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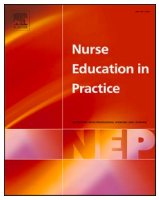

How does trauma informed care education for paediatric healthcare professionals' impact self-reported knowledge and practice. An integrative review☆

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ABSTRACT

Aim: To examine the literature on the impact of Trauma Informed Care education on paediatric health care practitioners' self-reported knowledge and practice.
Background: Psychosocial trauma during childhood is prevalent and linked to increased risk of adverse physical and mental health outcomes. Trauma Informed Care recognises the significant impact of childhood trauma in health outcomes. Education is key to health care practitioners' integrating Trauma Informed Care into practice.
Design: Integrative review of the literature.
Methods: The review employed Whittemore and Knafl's (2005) framework and adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) 2021 statement. A systematic search of Medline, CINAHL and SCOPUS, covering 2019 toMay 2024. Data were critically appraised using the Mixed Methods Appraisal Tool.
Results: Nine studies were included, identifying four themes using Braun and Clarke's thematic analysis: (1) 'awareness and understanding', (2)'self-efficacy and feeling competent', (3)'applying knowledge to practice' and (4)'barriers to implementation'. Following educational intervention, health care practitioners experienced increased knowledge regarding prevalence and impact of trauma for children and families and developed confidence to respond with trauma informed practices.
Conclusions: Findings closely relate to the four components of Trauma Informed Care practice; realising the widespread impact of trauma, recognising symptomology, responding through integrating trauma knowledge into policies and practice and resisting re-traumatisation. The findings illustrate that Trauma Informed Care educational interventions significantly improves health care practitioners' knowledge and practice. In addition, this review supports the implementation of routine Trauma Informed Care education and associated practice policies into paediatric practice settings.

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1. Introduction

Within the paediatric setting exposure to psychosocial trauma is widespread and correlated with poorer physical and mental health outcomes resulting in changes within the brain and maladaptive behavioural responses that can last a lifetime (Gilbert et al., 2015; Herringa, 2017; Hornor et al., 2019). These harmful events termed Adverse Childhood Experiences (ACEs) are defined by The Centers for Disease Control (CDC) as "potentially traumatic events that occur during childhood" that can often lead to mental and physical health issues, possibly resulting in early death (Centers for Disease Control and Prevention (CDC), 2019), para 1). Healthcare professionals (HCPs) working with children, young people and their families are witness to the detrimental effects of trauma and are uniquely positioned to improve health outcomes through providing Trauma Informed Care (TIC) (Davies, 2022; Goddard et al., 2022a). TIC is an approach to care that prioritises psychological and physical wellbeing, recognises trauma symptoms and acknowledges the role trauma may play in the lives of children and their family (Ford et al., 2020; Mental Health Services Administration, 2014).

2. Background

Trauma is defined by the Substance Abuse and Mental Health Services Administration (Substance Abuse and Mental Health Services Administration, 2014) as an event, series of events or set of circumstances, that are physically or emotionally harmful or life-threatening to an individual. Trauma is comprised of three elements: the event, experience and effect (Lathan et al., 2021; Substance Abuse and Mental Health Services Administration, 2014). In this research, "trauma" specifically pertains to emotional distress rather than physical injury alone. In paediatric healthcare settings trauma stems from various distressing events including motor-vehicle accidents, natural disasters, sporting accidents, loss of family members, a life changing diagnosis, colonisation, racism, as well as child abuse and neglect (Davies, 2022; Goddard et al., 2022a; Levine et al., 2021; Wignall, 2021). Distressing events are experienced as traumatic for children and their family if the event is viewed as being harmful to their well-being (Levine et al., 2021; Substance Abuse and Mental Health Services Administration, 2014). The level to which an event is perceived as harmful will vary depending on the resilience, feelings of powerlessness and the emotional response by children and their family (Goddard et al., 2022b; Lathan et al., 2021; Wignall, 2021). Traumatic events and their perceived experiences can cause on-going adverse effects for child and family functioning as well as impact mental, physical, social and spiritual well-being (Lathan et al., 2021; Substance Abuse and Mental Health Services Administration, 2014).

Literature identifies trauma informed care (TIC) as a framework for nurses and other HCPs to incorporate into their practice to decrease the harmful effects of trauma for children and their families (Davies, 2022; Goddard et al., 2022a; McDowell et al., 2022). TIC is defined as having an awareness of historical and on-going traumatic experiences, whilst understanding the associated negative effects on well-being and functioning from distressing events (Cutuli et al., 2019; Davies, 2022; Levine et al., 2021).

