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Adverse Childhood Experiences (ACEs) and Temperament
in Children Aged 14 to 36-months

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An Undergraduate Thesis Submitted in Partial Fulfillment
of the Requirements for the Honors-in Psychology Program
Psychology Department
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Date

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Date

Abstract

Researchers have explored the effects of early adverse life experiences (ACEs) on children's developmental outcomes for decades. In this study, I explored whether ACEs in toddlerhood were associated with temperament. I tested the hypotheses that: 1) children who were determined to have a difficult temperamental profile would have higher parent-reported ACE scores than children with an easy temperamental profile, and 2) children's temperament types would have stronger associations with abuse and neglect ACE scores than with household dysfunction ACE scores. Parents of 94 toddlers, who were between 14 and 36 months of age, completed online surveys on behalf of their toddlers, including a modified version of the original ACEs survey and the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Gartstein, & Rothbart, 2006). Results supported the first hypothesis that children with a difficult temperament profile would have higher ACE scores than children with an easy temperament profile. However, the second hypothesis was not supported. Exploratory analyses were conducted to investigate correlations between individual ACE items and two temperament superdimensions: negative affectivity and effortful control. This is one of the first investigations to explore the prevalence of ACEs in toddlers via parental report and one of the first to document an association between adverse childhood experiences and temperament in very early childhood. Future attempts at replicating these ACEs-temperament associations in very early childhood, in additional and more diverse samples, can help shed light on their validity.

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Adverse Childhood Experiences and Temperament

Researchers have explored the effects of early life experiences on children's developmental outcomes for decades. Among the most popular studies, Felitti et al. (1998) investigated the relationship between adverse childhood experiences (ACEs) and adult physical and mental health outcomes. The authors found a strong positive relationship between the number of adverse childhood experiences and the number of risk factors for leading causes of death in adulthood. The original ACEs survey employed by Felitti et al. included questions assessing respondents' experiences with physical, emotional, or sexual abuse; and a number of household dysfunctions including the presence of mental illness, substance abuse, divorce, incarceration of a relative, and/or witnessing the mother being treated violently. This study found that people with multiple categories of exposure were more likely to have multiple health risk factors later in their lives. Additionally, people with four or more categories of adverse childhood experiences had a 4 to 12 times higher risk of alcoholism, drug abuse, mental illness (depression), and suicide attempts in comparison to those with no categories of adverse childhood experiences. Likewise, those with four or more categories of exposure were also more likely to smoke, be less physically active, have more sexually transmitted diseases, and be obese (Felitti et al., 1998).

Since the publication of the original ACEs study (Felitti et al., 1998), more studies have been published investigating the relationship between early life experiences and health outcomes (Flaherty et al., 2006; Loman & Gunnar, 2010). Several studies have established the existence of a negative relationship between traumatic or stressful early life experiences and hypothalamic-pituitary-adrenal (HPA) axis regulation (Bush & Boyce, 2014; Lipscomb et al., 2018; Tarullo & Gunnar, 2006; Thomas, Letourneau, Campbell, & Giesbrecht, 2018), brain circuitry and

development (Bush & Boyce, 2014; Shonkoff et al., 2014), and cortisol reactivity (Johnson, Milner, DePasquale, Troy, & Gunnar 2018; Loman & Gunnar, 2010; Tarullo & Gunnar, 2006). Researchers have also found that early childhood maltreatment negatively affected children's later academic performance (McKelvey, Edge, Mesman, Whiteside-Mansell, & Bradley, 2018) and attachment in relationships (Lieberman, Chu, Van Horn, & Harris, 2011).

Other studies have emphasized the role social relationships and secure attachments can have on buffering the negative effects of adverse childhood experiences (e.g. Thomas et al., 2018; Johnson, Milner, DePasquale, Troy, & Gunnar, 2018). Research surrounding these buffering effects on trauma in early childhood and its effects has increased discussion regarding trauma prevention and intervention (Julian, Muzik, & Rosenblum, 2018). New screening tools and practices are being investigated and evaluated to assist in preventing childhood exposure to trauma and to intervene when trauma has already occurred (McKelvey, Selig, & Whiteside-Mansell, 2017).

Although a child's experience of trauma and adverse situations is usually conceptualized to be a consequence of his or her environment, children may inadvertently contribute to their own adverse experiences on some occasions. For example, it is conceivable that children's individual temperamental profiles may increase or decrease their likelihood of being exposed to certain types of experiences, including traumatic ones. For instance, Bell (1968) argued that children may bring about harsher parenting styles upon themselves based upon a child's "congenital determinants." Likewise, if a child has a longer attention span, and is able to focus longer during parent-child interactions, then a parent may recognize an opportunity to progress into teaching the child more complex subjects (Dixon & Smith, 2003). Also, if a child generally has a positive mood and is able to be soothed quickly, more time and energy can be devoted to

learning. Although children are not held accountable for the exposures and experiences they endure, they can unknowingly and sometimes uncontrollably contribute to the likelihood of the exposures based upon their actions and characteristics.

