

Executive Function and Communication in Children Who Have Experienced Adverse  
Childhood Experiences

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## **Abstract**

As research surrounding adverse childhood experiences (ACEs) has moved past evaluating long term effects and is now progressing towards developing interventions, viable targets for intervention must be found. This research project examined the relationships between executive functioning skills, aspects of communication, and verbal comprehension and vocabulary with ACEs and with coping. In this study, data from 56 parent-child dyads surrounding experience of ACEs, executive functioning, verbal comprehension, communication, and coping were analyzed. Correlations between these variables were analyzed, and several significant correlations were found. These include the relationship between domestic violence and digit span ( $r = -.40, p < .01$ ), working memory ( $r = -.31, p < .05$ ), and auditory working memory ( $r = -.37, p < .05$ ), and the relationship between parental Positive Mood and physical abuse ( $r = -.29, p < .05$ ), emotional neglect ( $r = -.29, p < .05$ ) and domestic violence ( $r = -.36, p < .01$ ). After future research, these could potentially be avenues for future interventions.

## **Introduction**

Although childhood is characterized by positive experiences for most people, not everyone has this experience. For some, childhood is marred by experiences of neglect or abuse, and these experiences have lasting effects on them as they age. These hardships during childhood have been studied using various terms, including adverse childhood experiences (ACEs) (Felitti et al., 1998), early life stress (ELS) (Cohen et al., 2006), and early life adversity (ELA) (Cosco to name a few. In the current study, I will use the term, ACEs. ACEs are defined as experiences of neglect, maltreatment, stressful situations, or maladaptive home life before the age of 18 (Felitti et al., 1998). There are many types of ACEs, including physical abuse, emotional abuse, sexual abuse, witnessing maternal abuse, parental separation, parental death, parental substance abuse, parental mental health problems, parental criminality (Felitti et al., 1998), physical or emotional neglect (McLaughlin, Sheridan, & Lambert, 2014), experiencing war, experiencing natural disaster, being hospitalized, and experiencing serious illness (Cohen et al., 2006). While this is not an exhaustive list of ACEs that a child can experience, it contains many of the ACEs that have been studied.

An important aspect of ACEs is that they do not occur independently of one another; that is, ACEs tend to co-occur. It is unlikely that a person would only experience one ACE; rather, they tend to occur in a compounding fashion. In a seminal study on this topic, Felitti et al. (1998) were the first to examine the possible co-occurrence of ACEs. They looked at seven ACEs and found that over half of the sample of over 13,000 adults in their study who reported experiencing any ACE in childhood reported at least two of the seven that they included. The ACEs included by Felitti et al. (1998) were psychological, physical, and sexual abuse; parental substance abuse, parental mental illness, maternal abuse, and parental criminal behavior. Furthermore, the more

ACEs that an individual experienced, the stronger the association with a variety of mental and physical health problems. Felitti et al. (1998) examined the relations between ACEs and diseases that were leading causes of death in adults, as well as between ACEs and risk factors for these diseases. The number of ACEs experienced was positively correlated with the number of risk factors experienced, and with the number of disease conditions experienced. Felitti et al. (1998) found that ACEs and morbidity were linked through health risk behaviors, including smoking, obesity, inactivity, depressed mood, suicide attempts, alcoholism, regular and parenteral drug abuse, sexual partners, and sexually transmitted infections

On top of these important findings, Felitti et al. (1998) provided the impetus for a wide variety of other studies over the following two decades. Subsequent studies used the data collected from the surveys and the health screenings from the Kaiser/CDC data to examine association between the experience of ACEs and a variety of psychopathological and behavioral problems in adulthood. These include attempted suicide (Dube et al., 2001), alcohol abuse (Dube, 2002), overall mental health (Edwards et al., 2003), depressive disorders (Chapman et al., 2004), and a variety of others. Additionally, studies using data other than Felitti et al. (1998) looked for associations between ACEs and anxiety disorders (Cohen et al., 2006) and mental and emotional wellbeing in adolescents (Mclaughlin et al., 2012), to name a few. All of these studies found a dose-response relationship between the number of ACEs experienced and the severity of the health problem being looked at later in life, meaning the more ACEs experienced, the more severe were the mental and physical health problems.

