Research article

# Strengthening the predictive power of screening for adverse childhood experiences (ACEs) in younger and older children

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ABSTRACT

*Background:* There is increasing interest in routine screening for Adverse Childhood Experiences (ACEs) to help identify high-risk children who would benefit from interventions. However, there has not yet been sufficient research concerning which particular set of ACEs would be most predictive as a potential screening tool.
*Objective:* This study compared 40 Adverse Childhood Experiences (ACEs), covering 11 different conceptual domains, in their ability to predict trauma symptoms in childhood.
*Participants and setting:* The current study uses pooled data from three National Surveys of Children's Exposure to Violence (NatSCEV) conducted in 2008, 2011, and 2014. Each survey collected information on children aged one month to 17 years.
*Methods:* Samples were obtained from a mix of random digit dialing and address based sampling methods. Telephone interviews were conducted with children 10 years and older and with caregivers, if the randomly selected child was under age 10.
*Results and conclusion:* A different set of 15 items best predicted trauma symptoms for younger ($2-9$-year-old) compared to older ($10-17$-year-old) youth. Some conventional ACEs, like physical and emotional abuse, proved important for both age groups. However, family-related factors were more predictive for younger children, while community and peer violence exposures were more predictive for older children. Our new proposed measures explained substantially more variance in subsequent trauma symptoms than did the original ACE measure ($R^2 = .31$ vs .18 for 2-9 year olds; $R^2 = .43$ vs .26 for 10-17 year olds; $p < .001$ for all) and identified a larger percentage of children with high levels of trauma.

## 1. Introduction

Research based on the Adverse Childhood Experiences (ACEs) framework is growing at a rapid rate. This literature points very consistently to the large number of later health and mental health conditions that appear to be associated with the accumulation of exposures to stressful conditions in childhood (Felitti et al., 1998; Hughes et al., 2019; Nurius, Fleming, & Brindle, 2019; Petruccelli, Davis, & Berman, 2019; Shonkoff et al., 2012). Researchers and advocates are attempting to draw strong conclusions from this literature about how to predict later life outcomes and what prevention measures are warranted. For example, in 2019 California passed legislation incentivizing pediatricians to screen all children for ACEs and backed it with $95 million for reimbursement and training costs (Stavely, 2019).

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However, before action plans are even more widely developed around the ACE findings and broad-based screening efforts are implemented, there are core foundational issues that should be addressed. Importantly, we need a better understanding of what constitutes an adverse childhood experience and which experiences should be prioritized for screening or prevention purposes. The original 10-item ACE inventory asked about childhood physical, sexual and emotional abuse, physical and emotional neglect, exposure to domestic violence, household substance abuse and mental illness, parental incarceration, and parental divorce (Dube, Felitti, Dong, Giles, & Anda, 2003). However, these items were not chosen through any systematic empirical process of selecting the best predictors of negative outcomes. The ability of this particular list of adversities to predict health outcomes was treated as validation of the measure, and much of the subsequent literature has relied on this list or close variants.

Yet, it is not clear these early-identified ACEs are the *most* predictive set of adversities among all potential domains of ACEs. Indeed, some of the ensuing research has pointed to important domains of adversity that were not covered by the original ACE inventory, such as forms of peer victimization, witnessing community violence, and family economic stressors (Finkelhor, Shattuck, Turner, & Hamby, 2013; McEwen & Gregerson, 2019). Questions have also been raised about whether the ACEs being measured are the actual causal influences or rather simply markers for the occurrence of other correlated events or conditions that may be the actual agents of trauma and related outcomes (McEwen & Gregerson, 2019). The literature on the impact of divorce, for example, one of the ACE items, suggests that the actual trauma agents are other factors such as exposure to parental conflict, reduced supervision, harsh discipline, and economic hardship more than the separation of the parents or the dissolution of the marriage (Amato, 2000). This suggests the need for a critical examination of adversity items in relationship to one another.

One exercise that would be useful in moving towards the development of a more empirically-based ACEs screener would be to start with much broader list of possible ACEs derived from multiple conceptual domains and compare them on their predictive merits. This exercise has the potential to illustrate other domains of adversities that warrant inclusion. It also has the potential to show the advantages among different kinds of possibly similar events or the rough equivalence of others for purposes of outcome prediction.

An important limitation of the original ACE literature, and most subsequent studies, was its reliance on adult populations who were being asked to report on adversities from a distant vantage point (Petruccelli et al., 2019). Although this may be appropriate for some ACEs usages, it does not provide the information needed to know which adversities to prioritize in childhood screenings in order to target prevention or intervention efforts. Childhood adversities in retrospect may be forgotten, mis-remembered or distorted (Brewin, Andrews, & Gotlib, 1993; Fisher et al., 2011; Shaffer, Huston, & Egeland, 2008). Identifying the most causally relevant experiences that have the greatest impact on health requires an understanding of how these experiences influence negative outcomes *in childhood.*

The experiences that are most impactful may also differ depending on when they occur or when they are assessed in childhood. Some adversities may have particular developmental critical periods (Khan et al., 2015; Niederkrotenthaler, Floderus, Alexanderson, Rasmussen, & Mittendorfer-Rutz, 2012), affecting children only or primarily if they occur during one developmental stage. The specification of such sensitive periods is still not well developed, but some findings suggest, for example, that parental morbidity and suicide have specific effects at earlier ages (Niederkrotenthaler et al., 2012), and the impact of peer emotional abuse is particularly influential at age 14 for girls (Khan et al., 2015). Thus, assessments with younger children may show a different set of ACEs that are most predictive of concurrent outcomes than assessments with older children, either because of critical period effects, development differences in the occurrence of particular types of ACEs, or because the proximal impact of different ACEs changes as children age. As a result, attempts to identify the most influential adverse experiences, should account for developmental variations depending on the age at which assessments take place. A related developmental consideration concerns at what ages children can provide valid self-reports about adverse experiences and at what ages parents are likely to provide more accurate reports of children's ACEs. We assess two age groups, $2-9$-year olds for which we have proxy parent reports and $10-17$-year olds for which we have self-report data. This developmental demarcation may be useful to incorporate into research, clinical and diagnostic settings, where decisions must be made about whether to get reports from parents or from children themselves.

The current study had the advantage of utilizing information on 40 contemporaneous adversities for children across a large age span enabling a comparison of these adversities in their ability to predict a subsequent outcome in childhood. We focus on trauma symptoms as the outcome, an indicator that is generally thought to be one of the major mediating indicators between adversity and poor health and mental health conditions in adulthood (Kendall-Tackett, 2002). Trauma symptoms are considered manifestations of emotional and endocrine dysregulation of the stress response system that take a toll on other aspects of physiology over time (Danese & McEwen, 2012).

The specific aims of this study are to: 1) Assess a comprehensive list of ACEs to determine which particular set of items has the strongest association with level of current trauma symptomatology, separately for younger (ages 2–9) and older (ages 10–17) children; 2) Compare the resulting sets of ACEs with the set of items included in the original ACE measure in terms of variance explained in trauma symptoms; 3) Establish the "high ACEs" cut off points that maximize both the sensitivity and specificity of each measure; and 4) Determine if the new proposed ACEs items are able to identify significantly more children and adolescents with clinically-relevant levels of trauma symptoms than the original ACEs measure.

