Emotion regulation in elementary school-aged children with a maternal history of suicidal behavior: A pilot study

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Abstract

Parental history of suicidal behavior is associated with an increased risk of early onset suicidal behavior in their offspring. The objective of this pilot study was to compare clinical characteristics, temperament, and emotion regulation in children, aged 6–9 years, with (PH+) and without (PH-) a maternal history of suicidal behavior to determine which factors could be markers of early vulnerability. At baseline, PH+ children, compared to PH- children, demonstrated more difficulties with temperament, emotion regulation, and experienced more life events in the year prior to their baseline appointment. At study follow-ups, however, no differences were found between PH+ and PH- children. Results suggest there are some signals of early vulnerability present in children with a maternal history of suicidal behavior and recruitment/retention of this group of youth is feasible.

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1. Introduction

Suicide is the second leading cause of death among youth in the U.S. and in 2017, accounted for 19.2% of deaths among individuals 10–24-years [1, 2]. A suicide attempt is the strongest risk factor associated with suicide death [3, 4] making the prevention of a first suicide attempt highly important. One risk factor associated with an earlier onset of suicidal behavior is a high familial loading of suicidal behaviors [5]. A parental history of suicidal behavior conveys nearly five-fold increased odds of suicide attempt in their offspring compared to those without a parental history [6]. These results persist even after controlling for the familial transmission of mood disorder [6]. Together, these findings suggest the mechanisms for the familial transmission of suicidal behavior may differ from the mechanisms associated with the familial transmission of mood disorder [7, 8]. Understanding the specific mechanisms in younger children associated with the familial transmission of suicidal behavior can contribute to the development and implementation of interventions dedicated to preventing a first suicide attempt in these youth at high-risk.

Emotional development begins early in childhood and is a dynamic process that reflects environmental and familial influences on how a child understands, responds to, and regulates their emotions [9, 10]. Healthy emotional development is associated with positive social and developmental outcomes (e.g., positive relationships with others) and is considered a protective factor that decreases the likelihood of various risk factors (e.g., depressive symptoms; [10–14]). Yet, negative emotional development can lead to several risks associated with psychopathology and detrimental behaviors (e.g., callous unemotional traits; [15]).

Emotion regulation is an emotional competence skill that serves as a key component of a child's temperament and influences social communication, interaction, and capability to communicate emotions effectively [14, 16]. Research suggests children with deficits in emotion regulation, known as emotion dysregulation, have difficult temperaments which could result in high negative emotional reactivity, increased vulnerability to develop psychopathology, and a higher likelihood of experiencing behavioral problems compared to youth without emotion dysregulation concerns [17–20]. Additionally, when experiencing stress, children with emotion dysregulation are more likely to practice avoidant strategies compared to children without these deficits [15]. These strategies include: fluctuations in negative emotion expression, averting eye contact when spoken to, or extreme proximity seeking (e.g., clinging to parents; [21]). The use of avoidant strategies is likely to promote maladaptive coping skills and has implications for future problematic concerns (e.g., non-suicidal self-injury [22, 23]).

Emotion dysregulation has also been associated with youth suicidal behavior [24–26]. In a longitudinal study examining emotion regulation and adolescent suicidal behavior, the inability to understand emotional states as well as the lack of skills used to effectively

manage the emotions experienced were both associated with a future suicide attempt even after controlling for depression [23]. In another longitudinal study, researchers found emotion dysregulation in a community sample of adolescents was predictive of future suicidal ideation even after controlling for levels of suicidal ideation at baseline [27]. Finally, in a cohort of children at high risk for later psychopathology, higher scores of emotion dysregulation in childhood were associated with increased risk for suicidal behavior during young adulthood [28]. These findings suggest emotion dysregulation may influence future suicidal thoughts and behaviors, however, research examining emotion dysregulation as an early vulnerability factor in children at high risk for suicidal behavior due to a parental history of suicidal behavior is limited.

The purpose of this pilot study was to compare temperament, emotion regulation/reactivity and other known suicide risk factors (e.g., depressive symptoms) in children with (PH+) and without (PH-) a maternal history of suicidal behavior. As an exploratory aim, differences between groups were also examined at 6-month and 1-year follow-ups. We hypothesized PH + children would experience more difficulties in temperament and emotion regulation and more severity of common risk factors (e.g., more depressive symptoms) associated with youth suicidal behavior.