TIC is guided by four key concepts: realising the widespread impact of trauma, recognising symptomology, responding through integrating trauma knowledge into policies and practice and resisting re-traumatisation (Goddard et al., 2022a; Guest, 2021; Substance Abuse and Mental Health Services Administration, 2014). Additionally, these concepts are supported by the principles of TIC which include safety, trustworthiness, peer support, collaboration, empowerment and cultural and historical considerations (Goddard et al., 2022b; Guest, 2021; Substance Abuse and Mental Health Services Administration, 2014).

HCPs working within paediatric settings where a family-centered care (FCC) approach is often practiced, may recognise the natural and complementary connection between FCC and TIC approach (Marsac et al., 2016). However, despite HCPs reported willingness and receptiveness to take a TIC approach (Hornor et al., 2019), evidence suggests that many underestimate the prevalence of trauma for children and families (Zilberstein, 2022) and lack knowledge, skills and confidence to implement it in practice (Huo et al., 2023). One of the keys to addressing gaps in knowledge and practice skills for paediatric HCPs is thorough TIC training and education (Marsac et al., 2016). Through adapting a TIC approach paediatric HCPs can promote positive outcomes for patients and their family through building resilience and preventing further re-traumatisation within the healthcare setting (Cutuli et al., 2019; Levine et al., 2021; Wignall, 2021).

2.1. Aim

To explore the impact of TIC educational interventions on paediatric HCP's self-reported knowledge and practice.

3. Methods

3.1. Design

An integrative review guided by Whittemore and Knafl (Whittemore and Knafl, 2005)'s five step framework, which allowed for the inclusion of both qualitative and quantitative evidence. The five steps being problem identification, literature search, data evaluation, data analysis and presentation.

3.2. Problem identification

The literature recommends that education is key to HCPs integrating TIC into practice (Davies, 2022; Goddard et al., 2022b; Guest, 2021; McDowell et al., 2022). However, there are few studies that have investigated if and how TIC education supports this recommendation (Cutuli et al., 2019; Guest, 2021; Levine et al., 2021). Therefore, this review aims to explore the literature related to the impact of TIC education on paediatric HCP's self-reported knowledge and practice.

3.3. Search Strategy

The PIO framework guided the development of the research question and search strategy (Speckman and Friedly, 2019). A systematic search of three databases (Cumulative Index to Nursing and Allied Health Literature Plus with Full Text (CINAHL), Medline-OVID and SCOPUS) was undertaken in May 2023 and repeated in August 2023 by a research assistant and an updated search was undertaken in May 2024. A combination of search terms were used for population, intervention and outcomes (Table 1). Boolean operators and truncation symbols enhanced search results, while proximity searches increased specificity. Keywords included text words, abbreviations and truncated text words.

3.4. Inclusion criteria

Articles were required to be peer reviewed empirical studies, case studies, reports, or letters to the editor on TIC education as an intervention within a paediatric healthcare setting published in English between 2018 and 2024.

3.5. Exclusion criteria

Articles that did not meet the inclusion criteria or included participants other than HCPs (i.e. police or teachers) where HCP data could not be extracted.

3.6. Quality appraisal

Two authors independently assessed the quality of the included

Table 1
Trauma Informed Care education in paediatrics search terms.

Research Question: **What is the impact of Trauma Informed Care education intervention on healthcare professionals self-reported knowledge and practice?**		
Population: **Paediatric Healthcare Professionals** Intervention: **Trauma Informed Care education** Outcomes/themes: **Self-reported impact in knowledge and practice**		
Search terms		
Population	Exposure	Outcomes/themes
Health care professional*	Trauma informed care	Knowledge*
Health professional	Trauma informed education	Education*
Nurse*	Trauma informed approach	Self-reported impact*
Health personnel	Education	Knowledge and practice
Paediatric*	Training	
Pediatric	Activities, Educational	
Health Care Providers	Educational Activities	
Healthcare Workers	Literacy Programs	
Children and Young People's Nursing	Training Programs	
Nursing, Pediatric		

articles using the appropriate criteria from the Mixed Methods Appraisal Tool (Hong et al., 2018) and scored yes, no, or can't tell for each criterion (Supplementary Table 1). Where disagreements between scores occurred, these were discussed with the other authors until a consensus was agreed.