For the better part of the two decades since the publication of the Felitti et al. (1988) original ACEs paper, the majority of the research has focused on empirically testing the hypothesis that ACEs are harmful to people beyond the actual experience of them. Although the

adverse consequences of ACEs may seem intuitive, the detrimental nature of ACEs still had to be supported with evidence, which is what these studies did. The associations between the experience of ACEs and the variety of mental and physical health problems in adulthood had to be established first before research could move forward. Currently, the harmful effects of ACEs have been adequately supported, so research has begun to move to the next stage of the process: finding how the experience of ACEs and future mental and physical health problems are connected. The ultimate goal is to create interventions that can be implemented for children who are experiencing or have experienced ACEs in order to decrease the severity, or even prevent the onset of these future problems. In order to develop interventions, the processes that account for the link between ACEs and future problems that the intervention can address must be found.

Many studies that have been looking for mediating factors, or links, between ACEs and mental and physical health problems in adulthood have looked at the role of stress and coping in the lives of these individuals (Compas et al., 2017). Stress is defined as mental or emotional strain or tension caused by adverse or demanding circumstances, termed stressors (Compas et al., 2017). Stress is experienced by everyone, though some are more susceptible to its effects than others. As such, the more stressors someone experiences and the less equipped they are to deal with it, the more likely they will experience mental and physical health problems. It is undeniable that ACEs are stressful experiences in the lives of the children who experience them, so it is possible that this increased stress level could be account for the increased likelihood of the development of mental and physical health problems.

The other half of the stress and coping process is coping, which can be conceptualized as voluntary emotion regulation under stress (Compas et al., 2001). Coping involves conscious and volitional skills, meaning it can be taught. One proposed model looks at coping in three distinct

factors: primary control coping, secondary control coping, and disengagement coping (Compas et al., 2014). Primary control coping is the use of strategies to change the source of stress (problem solving), or one's emotional reactions to the stressor (emotional expression and emotional modulation). Secondary control coping is efforts to adapt to stress (cognitive reappraisal, positive thinking, acceptance, distraction). Disengagement coping is efforts to orient oneself away from sources of stress or one's reaction to it (avoidance, denial, wishful thinking).

Primary control coping is best suited for stressors when a person can take action to alter their situation or their reaction to the situation in order to reduce stress. While not looked at as often as secondary control coping in regards to stressful situations for children and adolescents, some studies have found connections between primary control coping and reduced internalizing and externalizing problems. For example, this has been found for minority adolescents facing racial discrimination (Edwards & Romero, 2008) and children with Acute Lymphocytic Leukemia (Campbell et al., 2009).

In situations where the source of the stress is outside of the control of a person, the use of secondary control coping has been found to have the best effects of limiting internalizing and externalizing problems. This has been found in stressful situations of children with cancer (Compas et al., 2014) and with sickle cell disease (Prussien et al., 2018), and it is reasonable to believe that this would extend to the experience of ACEs, as well. As coping is something that can be taught, if primary and secondary control coping skills can be taught to children who have experienced ACEs in an intervention, it is possible that the stress levels can be reduced, thus reducing the probability of developing a mental or physical health problem related to the stress that comes with the experience of ACEs.

While coping is the voluntary response to stress, there are other factors that might affect one's ability to cope when they are facing extreme or chronic stress. The prefrontal cortex (PFC) of the brain is where executive functioning occurs, and chronic stress potentially disrupt its functioning, thus chronic stress is a risk for impairment of executive functioning skills (Radley, Morilak, Viau, & Campeau, 2015). Executive functioning (EF) is a set of top-down processes which aid in emotional regulation and behavior control; examples include working memory, inhibition, and cognitive flexibility (Diamond, 2013). Due to the nature and purpose of EF, it is plausible that it is related to coping. For example, an example of secondary control coping is cognitive reappraisal, in which one holds their thoughts in their working memory where they analyze and reframe them. With impaired working memory skills, this task would be more difficult and less effective. For example, Reising et al. (2017) found that certain areas of the PFC were active during a stressful EF task, but there were different activation patterns for children who experienced the chronic stress of having a mother with depression and those who have not. These regions of the PFC were also positively correlated with stress exposure and negatively correlated with secondary control coping. In other words, a child who has experienced more stress has to use greater levels of PFC brain activation (which is activated during EF tasks), which is related to lower levels of secondary control coping.