## 2. Methods

### 2.1. Sample and procedure

The analyses that follow utilize data from three National Surveys of Children's Exposure to Violence (NatSCEV), cross-sectional U.S. studies that collected information about nationally-representative samples of youth aged one month to 17 years in 2008, 2011, and 2014. The samples from each of the three surveys were obtained from a mix of random digit dialing (RDD), address based

sampling, as well as targeted oversampling of households with children, cell phone-only households, and/or underrepresented racial groups. Interviews began with an adult caregiver in each household to collect family demographic information. One child was randomly selected from all eligible children living in a household by sampling the child with the most recent birthday. Telephone interviews were conducted with children 10 years and older about their adversity experiences and other topics. If the selected child was under age 10, proxy interviews were conducted by the caregiver "who was most familiar with the everyday experiences of the child."

Sample weights adjusted for differential probability resulting from both this complex study design as well as variations within household eligibility and non-response by demographic characteristics. More information about the sample and weighting is available in prior publications (Finkelhor, Turner, Ormrod, & Hamby, 2009; Finkelhor, Turner, Shattuck, & Hamby, 2015; Finkelhor, Turner, Shattuck, & Hamby, 2013). The analysis for the current study used pooled data from all three surveys for a total sample size of 11,896 (n = 5532 aged 2–9; n = 6364 aged 10–17).

Interviews averaged about 50 min in length and were conducted in English or Spanish. Respondents who disclosed a situation of serious threat or ongoing victimization were re-contacted by a clinical member of the research team trained in telephone crisis counseling, whose responsibility was to provide them with contact information for support in their local community. All procedures involving human subjects were reviewed and approved by the University of New Hampshire IRB.

### 2.2. Measurement

#### 2.2.1. Adverse childhood experiences (ACEs)

The NatSCEV interviews included numerous questions and indexes from which to draw a large pool of Adverse Childhood Experiences (ACEs) that fell within several content domains. Forty ACEs were considered in the current study. ACEs were assessed with items of The Juvenile Victimization Questionnaire (JVQ) (Hamby, Finkelhor, Ormrod, & Turner, 2004), the Lifetime Childhood Adversity measure (Turner, Finkelhor, & Ormrod, 2006), and additional questions asked in the parent screener survey. All ACE items assessed in this study inquire about lifetime prevalence of the adverse event or condition. Detailed item wording and variable construction are provided in Appendix A.

The Juvenile Victimization Questionnaire (JVQ) (Hamby et al., 2004), is a comprehensive inventory of childhood victimization covering five general areas of youth victimization: conventional crime, maltreatment, victimization by peers and siblings, sexual victimization, and witnessing/indirect victimization. The JVQ has demonstrated good psychometric properties, including test-retest reliability and construct validity in a nationally representative sample (Finkelhor, Hamby, Ormrod, & Turner, 2005). For the present study, six ACE domains, representing six different components of childhood victimization, were assessed with items from the JVQ: Maltreatment (4 ACEs[1]), Community Violence Exposure (4 ACEs), Property Crimes (4 ACEs), Physical Assault (7 ACEs), Sexual victimization (2 ACEs), and Peer Victimization (2 ACEs). The specific victimization ACEs considered can been seen in Table 1.

Several ACE domains reflecting non-victimization adversities were also assessed, including Family Instability (6 ACEs), Interpersonal Loss (3 ACEs), Parent Psychological Disorder (2 ACEs), Non-Relational Threat (3 ACEs) and Economic Stressors (3 ACEs[2]). Many ACEs in these domains were items from the Lifetime Childhood Adversity measure. Additional questions asked in the NatSCEV parent screener questionnaire included income, reliance on public assistance, number of times the child moved residence, number of live-in partners the parent had since the child was born, and parental diagnoses of psychological and substance use disorders. The specific non-victimization ACEs considered can been seen in Table 2.

#### 2.2.2. Trauma symptoms

*Trauma symptomatology* was assessed using 24 items from the Trauma Symptom Checklist (TSC) (John Briere, 1996) designed for youth 10 and older and 26 items from Trauma Symptom Checklist for Young Children (TSCY) completed by parents of children, ages 2–9. Both scales assess children's responses to unspecified traumatic events in different symptom domains, including depression, anxiety, anger, post-traumatic stress, and dissociation. Respondents were asked to indicate how often they (or their child) had experienced each symptom within the last month. The TSC and TSCY have demonstrated good test-retest and internal consistency reliability and good concurrent validity in clinical and population-based samples (Briere, 1996; Briere et al., 2001). A summary measure of all items was constructed for each age group. For some analyses, we also constructed a "high trauma" indicator in order to identify cases of potential clinical significance. High trauma was defined at the top decile of the summary measure for each age group.

### 2.3. Analyses

Data analyses designed to identify the most impactful ACEs proceeded in several steps. Because of the likelihood of developmental variations, we conducted each step below separately for the 2−9-year-old and 10−17-year-old samples.

1) Given our goal of covering all major domains of adverse experience and selecting ACEs within each domain most strongly associated with trauma symptoms, we compared ordinary least square (OLS) standardized regression coefficients of each within-

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[1] "emotional neglect", an item included in the original ACEs index, was not considered in this study since an equivalent item was not available in the data set

[2] we were only able to assess current welfare receipt; a lifetime measure indicator of this item was unavailable

**Table 1**

Standardized regression coefficients for each adverse childhood experience (ACE) predicting trauma symptoms: Victimization domains.

| | Younger children (2 – 9 year olds) | | | Older children (10 – 17 year olds) | | |
|---|---|---|---|---|---|---|
| | % in sample | Beta in model | | % in sample | Beta in model | |
| **Physical Assault Domain** | | | | | | |
| Assault w/ weapon | 6.5 | 0.03 | | 12.7 | **0.08** | *** |
| Peer assault w/out injury | 40.9 | **0.07** | *** | 37.0 | 0.02 | |
| Peer assault with injury | 5.4 | **0.04** | * | 11.5 | **0.07** | ** |
| Serious assault threat | 7.3 | **0.05** | * | 27.0 | **0.09** | *** |
| Kidnap attempt | 1.3 | **0.05** | * | 2.3 | 0.01 | |
| Bias attack | 1.6 | 0.02 | | 4.4 | **0.09** | *** |
| Dating violence | — | — | | 3.0 | 0.01 | |
| **Property Crime (non-sib perpetrator)** | | | | | | |
| Theft | 11.7 | **0.08** | *** | 11.2 | 0.01 | |
| Robbery | 9.3 | 0.03 | | 33.3 | 0.03 | |
| Vandalism | 11.3 | **0.04** | * | 20.4 | 0.01 | |
| Home burglary | 12.4 | −0.00 | | 25.6 | 0.00 | |
| **Peer Victimization** | | | | | | |
| Peer physical intimidation | 22.1 | **0.08** | *** | 26.7 | **0.07** | *** |
| Peer emotional abuse | 26.4 | **0.18** | *** | 38.6 | **0.16** | *** |
| **Community Violence Exposure** | | | | | | |
| Witness attack with weapon | 5.7 | **0.05** | * | 30.0 | **0.06** | ** |
| Witness attach w/o weapon | 14.0 | 0.02 | | 46.3 | 0.02 | |
| People being shot, bombs, riots | 4.8 | 0.03 | | 14.4 | **0.09** | *** |
| School threat | 1.5 | 0.01 | | 16.8 | **0.05** | ** |
| **Child Maltreatment** | | | | | | |
| Physical abuse | 4.8 | **0.10** | *** | 13.7 | **0.08** | *** |
| Emotional abuse | 9.3 | **0.12** | *** | 19.1 | **0.13** | *** |
| Physical neglect | 4.6 | 0.01 | | 3.2 | **0.04** | * |
| Witness parental violence or chronic conflict | 16.6 | **0.10** | *** | 27.0 | **0.11** | *** |
| **Sexual Victimization** | | | | | | |
| Any sexual assault | 1.7 | **0.05** | ** | 6.4 | **0.11** | *** |
| Sexual harassment | 0.3 | **0.06** | * | 9.7 | **0.15** | *** |

Note: all significant positive betas are bolded.