3.7. Data extraction

Following appraisal of the nine articles a data extraction table was produced, (Table 2). The first author extracted and summarised data into a table with the following headings: Citation, design, data collection, study setting, participants, education method and findings. Displaying the data, in this way enabled the authors to begin to understand what was known about how education on TIC had an impact on paediatric health professionals practice and set the stage for data analysis (Braun and Clarke, 2006; Braun and Clarke, 2019).

3.8. Data analysis

Data analysis of the nine articles involved organising, categorising, summarising and performing thematic analysis of the data using Braun & Clarke's reflexive thematic analysis (Braun and Clarke, 2019). The approach to data analysis was primarily inductive although a degree of deductive analysis was employed to ensure the coding produced themes meaningful to the research question and in keeping with the principles of TIC (Byrne, 2022). Initially all selected papers were read several times, actively seeking meanings and patterns that answered the research question. This process enabled immersion and familiarisation with the data (Braun and Clarke, 2019; Byrne, 2022). In phase 2 initial codes were developed through writing notes in margins of the articles, using statements that reflected the interpreted meaning of the text (for example – 'increased knowledge' or 'realising impact'). Next the similarities were grouped into themes, which each had a central organising concept as represented in Table 3.

In phase 4 the data set as a whole and the coded data were reviewed again to ensure the developed themes were connected to the data, robust and addressed the research question (Braun and Clarke, 2021). In the fourth phase, themes were identified, defined and thoroughly evaluated for their relevance and focus. Finally, the themes were presented in a cohesive form using an infographic to demonstrate their interconnectedness (Fig. 3), presented in the findings.(Fig. 1)

4. Presentation of results

From 2954 citations, 2601 were removed as the titles were not relevant to the review and 94 were duplicates resulting in 259 articles. These articles (n = 259) were title and abstract screened and records 236 were excluded as they were not related to TIC education/intervention. Twenty-three articles were then assessed for eligibility and twelve were excluded due to not meeting inclusion criteria. The reasons for not meeting the inclusion criteria were that the article was a: opinion piece; a pilot/feasibility study with mixed data; evaluation of HCP education that was not TIC; evaluation of TIC education in combined groups of professionals where HCP data could not be separated for analysis. The systematic search strategy is shown in Fig. 2. PRISMA flow diagram (Page et al., 2021)

Overall, nine studies met the inclusion criteria. These consisted of three mixed methods (Cerny et al., 2023; Dublin et al., 2021; Palfrey et al., 2019) two quantitative descriptive studies (Dueweke et al., 2019; Gamal Badawy et al., 2023) and four non-randomised studies (Berg-Poppe et al., 2022; Chokshi et al., 2020; Dublin et al., 2022; Schmitz et al., 2019). All articles had some element of pretest/post-test design using a variety of methods including focus group questionnaires or interviews as methods to assess the effectiveness of TIC education as an intervention (Berg-Poppe et al., 2022; Cerny et al., 2023; Chokshi et al., 2020; Dublin et al., 2021; Dublin et al., 2022; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019; Schmitz et al., 2019). Questionnaires were used as the main quantitative components for the studies, primarily using Likert-scales or similar numerical self-rating scales to assess HCPs TIC knowledge and attitudes. Additionally, all studies used suitable statistical analysis methods to assess the significance of their quantitative data, such as t-tests, Wilcoxon signed-rank test, or analysis of variance (ANOVA). Seven studies used open ended questions as part of their post intervention questionnaires adding a qualitative component to the study (Berg-Poppe et al., 2022; Dublin et al., 2021; Dublin et al., 2022; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019; Schmitz et al., 2019) and two mixed method studies used focus groups and semi-structured interviews (Cerny et al., 2023; Chokshi et al., 2020).

The educational interventions took a variety of approaches towards delivery including elements of self-directed online modules plus some face to face teaching (Berg-Poppe et al., 2022; Cerny et al., 2023); online individualised self-directed learning (Chokshi et al., 2020; Schmitz et al., 2019); and primarily face to face training (Dublin et al., 2021; Dublin et al., 2022; Gamal Badawy et al., 2023; Palfrey et al., 2019). Dublin et al. (2021) used the well-established Core Curriculum on Childhood Trauma (CCCT) training package, whereas the other studies used educational interventions developed by the authors themselves. The time commitment for the education sessions ranged from as short as 25 minutes (Schmitz et al., 2019) up to a series of 45–60 minute blocks repeated over a period of six weeks (Gamal Badawy et al., 2023). Supplementary Table 2). The results of the articles were synthesised into four key themes being awareness and understanding, self-efficacy and feeling competent, applying knowledge to practice and barriers to implementation (Fig. 3).