Temperament can be defined as “constitutionally based individual differences in emotional, motor, and attentional reactivity and self-regulation, demonstrating consistency across situations and relative stability over time” (207, Rothbart & Bates 2007). Thomas and Chess (1977) originally identified nine dimensions of temperament and three types of temperament in children based upon combinations of these temperament subdimensions. The nine temperament subdimensions included: activity level, rhythmicity, distractibility, approach/withdrawal, adaptability, attention span, intensity, sensitivity, and mood (see Table 1 for more detailed descriptions; Thomas, Chess, & Birch, 1970). From these, they derived three temperament types, including easy, slow to warm, and difficult. Five dimensions were especially useful in distinguishing between “easy” and “difficult” temperament types. Temperamentally easy children were defined as being positive in mood, very adaptable, and highly predictable in biological functions, while exhibiting low to mild intensities of responsiveness, and being approachable. In contrast, difficult children were defined as being irregular in biological functions, withdrawing from new stimuli, slow to adapt, high in frequency of negative mood, and reacting intensely. Finally, slow to warm children were characterized by initially withdrawing, adapting slowly, being mildly intense in mood, being low in activity level, and initially reacting quietly (Thomas, Chess, & Birch, 1968).

As an alternative to Thomas and Chess’ approach, Rothbart and colleagues (Rothbart & Putnam, 2002) characterize temperamental profiles not as temperamental types, but as broad dimensions of neurobiologically-rooted difference. The three broad dimensions of temperament

from the Rothbartian perspective include negative affect, surgency, and effortful control. Although each of these broad dimensions are defined similarly throughout a child's lifespan from infancy to adolescence, the precise operational definitions vary somewhat developmentally. Generally, negative affectivity is comprised of the subdimensions of fear, anger, sadness, discomfort, and (low) soothability. Surgency is defined as a function of activity level, smiling/laughter, high intensity pleasure, impulsivity, positive anticipation, and (low) shyness. Finally, effortful control, analogous to "conscientiousness", consists of attentional focusing, inhibitory control, low intensity pleasure, and perceptual sensitivity (Rothbart & Bates, 2007).

Rothbart's broad dimensions of temperament can be adapted to describe at least two of the three temperamental types described by Thomas and Chess. Children with difficult temperament profiles, for example, could be characterized by high negative affectivity and low effortful control. In contrast, children with easy temperament profiles would be the opposite, having low negative affectivity and high effortful control. It is less clear how the slow to warm temperament profile would be characterized in terms of Rothbart's superdimensions. Surgency will be not included in this study because it can be argued that surgency contains both elements of difficult and easy temperamental profiles.

Research has shown that children with different temperament profiles have different mental and physical health trajectories. In one study, researchers found that when mothers rated their infants as having temperamental difficulty, they also rated their children, six years later, as having more behavior problems than children who were rated as easy or average (Wasserman, DiBlasio, Bond, Young, & Colletti, 1990). Other studies have reported a positive correlation between temperamental difficulty and the emergence of depressive symptoms (Carrasco Ortiz & Barrio Gándara, 2007; Windle, 1992), anxiety problems (Laredo et al., 2007), and childhood

psychiatric disorders (Sayal, Heron, Maughan, Rowe, & Ramchandani, 2014). Additionally, children with temperamental difficulty had a greater use of substances (Tubman & Windle, 1995) and those with high emotionality, a trait of temperamental difficulty, had larger body mass indexes in adulthood (Pulkki-Råback et al., 2005).

One of the reasons children with different temperamental profiles may have different mental and physical health outcomes is because their temperaments may influence the very environments they experience. For example, children's temperaments may affect the behaviors of their parents or caregivers. A child with a difficult temperament may be fussy, unable to be soothed, and may react harshly and intensely to the people around them. Mothers and caregivers may find these characteristics aversive, which may promote avoidance and inhibit responsiveness (Campbell, 1979; Milliones, 1978). Calkins, Hungerford, and Dedmon (2004) reported a positive association between infant frustration – a dimension of difficult temperament – and negative maternal characteristics including having higher stress, being more intrusive, being less physically stimulating, being less engaged, and being less responsive. On the other hand, and perhaps surprisingly, mothers of children with difficult temperament have also been shown to model higher quality and levels of play (Dixon & Smith, 2003), and provide their infants with greater social and sensory stimulation (Klein, 1984). In sum, mothers may modify their behaviors in recognition of their child's difficult temperamental profiles, such as avoiding their children or trying to increase their children's positive mood and activity level by engaging them through increased play and stimulation.

Because research has shown that children's temperamental profiles can influence their own surrounding environments, and because children's environments can expose them to adversity, it stands to reason that children's temperament may indirectly contribute to their

experience of adverse environments. A child with a difficult temperament will generally express more negative emotion, be harder to soothe, and have intense emotional reactivity. When children are consistently difficult to handle and be around, parents or caregivers may be “pushed to the edge” and resort to parenting methods that include neglecting or abusing the child (Bell, 1968). Thus, difficult children may be more inclined to experience a higher number of ACEs when compared with other temperament types. On the other hand, to the extent that temperamental difficulty would contribute to the number of ACEs children experience, it would presumably promote certain ACEs more than others, such as those reflecting abuse or neglect. Indeed, Sudbrack, Manfro, Kuhn, de Carvalho, and Lara (2015) found that adult men’s traits of being able to consciously make a decision, being in control over themselves, and having a stable life were negatively correlated with their experience of emotional abuse. Likewise, they found that male anger and female and male anxiety were positively correlated with experienced emotional abuse, suggesting that there was an association between the expression of high negative affectivity and being emotionally abused. In contrast, women’s and men’s expressions of volition and coping were negatively associated with experiences of emotional neglect, suggesting that low effortful control is associated with experiences of emotional neglect. DeLisi and Vaughn (2014) reported similar findings.

