Kelly, Y., Heilmann, A., Priest, N., & Lacey, R. E. (2021). Adverse childhood experiences and trajectories of internalizing, externalizing, and prosocial behaviors from childhood to adolescence. *Child Abuse & Neglect, 112*, 104890–104890. https://doi.org/10.1016/j.chiabu.2020.104890

Bounoua, N., & Sadeh, N. (2022). Dimensions of childhood maltreatment and adult risky behaviors: Differential affective and inhibition mechanisms. *Child Abuse & Neglect, 134*, 105877–105877. https://doi.org/10.1016/j.chiabu.2022.105877

Brock, L. L., Brock, C. D., & Thiedke, C. C. (2011). Executive function and medical non-adherence: A different perspective. *International Journal of Psychiatry in Medicine, 42*(2), 105–115. https://doi.org/10.2190/PM.42.2.a

Bronfenbrenner, U., & Cole, M. (1979). The ecology of human development: Experiments by nature and design. Harvard University Press. https://doi.org/10.2307/j.ctv26071r6

Bruce, J., Fisher, P. A., Graham, A. M., Moore, W. E., Peake, S. J., & Mannering, A. M. (2013). Patterns of brain activation in foster children and nonmaltreated children during an inhibition task. *Development and Psychopathology, 25*, 931–941. https://doi.org/10.1017/S095457941300028X

Cabecinha-Alati, S., Langevin, R., Kern, A., & Montreuil, T. (2021). Pathways from childhood maltreatment to unsupportive emotion socialization: Implications for children's emotional inhibition. *Journal of Family Violence, 36*(8), 1033–1043. https://doi.org/10.1007/s10896-020-00184-y

Carlson, G. A., Silver, J., & Klein, D. N. (2022). Psychometric properties of the Emotional Outburst Inventory (EMO-I): Rating what children do when they are irritable. *Journal of Clinical Psychiatry, 83*(2). https://doi.org/10.4088/JCP.21m14015

Carvalho, J. N., Renner, A. M., Donat, J. C., de Moura, T. C., Fonseca, R. P., & Kristensen, C. H. (2018). Executive functions and clinical symptoms in children exposed to maltreatment. *Applied Neuropsychology,* 1–12. https://doi.org/10.1080/21622965.2018.1497989

Chandler, C. E., Shanahan, M. E., & Halpern, C. T. (2021). The association between early reports to Child Protective Services and developmental trajectories through middle childhood. *Child Abuse & Neglect, 122*, 105303–105303. https://doi.org/10.1016/j.chiabu.2021.105303

Conley, M. I., Rapuano, K. M., Benson-Williams, C., Rosenberg, M. D., Watts, R., Bell, C., Casey, B. J., Baskin-Sommers, A. (2023). Executive network activation moderates the association between neighborhood threats and externalizing behavior in youth. *Research on Child and Adolescent Psychopathology.* https://doi.org/10.1007/s10802-022-01003-2

Danese, A., Moffitt, T. E., Arseneault, L., Bleiberg, B. A., Dinardo, P. B., Gandelman, S. B., Houts, R., Ambler, A., Fisher, H. L., Poulton, R., Caspi, A. (2017). The origins of cognitive deficits in victimized children: Implications for neuroscientists and clinicians. *American Journal of Psychiatry, 174*(4), 349–361. https://doi.org/10.1176/appi.ajp.2016.16030333

Daunhauer, L. A., Gerlach-McDonald, B., Will, E., & Fidler, D. J. (2017). Performance and ratings based measures of executive function in school-aged children with Down syndrome. *Developmental Neuropsychology, 42*(6), 351-368. https://doi.org/10.1080/87565641.2017.1360303

D'Elia, D., Carpinelli, L., & Savarese, G. (2022). Post-traumatic play in child victims of adverse childhood experiences: A pilot study with the MCAST-Manchester child attachment story task and the coding of PTCP markers. *Children, 9*(12). https://doi.org/10.3390/children9121991