2. Method

2.1 Sample

Families were recruited in two phases; the approach phase and the eligibility phase. During the approach phase, families were recruited one of three ways (Supplemental Figure 1: Consort Table of Recruitment): face-to-face at three Primary Care Centers from a large metropolitan Children's hospital (n=204), email through a hospital-wide service announcement of research opportunities (n=12), or flyers around the hospital (n=5). Mothers completed the Mental Health Inventory-5 (MHI-5; [29]) to evaluate current mood symptomology and one question concerning their lifetime history of suicidal behavior. All mothers who experienced mood symptoms in the past month and/or had a history of suicidal behavior went to the second phase of recruitment, the eligibility phase.

One hundred ten families transitioned to the eligibility phase. All families were contacted by study staff and of the 110, 25 families were not interested after told the full details of the pilot study, 44 families were unable to be contacted after multiple tries, and 41 families were screened for eligibility. Children and mothers were excluded if they were diagnosed with a traumatic brain injury, seizure disorder, any brain abnormality/disorder, or if English was not their primary language. Families were excluded if their primary language was not English as all self-report and interview measures used, observational tasks completed, and computer tasks given were all conducted in English. The final sample for this pilot study consisted of 22 children (11 per group), 6–9 years, and their biological mothers. Unfortunately, one family during their baseline appointment decided to discontinue their participation (PH+ family). The final sample for data analyses was n=21.

Families completed three timepoints for this pilot study: a baseline appointment (TP1), 6-month telephone interview (TP2), and 1-year follow-up appointment (TP3). At TP2, the

retention rate of families was 100% and at TP3 the retention rate was 90.5%. The study was approved by the institutional review board (IRB) of The Abigail Wexner Research Institute at Nationwide Children's Hospital (AWRINCH). Informed consent was obtained from all participants and assent was obtained for all 9-year-old children. During the consent process, families were informed of why the study was being conducted, what the study appointments would entail, the main risks/benefits of the study, and limitations associated with confidentiality (e.g., child abuse/neglect). Both mothers and children verbalized their agreement to participate prior to signing consent/assent forms. All families were compensated at every timepoint.

2.2 Procedures

Details on all measures used at all study timepoints including the psychometrics for these measures are specified in Supplemental Table 1. Demographic information was collected using the General Information Interview Sheet [30]. The demographic information collected included age, sex, race/ethnicity, and other relevant demographic characteristics (e.g., household composition). The Columbia-Suicide Severity Rating Scale (C-SSRS) [31, 32] and Pierce Suicide Intent Scale (P-SIS) [33] were used to assess parent- and child-reported lifetime and past month suicidal ideation and behaviors. Both measures were administered via interview with mothers and children interviewed separately. Mothers were asked about themselves and their child whereas children were asked about themselves only. The C-SSRS includes four sections: one concerning suicidal ideation severity, one examining suicidal ideation intensity, another concerning suicidal behavior, and the final section examining lethality of actual suicide attempts [31, 32]. P-SIS is a 12-item interview measure used to assess the severity of actual suicide attempts [33]. Both the C-SSRS and P-SIS have demonstrated good validity and reliability when assessing suicidal behavior in both youth and adults [31, 33–35]. Suicide attempt was defined as any behavior initiated, no matter the method used, with the intent to kill oneself.

Mothers also reported on their family history of suicidal behavior and familial mental health diagnoses using the Family History-Research Diagnostic Criteria (FH-RDC; [36]) and their child's current psychotropic medication use assessed by the Service Assessment for Children and Adolescents (SACA; [37]). Both are interview measures. Finally, mothers were asked to complete self-report measures about themselves and their child. These included the Temperament in Middle Childhood Questionnaire (TMCQ; [38]), Child Behavior Checklist (CBCL; [39, 40]), Child and Adolescent Survey of Experiences: Parent Version (CASE-P; [41]), Childhood Trauma Questionnaire (CTQ; [42, 43]) and Brief Symptom Inventory (BSI; [44]).

