Validation of the Traumatic Events Screening Inventory for ACEs

Kristen R. Choi, PhD, MS, RN,[a] Michael McCreary, MPP,[b] Julian D. Ford, PhD,[c] Sara Rahmanian Koushkaki, MHSA, BA,[b] Kristen N. Kenan, MD, MPH,[d] Bonnie T. Zima, MD, MPH[b]

abstract

OBJECTIVES: Our purpose in this study was to adapt and validate the Traumatic Events Screening Inventory (TESI) as a primary-care childhood adversity screening tool for children living in vulnerable neighborhoods using a community-partnered approach.

METHODS: In this cross-sectional, descriptive study, we used a sample of 261 children (3–16 years old) who were seeking services at a Federally Qualified Health Center with colocated behavioral health services in Chicago and had a positive Pediatric Symptom Checklist screen result or received a referral for behavioral health evaluation. The TESI was adapted as a screening tool to be sensitive to adverse childhood experiences (ACEs) unique to the clinic communities. ACEs were mapped by zip code with objective neighborhood crime data, and latent class analysis was performed to identify ACE subgroups.

RESULTS: The mapping validation suggested face validity for geographic overlap between participant ACEs and objective violent-crime occurrence. With latent class analysis, we identified 3 ACE subgroups: (1) high ACE (18.0% of the sample; polyvictimization and/or maltreatment), (2) moderate ACE (52.1%; violent environments), and (3) low ACE (29.9%; few adverse experiences). Membership in the high-ACE subgroup was associated with higher odds of a clinically significant Pediatric Symptom Checklist score (odds ratio = 3.83) and clinical-level attention problems (odds ratio = 3.58) even after accounting for child resilience and parent depression.

CONCLUSIONS: ACEs play a significant role in predicting a need for behavioral health services among children seeking primary-care services. The community-adapted TESI is a valid ACE screening tool.

[a]*Division of General Internal Medicine and Health Services Research, National Clinician Scholars Program and* [b]*Center for Health Services and Society, Semel Institute for Neuroscience and Human Behavior, University of California, Los Angeles, Los Angeles, California;* [c]*Department of Psychiatry, University of Connecticut, Mansfield, Connecticut; and* [d]*Department of Pediatrics, University of Illinois Hospital and Health Sciences System, Chicago, Illinois*

Drs Choi and Zima conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript; Mr McCreary designed the data-collection system and reviewed and revised the manuscript; Ms Rahmanian Koushkaki conducted a review of the measurement literature and reviewed and revised the manuscript; Drs Ford and Kenan reviewed and revised the manuscript for important intellectual content; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

DOI: https://doi.org/10.1542/peds.2018-2546

Accepted for publication Dec 28, 2018

Address correspondence to Kristen R. Choi, PhD, MS, RN, Division of General Internal Medicine and Health Services Research, University of California, Los Angeles, 1100 Glendon Ave, Suite 900, Los Angeles, CA 90024. E-mail: krchoi@ucla.edu

WHAT'S KNOWN ON THIS SUBJECT: Adverse childhood experiences (ACEs) are harmful to child health, but there is disagreement about the role of ACE screening in primary care. Adapting trauma assessment tools and colocating behavioral services may help identify high-ACE youth for connection to trauma-informed services.

WHAT THIS STUDY ADDS: The adapted Traumatic Events Screening Inventory has validity as an ACE screener in primary care and predicts behavioral dysfunction, particularly among polyvictimized youth. ACEs can be indicative of a need for behavioral health referral and trauma-informed intervention.

To cite: Choi KR, McCreary M, Ford JD, et al. Validation of the Traumatic Events Screening Inventory for ACEs. *Pediatrics.* 2019;143(4):e20182546

Traumatic experiences during childhood can have adverse, far-reaching effects on health and social wellness. Approximately two-thirds of individuals will experience at least 1 traumatic event before age 17 years.[1–4] Approximately 1 in 5 children experience 3 or more types of traumatic events, which is also called polyvictimization.[1,5] Polyvictimized children are at risk for severe problems with behavioral and physical health, in school and at work, and with the legal system across the life span.[1,6–12] A broad framework for identifying traumatically victimized children is provided in the extensive research conducted on adverse childhood experiences (ACEs).[13–21]

Given the known role of ACEs in a trajectory of poor health and social outcomes, identifying ACEs and intervening early is a critical component of comprehensive pediatric health care.[12] However, there is disagreement among experts and clinicians about whether ACE screening in primary care is appropriate and feasible. Proponents argue that the harm of ACEs is well established, and there is sufficient evidence for trauma-specific interventions (eg, trauma-focused cognitive behavioral therapy) to warrant screening.[22] Others contend that there are not sufficient resources for evidence-based traumatic stress treatment in most primary-care settings and that screening tools are not yet refined enough to warrant universal screening.[23,24] In determining best practices for ACE screening in primary care, 1 potential solution is to adapt comprehensive trauma-history assessment tools from child psychiatry for primary-care screening and implement the screen in integrated or colocated mental health clinics, where appropriate follow-up can occur. Psychiatric trauma screening assessments are typically designed to capture a broader range of trauma experiences than the brief ACE screeners (eg, community-violence experiences, such as violent crime, firearm violence, media violence, and bullying) as well as their impact on the child and their role in the development of posttraumatic stress sequelae.