[1] Each beta coefficient represents that ACE's association with trauma symptoms, controlling for all other ACEs (both non-victimization and victimization) outside of its individual domain.

  *** $p < .001$.

  ** $p < .01$.

 * $p < .05$.

domain ACE, controlling for all ACES that fall outside of that domain. This strategy allowed us to identify the most impactful ACE or set of ACEs that uniquely represent each domain. Tables 1 and 2 present all items within each domain and their beta coefficients predicting trauma symptoms, while controlling for all ACEs outside of the domain.

2) All ACEs that were significantly related to trauma symptoms ($p < .05$) in step 1 were then entered into another OLS regression model, allowing us to determine the unique, across-domain effect of each ACE (analyses not shown).

3) Because the number of statistically significant ACEs in step 2 was greater than would be ideal for a screening measure and because we wished to select the most impactful set of ACEs, we reduced the model further by selecting items with significant coefficients and strong predictive effects ($p < .01$) and $\beta > .05$. This yielded a set of 15 ACEs for each of the two age groups.

4) Another OLS regression analysis utilizing this reduced 15-item model was then conducted and compared to a regression of items that represent the original ACE measure, to contrast the total variance explained in trauma symptoms by each measure (Table 3).

5) In order to compare the relative effectiveness of the new proposed ACEs measure with the original scale in predicting trauma cases of potential clinical relevance, we evaluated cut points for "high" ACEs count by calculating the odds of predicting a high trauma score using each of the ACE measures. To this end, we examined the Receiver Operating Characteristic (ROC) curve, which plots the sensitivity, or the probability of detecting a high trauma case, as well as one minus the specificity, or the probability of detecting a case without a high trauma score. The area between these two lines is a measure of discrimination, or the model's likelihood of correctly identifying a child who is categorized as having high trauma. We plotted the sensitivity and specificity curves on the same plot for each measure and used the point at which they intercept as our cut point. This approach maximizes both sensitivity and specificity (Hosmer & Lemeshow, 2000).

6) Using the resulting cut points, we calculated Odds Ratios (ORs) predicting high trauma cases, given high ACEs scores on the original and new proposed ACEs measure (relative to non-high ACEs scores on each measure). We also estimated the percentage of

**Table 2**
Standardized regression coefficients for each adverse childhood experience (ACE) predicting trauma symptoms: Non-victimization domains.

| | Younger children (2 − 9 year olds) | | Older children (10 − 17 year olds) | |
|---|---|---|---|---|
| | % in sample | Beta in model[1] | % in sample | Beta in model[1] |
| **Family Instability Domain** | | | | |
| Does not live w/ both bio parents (divorced) | 38.8 | −0.00 | 47.2 | **−0.04** * |
| Multiple live-in partners (2 +) | 6.0 | 0.04 | 12.5 | 0.02 |
| Moved homes a lot | 9.2 | −0.02 | 19.8 | −0.01 |
| Taken from family | 2.2 | **0.09** ** | 3.6 | 0.04 |
| Family homelessness | 2.7 | 0.03 | 3.4 | −0.03 |
| Caregiver in prison | 5.8 | −0.03 | 9.8 | 0.01 |
| **Interpersonal Loss** | | | | |
| Someone close died | 22.9 | **0.04** * | 45.1 | **0.05** *** |
| Someone close illness | 25.7 | 0.03 | 47.9 | **0.06** *** |
| Someone close suicide attempt | 3.8 | **0.04** * | 11.7 | **0.10** *** |
| **Parental Disorder** | | | | |
| Mother or father mental illness | 18.5 | **0.09** *** | 18.5 | −0.01 |
| Family drug/alcohol problem | 4.6 | 0.01 | 6.8 | −0.00 |
| **Non-Relational Threat** | | | | |
| Natural disaster | 5.8 | 0.02 | 9.9 | 0.02 |
| Bad accident | 3.5 | 0.01 | 10.8 | 0.01 |
| Bad illness | 16.0 | 0.00 | 18.5 | 0.03 |
| **Economic Stressors** | | | | |
| Low income | 10.3 | **0.06** ** | 8.9 | 0.01 |
| Welfare | 29.1 | **0.08** *** | 20.0 | 0.01 |
| Job loss | 23.6 | **0.06** ** | 23.6 | **0.03** * |

Note: all significant positive betas are bolded.
[1] Each beta coefficient represents that ACE's association with trauma symptoms, controlling for all other ACEs (both non-victimization and victimization) outside of its individual domain.
   *** $p < .001$.
   ** $p < .01$.
   * $p < .05$.

high trauma cases that had high ACEs scores on both the original and newly proposed measure could identify (Table 4).
7) Appendix B lists proposed items for new ACEs measures.

## 3. Results

Tables 1 and 2 report beta coefficients for each ACE predicting trauma symptoms, while controlling for all other ACEs outside of that ACE's specific domain. For the non-victimization category (Table 1), ACEs in the interpersonal loss domain, such as having someone close attempt suicide, appeared most strongly associated with trauma symptoms among older youth, while ACEs most negatively affecting younger children fell within the economic stressor domain (e.g. welfare, parental job loss). Being taken away from family was also significantly associated with trauma symptoms for the younger group only. None of the ACEs that fell within the non-relational threat domain (natural disaster, personal illness, and personal injury) were significantly related to trauma symptoms in either age group.

In general, substantially more victimization ACEs were statistically significant and more strongly related to trauma symptoms than were non-victimization adversities. As seen in Table 2, most ACEs in the physical assault domain were significantly associated with trauma symptoms for both age groups, as were ACEs in the maltreatment and peer victimization domains. For the older youth only, most ACEs within the community violence domain were also significant. Although none of the property crime ACEs were significant in the older group, younger children were negatively affected by personal property theft.

In the next step of the analyses, we wished to reduce the set of ACEs further to allow for the construction of a screening instrument of reasonable length, selecting the ACEs with the strongest associations with trauma symptoms. To this end, we entered all significant ACEs that were positively associated with trauma from Tables 1 and 2 in an OLS regression model for each age group. We then identified significant ACEs with beta coefficients greater or equal to .05 (analyses not shown). This smaller set of items (15 ACEs in each age group) were then regressed on trauma symptoms and compared to a regression model comprised of ACE items from the original measure. These analyses are present in Table 3.