The TMCQ is a 157-item measure that includes 17 dimensions of temperament with three main subscales; negative affect, surgency, and effortful control. This measure was used to assess child temperament and emotion regulation/reactivity [38]. The CBCL is a 113-item measure with eight syndrome-based scales and six DSM-oriented scales. For this study we used the total internalizing and externalizing subscales to assess overall internalizing and externalizing behaviors [39, 40]. The CASE-P is a 38-item measure that assesses from the parent's perspective if a specific event took place in the child's life in the past year. These

events included both negative (e.g., child's pet died, got sick, lost or injured) and positive events (e.g., child won a prize, award, or contest) and are scored as either independent (e.g., someone special to child moved away) or dependent (e.g., big fight or argument with someone in family) of the child's own behavior [41]. The last two self-report measures were about the mothers themselves. The first, the CTQ [42, 43], is a 28-item measure used to assess any abuse and/or neglect the mothers experienced in their childhood and the second, the BSI [44], is a 53-item measure used to assess overall psychological functioning and consists of nine symptom scales and three global index scores.

For this pilot study, children completed the Kaufmann Brief Intelligence Tests-II (KBIT-II) [45, 46], an assessment of verbal and nonverbal intelligence, and self-report measures assessing common suicide risk factors. These self-report measures included the Center for Epidemiology Studies Depression Scale for Children (CES-DC; [47]), the CASE-C [41], the child version of the previously described measure (CASE-P), and the Revised Children's Manifest Anxiety Scale (RCMAS-2; [48]). The CES-DC [47, 49] is a 20-item measure of depressive symptoms for children ages six and above and the RCMAS-2 [48] is a 49-item measure of anxiety symptoms with four subscales (e.g., physiological anxiety). Higher scores on these measures indicate a larger number of depressive or anxiety symptoms. All self-report measures were read out loud to children and children responded verbally or by pointing to the answer to ensure comprehension of the questions.

2.3 Data Analysis

The primary goal of this pilot study was to test feasibility of recruitment and enrollment of children, 6–9 years, with and without a parental history of suicidal behavior. This pilot was used to inform a NIMH-proposed study to examine early vulnerability factors in a larger sample of at-risk youth (R21-MH116206). Power calculations for this pilot study were not conducted, however effect size calculations were included to determine if the group differences found, if any, were significant. To determine effect size, phi for categorical variables and Cohen's D for continuous variables were calculated.

Comparisons between PH+ and PH- mothers and children were made on demographic and clinical characteristics and child temperament/emotion regulation outcomes. For categorical data, Fisher's exact tests were conducted and for continuous data, independent t-tests were used. Statistical significance was set at $p < 0.05$ with effect sizes reported for significant findings only. All analyses were performed with SPSS version 26 [50].

3. Results

On average children were 7.6 years ($std = 1.2$) with average intelligence ($M = 102.8$, $std = 17.8$). Majority of children self-identified as Black (50%), Non-Hispanic (90.9%), female (54.5%), and lived with both biological parents (59.1%). Parents were on average 33.7 years, 63.6% of the mothers were employed, majority were married (50.0%), and for family income, most families were making $50,000 or less per year. No group differences were found on demographic characteristics (Table 1). For the groups, 11 children per group enrolled (PH+ and PH-) however one family in the PH+ group withdrew from the study prior to completing their baseline appointment. They were excluded from further analyses

beyond demographic characteristics. The final sample for data analysis was n=21 (n=10 PH + and n=11 PH-).

On average, mothers who had attempted suicide reported their most recent suicide attempt was 12 years prior to baseline appointment ($M = 12.2$, $std = 9.7$) with the most recent suicide attempt occurring 2.7 months prior to the baseline appointment date. Most mothers attempted suicide once in their lifetime (number of attempts ranged from one to seven) and the lethality of attempts ranged from no physical harm/damage (n=5) to moderate physical harm (e.g., medical attention needed; n=5).