4.1. Awareness and understanding

All nine studies concluded that HCP's awareness of trauma and knowledge of trauma informed concepts improved following TIC educational interventions (Berg-Poppe et al., 2022; Cerny et al., 2023; Chokshi et al., 2020; Dublin et al., 2021; Dublin et al., 2022; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019; Schmitz et al., 2019). Overall, the educational interventions successfully improved: HCP's beliefs about trauma (Gamal Badawy et al., 2023; Schmitz et al., 2019); their foundational knowledge (Berg-Poppe et al., 2022; Cerny et al., 2023; Chokshi et al., 2020; Dublin et al., 2021; Dublin et al., 2022; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey

Table 2
Data extraction table TIC Integrative Review.

Citation	Design	Data collection	Study Setting	Participants	Education Method/ Intervention	Findings relevant to review
Berg-Poppe et al., 2022	A quasi-experimental pre/post design (Non- randomised study)	Sundborg's (Sundborg, 2019) structural model	Midwestern Pediatric Services (USA)	N = 13 paediatric healthcare providers 4 OTs, 4 PTs, 1 SLP, 3 SW/MHS/BHS, and 2 participants reporting as "other" health care professionals.	4-hour interactive educational experience (in-person) Pre and post education repeated measures were used to assess changes in affective commitment, beliefs, foundational knowledge, and self-efficacy as they relate to TIC because of TIC specific educational programming	Proposed TIC curriculum effectively increased participants' TIC beliefs, knowledge, and self-efficacy as well as their perceptions of organizational support. TIC trainings tailored to the specific needs of the target audience hold potential toward promoting systemic organizational change among paediatric agencies.
Aim: To assess changes in affective commitment, beliefs, foundational knowledge, and self-efficacy following completion of a TIC curriculum for a group of interprofessional pediatric service providers						
Cerny et al., 2023	Mixed methods study Grounded theory for qualitative analysis Repeated measures design for quantitative analysis.	Attitudes Related to Trauma Informed Care (ARTIC) scale. Focus groups	USA	N = 18 paediatric healthcare professionals 4x OT, 5x PT, 4x SLP/ AuD, 5x SW/MHS.	Several components of self-study, online modules and scholarly readings. As well as face-to-face active learning experiences, presentations, and case discussions. Six weeks following the intervention, participants engaged in a follow-up focus group dialogue.	Results showed statistically significant pre- to post-programming improvements across all ARTIC domains. Qualitative themes aligned with the quantitative findings, indicating a sense of empowerment through knowledge, as well as an enhanced awareness of systematic challenges to implementation of trauma informed care approaches.
Aim: To understand the changes in knowledge, behaviors, and attitudes related to trauma-informed care following administration of a trauma-informed educational intervention.						
Chokshi et al., 2020	Pre/post session evaluation was embedded into the CA-TIC (Childhood adversity and trauma informed care) e-module interface, facilitating ease of completion. (Non- randomised study)	Evaluated the impact of the course by utilizing a pre-session and post-session questionnaire	Children's National Hospital Washington, USA	N = 35 Practitioners engaged in primary care. pediatric residents (28) two medical students (2), attending physicians (4), and one fellow.	Interactive case-based childhood adversity and trauma-informed care (CA-TIC) e-modules for pediatric primary care	assessments found a statistically significant score increase from presession to post session for each survey item. The largest magnitude of change was seen in items related to knowledge (re: central tenet of TIC, the six principles of TIC, and the components of childhood resilience) each yielding a mean score increase of more than 2 points The most common responses concerned the seven C's of resilience and information related to screening for trauma—including why screening is important and how to screen, each mentioned by 10 participants (29 %). When asked about the two practice changes they would make as a result of the course, 12 participants (34 %) mentioned screening for trauma, and five participants (14 %) mentioned actively applying the seven C's to build resilience.
Aim: To evaluate how the (CA-TIC) e-modules for pediatric primary care increases knowledge, skills, attitudes, and confidence regarding trauma informed approaches and resiliency building in daily clinical practice.						
Dublin et al., 2021	Mixed Methods	Evaluation surveys with both likert style and short answer	Various childhood based Mental Health Services in the United States.	N = 100 (paediatric mental health practitioners)	The Core Curriculum on Childhood Trauma (CCCT) is a case-based curriculum designed to strengthen trauma conceptual knowledge and increase critical	CCCT participants reported high levels of satisfaction and statistically significant improvements between pre and post training trauma skill scores. Quantitative analysis