Doebel S. (2020). Rethinking executive function and its development. *Perspectives On Psychological Science: A Journal of The Association for Psychological Science*, *15*(4), 942–956. https://doi.org/10.1177/1745691620904771

Dong, M. X., Giles, W., Felitti, V., Dube, Williams, J., Chapman, D., & Anda, R. (2004). Insights into causal pathways for ischemic heart disease - Adverse childhood experiences study. *Circulation, 110*(13), 1761–1766. https://doi.org/10.1161/01.CIR.0000143074.54995.7F

Elliott, M., & Ragsdale, J. M. (2022). Stress exposure and well-being: Correlates of meeting criteria for bipolar disorder, borderline personality disorder, or both. *Social Psychiatry and Psychiatric Epidemiology, 57*(9), 1885–1896. https://doi.org/10.1007/s00127-021-02172-z

Engler, A. D., Sarpong, K. O., Van Horne, B. S., Greeley, C. S., & Keefe, R. J. (2022). A systematic review of mental health disorders of children in foster care. *Trauma, Violence, & Abuse, 23*(1), 255–264. https://doi.org/10.1177/1524838020941197

Eriksson, M., Ghazinour, M. & Hammarström, A. (2018). Different uses of Bronfenbrenner's ecological theory in public mental health research: What is their value for guiding public mental health policy and practice? *Social Theory & Health 16*, 414–433. https://doi.org/10.1057/s41285-018-0065-6

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175–191. https://doi.org/10.3758/BF03193146

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. *American Journal of Preventive Medicine, 14*(4), 245–258. https://doi.org/10.1016/S0749-3797(98)00017-8

Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: A review using an integrative framework. *Psychological Bulletin, 134*(1), 31–60. https://doi.org/10.1037/0033-2909.134.1.31

Giano, Z., Wheeler, D. L., & Hubach, R. D. (2020). The frequencies and disparities of adverse childhood experiences in the U.S. *BMC Public Health, 20*(1). https://doi.org/10.1186/s12889-020-09411-z

Gioia, G. A., Isquith, P. K., Guy, S. C., & Kenworthy, L. (2015). Behavior Rating Inventory of Executive Function®, Second Edition (BRIEF®2). Lutz, FL: PAR Inc.

Guarnaccia, C., De Vita, E., Sortino, L., & Giannone, F. (2022). Links between adverse childhood experiences, psychopathological symptoms and recidivism risk in juvenile delinquents. *European Journal of Criminology, 19*(5), 1040–1059. https://doi.org/10.1177/1477370820941408

Hall, P. A., Fong, G. T., & Epp, L. J. (2014). Cognitive and personality factors in the prediction of health behaviors: an examination of total, direct and indirect effects. *Journal of Behavioral Medicine, 37*(6), 1057–1068. https://doi.org/10.1007/s10865-013-9535-4

Hall, P. A., & Marteau, T. M. (2014). Executive function in the context of chronic disease prevention: Theory, research and practice. *Preventive Medicine*, *68*, 44–50. https://doi.org/10.1016/j.ypmed.2014.07.008

Harden, B. J., Duncan, A. D., Morrison, C. I., Panlilio, C., & Clyman, R. B. (2015). Compliance and internalization in preschool foster children. *Children and Youth Services Review, 55*, 103–110. https://doi.org/10.1016/j.childyouth.2015.04.013

Harms, M. B., Shannon Bowen, K. E., Hanson, J. L., & Pollak, S. D. (2018). Instrumental learning and cognitive flexibility processes are impaired in children exposed to early life stress. *Developmental Science, 21*(4). https://doi.org/10.1111/desc.12596

Hawkins, M. A. W., Layman, H. M., Ganson, K. T., Tabler, J., Ciciolla, L., Tsotsoros, C. E., & Nagata, J. M. (2021). Adverse childhood events and cognitive function among young adults: Prospective results from the national longitudinal study of adolescent to adult health. *Child Abuse & Neglect*, *115*, 105008. https://doi.org/10.1016/j.chiabu.2021.105008

Hayes, A. F. (2023). The PROCESS macro for SPSS (Version 4.3.1) [Computer software].