One such assessment tool is the Traumatic Events Screening Inventory (TESI), an instrument that is used to assess a variety of potential traumatic events and a child's response.[25–30] The current version, the Traumatic Events Screening Inventory–Child Report Form Revised (TESI-CRF-R), is a 24-item version for youth ages 6 to 18 years, and the Traumatic Events Screening Inventory–Parent Report Revised (TESI-PRR) is a version available for parents of children ages <6 years.[31] The measure has shown evidence of reliability and validity and is recommended for assessing traumatic experiences among young children.[31,32] However, the TESI has not yet been widely used in primary-care settings. Brief trauma-screening instruments that are more common in primary care may miss important trauma experiences, and the TESI has potential to be a useful instrument for ACE screening in primary care. Our purpose in this study was to adapt and validate the TESI as a primary-care ACE screening tool for children living in vulnerable neighborhoods using a community-partnered approach. To achieve this goal, we addressed 2 specific aims: (1) adapt the TESI as a primary-care ACE screener and (2) validate the TESI as a primary-care screener by (a) mapping ACEs and crime statistics by neighborhood, (b) identifying ACEs subgroups with latent class analysis (LCA), and (c) exploring relationships between ACE subgroups and the need for behavioral health assessment.

METHODS

Study Design and Setting

This was a descriptive, cross-sectional analysis of baseline data from an ongoing study of colocated care models in 2 Federally Qualified Health Centers (FQHCs) in Chicago, Illinois. The clinics were located on the West Side and South Side of Chicago in West Town (site 1) and Englewood (site 2). In this analysis, we combined data from both clinics. Site 1 served primarily Hispanic and/or Latino youth, and site 2 served primarily black and/or African American youth, and both neighborhoods had high levels of socioeconomic vulnerability (Table 1).

Sample

Caregiver-child dyads were eligible for participation in the study if the child was 3 to 16 years of age (children age 17 years were excluded because they would become legal adults during the follow-up period), the caregiver and child spoke English or Spanish, the child had not received colocated mental health care in the past 3 months at the study site, and the child was identified as being in need of a behavioral health assessment by using a positive Pediatric Symptom Checklist (PSC) screen result (score ≥30) or receipt of a referral for on-site behavioral health evaluation.[33] There were 507 children who were eligible for enrollment in the study. Of the eligible sample, 340 children agreed to enroll, and 277 children went on to complete baseline measures. There were 261 children with a completed TESI questionnaire who qualified for inclusion in the analytic sample. Among the children in the sample, 46% were girls, and most were from minority ethnic and/or racial backgrounds. On average, children were 8.6 years old (SD = 4.5). Children had a mean of 4 ACEs (SD = 3.40) and 4 PSC symptoms (SD = 4.53). Sociodemographic characteristics did not vary by ACEs subgroup with the exception of child mean age (Table 1).