(*continued on next page*)

Table 2 (*continued*)

Citation	Design	Data collection	Study Setting	Participants	Education Method/ Intervention	Findings relevant to review
					reasoning skills to enhance providers' ability to respond to child trauma.	showed retention of self-reported learning outcomes for up to 2 years after training. Qualitative analysis identified four key impacts on clinical practice (increased empathy, understanding of complexity of trauma responses, systematic approach to case conceptualization, and catalysing further trauma learning
Aim: To assess whether immediate learning outcomes of the Core Curriculum on Childhood Trauma (CCCT) are retained over the longer term and whether CCCT training improves delivery of clinical services.						
Dublin et al., 2022	Nonrandomised quantitative	retrospective pre-post-training evaluations were collected from training participants. The evaluation surveys included a likert scale assessing 8 core childhood trauma skills.	Various childhood based Mental Health Services in the United States.	N = 1908 (74.9 % mental health professionals 41.9 % social workers 18.7 % family therapists 10.8 % psychologists, 3.6 % psychiatrists, 23.8 % other (e.g., case managers, educators, physicians)	The Core Curriculum on Childhood Trauma (CCCT) is a case-based curriculum designed to strengthen trauma conceptual knowledge and increase critical reasoning skills to enhance providers' ability to respond to child trauma.	The design and delivery of the CCCT trainings received high satisfaction ratings from participants. At least 89.2 % of participants gave a rating of 4 or 5 to each statement Participant self-ratings of child trauma skills showed statisti- cally significant improvement
Aim: To assess whether the learning outcomes of the Core Curriculum on Childhood Trauma (CCTC) are effective toward developing trauma knowledge for the wider multidisciplinary mental health workforce.						
Dueweke et al., 2019	Mixed methods	Mixed methods pre and post follow up surveys. The surveys were based on likert scales. The study also included a retrospective chart review of all patients seen by these 33 pediatric residents	South Carolina (USA)	Pediatric Residents N = 33 (quantitative) Subsample N = 9 (qualitative)	2 hour in person training	Participants reported a trend toward more favourable attitudes, and significantly greater perceived competence to enact trauma-informed care. Participants reported decreases in their perceptions that time constraints, lack of training, and confusing information interfered with provision of TIC practices. Participants reported no change in their perceptions that worry about retraumatising children and families interfered with provision of trauma-informed care practices.
Aim: To test the feasibility of a training curriculum designed to enhance pediatric residents' abilities to identify problems associated with traumatic stress in children and provide referrals for trauma-focused mental health interventions						
Gamal Badawy et al., 2023	A quasi-experimental research design using one group (before, immediately after, and 2 months follow-up) was used.	Data were collected using three tools. 1) Demographic questionnaire 2) Nurses' knowledge structured questionnaire 3) Nurses' Self-rated competence scale.	Pediatric Burn Unit at the Plastic, Reconstructive, and Burn Surgery Center at Mansoura University Hospitals, Egypt	N = 65 (nurses)	TIC education programme – three chapters • Meaning and principles of TIC • TIC interventions and management – taking steps to avoid re-traumatization • Techniques to cope with upsetting circumstances	The study revealed that there was a significant improvement in nurses' knowledge. All nurses showed incompetent score levels of practice before intervention. While the majority of them had a competent level of practice immediately and after two months of intervention. Implementing an educational program about trauma-informed care effectively improved nurses' knowledge and practices about the importance of incorporating both medical and psychological care at the pediatric burn unit
Aim: to evaluate the effect of trauma-informed care educational program on nurses' knowledge and practices at the pediatric burn unit						

(*continued on next page*)

Table 2 (*continued*)