Executive functioning is not limited to working memory nor is its relationship to coping limited to secondary control coping. Campbell et al. (2009) studied EF in children and adolescents with Acute Lymphocytic Leukemia. They looked at four measures of EF – working memory, behavioral inhibition, cognitive flexibility, and self-monitoring – in relation to all three styles of coping. They found that, for children and adolescents with this disease, all four measures of EF were significantly positively correlated with primary control coping, all but

behavioral inhibition were significantly positively correlated with secondary control coping, and all but cognitive flexibility were significantly negatively correlated with disengagement coping. Furthermore, all measures of EF and primary and secondary control coping were negatively correlated with behavioral problems. They also found that secondary control coping mediates the relationship between EF and behavioral problems. Such widespread findings indicate that EF and coping are linked, and that coping can be used to mediate issues that impaired EF might cause.

In addition to employing working memory skills, secondary control coping processes such as cognitive reappraisal also require the use of vocabulary and verbal skills. Cognitive reappraisal is the reevaluation of how one views the situation at hand. To do this, one must use verbal or vocabulary skills to reword mentally the perception of a source of stress. If verbal skills are limited or impaired, it becomes difficult to make use of this effective coping tool. For example, Prussien et al. (2018) looked specifically at these functions in children with sickle cell disease, a condition in which red blood cells cannot effectively carry oxygen to the body, including to the brain. They found that verbal comprehension was negatively associated with depressive symptoms through secondary control coping. In other words, this means a child's verbal comprehension skills impacted their ability to perform secondary control coping, which in turn impacted their levels of depression. This implies that if the skills needed to improve verbal comprehension can be taught, then secondary control coping can be improved and depression symptoms could be reduced. Secondary control coping has also been found to be negatively associated with other mental health problems, such as anxiety and depression (Compas et al., 2014), so improving secondary control coping can lead to a decrease in anxiety problems as well.



Another pathway to regulating emotion is the cognitive and spoken language used by the person. In a constructionist point of view surrounding emotion, language plays a role in discerning and labelling emotions both in one's self and in others (Lindquist, Satpute, & Gendron, 2015). Lindquist et al. (2015) found that when participants did not have the language to label specific emotions (such as children or semantic dementia patients) they could not specifically separate images of emotions "disgust", "fear", and "anger". Similarly, they found that when the semantic meaning of a word had been saturated (repeating the word "anger" out loud 30 times so it temporarily lost its meaning), an angry face lost its priming effect when presented as a prime before a question unrelated to "anger". Conversely, when semantic knowledge was made readily accessible by writing a story about a fearful experience, participants reacted more fearfully when presented with a stimulus designed to create a feeling of unpleasantness (Lindquist et al., 2015). As both sides of this relationship show a connection, it is plausible that language plays a role in the identification and experience of emotion. With this in mind, if language is negatively affected by the experience of ACEs, it could be more difficult for people fully identify emotions and their experience of them.

Finally, the communicative aspect of language has the ability to help reduce symptoms of depression and anxiety, two of the significant mental health problems among children who have experienced ACEs. Healthy communication with parents (Pantaleao & Ohannessian, 2019) and internal "self-talk" (Kross et al., 2014; Nook, et al., 2019) leads to reduced affective symptoms. Pantaleao and Ohannessian (2019) found significant correlations between adolescent-caregiver communication and a variety of coping strategies, as well as correlations with depressive and anxiety symptoms. Communication between adolescent boys and their fathers had a negative correlation for depressive symptoms and anxiety symptoms. Communication between adolescent