There are several noteworthy findings. First, several ACEs from the original measure were not significantly associated with trauma symptoms, even when only those ACEs were included in the regression. For both age groups, parental divorce and parental imprisonment were unrelated to trauma symptoms. For the younger children, physical neglect and family drug or alcohol problems

**Table 3**

Ordinary Least Squares (OLS) regression analyses predicting trauma symptomatology from total number of Adverse Childhood Experiences (ACEs): Standardized regression coefficients.

| | Younger children (2–9 year olds) | | Older children (10–17 year olds) | |
|---|---|---|---|---|
| | Original Measure | New Proposed Measure | Original Measure | New Proposed Measure |
| Physical abuse | .13*** | .09** | .12*** | .06* |
| Emotional abuse | .20*** | .11*** | .24*** | .10*** |
| Sexual assault | .17** | .06** | .17*** | .09*** |
| Physical Neglect | .01 | — | .06** | — |
| Witnessed domestic violence[1] | .12*** | .08** | .11** | .09*** |
| Parents Divorced | −.12 | — | −.04* | — |
| Family mental illness[2] | .14*** | .10*** | .03 | — |
| Family drug/ alcohol problem | .04 | — | .08** | — |
| Parent in prison | .02 | — | .02 | — |
| Weapon assault | | — | | .06** |
| Peer assault w/o injury | | .09*** | | — |
| Peer assault with injury | | .03** | | .05* |
| Serious assault threat | | — | | .09*** |
| Bias attack | | — | | .09** |
| Personal property theft | | .09*** | | — |
| Sexual harassment | | .07** | | .14*** |
| Peer physical intimidation | | .09*** | | .07*** |
| Peer emotional abuse | | .20*** | | .16*** |
| Witness attack with weapon | | .08** | | .05** |
| Witness shots, bombs, riots | | — | | .10*** |
| Someone close illness | | — | | .06*** |
| Someone close suicide attempt | | — | | .11*** |
| Taken from family | | .09** | | — |
| Welfare | | .08** | | — |
| Job loss | | .05* | | |
| R[2] | .18 | .31 | .26 | .43 |
| AIC | 14559.68 | 13634.93 | 16346.86 | 14715.00 |
| BIC | 14625.85 | 13740.80 | 16414.45 | 14823.13 |

  [1] New proposed measure used *witnessed domestic violence or chronic parental conflict*, which had stronger independent association with trauma symptoms than witnessing domestic violence only.

  [2] New proposed measure used *mother or father mental illness* which had stronger independent association with trauma symptoms than any family mental illness.

  * p < .05.

  ** p < .01.

  *** p < .001.

**Table 4**

High ACEs Count Predicting High Trauma Cases.

| | Original Measure | New Proposed Measure | Original Measure | New Proposed Measure |
|---|---|---|---|---|
| | Younger children (2-9 year olds) | | Older children (10-17 year olds) | |
| Number of Items Included | 9 | 15 | 9 | 15 |
| Sample Average # ACEs (std. error) | 0.87 (0.03) | 2.17 (0.05) | 1.28 (0.03) | 3.00 (0.06) |
| High trauma: mean ACEs | 2.02 (0.16) | 4.43 (0.20) | 2.73 (0.16) | 6.49 (0.22) |
| Not high trauma: mean ACEs | 0.74 (0.03) | 1.90 (0.04) | 1.12 (0.03) | 2.61 (0.05) |
| Discrimination measure: Area under ROC curve | 0.73 | 0.80 | 0.75 | 0.84 |
| High ACEs Count: Number of items | 4 | 5 | 4 | 7 |
| % sample with high ACEs count | 5.3 | 12.0 | 9.7 | 11.9 |
| Logit Odds Ratio: DV = high trauma; IV = high ACES[a] | 7.81 (2.03) | 9.28 (1.68) | 7.21 (1.31) | 11.23 (1.92) |
| % high trauma cases identified | 21.5 | 45.2 | 34.7 | 48.7 |
| % high trauma cases *not* identified | 78.5 | 54.8 | 65.3 | 51.3 |

  [a] All are sig at p < .001

also were not significantly related to trauma while, for older children, family mental illness was unrelated to this outcome. On the other hand, there were several additional ACEs in domains not covered in the original measure that were impactful and warranted inclusion in the new proposed measure. Of note were peer victimization ACEs; peer emotional abuse had the strongest association with trauma symptoms for both age groups. Several types of physical assault and sexual harassment were also important, especially

for the older age group, as was witnessing a weapon assault and gun violence or riots. Interpersonal loss ACEs involving someone close, such as a serious illness or a suicide attempt, also emerged as important predictors among the older children, while being taken away from family was predictive among the younger children. Finally, the economic stressors of family welfare and parental job loss were impactful for younger children only. Most importantly, the set of items in the new proposed measure explained substantially more variation in trauma symptoms than did the original set of items; about 42% more variance explained among the younger group (31% vs 18%) and 40% among the older group (43% vs 26%). In addition, the Akaike information criterion (AIC) and Bayesian Information Criterion (BIC) values are substantially lower for the two proposed models compared to the models using the original ACES set, indicating greater parsimony, even accounting for the larger number of predictor variables.

As a next step, we examined how well each ACE measure predicted high trauma cases to determine the extent to which children with potentially clinically significant trauma levels could be identified. As shown in Table 4, high trauma cases among the 2−9-year-old sample had an average of two ACEs using the original ACEs measure (that is, 22% of the total items were endorsed on average), but an average of almost 4.5 ACEs using the new proposed measure (30% of the total items, on average). For the 10−17-year olds, these figures were 2.7 (30%) and 6.5 (43%), respectively. We conducted ROC analyses to determine the optimal cut off score to define high ACEs for both the original measure and our new measure, for each age group.

Hosmer and Lemeshow (Hosmer & Lemeshow, 2000) consider a ROC between 0.7 and 0.8 as acceptable and a ROC in the range of 0.8 to 0.9 as excellent. The original ACES measures scored acceptable using these guidelines (ROC = 0.73 for 2−9-year-olds; ROC = 0.75 for 10−17-year-olds) and the new proposed ACES measure scored as excellent (ROC = 0.80 for 2−9-year-olds; ROC = 0.84 for 10−17-year-olds). We then used the ROC data to plot the sensitivity and specificity on the same graph for each measure, taking the point where they intercept as our cut point. The cut points for 2−9-year-olds are four ACES (out of a possible 9) in the original scale; or five ACES (out of a possible 15) in the new proposed scale. For 10−17-year-olds, the cut points are four ACES (out of a possible 9) in the original scale and seven ACES (out of a possible 15) in the new proposed measure. Using these cut points, a little over 5 % of the 2−9-year-olds fell into the "high ACEs" category in the original measure, while 12% fell into this category using the new measure. For the 10−17-year-olds, these figures were 9.7 % and 1 %, respectively.