For the self-report measures, PH+ mothers reported more paranoid thinking on the BSI measure [44] compared to PH- mothers ($M = 2.2$ $std = 1.0$ vs. $M = 1.1$ $std = 1.2$; $p = 0.03$, Cohen's D = 1.00). However, for the overall BSI global severity index score, no differences were found between PH+ and PH- mothers (bottom of Table 2). For history of childhood abuse as reported on the CTQ [42, 43], all PH+ mothers compared to PH- mothers (100% vs. 54.5%, $p = 0.04$) had a form of childhood abuse present. When examining the subscales individually, a significant difference was found for the sexual abuse subscale ($M = 16.7$ $std = 6.8$ vs. $M = 8.6$ $std = 5.9$; $p = 0.01$, Cohen's D = 1.27). PH+ mothers on average had a score on the sexual abuse subscale that was indicative of severe or extreme sexual abuse compared to the average score for the PH- mothers. Also, for the CTQ total abuse score, which is a summation score of the emotional, physical, and sexual abuse subscales, the score was much higher in the PH+ mothers compared to the PH- mothers ($M = 47.8$ $std = 14.8$ vs. $M = 31.7$ $std = 19.1$; $p = 0.05$, Cohen's D = 0.94) which indicates these traumatic experiences occurred more frequently in the mothers with a history of suicide attempt.

For the children, no group differences between PH+ and PH- youth were found on lifetime history of suicidal ideation (31.8% total sample) or suicidal behavior (9.1% of total sample) as measured by the C-SSRS [31, 32], current psychotropic medication use as measured by the SACA [37], and self-reported anxiety or depressive symptoms as measured by the RCMAS-2 [48] and CES-DC [47, 49](Table 2). Depressive symptoms for the PH+ group did, on average, fall above the clinical range (score 15; $M = 18.6$ std = 9.5) however this was not a significant finding.

For life events as measured by the CASE-C (child version; [41]), significant group differences were found for total life events and total independent events. On average, PH+ youth experienced 15 life events ($M = 15.1$ $std = 6.4$ vs. $M = 10.2$ $std = 3.9$; $p = 0.05$, Cohen's D = 0.92) in the year prior to their baseline appointment and they experienced more events that were independent of the own behavior (e.g., parent split up with partner; $M = 7.8$ $std = 2.9$ vs. $M = 4.3$ $std = 2.6$; $p = 0.01$, Cohen's D = 1.27) compared to PH- youth who participated. Although not significant, PH+ children also reported having more negative life events occur in the past year than PH- youth ($M = 7.8$ $std = 4.3$ vs. $M = 4.7$ $std = 2.6$, $p = 0.06$).

For the temperament/emotion regulation subscales as measured by the TMCQ [38], PH+ children were rated by their mothers as expressing more negative affect ($M = 15.8$ $std = 1.9$ vs. $M = 13.0$ $std = 2.7$; $p = 0.01$, Cohen's D = 1.20) than their PH- counterparts. When

examining the subscales of the negative affect category, PH+ youth were rated by their mothers as expressing more discomfort ($M = 2.9$ $std = 0.6$ vs. $M = 2.3$ $std = 0.4$; $p = 0.01$, Cohen's D = 1.18), sadness ($M = 3.1$ $std = 0.5$ vs. $M = 2.6$ $std = 0.6$; $p = 0.04$, Cohen's D = 0.91), and less ability to soothe themselves when they become upset (soothability; $M = 2.9$ $std = 0.6$ vs. $M = 3.6$ $std = 0.6$; $p = 0.02$, Cohen's D = 1.17).

For the follow-up appointments (6-month phone interview and 1-year follow-up appointment), no statistically significant group differences were present for the PH+ and PH-children on suicidal ideation or suicidal behavior as measured by the C-SSRS [31, 32]. In total, five children endorsed suicidal ideation at these timepoints with 60% of the children belonging to the PH+ group. When examining other risk factors associated with suicidal behavior (e.g., depressive symptoms), no group differences were found.

4. Discussion

This pilot study examined suicide risk factors in youth, 6–9 years, at high risk for future suicidal behavior due to a parental history of suicidal behavior. In this small sample of youth, baseline group differences were found however when examining group differences at the 6-month and 1-year follow-ups, no statistically significant differences presented themselves between the PH+ and PH- youth.

At baseline, PH+ children compared to PH- children did not differ on demographic characteristics however, when examining life events that occurred one year prior, PH+ youth reported, on average, more events (15 vs. 10) as well as more events that were independent of their own behavior compared to PH- youth (8 vs. 4). Life events, such as abuse/neglect, victimization in the school setting, or parental loss, have been associated with suicidal behavior in youth and young adults [51, 52] and a recent study suggests certain life events (e.g., fight/breakup with a romantic partner) may play a significant role in the transition from suicidal ideation to behavior in adolescents [53]. These findings suggest at this young age total life events experienced and total life events that are independent on the child's own behavior may be risks for future suicidal behavior if not addressed appropriately.