Heleniak, C., Jenness, J. L., Vander Stoep, A., McCauley, E., & McLaughlin, K. A. (2015). Childhood maltreatment exposure and disruptions in emotion regulation: A transdiagnostic pathway to adolescent internalizing and externalizing psychopathology. *Cognitive Therapy and Research, 40*(3), 394–415. https://doi.org/10.1007/s10608-015-9735-z

Helton, J. J., Vaughn, M. G., & Schiff, M. (2022). The accrual of parent reported adverse childhood experiences following a child protective services investigation: A prospective approach. *Child Abuse & Neglect, 124*, 105447–105447. https://doi.org/10.1016/j.chiabu.2021.105447

Herbert, J. L., & Bromfield, L. (2019). Better together? A review of evidence for multi-disciplinary teams responding to physical and sexual child abuse. *Trauma, Violence & Abuse*, *20*(2), 214–228. https://doi.org/10.1177/1524838017697268

Hindt, L. A., & Leon, S. C. (2022). Ecological disruptions and well-being among children in foster care. *American Journal of Orthopsychiatry, 92*(1), 39–50. https://doi.org/10.1037/ort0000584

Horn, S. R., Roos, L. E., Beauchamp, K. G., Flannery, J. E., & Fisher, P. A. (2018). Polyvictimization and externalizing symptoms in foster care children: The moderating role of executive function.

Journal of Trauma & Dissociation, 19(3), 307–324. *https://doi.org/10.1080/15299732.2018.1441353*

Hughes, K., Bellis, M. A., Hardcastle, K. A., Sethi, D., Butchart, A., Mikton, C., Jones, L., & Dunne, M. P. (2017). The effect of multiple adverse childhood experiences on health: A systematic review and meta-analysis. *The Lancet Public Health*, *2*(8), e356–e366. https://doi.org/10.1016/S2468-2667(17)30118-4

Hussey, J. M., Chang, J. J., & Kotch, J. B. (2006). Child maltreatment in the United States: prevalence, risk factors, and adolescent health consequences. *Pediatrics*, *118*(3), 933–942. https://doi.org/10.1542/peds.2005-2452

IBM Corp. (2022). IBM SPSS Statistics for Windows (Version 29.0) [Computer software]. IBM Corp.

Javier, J. R., Hoffman, L. R., & Shah, S. I. (2019). Making the case for ACEs: adverse childhood experiences, obesity, and long-term health. *Pediatric Research*, *86*(4), 420–422. https://doi.org/10.1038/s41390-019-0509-2

Kalmakis, K. A., & Chandler, G. E. (2015). Health consequences of adverse childhood experiences: A systematic review. *Journal of the American Association of Nurse Practitioners, 27*(8), 457–465. https://doi.org/10.1002/2327-6924.12215

Keane, L., & Loades, M. (2017). Low self-esteem and internalizing disorders in young people – a systematic review. *Child and Adolescent Mental Health, 22*(1), 4–15. https://doi.org/10.1111/camh.12204

den Kelder, R. O., den Akker, A. L. V., Geurts, H. M., Lindauer, R. J. L., & Overbeek, G. (2018). Executive functions in trauma-exposed youth: A meta-analysis. *European Journal of Psychotraumatology, 9*(1). https://doi.org/10.1080/20008198.2018.1450595

Klumparendt, A., Nelson, J., Barenbrügge, J., & Ehring, T. (2019). Associations between childhood maltreatment and adult depression: A mediation analysis. *BMC Psychiatry, 19*(1), 36–36. https://doi.org/10.1186/s12888-019-2016-8

Krause, E. D., Mendelson, T., & Lynch, T. R. (2003). Childhood emotional invalidation and adult psychological distress: The mediating role of emotional inhibition. *Child Abuse & Neglect, 27*(2), 199–213. https://doi.org/10.1016/S0145-2134(02)00536-7

Kysar-Moon, A. (2022). Adverse childhood experiences, family social capital, and externalizing behavior problems: An analysis across multiple ecological levels. *Journal of Family Issues, 43*(12), 3168–3193. https://doi.org/10.1177/0192513X211042849