TABLE 1 Sociodemographic and Clinical Characteristics by ACE Subgroup

	Overall (N = 261)	Low ACE (n = 78)	Moderate ACE (n = 136)	High ACE (n = 47)	P
Girls, % (n)	46.0 (120)	47.4 (37)	43.4 (59)	51.1 (24)	.746
Site 1	82.5 (99)	89.2 (33)	78.0 (46)	83.3 (20)	—
Site 2	17.5 (21)	10.8 (4)	22.0 (13)	16.7 (4)	—
Black and/or African American race, % (n)	26.4 (69)[a]	26.9 (21)	25.7 (35)	27.7 (13)	.961
Site 1	15.9 (11)	0 (0)	25.7 (9)	15.4 (2)	—
Site 2	84.1 (58)	100 (21)	74.3 (26)	84.6 (11)	—
Primary language is Spanish, % (n)	13.8 (36)[a]	17.9 (14)	14.0 (19)	6.4 (3)	.191
Site 1	100 (36)	100 (14)	100 (19)	100 (3)	—
Site 2	0 (0)	0 (0)	0 (0)	0 (0)	—
Parents unmarried,[b] % (n)	53.3 (140)[a]	46.2 (36)	52.9 (72)	68.1 (32)	.057
Site 1	86.4 (121)	86.1 (31)	88.9 (64)	81.3 (26)	—
Site 2	13.6 (19)	13.9 (5)	11.1 (8)	18.7 (6)	—
Parents uninsured, % (n)	77.4 (202)	74.4 (58)	76.5 (104)	85.1 (40)	.354
Site 1	76.7 (155)	74.1 (43)	78.8 (82)	75.0 (30)	—
Site 2	23.3 (47)	25.9 (15)	21.2 (22)	25.0 (10)	—
Psychosocial impairment (PSC score ≥30), % (n)	21.8 (57)	11.5 (9)	19.1 (26)	46.8 (22)	<.001
Site 1	66.7 (38)	77.8 (7)	61.5 (16)	68.2 (15)	—
Site 2	33.3 (19)	22.2 (2)	38.5 (10)	31.8 (7)	—
Attentional problems (PSC score ≥7), % (n)	29.9 (78)	24.4 (19)	26.5 (36)	48.9 (23)	.007
Site 1	75.6 (59)	78.9 (15)	77.8 (28)	69.6 (16)	—
Site 2	24.4 (19)	21.1 (4)	22.2 (8)	30.4 (7)	—
Internalizing problems (PSC score ≥5), % (n)	5.4 (14)	0.0 (0)	5.9 (8)	12.8 (6)	.008
Site 1	57.1 (8)	0 (0)	63.5 (5)	50 (3)	—
Site 2	42.9 (6)	0 (0)	37.5 (3)	50 (3)	—
Externalizing problems (PSC score ≥7), % (n)	18.0 (47)[a]	12.8 (10)	19.1 (26)	23.4 (11)	.292
Site 1	63.8 (30)	80 (8)	57.7 (15)	63.6 (7)	—
Site 2	36.2 (17)	20 (2)	42.3 (11)	36.4 (4)	—
Age, y, mean (SD)	8.56 (4.45)[c]	5.77 (2.97)	8.92 (3.47)	12.25 (2.97)	<.001
Site 1	8.92 (4.43)	6.70 (3.69)	8.93 (3.85)	12.75 (3.18)	—
Site 2	7.44 (4.63)	4.52 (3.14)	8.78 (4.39)	9.64 (2.86)	—
ACE count, mean (SD)	4.11 (3.40)	0.72 (0.73)	4.06 (1.42)	9.87 (2.24)	<.001
Site 1	4.13 (3.69)	0.67 (0.74)	4.05 (1.61)	9.86 (2.52)	—
Site 2	4.03 (3.72)	0.86 (0.79)	4.11 (1.46)	9.91 (2.02)	—
PHQ score, mean (SD)	4.51 (5.17)	3.0 (3.72)	4.79 (5.25)	6.19 (6.52)	.002
Site 1	4.18 (4.96)	2.56 (3.32)	4.53 (5.15)	5.69 (6.09)	—
Site 2	5.61 (5.67)	4.19 (4.44)	5.80 (5.40)	7.82 (7.27)	—
Resilience score, mean (SD)	79.76 (14.86)	81.87 (15.52)	79.67 (14.43)	76.53 (14.45)	.205
Site 1	80.34 (15.94)	80.98 (17.02)	81.19 (15.36)	76.79 (15.1)	—
Site 2	78.04 (16.52)	84.29 (14.84)	73.3 (14.69)	78.0 (18.01)	—
Overall PSC symptoms, mean (SD)	4.45 (4.53)	3.32 (3.66)	4.19 (4.19)	7.09 (5.62)	<.001
Site 1	4.20 (4.36)	3.58 (3.91)	3.78 (4.08)	6.44 (4.87)	—
Site 2	5.30 (5.84)	2.62 (3.33)	5.79 (5.22)	9.18 (8.96)	—
PSC attentional symptoms, mean (SD)	1.49 (1.71)	1.44 (1.65)	1.35 (1.64)	2.02 (1.86)	.038
Site 1	1.49 (1.69)	1.54 (1.68)	1.31 (1.63)	1.92 (1.76)	—
Site 2	1.53 (1.76)	1.14 (1.49)	1.49 (1.67)	2.36 (2.09)	—
PSC internalizing symptoms, mean (SD)	0.38 (0.63)	0.06 (0.12)	0.39 (0.64)	0.85 (1.19)	<.001
Site 1	0.34 (0.56)	0.09 (0.16)	0.36 (0.59)	0.67 (0.94)	—
Site 2	0.50 (0.85)	0 (0)	0.51 (0.81)	1.46 (1.85)	—
PSC externalizing symptoms, mean (SD)	0.72 (1.12)	0.56 (0.94)	0.72 (1.08)	1.00 (1.48)	.213
Site 1	0.63 (1.01)	0.58 (0.99)	0.62 (0.98)	0.72 (1.10)	—
Site 2	1.05 (1.43)	0.52 (0.79)	1.11 (1.34)	1.91 (2.42)	—

[a] Sites differed significantly in a χ^2 test.

[b] "Parents unmarried" category included parents who were single, divorced, widowed, or separated.

[c] Sites differed significantly in a t test.

Procedures

The study protocol and consent procedures were approved by the institutional review boards at the University of California, Los Angeles and the University of Illinois at Chicago. Members of the primary-care team identified participants during sick or well-child visits. They were then approached by a member of the embedded mental health team, who connected interested participants to the on-site study coordinator for completion of

enrollment and consent. Data were collected by using a Web-based clinical-care monitoring and data-collection tool developed for this study.[34] Measures were administered to all parent participants and to youth participants if they were ≥12 years of age in an individual in-person or phone interview. For all measures, symptoms or ACE items were considered to be present if either the parent or the youth reported the item at the clinical levels (ie, for discrepancies, the higher of the 2 scores or the positive endorsement was retained).

TESI Adaptation

We adapted the TESI as a primary-care screening tool using a community-partnered approach, anticipating that there could be unique community-violence–related ACEs occurring among our participants on the basis of cultural aspects of the communities and historical, structural, and policy inequalities affecting the neighborhoods.[35] Community partners preferred to use the TESI as an ACE screener and shift the detailed assessment of ACE characteristics to behavioral health workers; thus, we did not include the TESI follow-up questions on details about the ACE. Community-partner feedback led to 6 adaptations to the TESI-PRR and TESI-CRF-R: (1) adding an item for bullying to both versions, (2) specifying an item for death of someone close to the child due to violence in the TESI-PRR, (3) specifying physical assault due to harsh punishment in the TESI-PRR, (4) specifying physical assault due to a weapon attack in the TESI-PRR, (5) adding an item for actual or attempted suicide of someone close to the child to the TESI-CRF-R, and (6) adding an item for reporting any other ACEs to the TESI-CRF-R.

TESI Mapping Validation

Because the TESI and our adaptations were sensitive to community-violence experiences, we used mapping of participant-reported ACEs and objective crime occurrence in Chicago to determine if there was geographic face validity for our screener. We mapped ACEs reported by parents and youth by zip code in Chicago using our community-adapted version of the TESI, showing both the number of participants in each zip code and the average number of ACEs for the children in each zip code. Then, we mapped the number of reported violent crimes by city ward as a proxy for the level of community violence using data from the Chicago Police Department.[36] The violent-crime count included battery, assault, homicide, kidnapping, human trafficking, and criminal sexual offenses.[36]

Study Variable Construction

Outcome Variable

The dependent variables were (1) overall clinical-level PSC scores, (2) clinical-level PSC attentional scores, and (3) clinical-level PSC externalizing scores. The PSC is a 35-item, general psychosocial screening instrument of emotional, cognitive, and behavioral symptoms in children with 3 subscales: attentional problems, internalizing symptoms, and externalizing symptoms.[33] Symptoms are considered to be present for scores of 1 or 2, and clinical cutoffs were 7, 5, and 7 for the attentional problems, internalizing symptoms, and externalizing symptoms subscales, respectively. The PSC was reported by both parents and youth if they were ≥12 years of age, with symptoms considered to be present if either the parent or youth reported symptoms at the levels described above. We did not examine internalizing scores as an outcome because too few children reached the cutoff.