On the other hand, children with easy temperaments may elicit more positive and nurturing reactions and responses from their caregivers, because easy children are calmer and cause their parents less frustration in comparison with children with difficult temperaments. Therefore, an overall lower ACE score in children with easy temperaments would be expected.

The goal of this study was to examine the relationship between ACEs and temperament in children. Specifically, I investigated whether certain temperament dimensions were more or

less correlated with the presence of ACEs. I hypothesized that children with a difficult temperament profile – high in negative affectivity and low in effortful control – would have higher ACE scores than children with an easy temperament profile – low in negative affectivity and high in effortful control. Additionally, I hypothesized that the difficult and easy temperamental profiles would have stronger associations with the abuse and neglect ACE scores than the household dysfunction ACE scores. Household dysfunction ACEs include witnessing the mother being treated violently, living with someone who was a substance abuser, who had a mental illness, who attempted suicide, who was incarcerated. I expected that these household dysfunction ACE categories would be less affected by the temperamentally driven behaviors of children, because household dysfunction is likely outside of children’s direct influence.

Method

Participants

Participants included 94 anonymous caregivers who completed REDCap-based surveys about themselves and their children aged 14 months to 36 months of age. Participants were recruited from internet posts using listservs and social media sites such as Facebook and Reddit. Incentives for participating included being placed in a drawing to win one of twenty \$75 gift cards, if participants chose to provide their email addresses for the drawing.

Measures

Demographics

Participants were prompted to answer demographic questions soliciting annual household income, race, and parent gender identity among other items (see Table 2).

Adverse Childhood Experiences

Participants were asked to describe their children's adverse childhood experiences (ACEs) through a modified version of the ACEs survey (cf. Felitti et al., 1998) adapted to a parent report format that included 19 items (see Appendix). The modified parent-report instrument assessed parental reports of children's exposure to abuse, neglect, and household dysfunction.

Temperament

Participants were asked to complete the Early Childhood Behavior Questionnaire (EBCQ; Putnam, Gartstein, & Rothbart, 2006), an age-specific temperament instrument used to measure temperament in children aged 14 months to 36 months. There are three broad dimensions of temperament from the Rothbartian perspective, and that are indexed by the ECBQ: negative affect, surgency, and effortful control. For present purposes, children were determined to be temperamentally difficult if they scored below the median on low effortful control and above the median on negative affectivity. Likewise, children were determined to be temperamentally easy if they scored above the median on effortful control and below the median on negative affectivity.

Procedures

The three instruments described above were assembled into a single survey instrument that was administered electronically. Study data using this instrument were collected and managed using REDCap electronic data capture tools hosted at East Tennessee State University. REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and

4) procedures for data integration and interoperability with external sources (Harris et al., 2009; Harris et al., 2019). Each participant began the survey by clicking on a REDCap link posted on various social media websites (e.g., Reddit, Facebook). Participants were immediately prompted to enter their children's age in months, and then routed to the appropriate survey link to begin the survey. Each survey included the modified, parent-report ACEs instrument, the demographic questionnaire, and the ECBQ. All responses were recorded. Upon completing the survey, participants were given the option to enter a drawing to win one of twenty \$75 electronic gift cards by submitting their email addresses.

Results

Descriptive Statistics

There were 94 caregivers who participated in the study and anonymously answered questions about themselves and their children. A majority of the caregivers were white females who were the biological parents of the child. However, the participants were still diverse in the various demographic categories. For instance, there were participants in all of the race and ethnicity categories and participants in all marital status categories, except for the “widowed” category. Additionally, there were participants in all categories of the relation to the child. Demographic statistics of the caregivers and their children can be found in Table 2. Descriptive statistics of the temperament subdimensions and the individual ACE items can be found in Table 3.

Inferential Statistics

In order to determine which children had a difficult or easy temperamental profile, the variables of negative affectivity and effortful control were dichotomized to create “high” and “low” groups of each. Children with low negative affectivity and high effortful control were

placed in the easy temperament profile group. In contrast, children with high negative affectivity and low effortful control were placed in the difficult temperament profile group. The means of the parent-reported ACE scores as a function of these two groups can be found in Table 3. To test whether children with a difficult temperamental profile had higher ACE scores than children with an easy temperamental profile, an independent samples t-test was performed. The independent samples t-test revealed that there was a significant difference between the two temperament profiles $t(53) = -2.098, p = .013$. Consistent with expectations, children with a difficult temperament profile had a higher parent-reported ACEs score than children who had an easy temperament profile (see Table 3). These results support the hypothesis that children with a difficult temperament profile – high in negative affectivity and low in effortful control – would have a higher ACE score overall than children with an easy temperament profile – low in negative affectivity and high in effortful control.

