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Trauma-informed care education for pediatric providers: promoting resiliency and wellbeing

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Abstract

Background Adverse childhood experiences (ACEs) are common and can negatively affect the physical, mental, emotional, and developmental health of a child acutely and for a lifetime. Trauma-informed care (TIC) in the pediatric medical home helps counteract these effects by fostering supportive relationships and building skills that promote resilience. As key figures in the medical home, pediatric clinicians must understand adverse childhood experiences (ACEs) and TIC principles to effectively recognize, assess and intervene early in cases of childhood adversity, which ultimately promotes long-term health and well-being.

Methods Pediatric clinicians who attended a virtual symposium were surveyed before and after eight one-hour educational sessions on TIC topics. To assess their knowledge of fundamental TIC principles, they were asked about their familiarity with the ACE study, the affiliative response, and the strength-based approach in pediatrics. Participants rated each sessions' value using a 4-point Likert scale. In the post survey, they also shared how they would apply the knowledge gained clinically and suggestions to improve future education.

Results Seventy-five out of the 82 participants (91%) who were pediatric clinicians completed a pre survey and of those pediatric clinicians who completed the pre survey, 47 (63%) also completed the post-education survey. Prior to the educational sessions, 81% of participants were familiar with the ACE Study but only 37.1% were familiar with the affiliate response and only 50.6% with strength-based care approaches to pediatrics. Of those who completed the post survey, 95.7% rated the education as "Useful" or "Very useful." Statistically significant improvements were detected in scores relating to each of the three fundamental TIC principles: associations between childhood stressors and later life health and well-being ($p = < 0.0001$), familiarity with the affiliate response ($p = < 0.0001$), and familiarity with the concept of a strength-based approach to pediatrics ($p = < 0.005$). After the training sessions, a majority, 34/47 (72%), of participants stated they would apply concepts from the training in clinical care.

Conclusions This study was able to demonstrate existing gaps in pediatric clinicians' knowledge of TIC, the usefulness of pediatric TIC education, and practical steps in providing TIC education for pediatric clinicians and healthcare providers.

Keywords Adverse childhood experiences, Affiliate response, Ecobiodevelopmental model, Positive childhood experiences, Resilience in childhood, Strength-based care, Stress response, Trauma-informed care

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Background

Exposure to childhood traumatic events, which is common in individuals aged 0–18 [1, 2], can have lasting negative effects if a child lacks at least one safe, stable, and nurturing adult relationship (SSNR) with the capacity to buffer the stress. The absence of such a relationship can overwhelm the child's coping abilities, and lead to acute and lifelong detriments in their physical, mental, emotional, and developmental health. The original ACE study investigated eight specific childhood adversities; yet our understanding of ACEs has grown to include many more common factors such as poverty, homelessness, exposure to community violence, involvement in foster care, racism, discrimination related to personal identity, natural disaster, serious accident, and bullying [3–5]. Considering these additional factors, the prevalence of adversity in childhood is much higher than originally found [5]. Recent research in multiple disciplines demonstrates that promoting supportive and nurturing interpersonal relationships and environments and building skills that promote resilience protects children from the negative effects of adversity and are crucial for healthy development and well-being [6, 7].

Pediatric providers can use the "Affiliate Response" to compassionately and collaboratively address patients' and families' needs [8]. This approach involves a strengths-based care model that highlights patient and family assets, acknowledges their capacity to overcome obstacles, and emphasizes key concepts such as building supportive relationships, community engagement, positive family dynamics, and spiritual connections [9]. Additionally, by applying Trauma-Informed Care (TIC) principles—a strengths-based approach grounded in an understanding of and responsiveness to the impact of trauma – clinicians can promote physical, psychological, and emotional safety for both providers and survivors. TIC also creates opportunities for survivors to regain a sense of control and empowerment [10, 11]. By integrating these principles, clinicians can effectively recognize, assess, and intervene early in cases of childhood adversity, ultimately promoting long-term health and well-being.