Among the 2−9-year-olds, the odds of having a high trauma level was 7.8 times greater for the high ACEs group than for the non-high ACEs group, when based on the original ACEs measure. In contrast, the odds ratio using the new proposed measure in this age group was 9.3. Among the 10−17-year-olds, the odds of having a high trauma level was 7.2 times greater for the high ACEs group than for the non-high ACEs group, when based on the original ACEs measure. The odds ratio using the new proposed measure in this age group was 11.2. Importantly, there were substantial differences in the extent to which each measure could successfully identify high trauma cases. Among the 2−9-year-old children, a high ACEs score identified only 21.5 % of high trauma cases using the original measure, but almost 46% of high trauma cases were accurately identified with the new proposed measure. Among the 10−17-year-old children, a high ACEs score on the original measure identified 34.7% of high trauma cases while a high ACEs score on the new measure identified 48.7% of those with high trauma symptomatology.

## 4. Discussion

Research on ACEs has grown in recent years, as has interest in its use as a screening tool to identify high-risk children who would benefit from interventions. To do so effectively, however, some fundamental issues should be addressed. Among them is a better understanding of which ACEs most predict outcomes in childhood, outcomes that likely serve as mediating mechanisms to long-term health problems. We have argued that such efforts should be empirically derived, cover multiple domains of experience, and take into account possible developmental variations in the predictive power of different ACEs. The current research takes an important step in this direction.

This study started with a large inventory of 40 childhood adversities to determine what smaller group of items covering a number of environmental domains might efficiently predict high risk children suffering from psychological distress symptoms. It concluded that a particular (and somewhat different) set of 15 adversities was most parsimonious for both age groups. It also showed that these sets did substantially better at predicting trauma symptoms than the original ACE items, including identifying high trauma cases of potential clinical significance.

Several observations about the predictive associations are worth emphasizing. First, almost all events and conditions that have been discussed in the literature as potential childhood adversities do seem to be statistically associated with distress at the bivariate level. Moreover, it is also the case that adding any arbitrary list of such adversities together will predict more negative outcome than they do singly. However, this is an undiscriminating standard to use for deciding what adversities to choose for screening or for intervention.

Second, some childhood adversities that have been conventionally considered as impactful, like divorce and parental imprisonment, did not make significant contributions in predicting symptoms after accounting for other more predictive adversities. This provides some support for the idea that the actual trauma agents for divorce, for example, are other factors such as exposure to parental conflict, reduced supervision, harsh discipline, and economic hardship more than the separation of the parents (Amato, 2000). Thus, while these have very often been included in ACE inventories, it appears that related adversities, such as domestic violence and parental mental health problems are more causally relevant for negative outcomes. Another traditional ACE item that could be complicated in this way is neglect, which did not explain much variance in trauma symptoms when other factors were included. It did not enter at all among maltreatment items for younger kids, was weak for older youth, and dropped out once other adversities were included. The low prediction ability for neglect may be because physical and emotional abuse, as well as adversities related to economic and community disadvantage, co-vary strongly with neglect. But it also may be because neglect is a complex and

multi-faceted childhood stressor that is hard to assess with simple screen questions. We encourage more research to evaluate different measures of neglect in ACEs screening efforts.

Third, there clearly were some domains of adversity with strong abilities to predict distress that had been excluded in the original ACEs inventory. Peer victimization was in this category, with exposures to peer physical intimidation and especially peer emotional abuse, both making important independent contributions. These two adversity items align with what other researchers sometimes call physical and emotional bullying, and which has been shown to have predominant ACE contributions in other studies as well (Khan et al., 2015).

Other important independent and strong predictors from our analysis that were not included in the original ACE items were several forms of physical assault. For older children, being the victim of a physical assault that resulted in injury or an assault that involved a weapon, were independently predictive of trauma symptoms. Both types of assault are what law enforcement calls "aggravated assault" and are considered especially dangerous. Finally, a serious threat of assault when the youth thought he or she would get hurt also made the list of independent predictors. This finding, together with the significance of aggravated assaults, suggests victimizations that elicit threat of serious bodily harm or fear of death are particularly impactful.

A final type of physical assault, bias attack, was also independently related to trauma symptoms in this older group, regardless of whether it resulted in injury or a weapon was involved. This type of incident, motivated by bias against an individual's race, ethnicity, religion, disability, or sexual orientation, is what law enforcement sometimes label a "hate crime." This finding is consistent with recent national studies showing that victimization incidents with a perceived bias component had substantially greater odds of creating an extreme emotional reaction (Jones, Mitchell, Turner, & Ybarra, 2018) than victimizations without a bias component. For younger children, peer assault without injury was a significant predictor, suggesting that even assault at this lower threshold is meaningful for younger children. Importantly, all these assault items had predictive value controlling for one another and after peer physical intimidation and parental physical abuse were accounted for, indicating their importance as separate traumatic occurrences. The salience of the assault victimization domain among older youth is especially striking.

In addition, a child's exposure to community violence appears to also be an important predictor of trauma symptoms. The original ACEs inventory correctly included exposure to domestic violence as an important ACE but missed the equivalent exposure to community violence. Supporting past research on community violence exposure (Lynch, 2003; McCoy, Raver, & Sharkey, 2015), witnessing a weapon attack was predictive for both younger and older children and witnessing gun shots and civil disorder such as riots was predictive for the teens.

Our comprehensive approach also identified an important subtlety to the impact of sexual victimization. As expected, the experience of sexual assault made a strong contribution to predicting high trauma symptoms for both older and younger children. However, the separate experience of sexual harassment made an additional contribution independent of sexual assault for both age groups, and a particularly strong contribution among older youth. Thus, the experience of being demeaned, denigrated or stigmatized in a sexual way is an important childhood adversity that is not sufficiently explained by sexual assault or peer emotional abuse, which sometimes also has sexual components.

Another domain of adversity emerged from our analyses, but its implications are equivocal. Being the victim of personal property theft appeared to make some independent contribution for younger children. Property crime is a childhood adversity that has rarely been discussed by those interested in childhood mental health. Conventional beliefs hold that property harms are frequent, minor and transitory. Our property crime question was endorsed by only about one-tenth of the parents responding for this age group. Perhaps they were selective, only reporting on experiences associated with a strong sense of loss for the child. Nevertheless, for those assessing adversities to young children through parent inventories, our findings suggest that personal property theft bears consideration.

Two items from the interpersonal loss domain, someone close who had been very ill and someone close who attempted suicide, emerged as important predictors, but only for older children. Although it is unclear why this was the case, it may be that younger children are sometimes unaware of the serious illness or suicide attempt of the close network member. Even though the responding parent knows what happened, the child (particularly young children) may often be protected from the distressing details of the situation. In contrast, older youth, who are self-reporting, do so because they clearly know of the event and it has some salience for them. Moreover, in the case of suicide attempts, the close network member affected may often involve similar age peers; adolescents close in age to the person who has attempted suicide may be particularly impacted because the youth more strongly identifies with the victim.

A domain that has always been considered important for social policy analysts, but less so for mental health clinicians has been economic adversities. It was not considered in the original ACEs inventory and has generally been omitted in other adversity inventory versions (Oh et al., 2018), but has been considered by a few other ACEs researchers (Nurius et al., 2019). When our analysis contrasted several measures of economic adversity, low income was clearly not the best variable to use as a predictor. By contrast, being on welfare and parental job loss were independent predictors for younger children only.