To determine whether children's temperamental profiles had stronger associations with the abuse and neglect ACE scores than the household dysfunction ACE scores, a series of independent samples t-tests were performed for each individual ACE category. Generally speaking, temperament type was not associated with parental endorsement of any of the ACE items, let alone the abuse and neglect ACE categories as a group. The one exception was that children with easy versus difficult temperaments did differ significantly on the parent-reported ACEs Item 6, [$t(53) = -2.16, p = .035$], which stated, "Was one parent never involved with your child OR did your child lose a parent to death or abandonment (including foster or proctor care placement)?" Children with a difficult temperamental profile had a higher parental endorsement rate ($M = 0.15$) for this question in comparison to children with an easy temperamental profile ($M = 0.00$).

Lastly, exploratory correlational analyses were conducted to see whether either of the temperament dimensions of negative affectivity and effortful control were significantly correlated with parent endorsement of any of the ACEs items. As can be seen in Table 4, parent endorsement of Items 12, 14, and 15 were significantly positively correlated with negative affectivity. Parent endorsement of Items 6 and 13 were significantly negatively correlated with effortful control. The nature of these specific correlations will be described in more detail in the next section.

Discussion

The purpose of the study was to examine the relationship between temperament and ACEs in children aged 14 to 36 months of age. In particular, it was hypothesized that children with a difficult temperament profile would have higher parent-reported ACE scores, whereas children with an easy temperamental profile would have lower parent-reported ACE scores. Results were consistent with expectations. In general, a child with a difficult temperamental profile can be expected to react more intensely to situations, have a more negative mood, and be harder to soothe in comparison to a child with an easy temperamental profile. It stood to reason, then, that children with a difficult temperamental profile in the present study would experience a higher number of ACEs because they would have been consistently harder and more challenging to parent. This heightened parenting difficulty could have caused their caregivers to feel as if they had reached their limit and then resorted to abusing or neglecting the child. Empirical results from the present investigation are consistent with this possibility.

It was also hypothesized that children's temperamental profiles would be more strongly associated with the abuse and neglect ACE scores than the household dysfunction ACE scores. However, this hypothesis was not empirically supported. One exception was an association

between children's temperament and parents' endorsement of ACE Item 6. Temperamentally difficult children scored higher on this item than temperamentally easy children. This specific ACE item addressed whether a child had lost a parent or had been separated from a parent, including through foster or proctor care placement. Although the focus of this study was on how children's temperaments might contribute to their ACEs, it is possible that this specific item was significantly associated because of a reverse direction of effect. Even though a child's temperament is unlikely to affect household dysfunction or the loss of a parent because these experiences are outside of a child's direct influence; children who have lost a parent or have had a parent never involved in their life may have a difficult temperamental profile because of the negative emotions and impact that losing a parent or not being involved with a parent has upon one's life.

In sum, it is not clear why children's cumulative ACE scores differed as a function of children's temperament when there were very few differences at the item level. From a statistical point of view, the lack of many significant associations is likely the result of the fact that the temperamentally easy children had zero endorsements for many ACE items. For that reason, a cumulative ACE score may be a better descriptor of overall childhood adversity for children in this age range (Mersky, Janczewski, & Topitzes, 2017).

Because temperamental types did not appear to be associated with children's ACEs at the item level, a follow-up exploratory analysis was conducted to see if either of the temperament super dimensions were individually related to specific categories of ACEs. The exploratory analyses revealed positive correlations between parental endorsement of ACEs Items 12, 14, and 15 and negative affectivity; indicating that children who scored high in negative affectivity were more likely to have ACEs reflecting physical injury, being threatened, inappropriate touching,

and sexual abuse. These findings are consistent with the possibility that a child who is high in negative affect, as opposed to temperament difficulty more generally, may have indirectly contributed to these certain ACEs. High negative affectivity in a child is characterized by fear, anger, discomfort, sadness, and the inability to be soothed easily (Rothbart & Putnam, 2007). However, whereas children's negative affectivity may have contributed to parents' likelihood of engaging in physical or emotional abuse, it is unclear how negative affectivity would have contributed to sexual abuse. In this case, it seems more likely that a child's experiences of sexual abuse influenced their negative affectivity level.

The exploratory analyses also revealed negative correlations between parental endorsement of ACEs Items 6 and 13 and children's effortful control, indicating that children high in effortful control were less likely to lack the involvement of a parent or be sworn at or humiliated at home. Effortful control includes attentional focusing, low intensity pleasure, and perceptual sensitivity, and has been regarded as an early childhood version of conscientiousness (Rothbart & Putnam, 2007). It stands to reason that children high in effortful control would receive lower ACE scores generally because their self-regulatory capabilities would make them less challenging to parent. Caregivers of children high in effortful control would be less likely to use the harsher and harmful actions of verbal abuse and humiliation, as reflected in Item 13. In regard to Item 6, however, there may be an opposite direction of effect. Children often learn self-regulatory abilities from parents modelling these abilities themselves (Frankel et al., 2012). If children have one less parent in their life to model self-regulation, their opportunities to learn self-regulation are compromised accordingly. Indeed, in single parent households, parenting may be less about teaching and modeling self-regulation than about actually engaging in child regulation.