girls and their mothers was correlated with a decrease in depressive and anxiety symptoms through several coping strategies. These include humor (a positive correlation between mother-daughter communication and humor use; and a negative correlation between humor use and depressive symptoms and anxiety symptoms) and instrumental social support (a positive correlation between mother-daughter communication and instrumental social support; and a negative correlation between instrumental social support and depressive symptoms and anxiety symptoms). \Conversely, Miller, et al. (2018) found that children who experienced ACEs particularly relating to deprivation had higher externalizing problems indirectly effected by verbal abilities. The correlation between deprivation and verbal abilities was  $-.26$  and between verbal abilities and externalizing problems, it was  $-.16$ . The correlation between deprivation and externalizing problems was  $-.19$ , all statistically significant. Given that communication with parents is correlated both directly and indirectly with decreased affective symptoms and that decreased language ability mediated the negative correlation between deprivation and externalizing problems, the communicative relationship between adolescents and their parents is worth looking in to.

These findings suggest several potential avenues for interventions. While an intervention for children who have experienced ACEs is the ultimate goal, the first step is assessing whether potential processes are related to the stress experienced by ACEs and their ability to cope. If stress is the primary mediator of the effects of ACEs on later development, then what are other mediators that prevent these children from adequately coping with their stress? This is the focus of the current study. My first research question asks if there is a relationship between children's executive functioning, their exposure to ACEs, and their coping. My second research question asks if whether there is a relationship between parents' communication styles and children's

exposure to ACEs. Finally, my third research questions asks if there is a relationship between parents' communication styles, children's cognitive functioning, and children's coping.

## **Methods**

### **Participants**

Participants were 56 adolescent-caregiver dyads. The adolescents were aged 9-15 ( $M = 12.23$ ,  $SD = 1.68$ ) and 53.6% were female ( $n = 30$ ). The participants have experienced a wide range of ACEs, varying in number, type, and intensity. The relationship between the adolescent and the caregiver was varied; possible relationships included biological parents, adoptive parents, foster parents, and other relatives. These dyad pairs came from Stress and Emotion in the Lives of Families (SELF) study from the Vanderbilt Stress and Coping Lab. Only 37 participants completed the KBIT before it was removed from the procedure for time constraints. The WISC-V Auditory Working Memory Index standard score was able to be calculated for only 35 of the participants.

### **Measures**

*Adverse childhood experiences.* Both the parents and the children completed the Childhood Trauma Questionnaire (CTQ), a questionnaire the completed on paper consisting of 28 questions that assess if children have experienced maltreatment during their childhood and its severity and frequency. It covers six domains of ACEs – emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, and minimization/denial – as well as 3 added questions regarding witnessing domestic violence and experiencing natural disaster. These are scored by a research assistant and more information is obtained in a follow-up interview if determined necessary.

*Executive functioning.* The Wechsler Intelligence Scale for Children, fifth edition (WISC-V) to measure the executive functioning of the children. The test is split across three subtests, all administered by a research assistant. The first is the Digit Span subtest, where the research assistant orally presents a series of numbers, and the participant is asked to repeat them back in reverse order. Next, the participant completes the Picture Span subtest, where the participant is shown a series of pictures in a specific order for five seconds. They are then shown an array of pictures that includes the ones they previously saw and are asked to identify the ones they saw previously in the order they were shown. Finally, participants complete the Letter-Numbering Sequencing subtest, where the participant has to repeat a series of scrambled number or letter back to the research assistant in numerical or alphabetical order. All three of these tests take roughly 10 minutes to complete, for 30 minutes in total. These subtests are combined to measure the Working Memory and Auditory Working Memory Indexes. In these indexes, a score of 90-109 is considered normative.

*Verbal intelligence.* The Kaufman Brief Intelligence Test, Second Edition (KBIT-2) was used to measure the verbal intelligence of the children. This test takes roughly 20 minutes and is administered by a research assistant. It measures verbal and nonverbal intelligence and gives an overall IQ score.