Lechner, W. V., Sidhu, N. K., Kittaneh, A. A., & Anand, A. (2019). Interventions with potential to target executive function deficits in addiction: current state of the literature. *Current Opinion in Psychology, 30*, 24–28. https://doi.org/10.1016/j.copsyc.2019.01.017

Lew, D., & Xian, H. (2019). Identifying distinct latent classes of adverse childhood experiences among US children and their relationship with childhood internalizing disorders. *Child Psychiatry and Human Development, 50*(4), 668–680. https://doi.org/10.1007/s10578-019-00871-y

Liming, K. W., & Grube, W. A. (2018). Wellbeing outcomes for children exposed to multiple adverse experiences in early childhood: A systematic review. *Child & Adolescent Social Work Journal, 35*(4), 317–335. https://doi.org/10.1007/s10560-018-0532-x

Lund, J. I., Boles, K., Radford, A., Toombs, E., & Mushquash, C. J. (2022). A systematic review of childhood adversity and executive functions outcomes among adults. *Archives of Clinical Neuropsychology, 37*(6), 1118–1132. https://doi.org/10.1093/arclin/acac013

Lund, J. I., Toombs, E., Radford, A., Boles, K., & Mushquash, C. (2020). Adverse childhood experiences and executive function difficulties in children: A systematic review. *Child Abuse & Neglect, 106*. https://doi.org/10.1016/j.chiabu.2020.104485

Majer, M., Nater, U. M., Lin, J-M. S., Capuron, L., & Reeves, W. C. (2010). Association of childhood trauma with cognitive function in healthy adults: A pilot study. *BMC Neurology, 10*(61). https://doi.org/10.1186/1471-2377-10-61

Merrick, M. T., Ford, D. C., Ports, K. A., & Guinn, A. S. (2018). Prevalence of adverse childhood experiences from the 2011-2014 behavioral risk factor surveillance system in 23 states. *JAMA Pediatrics. 172*(11), 1038–1044. https://doi.org/10.1001/jamapediatrics.2018.2537

Miller, S.E., Reavis, R.E., & Avila, B.N. (2018). Associations between theory of mind, executive function, and friendship quality in middle childhood. *Merrill-Palmer Quarterly, 64*(3), 397-426. https://doi.org/10.13110/merrpalmquar1982.64.3.0397.

van Moorselaar, D., & Slagter, H. A. (2020). Inhibition in selective attention. *Annals of the New York Academy of Sciences, 1464*(1), 204–221. https://doi.org/10.1111/nyas.14304

Moreno-Manso, J. M., García-Baamonde, M. E., de la Rosa Murillo, M., Blázquez-Alonso, M., Guerrero-Barona, E., & García-Gómez, A. (2022). Differences in executive functions in minors suffering physical abuse and neglect. *Journal of Interpersonal Violence, 37*(5-6), NP2588–NP2604. https://doi.org/10.1177/0886260520944528

Moussavi, Y., Breivik, K., Wergeland, G. J., Haugland, B. S. M., Larsen, M., & Lehmann, S. (2021). Internalizing symptom profiles among youth in foster care: A comparison study. *Frontiers in Psychiatry, 12*, 711626–711626. https://doi.org/10.3389/fpsyt.2021.711626

Moussavi, Y., Wergeland, G. J., Bøe, T., Haugland, B. S. M., Larsen, M., & Lehmann, S. (2022). Internalizing Symptoms Among Youth in Foster Care: Prevalence and Associations with Exposure to Maltreatment. Child Psychiatry and Human Development, 53(2), 375–388. https://doi.org/10.1007/s10578-020-01118-x

Muentner, L., Stone, K. J., Davis, L., & Shlafer, R. (2022). Youth at the intersection of parental incarceration and foster care: Examining prevalence, disparities, and mental health. *Child Abuse & Neglect, 134,* 105910–105910. https://doi.org/10.1016/j.chiabu.2022.105910