For the temperament/emotion regulation measure, mothers in the PH+ group reported their children expressed more negative affect which included more sadness, discomfort, and the inability to soothe themselves once they became upset. Temperament plays a key role in emotion regulation skill acquisition and the development of psychopathology [20, 54–57]. Emotion dysregulation in youth has also been associated with suicidal behaviors and non-suicidal self- injurious (NSSI) behaviors [25, 58]. Having more negative affect with the inability to soothe oneself as well as the high risk already present for early onset suicidal behaviors due to their parental history [6, 59] make these children candidates for early intervention.

One intervention that may be beneficial in decreasing risk of suicide for this population of youth is the Promoting Alternative Thinking Strategies curriculum (PATHS; [60]). PATHS is a comprehensive program that teaches children to express, understand, and regulate emotions in order to increase their emotional meta-cognitive skills. PATHS has shown

positive outcomes in socio-emotional developmental and has been implemented in children as young as four years old [60, 61]. Providing these emotion regulation strategies early in childhood may decrease the likelihood of the development of risk factors (e.g., emotion dysregulation) associated with future suicidal behavior. Other interventions that are emotion regulation specific or dedicated to increase resiliency in at-risk youth have also shown positive results and lasting effects on suicidal ideation and behavior [62, 63].

There are several limitations to be recognized. First, the sample size is small and only included mothers. Other limitations include no measure of child abuse and/or neglect for the children and limited measures of emotion regulation. Future research incorporating mothers and fathers, a larger sample of families, and observational measures of emotion regulation would be valuable in examining these findings further. Though limitations are present, this pilot study sets the foundation and establishes feasibility for the longitudinal examination of early vulnerabilities in pre-pubescent children with a parental history of suicidal behavior. The retention rates at 6-month and 1-year follow-ups were high, indicating this sample of families can be followed over time. Discovering specific mechanisms associated with the familial risk of suicidal behavior is important and could inform intervention efforts to prevent a first suicide attempt in at-risk youth.

5. Summary

To our knowledge, this pilot study is the first to examine early vulnerabilities in pre-pubescent children with a parental history of suicidal behavior. At baseline, PH+ children, compared to PH-children, demonstrated more difficulties with temperament and emotion regulation and indicated more life events and more events independent of their own behavior had occurred in the year prior to their baseline appointments. At follow-up, however, no group differences were present. A large number of potentially stressful life events and emotion dysregulation combined with a parental history of suicide attempt puts these youth at high risk for suicidal behavior [6, 52, 53, 58, 64]. Findings suggest a longitudinal study following these youth over middle childhood/early adolescence to discover if these specific vulnerabilities serve as mechanisms associated with the familial risk of suicidal behavior is imperative. This pilot study sets the foundation to assist with these efforts and provides an opportunity to inform intervention activities to prevent a first suicide attempt for youth at-risk.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1.

Demographic Characteristics of Children with (PH+) and without (PH-) a Parental History of Suicidal Behavior

Demographic Characteristic	PH- Children (N = 11)		PH+ Children (N = 11)		Statistic	P-Value
	n	%	n	%		
Race					FET[a]	0.73
White	5	45.5	3	27.3		
Black	5	45.5	6	54.5		
Other	1	9.1	2	18.2		
Ethnicity					FET	1.00
Non-Hispanic	10	90.9	10	90.9		
Hispanic	1	0.09	1	0.09		
Sex					FET	0.67
Males	6	54.5	5	45.5		
Females	4	36.4	7	63.6		
Parental Employment					FET	0.66
Full- or Part-time	8	72.7	6	54.5		
Unemployed	3	27.3	5	45.5		
Parental Education					FET	0.39
Less than college	5	45.5	8	72.7		
College and more	6	54.5	3	27.3		
Family Income Before Taxes					FET	0.31
$50,000	7	63.6	10	90.9		
> $50,000	4	36.4	1	9.1		
	M	Std	M	Std	Statistic	P-Value
Age of Child	7.5	1.1	7.6	1.3	t = −0.18	0.86
Age of Parent	35.0	3.8	32.4	7.0	t = 1.09	0.29
Child KBIT-II[b] Composite Score	104.7	17.3	100.9	18.9	t = 0.49	0.63

[a]Fisher's Exact Test;

[b]Kaufman Brief Intelligence Test-II

Table 2.