This investigation was not without limitations. A main limitation was relying on a common source for both the predictor and the outcome variable. “Common source bias” happens when two variables exhibit an association and were measured using a common method. Common source bias can compromise the validity of the results because the common method may contribute to the correlation between the variables (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). In this case, both children’s ACE scores and their temperament scores were provided by the same caregiver. Therefore, common source bias could be a possibility in this study. However, the possibility of common source bias is somewhat attenuated by the fact that the temperament type correlations came out in the predicted direction at the level of the cumulative ACE score, whereas the temperament types did not even significantly predict ACE endorsements at the item level.

On the other hand, current research has not come to a consensus regarding the best method to measure ACEs in children who are too young or are otherwise unable to report their experiences publicly or even to themselves. Several studies have used home visitation to document or infer the presence of ACEs. In this paradigm, researchers go into a home and observe the environment and family structure. For example, McKelvey et al. (2016) used The Family Map Inventories, which included structured interviews to assess the family and climate context, parental characteristics, and physical and social conditions of the child. In another paradigm, researchers use questionnaires like the Pediatric Intake Form. In this approach, the parent or caregiver of the child will fill out this form that measures family medical history, health habits, activities, support, parent ACEs, and alcohol and drug use (Bright Futures). However, parent-report is not unprecedented (e.g., Bethell et al., 2017). In many circumstances, parent-reported ACEs are preferred because the caregiver has likely spent much time with the child and

knows their experiences. At the same time, relying on the parent-reporting of ACEs in some circumstances can be unreliable and inaccurate. Parents and caregivers may be reluctant to report about many negative aspects of their children's experiences, especially when their identities are known or knowable. In addition, they may also be hesitant to report abuse or neglect, for fear that they themselves would be reported to the authorities due to mandatory reporting statues in all 50 states. In the present study I attempted to attenuate this concern by collecting anonymous data. Anonymity was important for collecting data in this study in order help prevent caregivers from providing misleading responses due to shame, embarrassment, or fear of incarceration that may come from reporting ACEs in their child's life. Of course, participants could have provided misleading data for other reasons.

Still, even anonymous parent reports are not without their own validity challenges. Some parent reports have been shown to conflict with their children's report on the same topics. For instance, in regard to children's mental health, parents were more likely to report a higher number of symptoms and a larger impact on the child's well-being than the children did (Roy, Groholt, & Clench-Aas, 2010). Likewise, when reporting on children's behavior problems, abusive parents exaggerated their child's externalized behaviors in comparison to observed behaviors of the child (Lau, Valeri, McCarty, & Weisz, 2006).

Lastly, the design of the study may have inadvertently biased the sample. Because the study was conducted online, participants needed to have both an internet connection and a device to access the internet. These technological requirements ensured some amount of financial privilege among the research participants. Additionally, the survey required at least 45 minutes to complete, which ensured some amount of employment flexibility especially had participants

been working multiple jobs or caring for multiple children. Because of all of these factors, some participant populations may have been unable to participate in the study.

To my knowledge, these results are the first of their kind. However, future efforts at replication should include more diverse group of participants. Most of the respondents in the present sample were Caucasian and female. A more diverse sample would allow for a better understanding of the relationship between ACEs and temperament across different demographics and among demographics that better represent the population. Findings from the present study may not apply to other samples. Some populations, such as those comprising sexual, racial, and socio-economic minorities, may have a higher prevalence of ACEs (Mersky et al., 2017) while also at risk for heightened levels of temperamental difficulty (cf. Gouge, Dixon, Driggers-Jones, Price, 2020).

Furthermore, there may also be different directions of effect between temperament and ACEs within different populations. In impoverished populations, where there is an increased likelihood of household dysfunction, the presence of ACEs may contribute to children's development of negative affectivity and the lack of development of effortful control. In contrast, among children raised in the context of minimal adversity, children's temperamental difficulty may make a relatively stronger contribution to neglectful or abusive parenting strategies.

Ultimately, more research focus should be placed on preventing ACEs and their physical and mental health sequelae (Felitti et al., 1998). However, in order to be able to prevent these negative effects, it is important to first understand the various relationships between ACEs and child characteristics that may place some children at particular risk. Based on the present investigation, children's difficult temperament may be one such risk indicator.

References

- Bell, R. Q. (1968). A reinterpretation of the direction of effects in studies of socialization. *Psychological Review*, 75(2), 81.
- Bethell, C. D., Carle, A., Hudziak, J., Gombojav, N., Powers, K., Wade, R., & Braveman, P. (2017). Methods to Assess Adverse Childhood Experiences of Children and Families: Toward Approaches to Promote Child Well-being in Policy and Practice. *Academic Pediatrics*, 17(7).
- Bright Futures (n.d.). *Pediatric Intake Form* [Measurement instrument]. Retrieved from https://www.brightfutures.org/mentalhealth/pdf/professionals/ped_intake_form.pdf.
- Bush, N. R., & Boyce, W. T. (2014). The contributions of early experience to biological development and sensitivity to context. In *Handbook of Developmental Psychopathology* (pp. 287-309). Springer, Boston, MA.
- Carrasco Ortiz, M. A., & Barrio Gándara, M. V. D. (2007). Temperamental and personality variables in child and adolescent depressive symptomatology. *Psicothema*, 19(1).
- Campbell, S. B. G. (1979). Mother-infant interaction as a function of maternal ratings of temperament. *Child Psychiatry and Human Development*, 10(2), 67-76.
- Calkins, S. D., Hungerford, A., & Dedmon, S. E. (2004). Mothers' interactions with temperamentally frustrated infants. *Infant Mental Health Journal*, 25(3), 219–239.
- DeLisi, M., & Vaughn, M. G. (2014). Foundation for a temperament-based theory of antisocial behavior and criminal justice system involvement. *Journal of Criminal Justice*, 42(1), 10-25.