Muniz, C. N., Fox, B., Miley, L. N., Delisi, M., Cigarran, G. P., & Birnbaum, A. (2019). The effects of adverse childhood experiences on internalizing versus externalizing outcomes. *Criminal Justice and Behavior, 46*(4), 568–589. https://doi.org/10.1177/0093854819826213

Murphy, F., Nasa, A., Cullinane, D., Raajakesary, K., Gazzaz, A., Sooknarine, V., Haines, M., Roman, E., Kelly, L., O'Neill, A., Cannon, M., & Roddy, D. W. (2022). Childhood trauma, the HPA axis and psychiatric illnesses: A targeted literature synthesis. *Frontiers in Psychiatry*, *13*, 748372–748372. https://doi.org/10.3389/fpsyt.2022.748372

Pechtel, P., & Pizzagalli, D. A. (2013). Disrupted reinforcement learning and maladaptive behavior in women with a history of childhood sexual abuse: A high-density event-related potential study. *JAMA psychiatry*, *70*(5), 499–507. https://doi.org/10.1001/jamapsychiatry.2013.728

Perry, B. D., Pollard, R. A., Blakley, T. L., Baker, W. L., & Vigilante, D. (1995). Childhood trauma, the neurobiology of adaptation, and "use-dependent" development of the brain: How "states" become "traits." *Infant Mental Health Journal*, *16*(4), 271–291. https://doi.org/10.1002/1097-0355(199524)16:4<271::AID-IMHJ2280160404>3.0.CO;2-B

Perry-Parrish, C., Copeland-Linder, N., Webb, L., & Sibinga, E. M. S. (2016). Mindfulness-based approaches for children and youth. *Current Problems in Pediatric and Adolescent Health Care, 46*(6), 172–178. https://doi.org/10.1016/j.cppeds.2015.12.006

Peterson, C. (2021). What is your earliest memory? It depends. *Memory, 29*(6), 811–822. https://doi.org/10.1080/09658211.2021.1918174

Poitras, K., Tarabulsy, G. M., & Pulido, N. V. (2022). Contact with biological parents following placement in foster care: Associations with preschool child externalizing behavior. *Clinical Child Psychology and Psychiatry, 27*(2), 466–479. https://doi.org/10.1177/13591045211049295

Prina, A. M., Cosco, T. D., Dening, T., Beekman, A., Brayne, C., & Huisman, M. (2015). The association between depressive symptoms in the community, non-psychiatric hospital admission and hospital outcomes: A systematic review. *Journal of Psychosomatic Research, 78*(1), 25–33. https://doi.org/10.1016/j.jpsychores.2014.11.002

Quistberg, K. A., & Mueller, U. (2020). Prospective relations between kindergarteners' executive function skills and their externalizing and internalizing behaviors. *Clinical Neuropsychologist, 34*(4), 845–862. https://doi.org/10.1080/13854046.2019.1591510

Reynolds, B. W., Basso, M. R., Miller, A. K., Whiteside, D. M., & Combs, D. (2019). Executive function, impulsivity, and risky behaviors in young adults. *Neuropsychology, 33*(2), 212–221. https://doi.org/10.1037/neu0000510

Ruhland, E. L., Davis, L., Atella, J., & Shlafer, R. J. (2020). Externalizing behavior among youth with a current or formerly incarcerated parent. *International Journal of Offender Therapy and Comparative Criminology, 64*(1), 3–21. https://doi.org/10.1177/0306624X19855317

Sattler, K. M. P., & Font, S. A. (2018). Resilience in young children involved with child protective services. *Child Abuse & Neglect*, *75*, 104–114. https://doi.org/10.1016/j.chiabu.2017.05.004

Schmidt, M. R., Narayan, A. J., Atzl, V. M., Rivera, L. M., & Lieberman, A. F. (2020). Childhood maltreatment on the adverse childhood experiences (ACEs) scale versus the childhood trauma questionnaire (CTQ) in a perinatal sample. *Journal of Aggression, Maltreatment & Trauma,* 1–19. https://doi.org/10.1080/10926771.2018.1524806