Citation	Design	Data collection	Study Setting	Participants	Education Method/ Intervention	Findings relevant to review
Palfrey et al., 2019	Mixed methods	Questionnaire-measured participant confidence, awareness and attitude towards TIC at two time points: pre-training and immediately post-training. The questionnaire included a ten point response scale and three qualitative questions.	Child and Adolescent Mental Health Service (USA)	N = 102 37x nurses, 28x psychologists, 13x social workers, 10x mental health professionals, 6x students, 4x OT, 2x psychiatrists, 2x paediatricians)	A single-day workshop. Combining presentations and interactive approaches	After the workshop participants' reported confidence, awareness and attitudes towards TIC significantly increased. The perceived number of barriers to working within a TIC framework significantly decreased.
Aim: To evaluate a workshop designed to influence mental health practitioners in TIC principles and practices						
Schmitz et al., 2019	Mixed methods	Online computer based survey to assess knowledge and comfort in discussing ACEs, TIC, toxic stress, and resiliency, as well as confidence in and frequency of incorporating the information into clinical practice.	USA	N = 29 pediatric residents (pre module) N = 11 (post module)	Modules focusing on ACEs and TIC education f	Presurvey results demonstrated that residents were not confident discussing ACEs, TIC, or resiliency (median = 2). Residents reported that it was very important to discuss ACEs, toxic stress, and resiliency with families (median = 5), although they were rarely discussed in clinic (median = 1 or 2). Matched pre/post data showed significant increases in knowledge, confidence, and discussion frequency. The results demonstrated a need for ACE education for pediatric residents.
Aim: To identify residents' baseline perceived importance, confidence, and frequency of discussion of ACEs, TIC, toxic stress, and resiliency and evaluate the efficacy of an educational module addressing these topics.						

Abbreviations: Adverse childhood experiences (ACEs), Attitudes related to trauma informed care (ARTIC), Childhood adversity and trauma informed care (CA-TIC), Core Curriculum on Childhood Trauma (CCCT), Trauma informed Care (TIC)

et al., 2019; Schmitz et al., 2019); and understanding of protective factors (such as caregivers who create safe positive relationships or whom are present and interested), in terms of their role in prevention and ongoing recovery (Cerny et al., 2023). Some of the other important benefits of educational interventions were related to growth of knowledge about specific practical topics such as making referrals, responding to disclosures and undertaking elements of assessments i.e. screening (Dueweke et al., 2019; Palfrey et al., 2019; Schmitz et al., 2019): *The training made me more aware of these issues and how they impact patients and their families ((*Schmitz et al., 2019*), p. 5)*

In addition to significantly improving HCP's general knowledge, TIC education developed HCP's perceptions of caregiver and family trauma, which enabled them to see the importance of adjusting their approach from not just being patient focused but being family focused, illustrating a wider realisation and understanding of the ripple effect trauma has on the wider family unit (Cerny et al., 2023; Dublin et al., 2021; Dueweke et al., 2019). TIC educational interventions also enhanced HCP's empathy towards healthcare consumers and their experiences (Cerny et al., 2023; Dublin et al., 2021; Palfrey et al., 2019): *I do consider a patient's background more before clinical encounters and at least feel a little more empathetic* (Schmitz et al., 2019)

4.2. Self-efficacy and feeling competent

The studies demonstrated an overall increase in HCP's abilities and confidence to recognise trauma after completing TIC education (Berg-Poppe et al., 2022; Chokshi et al., 2020; Dueweke et al., 2019; Palfrey et al., 2019). The increased levels of confidence relating to trauma and TIC enabled them to acknowledge and address past trauma in patients and families they cared for which prompted them to incorporate TIC into practice (Berg-Poppe et al., 2022; Chokshi et al., 2020; Dublin et al., 2022; Palfrey et al., 2019; Schmitz et al., 2019). Dublin et al. (2021) and Cerny et al. (2023) stated HCPs had increased understanding of the complexity of trauma responses and learned to move beyond simply identifying signs or symptoms and/or feeling empathy to a position where they were more confident to take action in practice: *It's helped me to be mindful about the multitude of ways in which trauma can impact children and their families so that I think more critically about how each identified "problem" behavior may in fact be a trauma response* (Dublin et al., 2021), p. 7)

This notion that TIC education increased HCP's ability to view children and family experiences through a trauma lens came through in several studies (Cerny et al., 2023; Chokshi et al., 2020; Dublin et al., 2021; Dublin et al., 2022; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019). In addition, participants noted that education enabled them to recognise trauma in others they worked with, for example teachers (Cerny et al., 2023) which gave them confidence to work alongside and support their colleagues. In the Gamal Badawy et al. (2023) study some nurses self-rated themselves as competent prior to the educational intervention and therefore concluded that many nurses may practice in a way that is trauma informed without fully understanding TIC as a concept.

4.3. Applying knowledge to practice

This theme relates to how HCPs applied principles of TIC into practice following TIC education. Participants across all studies, reported both specific and general examples of how education impacted their practice: *…think[ing] more consciously…about the decisions that I make when it comes to gathering information from a family and beginning*

Table 3
Illustration of theme development.