An important question, however, is just what dynamics are responsible for distressing consequences of economic adversity on younger children. Since our models already had many elements of family conflict, maltreatment, neighborhood crime, and residential instability, all of which can be concomitants of economic adversity, the mechanisms may be other aspects of family conditions or behaviors not directly captured by the ACEs assessed. For example, welfare and parental job loss may be proxy indicators for low parental involvement and availability, parenting practices and styles associated with low parent education (Brand, 2015; McLoyd, Jayaratne, Ceballo, & Borquez, 1994), or even the prenatal environment that can influence epigenetic dysregulation and brain development before birth (Babenko, Kovalchuk, & Metz, 2015; Monk, Spicer, & Champagne, 2012).

Family instability is also viewed as an important possible component of childhood adversity (Hadfield, Amos, Ungar, Gosselin, & Ganong, 2018; Lee & McLanahan, 2015). While the two conventional ACE items of divorce and parental imprisonment did not

contribute independently to predicting distress, we also looked at a variety of other family instability indicators like moving a lot, a parent having multiple romantic partners, or the family being homeless. Nonetheless, the only family instability indicator that made an independent contribution was the child being removed from the family, and only for the younger children. Removal from the family occurs primarily for abuse, neglect and parental incapacity (Takayama, Wolfe, & Coulter, 1998; Turney & Wildeman, 2017), but these correlated adversities were controlled for in the analyses. Thus, the strength of this predictor may be due to additional trauma from the removal itself, like change of caregiver or living conditions (Maclean, Sims, O'Donnell, & Gilbert, 2016). It may also be a marker for particularly intense forms of maltreatment or parental incapacity, which differentially result in removal (Baldwin et al., 2019).

Another family instability factor included in our assessment was parental mental illness. A version of this, any family mental illness, was used to represent the item in the original screener, which asked about mental health problems among household members. After comparing the strength of associations with trauma symptomatology, we chose to include a more narrowly defined item of mother or father mental illness in our new proposed measure. This factor was only significant for the younger children, which is consistent with some recent studies from Sweden (Niederkrotenthaler et al., 2012). Although family drug or alcohol problem was also significant for older youth within the original ACEs analyses, it was not significant in either age group in the new proposed measure analyses, suggesting that ACEs that may be corollaries to this family problem accounted for its impact. In contrast, parent mental illness remained an independent predictor for younger children with other ACEs controlled.

Like economic stressors, the importance of parent mental illness for young children suggests that there are mechanisms not tapped by our list of ACEs. Future research should attempt to better understand how factors that reflect "status conditions", like economic disadvantage and parental mental disorder, influence child distress. They may index adversity experiences that still need to be identified and potentially included in ACEs measures as more direct causal agents of trauma. Conversely, the mechanisms explaining these associations may fall outside of what are typically considered toxic stress exposures. Either way, the issue highlights the need for more theoretical and empirical work to inform discussions on what, and what is not, part of the conceptual domain of "adverse childhood experiences".

### 4.1. Limitations

There are several limitations of this study. First, there may be low base-rate ACEs that could potentially have a substantial impact on child well-being, but we did not have power to detect significant associations. That being said, it can be argued that including ACE items that have very low base-rates would not be useful for identifying most children at high risk for negative outcomes and, therefore, would not be effective items to include in a wide-spread or universal screening measure. Second, older children may forget about adversities that had happened to them at very young ages and as a result, may tend to report more proximal adversities. However, this most certainly is also a problem of studies that rely on adults' retrospective accounts of their own childhood adversities. Relatedly, parents who provide proxy reports of their children's experiences may underreport certain ACEs, either because they do not know of the exposure or because they may be unwilling to report exposures that involve a parent. Third, our construction of the conventional ACE model is missing one item: emotional neglect, which was not explicitly measured in the NatSCEV. We did have a measure of emotional abuse, physical neglect and other parental incapacity measures, but it is not certain that these would cover the influence of parental emotional neglect measured more directly. Fourth, the current study is limited by cross-sectional data that does not allow us to control for pre-exposure trauma symptoms to fully establish temporal ordering. Moreover, although our study had the advantage of assessing cumulative adversities and recent trauma symptomatology in childhood, it is not certain that the ACEs that best predicted this outcome would be the same ACEs causally responsible for long term health problems in adulthood. Only a study that begins in childhood and follows individuals across decades of the life course, could more conclusively specify ACEs of greatest significance for long-term outcomes and the mediating factors that operate along the way. Finally, future studies might consider whether assessing more nuanced variations in the impact of different ACEs, for example by gender, race, and more narrow age ranges, would improve the predictability of screening instruments.

## 5. Conclusion

Many of the adverse childhood experiences included in the original ACEs index, such as physical abuse, emotional abuse, sexual assault, and witnessing domestic violence were good predictors of trauma symptoms for both older and younger children. However, others, such as divorce and parental imprisonment, were unrelated to this outcome in our analyses. If the goal is to identify children at high risk of experiencing trauma symptoms, and other related outcomes, increasing predictive accuracy of ACE measures can make a substantial difference. Clearly, we do not want to waste resources by unnecessarily flagging children who are not at significant risk.

Developmental differences in the most predictive ACEs highlight the more dominant influence of family-related factors for younger children, such as being taken from family, economic stressors, and parent mental health. Older children appear to be more strongly affected by community and peer violence exposure, especially in the form of different types of serious assault, like assault with injury, weapon assault and bias motivated assault. Interpersonal loss ACEs, like a close network member being serious ill or attempting suicide, are also more influential among older youth. Thus, while many ACEs were predictive of trauma symptoms across the full developmental spectrum, there were several that were specific to the age of assessment, suggesting that developmental considerations are important when using ACEs as an assessment tool.

The ACEs field appears to be pushing ahead with plans to screen children and adults in an attempt to provide interventions to prevent their possibly negative developmental effects (Purewal et al., 2016; Stavely, 2019; Stevens, 2014). Many ACES researchers,

however, have expressed concern about the risks of scaling up such screening prematurely (Finkelhor, 2018; Kelly-Irving & Delpierre, 2019; McLennan et al., 2019; Murphey & Bartlett, 2019; Racine, Killam, & Madigan, 2020). Effective screening regimens have been shown to require proven screening tools that efficiently identify cases that will benefit from treatment, and treatments for the identified conditions that have proven benefits themselves (Dobrow, Hagens, Chafe, Sullivan, & Rabeneck, 2018; Krist, Davidson, & Ngo-Metzger, 2019). ACEs research is nowhere near meeting those conditions. In fact, the current study directly highlights some of the weaknesses and uncertainties about which items or which combinations would be most useful in ACEs screening, and how inventories may fail to evaluate important adversities while screening for others that may be inert. We urge a more incremental and research-based approach to screening and treating childhood adversity exposure to avoid a possible waste of resources and to insure effective treatment. Our 15 item inventories provide a starting point that may be useful in future developmental studies, but additional research is needed. More rigorous construction of screening tools and more thorough evaluations of their comparative utility in clinical settings are needed to be successful in this goal of early intervention.

## Funding

## Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

## Informed consent

Informed consent was obtained from all individual participants included in the study or their legal guardians. Assent was also obtained from all participants under the age of 18.