Sinha, P., Calfee, C. S., & Delucchi, K. L. (2021). Practitioner's guide to latent class analysis: Methodological considerations and common pitfalls. *Critical Care Medicine, 49*(1), e63–e79. https://doi.org/10.1097/CCM.0000000000004710

Steward, T., & Berner, L. A. (2020). Binge Eating. Springer. https://doi.org/10.1007/978-3-030-43562-2_10

Taşören, A. B. (2017). Drug use and self-harming behavior among incarcerated men: Does childhood abuse, anger, and executive function make a difference? *Journal of Aggression, Maltreatment & Trauma, 26*(9), 1006–1023. https://doi.org/10.1080/10926771.2017.1346028

Thakur, N., Hessler, D., Koita, K., Ye, M., Benson, M., Gilgoff, R., Bucci, M., Long, D., & Burke Harris, N. (2020). Pediatrics adverse childhood experiences and related life events screener (PEARLS) and health in a safety-net practice. *Child Abuse & Neglect*, *108*, 104685. https://doi.org/10.1016/j.chiabu.2020.104685

Vazire, S. (2006). Informant reports: A cheap, fast, and easy method for personality assessment. *Journal of Research in Personality, 40*(5), 472–481. https://doi.org/10.1016/j.jrp.2005.03.003

Vreeland, A., Ebert, J. S., Kuhn, T. M., Gracey, K. A., Shaffer, A. M., Watson, K. H., Gruhn, M. A., Henry, L., Dickey, L., Siciliano, R. E., Anderson, A., & Compas, B. E. (2020). Predictors of placement disruptions in foster care. *Child Abuse & Neglect, 99*, 104283–104283. https://doi.org/10.1016/j.chiabu.2019.104283

Weber, D. A., & Reynolds, C. R. (2004). Clinical perspectives on neurobiological effects of psychological trauma. *Neuropsychology Review, 14,* 115-129. https://doi.org/10.1023/B:NERV.0000028082.13778.14

Wei, X., & Lü, W. (2023). Childhood trauma and internalizing and externalizing behavior problems among adolescents: Role of executive function and life events stress. *Journal of Adolescence.* https://doi.org/10.1002/jad.12150

Wetherill, L., Foroud, T., & Goodlett, C. (2018). Meta-analyses of externalizing disorders: Genetics or prenatal alcohol exposure? *Alcoholism, Clinical and Experimental Research, 42*(1), 162–172. https://doi.org/10.1111/acer.13535

Xue, J.-M., Lin, P.-Z., Sun, J.-W., & Cao, F.-L. (2017). Disrupted executive function and aggression in individuals with a history of adverse childhood experiences: An event-related potential study. *The Journal of Nervous and Mental Disease, 205*(12), 942–951. https://doi.org/10.1097/NMD.0000000000000743

Yang, Y., Shields, G. S., Zhang, Y., Wu, H., Chen, H., & Romer, A. L. (2022). Child executive function and future externalizing and internalizing problems: A meta-analysis of prospective longitudinal

studies. *Clinical Psychology Review, 97*, 102194–102194. https://doi.org/10.1016/j.cpr.2022.102194

Yoon, M., Cho, S., & Yoon, D. (2019). Child maltreatment and depressive symptomatology among adolescents in out-of-home care: The mediating role of self-esteem. *Children and Youth Services Review, 101*, 255–260. https://doi.org/10.1016/j.childyouth.2019.04.015

Zarse, E. M., Neff, M. R., Yoder, R., Hulvershorn, L., Chambers, J. E., & Chambers, R. A. (2019). The adverse childhood experiences questionnaire: Two decades of research on childhood trauma as a primary cause of adult mental illness, addiction, and medical diseases. *Cogent Medicine, 6*(1). https://doi.org/10.1080/2331205X.2019.1581447

Zelazo, P. D. (2020). Executive function and psychopathology: A neurodevelopmental perspective. *Annual Review of Clinical Psychology, 16*(1), 431–454. https://doi.org/10.1146/annurev-clinpsy-072319-02424