- Dixon Jr, W. E., & Smith, P. H. (2003). Who's controlling whom? Infant contributions to maternal play behavior. *Infant and Child Development: An International Journal of Research and Practice*, *12*(2), 177-195.
- Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults: The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, *14*(4), 245-258.
- Flaherty, E. G., Thompson, R., Litrownik, A. J., Theodore, A., English, D. J., Black, M. M., ... & Dubowitz, H. (2006). Effect of early childhood adversity on child health. *Archives of Pediatrics & Adolescent Medicine*, *160*(12), 1232-1238.
- Frankel, L. A., Hughes, S. O., Oconnor, T. M., Power, T. G., Fisher, J. O., & Hazen, N. L. (2012). Parental Influences on Childrens Self-Regulation of Energy Intake: Insights from Developmental Literature on Emotion Regulation. *Journal of Obesity*, *2012*, 1–12.
- Gouge, N., Dixon, W. E., Driggers-Jones, L. P., & Price, J. S. (2020). Cumulative Sociodemographic Risk Indicators for Difficult Child Temperament. *The Journal of Genetic Psychology*, *181*(1), 32–37.
- Harris, P. A., Taylor, R., Minor, B. L., Elliott, V., Fernandez, M., Oneal, L., ... Duda, S. N. (2019). The REDCap consortium: Building an international community of software platform partners. *Journal of Biomedical Informatics*, *95*, 103208. doi: 10.1016/j.jbi.2019.103208
- Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—A metadata-driven methodology and workflow

- process for providing translational research informatics support. *Journal of Biomedical Informatics*, 42(2), 377–381. doi: 10.1016/j.jbi.2008.08.010
- Johnson, A. B., Milner, S. B., Depasquale, C. E., Troy, M., & Gunnar, M. R. (2018). Attachment security buffers the HPA axis of toddlers growing up in poverty or near poverty: Assessment during pediatric well-child exams with inoculations. *Psychoneuroendocrinology*, 95, 120-127.
- Julian M.M., Muzik M., Rosenblum K.L. (2018) Parenting in the Context of Trauma: Dyadic Interventions for Trauma-Exposed Parents and Their Young Children. In: Muzik M., Rosenblum K. (eds) *Motherhood in the Face of Trauma. Integrating Psychiatry and Primary Care*. Springer, Cham.
- Klein, P. S. (1984). Behavior of Israeli mothers toward infants in relation to infants' perceived temperament. *Child Development*, 1212-1218.
- Laredo, A., Jané, M. C., Viñas, F., Mitjavila, M., Pla, E., Pi, M., ... & Domènech, E. (2007). Temperamental dimension and anxiety problems in a clinical sample of three-to six-year old children: a study of variables. *The Spanish Journal of Psychology*, 10(2), 399-407.
- Lau, A. S., Valeri, S. M., McCarty, C. A., & Weisz, J. R. (2006). Abusive parents' reports of child behavior problems: Relationship to observed parent-child interactions. *Child Abuse & Neglect*, 30(6), 639–655.
- Lieberman, A. F., Chu, A., Van Horn, P., & Harris, W. W. (2011). Trauma in early childhood: Empirical evidence and clinical implications. *Development and Psychopathology*, 23(2), 397-410.
- Lipscomb, S. T., Becker, D. R., Laurent, H., Neiderhiser, J. M., Shaw, D. S., Natsuaki, M. N., ... & Leve, L. D. (2018). Examining morning HPA axis activity as a moderator of hostile,

- over-reactive parenting on children's skills for success in school. *Infant and Child Development*, 27(4), e2083.
- Loman, M. M., & Gunnar, M. R. (2010). Early experience and the development of stress reactivity and regulation in children. *Neuroscience & Biobehavioral Reviews*, 34(6), 867-876.
- McKelvey, L. M., Edge, N. C., Mesman, G. R., Whiteside-Mansell, L., & Bradley, R. H. (2018). Adverse experiences in infancy and toddlerhood: Relations to adaptive behavior and academic status in middle childhood. *Child Abuse & Neglect*, 82, 168-177.
- McKelvey, L. M., Selig, J. P., & Whiteside-Mansell, L. (2017). Foundations for screening adverse childhood experiences: Exploring patterns of exposure through infancy and toddlerhood. *Child Abuse & Neglect*, 70, 112-121.
- Mckelvey, L. M., Whiteside-Mansell, L., Conners-Burrow, N. A., Swindle, T., & Fitzgerald, S. (2016). Assessing adverse experiences from infancy through early childhood in home visiting programs. *Child Abuse & Neglect*, 51, 295–302.
- Mersky, J. P., Janczewski, C. E., & Topitzes, J. (2017). Rethinking the Measurement of Adversity. *Child Maltreatment*, 22(1), 58–68.
- Milliones, J. (1978). Relationship between perceived child temperament and maternal behaviors. *Child Development*, 1255-1257.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903.