*Coping.* Parents and children filled out the Response to Stress Questionnaire (RSQ) Family Stress Version to assess coping styles. This is a self-report survey that the adolescent takes on a computer prior to coming to the lab. It consists of 57 questions that measure the way the adolescent responds to stress and regulates their emotions with respect to stressful family situations that have occurred in the past 6 months. The children fill out a self-report and the parents fill out both a self-report and a report on their child.

*Communication.* The adolescent-caregiver dyads completed a 10-minute video-taped conversation surrounding a recent stressful event to examine the communication styles of the parents and the adolescents. The dyads are asked to discuss a topic, present both of their perspectives, and try to reach a solution to the problem. These videos were coded by reliable coders using the Iowa Family Interaction Rating Scale (IFIRS) to measure macro-level interactions. IFIRS scales are coded on a 1 to 9 scale, where 1 signifies the scale description is “not at all characteristic” of the subject, where there is no frequency or intensity. A 9 means the description is “mainly characteristic” of the subject, either because of consistent frequency, high intensity, or both. The codes analyzed in this study are communication (CO), listener response (LR), positive mood (PM), hostility (HS), and externalized negativity (EX).

## **Procedure**

The dyads completed all of the measures in the Stress and Coping Laboratory on Vanderbilt’s Peabody campus. Several surveys were completed prior to arrival through REDcap, including the RSQ. After obtaining consent and assent, the participants began by separately completing a series of questionnaires including the CTQ and doing cognitive testing, including the WISC and the KBIT-2. Once they finished, they were brought into the same room to perform a series of tasks used to measure physiological data (this data will not be used in this project). Participants then completed the 10-minute recorded conversation. Finally, they separated again and watched the video of the conversation, continuously rating how they felt during the interaction (this data will not be used in this project). Once they completed everything, the family received \$100 compensation.

## Data Analyses

This project examined bivariate correlations among the primary variables of interest: ACEs and cognitive functioning; cognitive functioning and responses to stress; ACEs and responses to stress; ACEs and communication; communication and responses to stress; and communication and cognitive functioning. These correlations were done using SPSS.

## Results

### Descriptive Statistics

As can be seen in Table 1, on average, the children WISC-V scores fell within the normative range for working memory ( $M = 104.21$ ,  $SD = 13.03$ ) and auditory working memory ( $M = 101.51$ ,  $SD = 13.58$ ). There were very high levels of skewness in the number of ACEs reported, with most children and adolescents reporting low levels of ACEs. This can be seen across all four aspects measured, with emotional neglect the least skewed at 1.83, physical abuse at 3.30, domestic violence at 3.85, and physical neglect the highest at 4.24. To account for this degree of skewness, a log regression transformation was performed with a base of 10, which reduced the skewness. The new skewness levels are physical abuse at 2.79 ( $M = .77$ ,  $SD = .12$ ), emotional neglect at .86 ( $M = .83$ ,  $SD = .14$ ), physical neglect at 1.76 ( $M = .79$ ,  $SD = .13$ ), and domestic violence at 2.12 ( $M = .40$ ,  $SD = .20$ ). These are still skewed, and thus should still be taken with caution, but they are much less so than before the log transformation. With respect to coping, the children and adolescents used similar proportions of primary control coping ( $M = 0.17$ ,  $SD = .04$ ), secondary control coping ( $M = 0.24$ ,  $SD = .06$ ) and disengagement coping ( $M = 0.16$ ,  $SD = .06$ ). For the IFIRS codes on parent communicative styles, the parents towards the low to middle range, with PM being the lowest ( $M = 2.96$ ,  $SD = 1.39$ ), followed by EX ( $M =$

3.16,  $SD = 1.72$ ), HS ( $M = 4.40$ ,  $SD = 1.70$ ), LR ( $M = 5.35$ ,  $SD = 1.16$ ), and CO being the highest ( $M = 6.25$ ,  $SD = 0.99$ ).