Independent Variables

ACE history was measured by using our 28-item adapted version of the TESI, with items considered to be present if either the parent or the child endorsed the adverse event.[32] The parent, child (if age ≥12 years), or both completed the TESI screen. A simple tally of ACEs (ACE count) was used as an indicator of cumulative ACE burden. Resilience was measured by using the parent-report Connor-Davidson Resilience Scale.[37,38] Connor-Davidson Resilience Scale scores range from 0 to 100, and 80 is the US population's average score for resilience.[38] The 9-item Patient Health Questionnaire (PHQ), a self-report screen for probable depression, was administered to parents.[39] Functional impairment was measured by using the Columbia Impairment Scale.[40,41] A cutoff score of 15 on the Columbia Impairment Scale indicates significant functional impairment; symptoms were considered to be present if either the parent or child endorsed the symptom at levels of 3 or higher on a 0-to-4 scale. Sociodemographic items were child sex (male or female), child race and/or ethnicity (black and/or African American, white, or Hispanic), child age (0–17 years), child primary language as a proxy for acculturation (English and/or Spanish), parent marital status as a proxy for primary support (married or unmarried), and parent insurance status as a proxy for family socioeconomic status (insured [Medicaid or private] or uninsured).[42]

Analysis

To identify subgroups of ACEs in the sample, we used LCA based on the 28-item adapted version of the TESI. LCA is a model-based clustering technique that is used to identify unobserved heterogeneity in a sample by identifying a latent grouping variable.[43] We selected this approach given that ACEs often occur in constellations and that ACE types and characteristics, in addition to cumulative ACE burden, can lead to variations in behavioral health outcomes.[44] Additional details about LCA are reported in the Supplemental Information. To examine differences

in analytic variables across the 3 ACE subgroups, we used χ^2 tests for categorical variables and analysis of variance for continuous variables.

To examine predictors of clinical outcomes, logistic regression models were estimated to assess relationships between ACE subgroups, resilience, and behavioral problems. We estimated the models in stages, predicting outcomes with ACE subgroups in the first model, adding resilience in the second model, and adding parent depression in the third model.[45] We then estimated a fourth model, adding child impairment after parent depression to verify the relationships among variables. The models were adjusted for child sex, race and/or ethnicity, age, primary language, parent marital status, and parent insurance status. Because only 1.5% of youth in the sample identified as non-Hispanic white, we could not make meaningful comparisons with this group, and the race covariate was collapsed into a black and/or African American Hispanic variable. Missing data were multiply imputed by using chained equations; all analytic variables were missing at rates of <3%.

RESULTS

The mapping validation provided face validity for our measure because there was geographic overlap between parent- and youth-reported ACEs and objective crime occurrence in Chicago (Fig 1). There were particularly high crime levels in the West Side and South Side city wards, and these wards overlapped with zip codes with both the largest numbers of youth reporting ACEs and the most ACEs.

With LCA, we identified 3 types of ACE subgroups characterized by the likelihood and type of ACEs exposure: (1) high likelihood of multiple ACEs (high ACE and/or polyvictimization; 18.0% of the sample), (2) moderate likelihood of direct or witnessed exposure to violence or death (moderate ACE and/or violent environments; 52.1% of the sample), and (3) low likelihood of ACEs (low ACE; 29.9% of the sample). Bullying, 1 of the community-adapted TESI items, was a frequently reported ACE experience in both the moderate- and high-ACE subgroups, but high-ACE youth were more than twice as likely to have experienced bullying than the moderate-ACE subgroup members (70% probability versus 30% probability, respectively). The other community-adapted ACE items for physical assault (physical assault, abusive physical punishment, and physical attack with a weapon) also differentiated the high-ACE from the moderate-ACE subgroup. Both subgroups experienced physical assaults generally, but only youth in the high-ACE subgroup had experienced abusive physical punishment and weapon attacks. The moderate-ACE subgroup was the largest and was most similar to the overall sample on ACE, clinical, and demographic characteristics, so this subgroup was used as the reference category.

In bivariate tests in which we examined differences in ACE subgroups (Table 1), the high-ACE subgroup had significantly higher proportions of children reaching the clinical cutoff for the PSC (46.8%; $P < .001$) and its attentional and internalizing subscales (48.9%; $P = .007$ and 12.8%; $P = .008$, respectively) than other subgroups. This subgroup also had significantly more overall PSC symptoms and ACEs than the moderate- or low-ACE subgroups. Furthermore, youth in the high-ACE subgroup had significantly lower resilience scores and parents with more reported PHQ symptoms in comparison with both other subgroups.

Membership in the high-ACE subgroup was associated with 4.23-fold higher odds of a clinically significant overall PSC score in the first model (Table 2). Resilience slightly lessened the strength of this relationship and was associated with lower odds of a clinically significant overall PSC score. When parent depression was added, resilience was no longer a significant predictor, although membership in the high-ACE subgroup was. In the final model, when impairment was added as a predictor, high-ACE subgroup membership remained a significant predictor of a clinical-level PSC score.