Authors	Related Theme	Examples of extracted data illustrating how themes developed
Berg-Poppe et al., 2022	Awareness Understanding Barriers to implementation Applying knowledge to practice Self-efficacy & feeling competent. Awareness & understanding Barriers to implementation Applying knowledge to practice	Higher levels of affective commitment to TIC and foundational knowledge Educational intervention successfully improved beliefs about trauma, foundational knowledge, and TIC self-efficacy beyond entry-level Working in silos, institutional structures made TIC challenging. Participants began to use a TIC lens. Face-to-face training related to higher self-efficacy. With more recent training both self-efficacy and affective commitment were higher Time limitations Speculation that greater knowledge realigned practice
Cerny et al., 2023	Barriers to implementation Awareness & understanding Awareness & understanding Self-efficacy and feeling competent. Self-efficacy and feeling competent. Self-efficacy and feeling competent. Applying knowledge to practice Barriers to implementation Barriers to implementation Awareness & understanding Applying knowledge to practice Applying knowledge to practice + Awareness & understanding Awareness & understanding Awareness & understanding	Perception that lack of team work and resistance from team members to have a united approach was a barrier New perception and appreciation for the reasons behind others' behaviours post education Participants expressed understanding of the importance of protective factors in prevention and ongoing recovery from trauma Participants endorsed recognizing the effects of secondary trauma/ vicarious traumatization both regarding themselves and when pressing to understand the behaviours of others. Recognition of trauma in others they worked with (i.e. teachers) Participants reported improved confidence in moving from feeling empathy to taking action. Participants specified ways in which they took action steps, based on their new knowledge of TIC Participants described structural and contextual barriers to implementing TIC in work settings Time limits impacted on ability to provide true TIC Acknowledged a need for interventions that are culturally responsive. Endorsed that knowledge in TIC supported their use of empathy-focused approaches rather than control-focused approaches. Participants described pressing to understand the underlying causes of caregiver decision making, rather than assuming the family did not care or was not motivated. Participants voiced how receiving education empowered them to be more willing and feel more competent in applying TIC with their patients/clients and families. Helped understanding of underlying causes of child behaviour and provided techniques for questioning and interviewing children to better understand presenting behaviours.
Chokshi et al., 2020	Awareness & understanding Self-efficacy and feeling competent. Self-efficacy and feeling competent. Applying knowledge to practice Applying knowledge to practice Barriers to implementation	The largest magnitude of change was seen in items related to knowledge to specific concepts but also a general increase in knowledge across the board. The presession to post-session increases for each practice and confidence item, as well as for practice and confidence as categories, were also statistically significant. Course not only increased participant scores but consistently helped participants reach a high level of knowledge, attitudes, Likelihood to practice TIC, and confidence at providing TIC Scores relating to likelihood to practice TIC had improved scores. Participants articulated changes they would make to practice after the education Concern about re- traumatisation still acted as a barrier to TIC
Dublin et al., 2021	Awareness & understanding Awareness & understanding Applying knowledge to practice Self-efficacy and feeling competent. Awareness & understanding Self-efficacy and feeling competent.	Statistically significant increases were seen between Core Curriculum on Childhood Trauma (CCCTI) participants' self-reported. Pre-training ratings and their follow-up ratings 6–24 months later (effect size: 0.90–1.07) for all four child trauma skills. Rather than identifying "problem behaviors", respondents reported learning to see behaviors through the lens of trauma. Increased empathy for children and families, Deeper understanding of the complexity of trauma responses, More systematic approach to case conceptualization, Catalyzing further trauma learning.
Dublin et al., 2022	Self-efficacy and feeling competent. Applying knowledge to practice Awareness & understanding Self-efficacy and feeling competent.	Findings of this study suggest that the CCCT may be an effective tool for increasing the trauma capacity of a multidisciplinary paediatric mental health workforce broader training of facilitators and dissemination of the CCCT could support national workforce development goals. Participant self-ratings of child trauma skills showed statistically significant improvement ($p < .001$) between pre- and post-ratings in the aggregate Trauma Skill Score, as well as in all eight individual trauma skill areas Core Curriculum on Childhood Trauma (CCCT)consistency of positive outcomes across a wide variety of training formats and audiences
Dueweke et al., 2019	Barriers to implementation Awareness & understanding Self-efficacy and feeling competent. Self-efficacy and feeling competent.	Barriers to implementing TIC were measured pre and post intervention included time constraints, concerns about potentially exacerbating distress in children and families, insufficient training, and the presence of