### **Hypothesis 1**

The first hypothesis regarding the relationship between exposure to ACEs, cognitive function, and coping was partially supported. Table 2 presents the correlations relevant to this research question: WISC-V scores, CTQ scores, and RSQ ratio scores. The hypothesis was partially supported, as several of the correlations between the WISC-V and CTQ scores were statistically significant. Exposure to domestic violence is the most prominent, being significantly correlated with digit span ( $r = -.40$ ,  $p < .01$ ), working memory ( $r = -.31$ ,  $p < .05$ ), and auditory working memory ( $r = -.37$ ,  $p < .05$ ). Digit span was also correlated with physical abuse ( $r = -.28$ ,  $p < .05$ ) and physical neglect ( $r = -.33$ ,  $p < .05$ ).

Consistent with prior research (Felitti et al., 1998), all of the ACEs were significantly correlated with each other. This supports the notion that ACEs rarely occur in isolation, and that if a child experiences one, they are likely to experience others concurrently. The correlations for the ACEs can be seen in Table 2.

Surprisingly, coping was not correlated with EF nor ACEs experienced. It is possible that using another combination of parent report on child and child self-report would have significant findings, but using the parent-report on ACEs and the child-report on coping did not. Additionally, contrary to expectations, verbal intelligence was not significantly correlated with any of the other measures across hypotheses (these analyses are not included in Table 2).

Regression analyses with each of the EF measures as the dependent variables and the ACEs and the coping measures as the independent variables were completed in an attempt to

expand on the hypothesis. There were no significant findings for dependent variables of Digit Span ( $F = 1.93, p = .09$ ), Working Memory ( $F = 1.21, p = .31$ ), nor Auditory Working Memory ( $F = 1.05, p = .42$ ).

## **Hypothesis 2**

The second hypothesis, which examined the relationship between parents' communication and children's ACEs, was also partially supported. As expected, there were positive relationships between the positive communication codes CO, LR, PM, and negative relationships between these three and HS. There were no significant correlations between EX and any of the other IFIRS codes.

The main support for the hypothesis is that parents' PM was significantly negatively correlated with physical abuse ( $r = -.29, p < .05$ ), emotional neglect ( $r = -.29, p < .05$ ) and domestic violence ( $r = -.36, p < .01$ ). This suggests that parents of children who experienced higher levels of ACEs were low in their displays of positive emotions towards the child, in the case of neglect, or in general, in the case of domestic violence. The only other significant correlation was between parent's CO and emotional neglect ( $r = -.33, p < .05$ ). This was also consistent with the hypothesis, as parents of children who experienced emotional neglect displayed less positive communication towards their children.

Finally, counter to the hypothesis, parental HS, EX, and LR were not correlated with any measures of ACEs .



### **Hypothesis 3**

The final hypothesis about the relationship between parents' communication, children's EF, and children's coping was not supported. The only significant correlation across the categories was between parent's PM and disengagement coping ( $r = -.28, p < .05$ ).

Regression analyses with each of the coping styles as the dependent variables and parent communication measures and EF measures as the independent variables were run. Once again, there were no significant findings for dependent variables of Primary Control Coping ( $F = .86, p = .57$ ), Secondary Control Coping ( $F = .82, p = .59$ ), nor Disengagement Coping ( $F = 2.00, p = .09$ ).

### **Discussion**

Research has confirmed that ACEs are linked to later mental health problems (Chapman et al., 2004; Cohen et al., 2006) and physical health problems (Felitti et al., 1998). Further research has looked at the role stress and coping play in the association between ACEs and future mental and physical health problems (Compas et al., 2001; Gruhn & Compas, 2020). Research on stress and coping can provide important information on the mechanisms that account for the association of ACEs and mental and physical health. However, it is unlikely that stress and coping function in isolation in mediating this relationship; there likely are other factors at play. This research study addressed several potential other factors that could play a role in the relationship between the stress of ACEs and coping.

The first research hypothesis examined the relationship between EF, ACEs, and coping and yielded several findings. First, there was no relationship between verbal intelligence and ACEs nor coping. This is surprising, given the linguistic nature of several types of secondary

control coping (e.g., Prussien et al., 2018). Second, the lack of relationship between ACEs and coping is unexpected given that this relationship has been found when looking at other types of ACEs (Compas et al., 2014; Edwards & Romero, 2008; Gruhn & Compas, 2020). Finally, there were significant correlations between measures of EF and ACEs. What was surprising about these findings, though, was that the correlations were the highest between EF and domestic violence, which is an ACE that occurs in the environment of the child, but is not directed at the child in the same way as physical abuse, physical neglect, or emotional neglect. This relationship poses an opportunity for further investigation.