In the first logistic regression model predicting clinical-level attention problems, membership in the high-ACE subgroup was associated with 3.97-fold higher odds of attention problems. When resilience was added, the strength of this relationship decreased slightly but remained significant (odds ratio [OR] = 3.80). In the third model, parent depression was associated with higher odds of attention problems (OR = 1.06), and membership in the high-ACE subgroup remained significant (OR = 3.58). When impairment symptoms were added in the final model, high-ACE subgroup membership remained significant (OR = 3.28). In the models predicting clinical-level externalizing problems, the predictors did not achieve statistical significance except in the final model that included impairment symptoms (Table 2).

DISCUSSION

In this analysis, we explored relationships between ACE subgroups, resilience, and behavioral health outcomes among youth in Chicago after adapting the TESI as a primary screener using a community-partnered approach. There was face validity for our screener because mapping demonstrated geographic overlap between participant-reported ACEs and objective violent-crime data. The results suggest that ACEs are associated with a need for behavioral health services in a population of

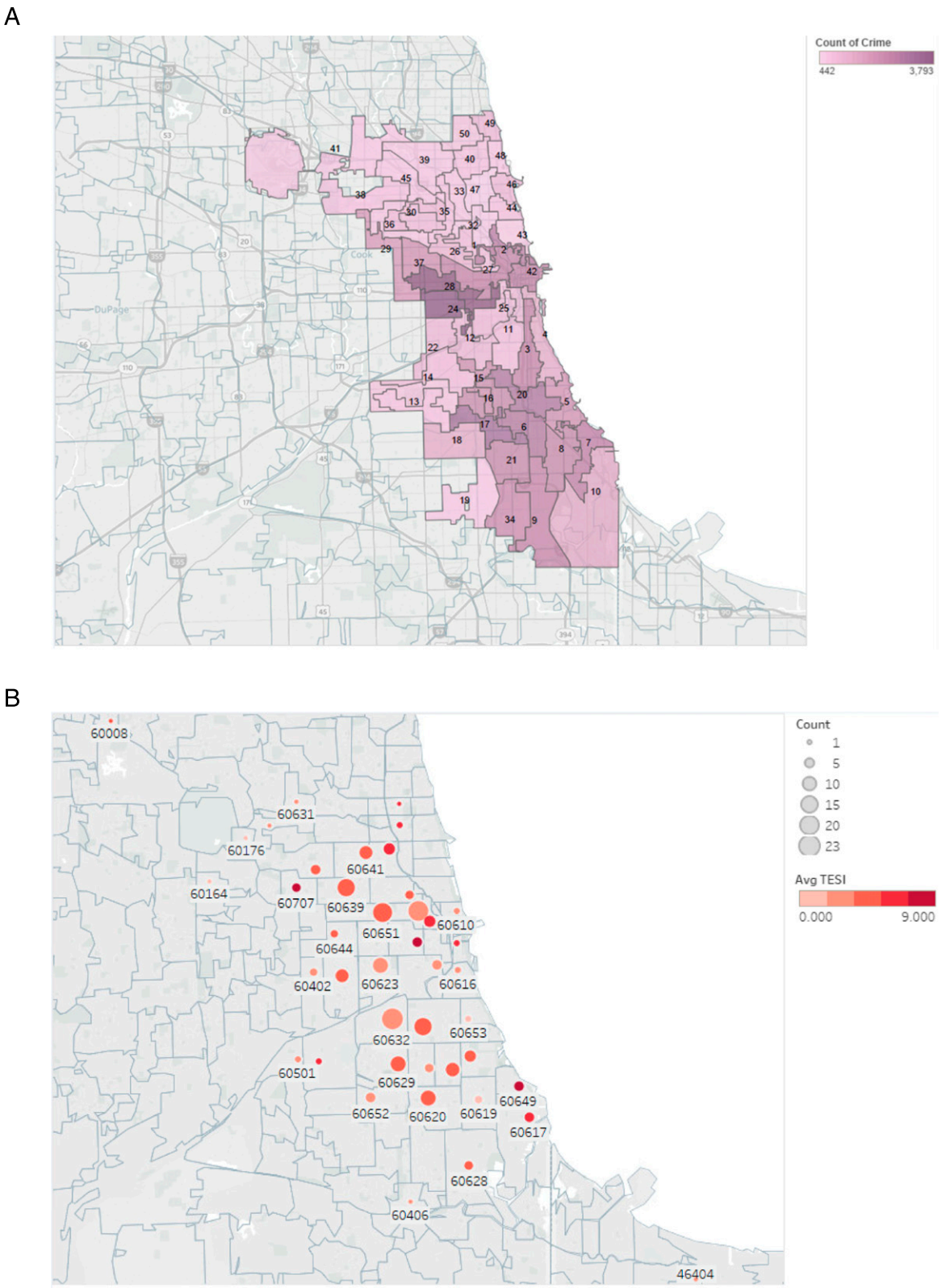

FIGURE 1

TESI mapping validation with objective violent crime data. A, Violent-crime map by city ward. The map is based on longitude and latitude by city ward. Color indicates details about the crime count, including battery, criminal damage, and assault. B, ACE map by zip code. The map is based on longitude and latitude by zip code. Color indicates details about the average number of reported ACEs by using the community-adapted TESI. Size reveals the count of children reporting trauma experiences in a given zip code.