## Declaration of Competing Interest

The authors declare that there is no conflict of interest relating to this manuscript, nor any financial interests.

## Appendix A. Adverse Childhood Experiences (ACEs) by Domain

*Family Instability (6 ACEs)*

Divorced/Separated
  IF child currently does not live with both biological mother and biological father
  Who are the adults currently living in the household?
Moved homes a lot
  Answered four or more to following:
  How many times has your [CHILD'S AGE]-year old moved since he/she was born?
Multiple live in partners
  IF answered two or more to following:
  How many DIFFERENT marriages or live-in partners have you had since your [CHILD'S AGE]-year-old was born? [Interviewer: Count marriage or live-in to same partner only once]
Parent went to prison
  At any time in (your child's/your) life did either of (your child's/your) parents, stepparent, or guardian ever have to go to prison?
Child taken away
  (Was your child/were you) ever sent away or taken away from your family for any reason?
Family homelessness
  Was there ever a time in (your child's/your) life when (your child's/your) family had to live on the street or in a shelter because they had no other place to stay?

*Interpersonal Loss (3 ACEs)*

Someone close died
Did (your child/you) ever have anyone close to (him/her/you) die because of an illness or an accident?

Someone close very ill

Has someone (your child was/you were) really close to ever had a VERY BAD illness where they had to be in the hospital a lot? Again, this would be someone important to (your child/you), like a parent, brother or sister, or best friend.

Someone close attempted suicide

Has someone close to (your child/you) ever tried to kill him or herself on purpose (like by shooting or cutting him or herself, or taking too many pills or drugs)?

*Family Disorder (2 ACEs)*

Has anyone in your [CHILD'S AGE]-year-old's family ever been diagnosed by a doctor, therapist or another professional with the following? (answer yes/no to each of the following)

a Major Depressive Disorder
b Bipolar Disorder
c Anxiety Disorder
d Substance or Alcohol Related Disorder
e Some other Psychiatric Disorder

Was that person (or those people) his/her mother, father, stepmother, stepfather, sister, brother, or someone else? (check all that apply)

Any family mental illness (original measure)

Counted ACE if respondent answered yes to **a, b, c, and/or e** with respect to any family member

Mother or father mental illness (new measure)

Counted ACE if respondent answered yes to **a, b, c, and/or e** AND indicated the person was mother, father, stepmother and/or stepfather.

Family drug or alcohol problem

Has there ever been a time that a member of (your child's/your) family drank or used drugs so often that it caused problems?

*Non-Relational Threat (3 ACEs)*

Natural Disaster

In (his/her/your) whole life, (was your child/were you) ever in a VERY BAD fire, flood, tornado, hurricane, earthquake or other disaster? This would be a time that (your child's/your) home or apartment was damaged and (your child/you) might have had to live somewhere else for a while

Personal illness

Did (your child/you) ever have a VERY BAD illness where (your child/you) had to go to the hospital? This could be a time when (your child was/you were) so sick that (your child/you) had to be in the hospital a lot? Has that ever happened?

Personal accident

Was your child/Were you) ever in a VERY BAD accident (at home, school, or in a car) where (your child/you) had to go to the hospital? This would be a time that (your child was /you were) was very hurt and needed to spend a long time in the hospital. Has that ever happened?

*Economic Stressors (3 ACEs)*

Parental job loss

Have there ever been any times when (your child's/your) mother, father, or guardian lost a job or couldn't find work?

Welfare

Do you currently receive Temporary Aid to Needy Families (TANF), WIC, welfare, Medicaid, or any other public assistance? [Asked in parent screener interview]

Low Income

Counted IF yearly household income was < $15,000

*Child Maltreatment (4 ACEs)*

Physical abuse

Not including spanking on (his/her /your) bottom, at any time in (your child's/your) life did a grown-up in (your child's/your) life hit, beat, kick, or physically hurt (your child/you) in any way?

Emotional abuse

At any time in (your child's/your) life, did (your child/you) get scared or feel really bad because grown-ups in (your child's/your) life called (him/her /you) names, said mean things to (him/her /you), or said they didn't want (him/her /you)?

Neglect

When someone is neglected, it means that the grown-ups in their life didn't take care of them the way they should. They might not get them enough food, take them to the doctor when they are sick, or make sure they have a safe place to stay. At any time in (your child's/your) life, (was your child/were you) neglected?

Witness parental violence/chronic conflict

Counted IF respondent answered yes to either of the following:

At any time in (your child's/your) life did (your child/you) SEE a parent get pushed, slapped, hit, punched, or beat up by another parent, or their boyfriend or girlfriend?

Has there ever been a time when (your child's/your) parents or stepparents were ALWAYS arguing, yelling, and angry at one another a lot of the time?

*Community Violence Exposure (4 ACEs)*

Witness Weapon Assault

At any time in (your child's/your) life, in real life, did (your child/you) SEE anyone get attacked or hit on purpose WITH a stick, rock, gun, knife, or other thing that would hurt? Somewhere like: at home, at school, at a store, in a car, on the street, or anywhere else?

Witness Simple Assaults

At any time in (your child's/your) life, in real life, did (your child/you) SEE anyone get attacked or hit on purpose WITHOUT using a stick, rock, gun, knife, or something that would hurt?

School Threat

(Has your child/Have you) ever gone to a school where someone said there was going to be a bomb or attack on the school and (your child/you) thought they might really mean it?

Witness shootings, riots

At any time in (your child's/your) life, (was your child/ were you) in any place in real life where (he/she /you) could see or hear people being shot, bombs going off, or street riots?

*Property Crime (4 ACEs)*

Robbery

At any time in (your child's/your) life, did anyone use force to take something away from (your child/you) that (he/she was/you were) carrying or wearing?

Theft of personal property

At any time in (your child's/your) life, did anyone steal something from (your child/you) and never give it back? Things like a backpack, money, watch, clothing, bike, stereo, or anything else?

Vandalism

At any time in (your child's/your) life, did anyone break or ruin any of (your child's/your) things on purpose?

Household burglary

At any time in (your child's/your) life, did anyone steal something from your house that belongs to (your child's/your) family or someone (your child/you) live with? Things like a TV, stereo, car, or anything else?

*Physical Assault (6 ACEs)*

Weapon assault

Sometimes people are attacked with sticks, rocks, guns, knives, or other things that would hurt. At any time in (your child's/your) life, did anyone hit or attack (your child/you) on purpose with an object or weapon? Somewhere like: at home, at school, at a store, in a car, on the street, or anywhere else?

Threatened serious assault

At any time in (your child's/your) life, did someone threaten to hurt (your child/you) when (your child/you) thought they might really do it?

Bias assault

At any time in (your child's/your) life, (has your child/have you) been hit or attacked because of (your child's/your) skin color, religion, or where (your child's/your) family comes from? Because of a physical problem (your child has/you have)? Or because someone said (your child was/you were) gay?

Dating violence

At any time in your life, did a boyfriend or girlfriend or anyone you went on a date with slap or hit you? (asked only of youth ages 12 and older)

Peer assault with injury

Counted IF perpetrator was non-sibling AND respondent answered YES to either of the following AND follow-up indicated injury:

At any time in (your child's/your) life, did any kid, even a brother or sister, hit (your child/you)? Somewhere like: at home, at school, out playing, in a store, or anywhere else?