The second research hypothesis examined the relationship between parental communication styles and ACEs. Testing of this hypothesis yielded significant correlations between several measures of ACEs and parental communication styles. Parents' PM was negatively correlated to emotional neglect. Parent's CO was also negatively correlated with emotional neglect. These findings make sense, as a parent who emotionally neglects their child would likely not be very positive nor communicative towards them. The fact that parents' HS did not correlate with any of the ACEs was interesting, as HS is an avenue for abusive parenting behaviors.

Finally, the third research hypothesis involving parental communication style, child EF, and child coping did not yield any major findings. The only significant correlation was a negative correlation between parent's LR and children's disengagement coping. This lack of relationship is contrary to previous findings (Pantaleao & Ohannessian, 2019) and is thus an avenue for further research.

Although this study showed several significant findings, there are design limitations which could have potentially affected results. Primarily, this is part of an ongoing study, with

only 56 participants enrolled at the time that these analyses are conducted, and several measures only had data on a little more than 30 of the participants. Additionally, the number of ACEs experienced by children in this sample was relatively low and scores on the CTQ highly skewed. The sample studied reported lower degrees of exposure to ACEs on the CTQ. A sample of children and adolescents who report higher levels of ACEs might show different degrees of relationships between all the variables or may show different relationships all together. Given that studies have found that ACEs have a dose-response relationship with health problems later in life where the more ACEs experienced, the more severe the problems are (e.g., Dube et al., 2001; Edwards et al., 2003), this would be an important group to study. They are the ones in most dire need of an intervention as they are at the greatest risk.

Other opportunities for future studies include analyzing other aspects of the WISC-V and seeing how those measures compare to ACEs and coping. Additionally, the RSQ and CTQ were filled out by both the child about themselves and the parent about the child. This study looked at parent report on child for the CTQ and child self-report for RSQ. other studies could look at different combinations of these two measures with each other, with communication, and with EF.

This study looked at several aspects that could have served as potential entry points for future interventions. Although the findings here were not as widespread as originally hoped, they did point out several interesting relationships that can be further expanded upon. In time, perhaps these findings can lead to interventions that help reduce future health problems for children who have experiences ACEs.

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**Table 1***Descriptive statistics for key study variables*

Variable	M	SD	Min	Max	Skewness
<b>Child Executive Functioning</b>					
WISC-V Digit Span	10.29	2.67	4.00	18.00	-.15
WISC-V Working Memory Index	104.21	13.03	72.00	132.00	-.17
WISC-V Auditory Working Memory Index	101.51	13.58	73.00	143.00	.88
<b>ACEs</b>					
CTQ Physical Abuse (PRC)	.77	.12	.70	1.34	2.79
CTQ Emotional Neglect (PRC)	.83	.14	.70	1.18	.86
CTQ Physical Neglect (PRC)	.79	.13	.70	1.28	1.76
CTQ Domestic Violence (PRC)	.40	.20	.30	1.00	2.21
<b>Child Self Report Coping Ratio</b>					
Primary Control Coping (RC)	.17	.04	.08	.25	.07
Secondary Control Coping (RC)	.24	.06	.14	.44	.73
Disengagement Coping (RC)	.16	.03	.10	.24	-.09
<b>Parent Communication Style</b>					
IFIRS Parent PM	2.96	1.39	1	6	.15
IFIRS Parent LR	5.35	1.16	2	7	-.80
IFIRS Parent CO	6.25	0.99	3	8	-.54
IFIRS Parent EX	3.16	1.72	1	8	.76
IFIRS Parent HS	4.40	1.70	1	8	-.21