TABLE 2 Logistic Regression Models Predicting Behavioral Problems by ACE Subgroup

	Psychosocial Impairment (PSC Score ≥30)[a]		Attentional Problems (PSC Score ≥7)[a]		Externalizing Problems (PSC Score ≥7)[a]	
	OR	CI	OR	CI	OR	CI
Model 1[b]						
Low ACE	0.51	0.21–1.24	0.70	0.35–1.42	0.43	0.18–1.05
High ACE	4.23	1.87–9.60	3.97	1.81–8.72	2.03	0.82–5.06
Model 2[b]						
Low ACE	0.55	0.22–1.34	0.73	0.36–1.48	0.47	0.19–1.14
High ACE	4.03	1.77–9.17	3.80	1.73–8.37	1.91	0.76–4.79
Resilience	0.98	0.96–0.99	0.99	0.97–1.01	0.98	0.96–1.01
Model 3[b]						
Low ACE	0.60	0.24–1.49	0.82	0.40–1.69	0.51	0.21–1.25
High ACE	3.83	1.67–8.80	3.58	1.61–7.95	1.81	0.71–4.57
Resilience	0.99	0.96–1.01	1.00	0.97–1.02	0.99	0.97–1.01
PHQ scores	1.05	0.98–1.12	1.06	1.00–1.13	1.05	0.98–1.12
Model 4[b]						
Low ACE	0.61	0.23–1.65	0.85	0.41–1.77	0.49	0.18–1.32
High ACE	3.52	1.33–9.32	3.28	1.43–7.54	1.24	0.40–3.79
Resilience	0.99	0.96–1.02	1.00	0.98–1.02	1.00	0.97–1.03
PHQ scores	1.01	0.93–1.10	1.05	0.98–1.12	1.00	0.92–1.09
Impairment symptoms	1.92	1.53–2.41	1.34	1.13–1.59	2.11	1.63–2.72

CI, confidence interval.

[a] Estimates are adjusted for age, sex, race, language, parent marital status, and parent insurance status.

[b] The moderate-ACE subgroup characterized by violent environments was 52% of the sample and most similar to the sample as a whole on sociodemographic and clinical characteristics. As such, this group was the reference against which the smaller low-ACE and high-ACE subgroups were compared.

youth living in a socioeconomically disadvantaged community. Our adaptations of adding items for bullying and characteristics of physical violence helped distinguish polyvictims (high-ACE subgroup) who are at the greater risk for behavioral health problems from the general population of community-violence–exposed youth (moderate-ACE subgroup). Internalizing and attention problems in particular were elevated in relationship to polyvictimization over and above the effects of living in a violent environment. The identification of a violent-environments subgroup parallels findings in another study of youth who were receiving behavioral health services and had similar socioeconomic disadvantages.[45] For youth in communities facing serious resource deprivation, it appears that exposure to violence has an adverse impact, and polyvictimization confers an additional degree of psychosocial and attentional problems warranting treatment.[32]

There are several limitations to this study that should be considered. We used cross-sectional, self-report data, and the relationships found are only associative. We could not account for characteristics of ACEs (eg, age of experience, frequency of experience, relationship to perpetrator, and time since the experience) that might influence relationships between ACEs and outcomes. Additionally, the behavioral health measures did not require a specification that the symptoms were directly related to the ACE. We may have overestimated the relationship between symptoms and ACEs because we selected children who were more likely to have mental health problems. We used a sample of minority youth receiving FQHC services within 2 vulnerable, racially and socioeconomically segregated communities in Chicago. As such, the findings are not generalizable to all FQHC populations or the general population, and the high burden of ACEs found in this sample may not exist in other communities.

The TESI appears to have validity as an ACE screening instrument in primary care and was predictive of behavioral dysfunction in our sample even without soliciting details about the characteristics of traumatic events. Our analysis suggests that screening operationalized as a simple count of ACEs can be indicative of a need for behavioral health referral and intervention. Assessing an ACE count in primary care may complement the use of behavioral health screeners, such as the PSC, because an ACE count points to a need for trauma-informed behavioral health services and trauma-specific treatment, which may be otherwise missed.[13,22,46] An important implication for clinicians in integrated or colocated care settings is that the use of the TESI can help identify ACEs occurring in the community that are not included in standard ACE assessment tools. The TESI extends traditional ACE screeners by including both within-household and community ACEs. Community partners in this study found that the TESI provided a comprehensive yet efficient and clinically informative approach to ACE screening. For clinicians who wish to implement the tools used in

our study, the original TESI is publicly available through the National Center for Posttraumatic Stress Disorder,[47] and our adapted TESI screener is available in the Supplemental Information.

CONCLUSIONS

This study suggests that the community-adapted TESI as a primary-care ACE screening tool is feasible for colocated primary-care and/or behavioral health services. The ACE subgroups identified in our analysis are indicators of the validity of the adapted TESI as a screening tool and suggest that polyvictimization has particularly strong associations with attention problems. Primary-care clinics with colocated behavioral health services are an ideal setting to assess ACEs and their impact, and primary-care clinicians in such settings should consider screening for a broad range of ACEs, including those that may be unique to the community served by the clinic. Future researchers should explore the acceptability and feasibility of ACE screening with the adapted TESI in colocated care settings.

ACKNOWLEDGMENTS

We are grateful to the clinics, families, and children who participated in this study.

ABBREVIATIONS

ACE: adverse childhood experience
FQHC: Federally Qualified Health Center
LCA: latent class analysis
OR: odds ratio
PHQ: Patient Health Questionnaire
PSC: Pediatric Symptom Checklist
TESI: Traumatic Events Screening Inventory
TESI-CRF-R: Traumatic Events Screening Inventory–Child Report Form Revised
TESI-PRR: Traumatic Events Screening Inventory–Parent Report Revised

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: Dr Ford is a co-owner of Advanced Trauma Solutions, Inc, which is the sole distributor of the Trauma Affect Regulation: Guide for Education and Therapy (TARGET) model (copyrighted by the University of Connecticut); the other authors have indicated they have no financial relationships relevant to this article to disclose.