Peer assault with no injury

IF perpetrator was non-sibling AND respondent answered YES to following AND follow-up indicated no injury:

At any time in (your child's/your) life, did any kid, even a brother or sister, hit (your child/you)? Somewhere like: at home, at school, out playing, in a store, or anywhere else?

Kidnap attempt

When a person is kidnapped, it means they were made to go somewhere, like into a car, by someone who they thought might hurt them.] At any time in (your child's/your) life, has anyone ever tried to kidnap (your child/you)?

*Sexual Victimization (2 ACEs)*

Sexual Harassment

At any time in (your child's/your) life, did anyone hurt (your child's/your) feelings by saying or writing something sexual about (your child/you) or (your child's/your) body?

Sexual Assault

YES response to any of the following:

At any time in (your child's/your) life, did a grown-up (your child knows/you know) touch (your child's/your) private parts when they shouldn't have or make (your child/you) touch their private parts? Or did a grown-up (your child knows/you know) force (your child/you) to have sex?

At any time in (your child's/your) life, did a grown-up (your child/you) did not know touch (your child's/your) private parts when they shouldn't have, make (your child/you) touch their private parts or force (your child/you) to have sex?

Now think about other kids, like from school, a boyfriend or girlfriend, or even a brother or sister. At any time in (your child's/ your) life, did another child or teen make (your child/you) do sexual things?

*Peer Victimization (2 ACEs)*

Physical intimidation

At any time in (your child's/your) life, did any kids, even a brother or sister, pick on (your child/you) by chasing (your child/you) or grabbing (your child/you) or by making (him/her /you) do something (he/she /you) didn't want to do?

Emotional bullying

At any time in (your child's/your) life, did (your child/you) get really scared or feel really bad because kids were calling (him/her /you) names, saying mean things to (him/her /you), or saying they didn't want (him/her /you) around?

## Appendix B. Proposed New Measure Items

*Young children ages 2−9 (caregiver screener)*

1) Was your child ever sent away or taken away from your family for any reason?
2) Has any parent or stepparent of your child ever been diagnosed by a doctor, therapist or another professional with Major Depressive Disorder, Bipolar Disorder, Anxiety Disorder or any other psychiatric disorder?
3) Have there ever been any times when your child's mother, father, or guardian lost a job or couldn't find work?
4) Does your child's family currently receive Temporary Aid to Needy Families (TANF), WIC, welfare, Medicaid, or any other public assistance?
5) Not including spanking on his/her bottom, at any time in your child's life did a grown-up in your child's life hit, beat, kick, or physically hurt your child in any way?
6) At any time in your child's life, did your child get scared or feel really bad because grown-ups in your child's life called him/her names, said mean things to him/her, or said they didn't want him/her?
7) At any time in your child's life did your child SEE a parent get pushed, slapped, hit, punched, or beat up by another parent, or their boyfriend or girlfriend? Or has there ever been a time when your child's parents or stepparents were ALWAYS arguing, yelling, and angry at one another a lot of the time?
8) At any time in your child's life, in real life, did your child SEE anyone get attacked or hit on purpose WITH a stick, rock, gun, knife, or other thing that would hurt? Somewhere like: at home, at school, at a store, in a car, on the street, or anywhere else?
9) At any time in your child's life, did anyone steal something from your child and never give it back? Things like a backpack, money, watch, clothing, bike, stereo, or anything else?
10) At any time in your child's life, did any kid (not including a brother or sister) hit your child causing him/her to be injured? That is, he/she felt pain the next day or had something like a cut, bruise, or broken bone? This could have happened at home, at school, out playing, in a store, or anywhere else.
11) At any time in your child's life, did any kid (not including a brother or sister) hit your child even though he/she was not injured? This could have happened at home, at school, out playing, in a store, or anywhere else?
12) At any time in your child's life, did anyone hurt your child's feelings by saying or writing something sexual about your child or your child's body?
13) At any time in your child's life, did any kids, even a brother or sister, pick on your child by chasing your child or grabbing your child or by making him/her do something he/she didn't want to do?

14) At any time in your child's life, did your child get really scared or feel really bad because kids were calling him/her names, saying mean things to him/her, or saying they didn't want him/her around?
15) At any time in your child's life, did any grown-up (that your child knows or did not know) touch your child's private parts when they shouldn't have or make your child touch their private parts? Or did any grown-up force your child to have sex?

AND/OR

Now think about other kids, like from school, a boyfriend or girlfriend, or even a brother or sister. At any time in your child's life, did another child or teen make your child do sexual things?

*Older youth 10 – 17 (self-report)*

1) Has someone you were really close to ever had a VERY BAD illness where they had to be in the hospital a lot? This would be someone important to you, like a parent, brother or sister, or best friend.
2) Has someone close to you ever tried to kill him or herself on purpose (like by shooting or cutting him or herself, or taking too many pills or drugs)?
3) Not including spanking on your bottom, at any time in your life did a grown-up in your life hit, beat, kick, or physically hurt you in any way?
4) At any time in your life, did you get scared or feel really bad because grown-ups in your life called you names, said mean things to you, or said they didn't want you?
5) At any time in your life did you SEE a parent get pushed, slapped, hit, punched, or beat up by another parent, or their boyfriend or girlfriend? Or has there ever been a time when your parents or stepparents were ALWAYS arguing, yelling, and angry at one another a lot of the time?
6) At any time in your life, in real life, did you SEE anyone get attacked or hit on purpose WITH a stick, rock, gun, knife, or other thing that would hurt? Somewhere like: at home, at school, at a store, in a car, on the street, or anywhere else?
7) At any time in your life, did any kid (not including a brother or sister) hit you causing you to be injured. That is, you felt pain the next day or had something like a cut, bruise, or broken bone? This could have happened at home, at school, out playing, in a store, or anywhere else
8) Sometimes people are attacked with sticks, rocks, guns, knives, or other things that would hurt. At any time in your life, did anyone hit or attack you on purpose with an object or weapon? Somewhere like: at home, at school, at a store, in a car, on the street, or anywhere else?
9) At any time in your life, did someone threaten to hurt you when you thought they might really do it?
10) At any time in your life, have you been hit or attacked because of your skin color, religion, or where your family comes from? Because of a physical problem you have? Or because someone said you were gay?
11) At any time in your life, were you in any place in real life where you could see or hear people being shot, bombs going off, or street riots?
12) At any time in your life, did anyone hurt your feelings by saying or writing something sexual about you or your body?
13) At any time in your life, did any kids, even a brother or sister, pick on you by chasing you or grabbing you or by making you do something you didn't want to do?
14) At any time in your life, did you get really scared or feel really bad because kids were calling you names, saying mean things to you, or saying they didn't want you around?
15) At any time in your life, did any grown-up (that you know or did not know) touch your private parts when they shouldn't have or make you touch their private parts? Or did any grown-up force you to have sex?

AND/OR

Now think about other kids, like from school, a boyfriend or girlfriend, or even a brother or sister. At any time in your life, did another child or teen make your you do sexual things?

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