In 2022, over 90% of children under the age of 18 had an annual well-child check-up [12, 13]. Therefore, pediatric clinicians who understand the effects of ACEs, Positive Childhood Experiences (PCEs), and who apply Trauma-Informed Care (TIC) principles in their interactions with patients and families, have the capability to make an even greater positive impact in the lives of the children and families. Understanding TIC enables them to better recognize, assess, and respond to childhood adversity, promote PCEs and develop a deeper trust and partnership with the patient and family. As trusted healthcare professionals and key stakeholders in the lives of young patients, primary care physicians have been specifically called upon by the Centers for Disease Control (CDC) to provide early interventions to mitigate "the immediate and long-term harms of ACE exposure" [14]. Using their expertise in biology and development, pediatric clinicians are at the forefront of promoting the prevention and early identification of adversity in childhood [15]. By intervening early, they can improve both acute and life-long health outcomes. Enhanced ACE training for pediatric trainees and primary care providers has shown promise in improving patient satisfaction as well as clinicians' comfort, confidence, and perceived competence in screening for childhood adversity and intervening [16, 17]. The Accreditation Council for Graduate Medical Education (ACGME) has prioritized training pediatric residents about mental health and TIC [18]. However, there remains a gap in formalized and consistent TIC training for current pediatricians in practice.

Improving pediatric clinicians' knowledge of ACEs, PCE's and TIC principles will allow providers to comprehensively identify children at risk of early toxic stress and educate patients and their caregivers on skills that promote resilience. By promoting supportive and nurturing relationships, pediatric clinicians are better equipped to prevent and mitigate toxic stress, offer practical interventions in every patient encounter, and improve long-term biopsychosocial outcomes for children at risk of the effects of childhood adversity/trauma.

This study aims to describe pediatric clinicians' current knowledge gaps for core TIC principles, introduce an education framework to teach the elements of ACEs and TIC to pediatric clinicians and assess the efficacy of this education in improving clinicians' knowledge of ACEs and TIC principles as part of ongoing medical training.

Methods

Participants from a 2022 pilot cohort were recruited locally form Maricopa County, AZ and attended a half day virtual symposium consisting of 4 one-hour educational presentations by national TIC experts. The presentations covered the following topics: *Physiology of Trauma*, *Signs and Symptoms of Trauma*, *The Ecobiodevelopmental Model*, *Resilience in Childhood*,*Attachment*, *Regulation and Co-Regulation*, *Stress Response*, *Stress Response Regulators*, *and Integrative Tools to Help Regulate the Stress Response*. All participants were asked to complete pre- and immediate post-training surveys through REDCap. Based on feedback from the 2022 education cohort, the 2023 curriculum was modified to a free full-day (8 am to 5 pm MST) symposium featuring eight one-hour sessions and provided more practical tools for application in clinical care to participants enrolled nationally. Marketing for the conference consisted of both local and national advertisement to Phoenix Children's network and list

serve, Maricopa County Public Health, National Pediatric Associations. The 2023 presentations were given by national experts in trauma informed care principles. The presentations covered the following topics: *Early Brain Development, the Effects of Adversity to the Child's Brain and Body, Psychoneuroimmunology, The Affiliate Response, Relationship-Based Care, Strength-Based Care, Transgenerational ACEs, PCEs, Whole Child Integrated and Integrative Care and Clinician Self-Care (Supplementary Table* 1).

Self-reported surveys from the 2023 cohort were collected pre- and post-education to assess how the TIC curriculum's aims correlated with participant's perceived learning in TIC principles. The pre survey was sent via email to the participants to fill out before the start of the symposium and the post survey was sent via email at the end of the symposium. Surveys in 2023 included both quantitative and qualitative questions. The 3 quantitative questions used a 4-point Likert scale, with responses examined as categories and/or a numeric score coded as 1 = Very familiar, 2 = Somewhat familiar, 3 = Vaguely familiar and 4 = Not at all familiar. The 2 qualitative questions assessed the strengths and weaknesses of the symposium: which aspects of the curriculum attendees felt could be implemented into their patient-centered practices and which aspects of the education could be improved for future cohorts. Two individual reviewers coded the qualitative responses by the most prevalent themes.

Statistical analyses examined the de-identified survey responses from participants who completed only the pre-education survey or both the pre- and post-education surveys in 2023.

Descriptive statistics summarized participants' demographics, their knowledge of the ACE Study that assessed associations of ACEs with health and wellbeing, the affiliate response, and strength-based care approach. To identify possible selection bias, initial analyses compared responses between participants who completed only the pre-education survey and those who completed both the pre- and post-education survey using the Fisher exact or Wilcoxon rank sum test, as appropriate for the data distribution.

Changes in pre- vs. post-education responses for Likert-type questions were compared using Bowker's symmetry test to account for the paired nature of the data. To ensure table symmetry, an additional data point was added to each cell when no data was present within a response category. In addition, Likert responses were coded numerically (1 = Very familiar, 2 = Somewhat familiar, 3 = Vaguely familiar and 4 = Not at all familiar), with the magnitude of the change quantified as the difference (pre-education score minus post-education score), such that positive differences indicated increased familiarity. Differences between pre- and post-education numeric scores were compared using the Wilcoxon signed-rank-test, which accounted for the paired nature of the data. All statistical tests were two-sided, and significance was evaluated at the 5% level.