FUNDING: Supported by the Illinois Children's Healthcare Foundation. Dr Choi received fellowship support from the University of California, Los Angeles National Clinician Scholars Program and Kaiser Permanente Southern California.

POTENTIAL CONFLICT OF INTEREST: Dr Ford is a co-owner of Advanced Trauma Solutions, Inc, which is the sole distributor of the Trauma Affect Regulation: Guide for Education and Therapy (TARGET) model (copyrighted by the University of Connecticut); the other authors have indicated they have no potential conflicts of interest to disclose.

REFERENCES

1. Ford JD, Elhai JD, Connor DF, Frueh BC. Poly-victimization and risk of posttraumatic, depressive, and substance use disorders and involvement in delinquency in a national sample of adolescents. *J Adolesc Health*. 2010;46(6):545–552
2. McLaughlin KA, Koenen KC, Hill ED, et al. Trauma exposure and posttraumatic stress disorder in a national sample of adolescents. *J Am Acad Child Adolesc Psychiatry*. 2013;52(8):815–830.e14
3. Finkelhor D, Turner HA, Shattuck A, Hamby SL. Prevalence of childhood exposure to violence, crime, and abuse: results from the national survey of children's exposure to violence. *JAMA Pediatr*. 2015;169(8):746–754
4. Hillis S, Mercy J, Amobi A, Kress H. Global prevalence of past-year violence against children: a systematic review and minimum estimates. *Pediatrics*. 2016;137(3):e20154079
5. Finkelhor D, Ormrod RK, Turner HA. Poly-victimization: a neglected component in child victimization. *Child Abuse Negl*. 2007;31(1):7–26
6. Dierkhising CB, Ford JD, Branson C, Grasso DJ, Lee R. Developmental timing of polyvictimization: continuity, change, and association with adverse outcomes in adolescence [published online ahead of print July 23, 2018]. *Child Abuse Negl*. doi:doi:10.1016/j.chiabu.2018.07.022
7. Le MTH, Holton S, Romero L, Fisher J. Polyvictimization among children and adolescents in low- and lower-middle-income countries: a systematic review and meta-analysis. *Trauma Violence Abuse*. 2018;19(3):323–342
8. Turner HA, Shattuck A, Finkelhor D, Hamby S. Effects of poly-victimization on adolescent social support, self-concept, and psychological distress. *J Interpers Violence*. 2017;32(5):755–780
9. Charak R, Byllesby BM, Roley ME, et al. Latent classes of childhood poly-victimization and associations with suicidal behavior among adult trauma victims: moderating role of anger. *Child Abuse Negl*. 2016;62:19–28
10. Elliott AN, Alexander AA, Pierce TW, Aspelmeier JE, Richmond JM. Childhood victimization, poly-victimization, and