Table 2

*Bivariate correlation matrix among key study variables for Hypothesis 1*

Variable	1	2	3	4	5	6	7	8	9
1. WISC-V Digit Span	—								
2. WISC-V Working Memory Index	.83**	—							
3. WISC-V Auditory Working Memory Index	.92**	.80**	—						
4. CTQ Physical Abuse (PRC)	-.28*	-.21	-.10	—					
5. CTQ Emotional Neglect (PRC)	-.16	-.09	-.05	.36**	—				
6. CTQ Physical Neglect (PRC)	-.33*	-.23	-.24	.72**	.47**	—			
7. CTQ Domestic Violence (PRC)	-.40**	-.31*	-.37*	.67**	.29*	.59**	—		
8. RSQ Primary Control Coping Ratio (CR)	.07	.06	-.03	-.16	-.16	-.08	.03	—	
9. RSQ Secondary Control Coping Ratio (CR)	-.02	-.11	-.10	-.19	-.07	-.11	-.20	.30*	—
10. RSQ Disengagement Coping Ratio (CR)	-.17	-.05	-.03	.10	.12	.10	.09	-.57**	-.43**

*Note.* WISC-V = Wechsler Intelligence Scale for Children-V; CTQ = Childhood Trauma Questionnaire; (PRC) = Parent report on child; RSQ = Response to Stress Questionnaire; (CR) = Child report. \* $p < .05$ , \*\* $p < .01$

Table 3

*Bivariate correlation matrix among key study variables for Hypothesis 2*

Variable	1	2	3	4	5	6	7	8
1. CTQ Physical Abuse (PRC)	—							
2. CTQ Emotional Neglect (PRC)	.36**	—						
3. CTQ Physical Neglect (PRC)	.72*	.47**	—					
4. CTQ Domestic Violence (PRC)	.67**	.29*	.59**	—				
5. Parent IFIRS PM	-.29*	-.29*	-.16	-.36**	—			
6. Parent IFIRS LR	-.03	-.13	.02	-.03	.43**	—		
7. Parent IFIRS CO	-.12	-.33*	-.12	-.26	.59**	.75**	—	
8. Parent IFIRS EX	-.06	.16	-.41	.02	-.02	.16	.04	—
9. Parent IFIRS HS	.10	-.01	-.10	.06	-.31*	-.50**	-.46**	-.02

*Note.* CTQ = Childhood Trauma Questionnaire; PRC = Parent report on child; IFIRS = Iowa Family Interaction Rating Scale; PM = positive mood; LR = listener response; CO = communication; EX = externalized negativity; HS = hostility. \* $p < .05$ , \*\* $p < .01$

Table 4

*Bivariate correlation matrix among key study variables for Hypothesis 3*

Variable	1	2	3	4	5	6	7	8	9	10
1. Parent IFIRS PM	—									
2. Parent IFIRS LR	.43**	—								
3. Parent IFIRS CO	.59**	.75**	—							
4. Parent IFIRS EX	-.02	.16	.04	—						
5. Parent IFIRS HS	-.31*	-.50	-.46**	-.02	—					
6. WISC-V Digit Span	.04	-.15	-.04	.10	-.03	—				
7. WISC-V Working Memory Index	-.01	-.15	-.07	.20	-.13	.83**	—			
8. WISC-V Auditory Working Memory Index	.03	-.22	-.06	.024	.07	.92**	.80*	—		
9. RSQ Primary Control Coping Ratio (CR)	.27	.05	.04	-.17	-.09	.07	.06	-.03	—	
10. RSQ Secondary Control Coping Ratio (CR)	.12	.05	-.03	-.21	.16	-.02	-.11	-.10	.30*	—
11. RSQ Disengagement Coping Ratio (CR)	-.28*	-.25	-.19	.14	.05	-.17	-.05	-.03	-.57**	-.43**

*Note.* IFIRS = Iowa Family Interaction Rating Scale; PM = positive mood; LR = listener response; CO = communication; EX = externalized negativity; HS = hostility; WISC-V = Wechsler Intelligence Scale for Children-V; RSQ = Response to Stress Questionnaire; (CR) = Child report. \* $p < .05$ , \*\* $p < .01$