Results

There were 228 people who attended the 2023 virtual curriculum. 82 of the participants were pediatric clinicians of which 75 (91%) completed the pre-education survey. Of these 75 pediatric clinicians 47 (63%) also completed the post-education survey. No statistically significant differences were detected in demographics and pre-education survey responses between the 28 participants who completed only the pre-education survey and the 47 participants who completed both pre- and post-education surveys (Table 1).

The 47 participants who completed both pre- and post-education surveys included 41(89%) females, 28 (60%) White/non-Hispanic, and 16 (34%) ages 30–40 years. The majority 31 (78%) had MD/DO degrees, with a mean of 14 (± 12) years in practice post residency (Table 1).

Comparisons of pre- vs. post-education responses showed significantly increased familiarity with the ACE study and association of childhood stressors and the impacts on later-life health and wellbeing, with 41% pre-education vs. 77% post-education of participants reporting as being very familiar ($p = 0.03$). After the TIC training, 55% of participants were very familiar with the role of the affiliate response to mitigate the impacts of trauma compared to 20% prior to the educational sessions ($p =< 0.0001$). Lastly, participants increased their familiarity with the concept of strength-based approach to care in pediatrics from 22 to 70% ($p = 0.0005$). Analyses of responses as numeric scores corroborated the improvements in familiarity with ACE study findings, affiliate response due to a threat and the concept of a strength-based approach in pediatrics (Table 2). Nearly all participants 45 (98%) described the value of the education as "Useful" or "Very Useful," and 34 (72%) of participants reported that they would apply new TIC skills in clinical practice.

In the post survey, the first qualitative question aimed to provide insight into specific ways in which participants would apply knowledge gained into their clinical practice. 34 participants answered this section, with some participants having more than one response. Based on two independent reviewers, the top two themes were *understanding the importance of relational health/affiliate response and the need to screen for and/or acknowledge the impact of adversity* (Table 3 and Supplementary Table 2). The second

Table 1 Characteristics and pre-education survey responses

Question	Total (*N* = 75)	Survey completion		*p* value
		Only Pre-education (*N* = 28)	Both pre- and post-education (*N* = 47)	
What is your gender? *(Missing N = 1)*				
Male	8 (10.8%)	3 (10.7%)	5 (10.9%)	1.00[1]
Female	66 (89.2%)	25 (89.3%)	41 (89.1%)	
What is your race/ethnicity?				
American Indian or Alaska Native	2 (2.7%)	0 (0.0%)	2 (4.3%)	0.47[1]
African American, non-Hispanic	2 (2.7%)	2 (7.1%)	0 (0.0%)	
Asian	19 (25.3%)	7 (25.0%)	12 (25.5%)	
Hispanic or Latino	5 (6.7%)	1 (3.6%)	4 (8.5%)	
White, non-Hispanic	45 (60.0%)	17 (60.7%)	28 (59.6%)	
Other, including mixed race/ethnicity	2 (2.7%)	1 (3.6%)	1 (2.1%)	
What is your age which range)?				
30–40	25 (33.3%)	9 (32.1%)	16 (34.0%)	0.58[1]
40–50	13 (17.3%)	5 (17.9%)	8 (17.0%)	
50–60	21 (28.0%)	10 (35.7%)	11 (23.4%)	
> 60	16 (21.3%)	4 (14.3%)	12 (25.5%)	
Please indicate your degree completion *(Missing = 12)*				
MD/DO	46 (73.0%)	15 (65.2%)	31 (77.5%)	0.36[1]
NP	10 (15.9%)	4 (17.4%)	6 (15.0%)	
PA	1 (1.6%)	0 (0.0%)	1 (2.5%)	
Other	6 (9.5%)	4 (17.4%)	2 (5.0%)	
Please indicate years post residency *(Missing N = 25)*				
Mean (SD)	15.2 (12.1)	17.8 (13.2)	13.9 (11.6)	0.28[2]
Median	15.0	21.0	14.0	
How familiar are you with the Adverse Childhood Experiences (ACE) Study that assessed the associations between childhood stressors and later-life health and well-being? *(Missing N = 1)*				
1 = Very familiar	34 (45.9%)	15 (53.6%)	19 (41.3%)	0.43[2]
2 = Somewhat familiar	26 (35.1%)	8 (28.6%)	18 (39.1%)	
3 = Vaguely familiar	7 (9.5%)	2 (7.1%)	5 (10.9%)	
4 = Not at all familiar	7 (9.5%)	3 (10.7%)	4 (8.7%)	
How familiar are you with the affiliate response due to a threat? *(Missing N = 13)*				
1 = Very familiar	9 (14.5%)	1 (4.5%)	8 (20.0%)	
2 = Somewhat familiar	14 (22.6%)	6 (27.3%)	8 (20.0%)	0.91[2]
3 = Vaguely familiar	17 (27.4%)	9 (40.9%)	8 (20.0%)	
4 = Not at all familiar	22 (35.5%)	6 (27.3%)	16 (40.0%)	
How familiar are you with the concept of strength-based approach in pediatrics? *(Missing N = 12)*				
1 = Very familiar	13 (20.6%)	4 (17.4%)	9 (22.5%)	
2 = Somewhat familiar	19 (30.2%)	9 (39.1%)	10 (25.0%)	0.91[2]
3 = Vaguely familiar	18 (28.6%)	5 (21.7%)	13 (32.5%)	
4 = Not at all familiar	13 (20.6%)	5 (21.7%)	8 (20.0%)	
I would feel comfortable taking care of patients who have experienced trauma and/or significant adversity with more education on the topic				
Strongly Disagree	1 (1.3%)	0 (0.0%)	1 (2.1%)	
Disagree	4 (5.3%)	2 (7.1%)	2 (4.3%)	
Neutral	17 (22.7%)	8 (28.6%)	9 (19.1%)	0.80[1]
Agree	33 (44.0%)	11 (39.3%)	22 (46.8%)	
Strongly Agree	20 (26.7%)	7 (25.0%)	13 (27.7%)	