adjustment to college in women. *Child Maltreat*. 2009;14(4):330–343

11. Lereya ST, Copeland WE, Costello EJ, Wolke D. Adult mental health consequences of peer bullying and maltreatment in childhood: two cohorts in two countries. *Lancet Psychiatry*. 2015;2(6):524–531
12. Shonkoff JP, Garner AS; Committee on Psychosocial Aspects of Child and Family Health; Committee on Early Childhood, Adoption, and Dependent Care; Section on Developmental and Behavioral Pediatrics. The lifelong effects of early childhood adversity and toxic stress. *Pediatrics*. 2012;129(1). Available at: www.pediatrics.org/cgi/content/full/129/1//e232
13. Felitti VJ, Anda RF, Nordenberg D, et al. Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) study. *Am J Prev Med*. 1998;14(4):245–258
14. McLaughlin KA. Future directions in childhood adversity and youth psychopathology. *J Clin Child Adolesc Psychol*. 2016;45(3):361–382
15. Finkelhor D, Shattuck A, Turner H, Hamby S. A revised inventory of adverse childhood experiences. *Child Abuse Negl*. 2015;48:13–21
16. Browne KD, Hamilton-Giachritsis C. The influence of violent media on children and adolescents: a public-health approach. *Lancet*. 2005;365(9460):702–710
17. McLaughlin KA, Sheridan MA. Beyond cumulative risk: aa dimensional approach to childhood adversity. *Curr Dir Psychol Sci*. 2016;25(4):239–245
18. Wade R Jr, Cronholm PF, Fein JA, et al. Household and community-level Adverse Childhood Experiences and adult health outcomes in a diverse urban population. *Child Abuse Negl*. 2016;52:135–145
19. Dion J, Matte-Gagné C, Daigneault I, et al. A prospective study of the impact of child maltreatment and friend support on psychological distress trajectory: from adolescence to emerging adulthood. *J Affect Disord*. 2016;189:336–343
20. Stein JA, Leslie MB, Nyamathi A. Relative contributions of parent substance use and childhood maltreatment to chronic homelessness, depression, and substance abuse problems among homeless women: mediating roles of self-esteem and abuse in adulthood. *Child Abuse Negl*. 2002;26(10):1011–1027
21. Wilson HW, Samuelson SL, Staudenmeyer AH, Widom CS. Trajectories of psychopathology and risky behaviors associated with childhood abuse and neglect in low-income urban African American girls. *Child Abuse Negl*. 2015;45:108–121
22. Harris NB. *The Deepest Well: Healing the Long-Term Effects of Childhood Adversity*. Boston, MA: Houghton Mifflin Harcourt; 2018
23. Finkelhor D. Screening for adverse childhood experiences (ACEs): cautions and suggestions. *Child Abuse Negl*. 2018;85:174–179
24. Center for Substance Abuse Treatment. Screening and assessment. In: *Substance Abuse Treatment: Addressing the Specific Needs of Women*. Treatment Improvement Protocol (TIP) Series, No. 51. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2009. Available at: https://www.ncbi.nlm.nih.gov/books/NBK83253/. Accessed July 24, 2018
25. Ippen CG, Ford J, Racusin R, et al. *Traumatic Events Screening Inventory - Parent Report Revised*. White River Junction, UT: National Center for PTSD and Dartmouth Child Psychiatry Research Group; 2002
26. Ford JD, Racusin R, Rogers K, et al. *Traumatic Events Screening Inventory for Children (TESI-C). Version 8.4*. White River Junction, UT: National Center for PTSD and Dartmouth Child Psychiatry Research Group; 2002
27. Roberts YH, Campbell CA, Ferguson M, Crusto CA. The role of parenting stress in young children's mental health functioning after exposure to family violence. *J Trauma Stress*. 2013;26(5):605–612
28. Ribbe D. Psychometric review of traumatic event screening instruments for children (TESI-C). In: Stamm BH, ed. *Measurement of Stress, Trauma, and Adaptation*. Lutherville, MD: Sidran Press; 1996:386–387
29. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Washington, DC: American Psychiatric Association. 2000
30. Ford JD, Rogers K. Empirically-based assessment of trauma and PTSD with children and adolescents. In: *Proceedings from the International Society for Traumatic Stress Studies Annual Meeting*; October 1, 1997; Washington, DC
31. Strand VC, Sarmiento TL, Pasquale LE. Assessment and screening tools for trauma in children and adolescents: a review. *Trauma Violence Abuse*. 2005;6(1):55–78
32. Ford JD, Racusin R, Ellis CG, et al. Child maltreatment, other trauma exposure, and posttraumatic symptomatology among children with oppositional defiant and attention deficit hyperactivity disorders. *Child Maltreat*. 2000;5(3):205–217
33. Jellinek MS, Murphy JM, Little M, Pagano ME, Comer DM, Kelleher KJ. Use of the Pediatric Symptom Checklist to screen for psychosocial problems in pediatric primary care: a national feasibility study. *Arch Pediatr Adolesc Med*. 1999;153(3):254–260
34. McCreary M, Arevian A, Brady M, et al. A web-based tool to track clinical care and outcomes in two community-based pediatric integrated care models. In: *Presented at the Annual Meeting of the American Academy of Child and Adolescent Psychiatry*; October 22–27, 2018; Seattle, WA
35. Jones L, Wells K. Strategies for academic and clinician engagement in community-participatory partnered research. *JAMA*. 2007;297(4):407–410
36. City of Chicago. Crimes - 2001 to present – dashboard. dp2018. Available at: https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-present-Dashboard/5cd6-ry5g. Accessed July 24, 2018
37. Campbell-Sills L, Stein MB. Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): validation of a 10-item

measure of resilience. *J Trauma Stress*. 2007;20(6):1019–1028

38. Connor KM, Davidson JR. Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). *Depress Anxiety*. 2003;18(2):76–82
39. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606–613
40. Bird HR, Andrews H, Schwab-Stone M, et al. Global measures of impairment for epidemiologic and clinical use with children and adolescents. *Int J Methods Psychiatr Res*. 1993;6(4):295–307
41. Bird HR, Shaffer D, Fisher P, Gould MS. The Columbia Impairment Scale (CIS): pilot findings on a measure of global impairment for children and adolescents. *Int J Methods Psychiatr Res*. 1993;3(3):167–176
42. Griffith J, Villavicencio S. Relationships among acculturation, sociodemographic characteristics and social supports in Mexican American adults. *Hisp J Behav Sci*. 1985;7(1):75–92
43. Raykov T. *Latent Class Analysis in Social Science Research. Short Course. Inter-University Consortium for Political and Social Research (ICPSR)*. Ann Arbor, MI: University of Michigan; 2015
44. Kisiel CL, Fehrenbach T, Torgersen E, et al. Constellations of interpersonal trauma and symptoms in child welfare: implications for a developmental trauma framework. *J Fam Violence*. 2014;29(1):1–4
45. Grasso DJ, Dierkhising CB, Branson CE, Ford JD, Lee R. Developmental patterns of adverse childhood experiences and current symptoms and impairment in youth referred for trauma-specific services. *J Abnorm Child Psychol*. 2016;44(5):871–886
46. Purewal SK, Bucci M, Gutiérrez Wang L, et al. Screening for adverse childhood experiences (ACEs) in an integrated pediatric care model. *Zero Three*. 2016;37(1):10–17
47. US Department of Veterans Affairs; National Center for PTSD. Traumatic Events Screening Inventory for Children (TESI-C). Available at: https://www.ptsd.va.gov/professional/assessment/child/tesi.asp. Accessed January 21, 2019

Validation of the Traumatic Events Screening Inventory for ACEs

Kristen R. Choi, Michael McCreary, Julian D. Ford, Sara Rahmanian Koushkaki, Kristen N. Kenan and Bonnie T. Zima

Pediatrics originally published online March 5, 2019;

PEDIATRICS®
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Validation of the Traumatic Events Screening Inventory for ACEs

Kristen R. Choi, Michael McCreary, Julian D. Ford, Sara Rahmanian Koushkaki, Kristen N. Kenan and Bonnie T. Zima

Pediatrics originally published online March 5, 2019;