Baseline Clinical Characteristics, Temperament/Emotion Regulation, Neurocognitive Functioning, and Parental Characteristics of Children with (PH+) and without (PH-) a Parental History of Suicidal Behavior[a]

Child Clinical Characteristic	PH- Children (N = 11)		PH+ Children (N = 10)		Statistic	P-Value	Effect Size[l]
	n	**%**	**n**	**%**	**Statistic**	**P-Value**	**Effect Size**
Lifetime Suicidal Ideation[b], % yes	3	27.3	3	30.0	FET[k]	1.00	
Lifetime History of Suicide Attempt[b], % yes	1	9.1	1	10.0	FET	1.00	
Child Current Psychotropic Medication Use[c], % yes	4	36.4	4	40.0	FET	1.00	
	M	**Std**	**M**	**Std**	**Statistic**	**P-Value**	**Effect Size**
CBCL[d] Internalizing	9.0	4.9	10.4	8.8	t = −0.5	0.65	
CBCL[d] Externalizing	7.8	6.8	10.2	6.4	t = −0.8	0.44	
Anxiety Symptoms[e]	17.4	14.0	15.6	11.1	t = 0.3	0.76	
Depressive Symptoms[f]	14.6	11.8	18.6	9.5	t = −8.4	0.41	
Total number of life events in past year[g]	**10.2**	**3.9**	**15.1**	**6.4**	**t = −2.2**	**0.05**	**d=0.92**
Total negative life events in past year[g]	4.7	2.6	7.8	4.3	t = −2.0	0.06	
Total independent life events in past year[g]	**4.3**	**2.6**	**7.8**	**2.9**	**t = −0.6**	**0.01**	**d=1.27**
Child Temperament/Emotion Regulation	**M**	**Std**	**M**	**Std**	**Statistic**	**P-Value**	**Effect Size**
Negative Affect[h]	**13.0**	**2.7**	**15.8**	**1.9**	**t = −2.8**	**0.01**	**d=1.20**
Discomfort[h]	**2.3**	**0.4**	**2.9**	**0.6**	**t = −2.9**	**0.01**	**d=1.18**
Sadness[h]	**2.6**	**0.6**	**3.1**	**0.5**	**t = −2.2**	**0.04**	**d=0.91**
Soothability[h]	**3.6**	**0.6**	**2.9**	**0.6**	**t = 2.6**	**0.02**	**d=1.17**
Parental Measures	**M**	**Std**	**M**	**Std**	**Statistic**	**P-Value**	**Effect Size**
BSI Global Severity Index Score[i]	0.7	0.6	1.2	0.6	t= −1.9	0.07	
Paranoid Thinking	**1.1**	**1.2**	**2.2**	**1.0**	**t= −2.3**	**0.03**	**d=1.00**
CTQ scores[j]							
Emotional Abuse	12.8	8.6	18.2	6.1	t= −1.6	0.12	
Physical Abuse	10.5	7.2	13.2	5.1	t =−1.0	0.33	
Sexual Abuse	**8.6**	**5.9**	**16.7**	**6.8**	**t = −2.9**	**0.01**	**d=1.27**
Total Abuse	**31.7**	**19.1**	**47.8**	**14.8**	**t = −2.1**	**0.05**	**d=0.94**

[a]One child was excluded from analyses due to incomplete data.

[b]Columbia Suicide Severity Scale (C-SSRS);

[c]Service Assessment for Children and Adolescents;

[d]Child Behavior Checklist (CBCL) for Ages 6–18;

[e] Revised Children's Manifest Anxiety Scale-2 (RCMAS-2);

[f] Center for Epidemiological Studies Depression Scale for Children (CES-DC);

[g] Child and Adolescent Survey of Experiences;

[h] Temperament in Middle Childhood Questionnaire (TMCQ); Soothability is reverse scored for the Negative Affect subscale; lower soothability more negative affect. Children did not differ on Effortful Control or Surgency Subscales.

[i] Brief Symptom Inventory;

[j] Childhood Trauma Questionnaire;

[k] Fisher's Exact Test;

[l] For effect size, Phi was used for categorical variables and Cohen's D for continuous variables.