- Pulkki-Råback, L., Elovainio, M., Kivimäki, M., Raitakari, O. T., & Keltikangas-Järvinen, L. (2005). Temperament in childhood predicts body mass in adulthood: the Cardiovascular Risk in Young Finns Study. *Health Psychology, 24*(3), 307.
- Putnam, S. P., Gartstein, M. A., & Rothbart, M. K. (2006). Measurement of fine-grained aspects of toddler temperament: The Early Childhood Behavior Questionnaire. *Infant Behavior and Development, 29*(3), 386-401.
- Rothbart, M. K. (2007). Temperament, development, and personality. *Current Directions in Psychological Science, 16*(4), 207-212.
- Rothbart, M. K., & Bates, J. E. (2007). Temperament. *Handbook of Child Psychology, 1-50*.
- Rothbart, M. K., & Putnam, S. P. (2002). Temperament and socialization. In: Pulkkinen L, Caspi A, (Eds.) *Paths to Successful Development: Personality in the Life Course* (pp. 19-45). Cambridge, U.K.: Cambridge University Press.
- Roy, B. V., Groholt, B., Heyerdahl, S., & Clench-Aas, J. (2010). Understanding discrepancies in parent-child reporting of emotional and behavioural problems: Effects of relational and socio-demographic factors. *BMC Psychiatry, 10*(1).
- Sayal, K., Heron, J., Maughan, B., Rowe, R., & Ramchandani, P. (2014). Infant temperament and childhood psychiatric disorder: longitudinal study. *Child: Care, Health and Development, 40*(2), 292-297.
- Shonkoff, J. P., Garner, A. S., Siegel, B. S., Dobbins, M. I., Earls, M. F., McGuinn, L., ... & Committee on Early Childhood, Adoption, and Dependent Care. (2014). The lifelong effects of early childhood adversity and toxic stress. *Pediatrics, 129*(1), e232-e246.

Sudbrack, R., Manfro, P. H., Kuhn, I. M., de Carvalho, H. W., & Lara, D. R. (2015, March).

What doesn't kill you makes you stronger and weaker: how childhood trauma relates to temperament traits.

Tarullo, A. R., & Gunnar, M. R. (2006). Child maltreatment and the developing HPA axis. *Hormones and Behavior*, *50*(4), 632-639.

Thomas, A., Chess, S., & Birch, H. (1968). *Temperament and behavior disorders in children*. New York: New York University Press.

Thomas, A., & Chess, S. (1977). *Temperament and development*. New York: Brunner/Mazel.

Thomas, A., Chess, S., & Birch, H. G. (1970). *The origin of personality*. San Francisco: W.H. Freeman.

Thomas, J., Letourneau, N., Campbell, T., & Giesbrecht, G. (2018). Social buffering of the maternal and infant HPA axes: Mediation and moderation in the intergenerational transmission of adverse childhood experiences. *Development and Psychopathology*, *30*(3), 921-939.

Tubman, J. G., & Windle, M. (1995). Continuity of difficult temperament in adolescence: Relations with depression, life events, family support, and substance use across a one-year period. *Journal of Youth and Adolescence*, *24*(2), 133-153.

Wasserman, R. C., DiBlasio, C. M., Bond, L. A., Young, P. C., & Colletti, R. B. (1990). Infant temperament and school age behavior: 6-year longitudinal study in a pediatric practice. *Pediatrics*, *85*(5), 801-807.

Windle, M. (1992). Temperament and social support in adolescence: Interrelations with depressive symptoms and delinquent behaviors. *Journal of Youth and Adolescence*, *21*(1), 1-21.

Tables

Table 1

Definitions of Thomas and Chess' (1970) Temperament Subdimensions

Subdimension	Definition
Activity level	determined by the level and extent of the activity
Rhythmicity	the regularity of a child's functions like sleeping and eating
Approach/withdraw	determined by how a child responds to a new object, person, or experience
Distractibility	the degree of how distracted they are from tasks
Adaptability	a child's ability to adapt to their changing environment
Attention span	attention span measures a child's attention and persistence in their activities
Sensitivity	threshold to stimuli
Intensity	measured from their energy level of their responses
Mood	determined by a general observation of positive or negative dispositions

Table 2

Child and Caregiver Demographic Characteristics

Category	N
Child characteristics	
Female	50
Male	44
Child age (<i>M, SD</i>)	1.98 (0.47)
Temperament profile	
Easy	28
Difficult	27
Caregiver characteristics	
Caregiver age (<i>M, SD</i>)	31.8 (5.37)
Gender identity	
Female	85
Male	7
Transgender male	1
Agender	1
Sexual Orientation	
Straight	80
Bisexual	9
Asexual	1
Pansexual	4
Marital Status	
Never married, not in a relationship	5
Never married, in a relationship	10
Married/civil union	74
Separated	2
Divorced	3
Race/ethnicity	
White, not of Hispanic origin	84