[1]Fisher exact test

[2]Wilcoxon rank sum test

Table 2 Changes in pre-post education survey responses completed by 47 participants

Survey Question	Pre-education	Post-education	Difference (Pre-Post education)	*P*-value
How familiar are you with the Adverse Childhood Experiences (ACE) Study that assessed the associations between childhood stressors and later-life health and well-being?				
(Missing N=1)				
1=Very familiar	19 (41)	39 (77)	-	0.03[1]
2=Somewhat familiar	18 (39)	9 (19)		
3=Vaguely familiar	5 (11)	2 (4)		
4=Not at all familiar	4 (8.7)	0 (0)		
Numeric Scores (1 to 4)[3]				
Median (Q1, Q3)	2 (1, 2)	1 (1, 1)	0 (0, 1)	<0.0001[2]
Mean (SD)	1.87 (0.93)	1.28 (0.54)	0.61 (0.83)	
How familiar are you with the affiliate response due to a threat?				
(Missing N=7)				
1=Very familiar	8 (20)	22 (55)	-	0.007[1]
2=Somewhat familiar	8 (20)	17 (43)		
3=Vaguely familiar	8 (20)	0 (0)		
4= Not at all familiar	16 (40)	1 (2)		
Numeric Scores (1 to 4)[3]				
Median (Q1, Q3)	3 (2, 4)	1 (1, 2)	1 (0, 2)	<0.0001[2]
Mean (SD)	2.80(1.18)	1.50(0.64)	1.3(1.2)	
How familiar are you with the concept of a strength-based approach in pediatrics?				
(Missing N=7)				
1=Very familiar	9 (22)	28 (70)	-	0.0005[1]
2=Somewhat familiar	10 (25)	9 (22)		
3=Vaguely familiar	13 (33)	2 (5)		
4=Not at all familiar	8 (20)	1 (3)		
Numeric Scores (1 to 4)[3]				
Median (Q1, Q3)	3(2, 3)	1(1, 2)	1(0, 2)	<0.0001[2]
Mean (SD)	2.50(1.06)	1.40(0.71)	1.10(1.03)	

Q1 = First Quartile, Q3 = Third Quartile, SD=Standard Deviation

[1]Bowker's test

[2]Wilcoxon signed rank sum test

[3]Score was coded as 1 = Very familiar, 2 = Somewhat familiar, 3 = Vaguely familiar and 4 = Not at all familiar

qualitative question requested suggestions for how to improve the TIC education to make it more useful in future trainings. Participants recommended less overlap of the presentations and more practical advice for direct clinical application.