Black, not of Hispanic origin	7
Hispanic	8
American Indian or Alaskan Native	1
Asian or Pacific Islander	3
Other	1
Relationship to child	
Parent	93
Other	1
Relation to child	
Biological relative	89
Step relative	3
Adoptive relative	1
Foster relative	1

Table 3

Descriptive Statistics

	N	Mean	SD
Temperament subdimension			
Negative affectivity	94	3.17	0.71
Effortful control	94	4.87	0.62
Overall ACE score by temperament profile			
Temperamentally easy	28	0.50	0.69
Temperamentally difficult	27	1.44	2.28
Mean Endorsement of Individual ACE items by temperament profile			
1			
Easy	28	0.32	0.48
Difficult	27	0.44	0.48
2			
Easy	28	0.44	0.51
Difficult	27	0.11	0.32
3			
Easy	28	0.07	0.26
Difficult	27	0.11	0.32
4			
Easy	28	0.00	0.00
Difficult	27	0.07	0.27
5			
Easy	28	0.04	0.19
Difficult	27	0.11	0.32
6			
Easy	28	0.00	0.00
Difficult	27	0.15	0.36
7			

Easy	28	0.00	0.00
Difficult	27	0.04	0.19
8			
Easy	28	0.00	0.00
Difficult	27	0.07	0.27
9			
Easy	28	0.00	0.00
Difficult	27	0.04	0.19
10			
Easy	28	0.00	0.00
Difficult	27	0.04	0.19
11			
Easy	28	0.00	0.00
Difficult	27	0.00	0.00
12			
Easy	28	0.00	0.00
Difficult	27	0.04	0.19
13			
Easy	28	0.00	0.00
Difficult	27	0.11	0.32
14			
Easy	28	0.00	0.00
Difficult	27	0.04	0.19
15			
Easy	28	0.00	0.00
Difficult	27	0.04	0.19
16			
Easy	28	0.00	0.00
Difficult	27	0.00	0.00
17			
Easy	28	0.00	0.00

Difficult	27	0.00	0.00
18			
Easy	28	0.00	0.00
Difficult	27	0.04	0.19
19			
Easy	28	0.00	0.00
Difficult	27	0.00	0.00

Table 4

*Correlations Between Parent-reported ACE Questions and Negative Affectivity and Effortful**Control (N = 94)*

Parent-report ACEs question	Negative affectivity	Effortful control
Question 6 - Was one parent never involved with your child OR did your child lose a parent to death or abandonment (including foster or proctor care placement)	.18	-.21*
Question 12 - Has your child ever been physically hurt, injured OR threatened by anyone in the home? (Do not include light spanking.)	.21*	-.10
Question 13 - Has your child ever been sworn at, insulted, humiliated, OR put down in the home?	.17	-.34**
Question 14 - Has your child ever been touched inappropriately (sexually) OR felt uncomfortable, embarrassed, or ashamed while someone else was watching him/her bathing or undressing?	.21*	-.10
Question 15 - Has your child ever been made to watch sexual acts (including pornography) OR encouraged to touch someone else sexually?	.21*	-.10

 Note: * $p < .05$; ** $p = .01$

Appendix

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Temperament and ACEs Study
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ACEs-Parent

Record ID _____

In this section, we are interested in any negative experiences your child may have had. Please answer the following questions about your child's experiences.

Has your child lived with anyone who was depressed, mentally ill, OR suicidal?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child lived with anyone who was a problem drinker or alcoholic?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child lived with anyone who used illegal drugs OR who abused prescription medications?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child lived with anyone who served time or was sentenced to serve time in a prison, jail, OR other correctional facility?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child directly experienced the separation or divorce of his/her parents?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Was one parent never involved with your child OR did your child lose a parent to death or abandonment (including foster or proctor care placement)?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child ever not had enough to eat, had to wear dirty clothes, or had no one to protect him/her?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child often felt unloved by a caregiver, or treated as not important or special?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child often felt that his/her family didn't look out for each other, felt close or supported by each other?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child ever lived in a home where there was domestic abuse (such as physical assaults or verbal threats)?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child often been afraid to go home?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child ever been physically hurt, injured OR threatened by anyone in the home? (Do not include light spanking.)	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know
Has your child ever been sworn at, insulted, humiliated, OR put down in the home?	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> I don't know

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Has your child ever been touched inappropriately (sexually) OR felt uncomfortable, embarrassed, or ashamed while someone else was watching him/her bathing or undressing? Yes No I don't know

Has your child ever been made to watch sexual acts (including pornography) OR encouraged to touch someone else sexually? Yes No I don't know

Has anyone ever coerced OR forced your child into having sex? Yes No I don't know

Has your child often been bullied at school (e.g. about race, sexuality, immigration, intelligence, etc.) AND felt unprotected? Yes No I don't know

Has your child ever been homeless? Yes No I don't know

Has your child often been afraid to be outside because of violence in his/her neighborhood or community? Yes No I don't know