Discussion

This study demonstrates that an 8-hour educational symposium can significantly increase self-reported knowledge of essential TIC principles for pediatric clinicians. Pre-session surveys established clinician's familiarity with essential TIC topics such as ACEs, the affiliate response, and strength-based approaches to pediatrics. Of the participants who answered the pre survey, 68.2% were only vaguely or not at all familiar with the affiliate response and 43.4% were vaguely or not all familiar with strength-based approaches in pediatrics. These numbers highlight gaps in previous medical education curricula. Comparisons between pre- and post-education responses showed improved familiarity with TIC principles in line with the aim of the sessions. Furthermore, the surveys qualitatively show that after the education, participants felt empowered to implement TIC skills in their clinical work with patients and families (Table 3 and Supplementary Table 2). The top two themes for clinical application of learned skills were: the importance of relational health (affiliate response) and the need to screen for and/or acknowledge the impact of adversity.

While this study marks a practical step in providing education on ACEs and TIC principles, there are a few limitations including the potential risk of inaccurate self-reporting during survey evaluation, selection bias, and courtesy bias [19, 20]. Those who chose to attend the session may already be open to learning TIC and different from a less engaged sample.While immediately post-curriculum, self-reported markers are promising indicators for provider knowledge and awareness in TIC, ongoing studies are needed to evaluate how these trainings may sustainably improve clinical practice and impact patient

Table 3 Clinical application of learned skills

*Prevalent Themes of Attendee Responses	Number of Attendees
Importance of relational health, affiliate response	14
Screen for and/or acknowledge the impact of adversity	9
Family support and resources	6
TIC – clinical implementation, resident education	6
Strength-based approaches to care	4
Teaching/personally implementing calming skills	4

*Two independent reviewers coded 34 individual responses to the question "A*s a result of what you have learned in the presentations at the pediatric Education symposium 2023, what changes, if any, do you plan to make in how you care for your patients?"* They then identified the most prevalent themes. Some attendees had multiple answers and thus counted for more than 1 theme. The number in parenthesis at the end of each theme represents the number of responses that met criteria for that theme

outcomes. Ongoing studies evaluating post-curriculum trends in clinical care, referral rates, and consideration of social determinants of health can help quantify clinician's application of TIC principles in practice. Future retrospective studies can specifically evaluate changes to the TIC education to improve the educational material and determine a standardized curriculum for implementation nationally.

Ultimately, we propose that this pediatric education model will illuminate knowledge gaps in TIC principles and empower pediatric clinicians to integrate TIC into continuing education and clinical practices. Further advocacy and ongoing provider education are needed to establish a standard set of evidence-based best practices regarding TIC for all pediatric healthcare providers. While the ACGME has prioritized mental health and trauma-informed care for pediatric residency programs [14], we hope that this study inspires educators to incorporate TIC curricula throughout the spectrum of medical education so that evidence-based TIC is universally understood and routinely included in all aspects of healthcare.

Conclusions

This study demonstrates that an 8-hour evidence-based TIC education program can significantly increase practicing pediatric clinicians' knowledge of core TIC principles. Furthermore, >70% of participating clinicians felt empowered to immediately implement TIC skills in clinical practice. This model can be used to ensure that pediatric clinicians, across a spectrum of training, nurses and administrators are equipped to universally implement TIC principles, leaving no child behind. A better educated medical team in TIC principles would not only improve healthcare delivery but could revolutionize health care outcomes for future generations. Following the evaluation of this study, we hope to expand TIC education to include all pediatric healthcare clinicians. We are optimistic that by increasing healthcare provider knowledge, comfort and confidence around trauma-informed care, children and families will be connected to resources, education, and communities that help prevent childhood adversity, strengthen skills of resiliency, and improve the health and well-being of every child.

Abbreviations

ACEs Adverse childhood experiences
TIC Trauma-informed care
CRW Center for resiliency and wellbeing at Phoenix Children's
PCE Positive childhood experiences

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

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Authors' contributions

A.S. designed the study, assisted in data analysis, conducted the literature review, and wrote the manuscript. K.S. assisted in the manuscript writing and editing and assisted in study design and data analysis. L.D. assisted with revising the manuscript.J.J. assisted with the manuscript writing and the literature review. C.M. assisted with the manuscript writing, the literature review, and editing. J.L. and L.M. performed all statistical analysis and generated Tables 1, 2 and 3. All authors reviewed and approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Data availability

All data generated or analyzed during this study are included in this article.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the ethical standards outlined in the Declaration of Helsinki and approved by the Phoenix Children's Review Board on October 03, 2022. A waiver of informed consent was granted by the IRB due to the minimal risk posed to participants. All data used in this study were obtained and handled in compliance with applicable regulations to ensure participant confidentiality and privacy. No Identifiable personal information was accessed or included in the study. The research team adhered to all institutional and international ethical guidelines to protect participants rights and welfare.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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