(*continued on next page*)

Table 3 (*continued*)

Authors	Related Theme	Examples of extracted data illustrating how themes developed
	Applying knowledge to practice Awareness & understanding Barriers to implementation	ambiguous information/evidence) Participants reported decreases in their perceptions that time constraints, lack of training, and confusing information interfered with provision of trauma-informed care practices Participants reported a trend toward more favourable attitudes (P = .065) and significantly greater perceived competence (P < .001) to enact trauma-informed care practices Improved confidence Chart reviews revealed a significant increase in completed trauma screens (0–8.0 %), and a slight increase in internal referrals for psychology-/psychiatry-related services (1.9–4.2 %) following the training. (88.9 %) had positive impressions of the STAR pocket card (i.e., the card and dot phrase that outlined the screening and referral process in the electronic medical record) Decreased perception that time constraints and lack of training interfered with TIC practices
Gamal Badawy et al., 2023	Awareness & understanding Awareness & understanding Self-efficacy and feeling competent. Applying knowledge to practice Barriers to implementation	Significant improvement in nurses' knowledge. Following the implementation nurses had favourable judgments about trauma-informed practices and felt knowledgeable about the Specific areas examined by the survey. Nurses' self-rated competence regarding trauma-informed care, a limited number of nurses rated their practice as competent before the educational intervention. May explain that most nurses apply trauma-informed practices without knowing the concept of tic nurses' Time restrictions and lack of training are a barriers to implementation of tic
Palfrey et al., 2019	Barriers to implementation Barriers to implementation Awareness & understanding Awareness & understanding Awareness & understanding Self-efficacy and feeling competent. Self-efficacy and feeling competent. Applying knowledge to practice	Biggest barrier was the view among HCP's that 'trauma' was specialised area outside of their scope of practice Concern that without knowledge would re-traumatise healthcare consumers. Knowledge improvement overall was statistically significant. Improved awareness of services and resources Increased understanding of importance of screening For trauma, the skills involved in asking clients about their experiences of trauma and responding to disclosures of traumatic events. Statistically significant increase in confidence in assessment, responding to disclosure and knowledge and skills working with pt affected by trauma and adversity. Participants indicated they had greater confidence in their ability to acknowledge and address a person's traumatic past. Asked to comment on what aspects of practice they anticipate would change these were: •Including trauma in assessments •Increased focus on therapeutic alliance •Feeling less intimidates by presentations of trauma •Work more closely with family/ parent
Schmitz et al., 2019	Self-efficacy and feeling competent Awareness & understanding Applying knowledge to practice Barriers to implementation	Pediatric residents significantly increased confidence in their knowledge and ability to discuss or practice the topics. Found it important to address aces, tic, toxic stress, and resiliency when interacting with families, yet did not feel confident in doing so Residents demonstrated behavioural changes as they reported more frequently addressing aces, tic, toxic stress, and resiliency within a clinical encounter. Heavy caseloads, limited time seen as structural barrier to tic integration in practice.

treatment" and "think[ing] of all components of the case and areas that [I] normally would not consider (Chokshi et al., 2020), p. 7)

Several studies outlined statistically significant improvement in both confidence and likelihood of HCP's engagement with TIC principles post TIC education (Cerny et al., 2023; Dueweke et al., 2019; Palfrey et al., 2019; Schmitz et al., 2019). Additionally, Palfrey et al. (Palfrey et al., 2019) highlighted an improvement in HCP's responsiveness to trauma by identifying an increase in trauma screening assessments and referrals. The findings also revealed HCP's demonstrated enhanced contextual understanding and a strengthened belief in their capacity to implement TIC principles in practice, allowing them to respond through a trauma-focused approach (Berg-Poppe et al., 2022; Dublin et al., 2021; Dublin et al., 2022). A good example of this was described by Cerny et al. (2023) where participants described how '*pressing to understand the causes of caregiver decision making rather than assuming the family did not care or was not motivated'* (p. 293*),* enabled them to practice with more empathy. Two studies asked participants to speculate how TIC education would improve their practice, with participants indicating an increased likelihood to, practice TIC, screen for trauma and use a trauma informed lens (Berg-Poppe et al., 2022; Chokshi et al., 2020).

4.4. Barriers to implementation

Participants across the studies highlighted challenges in their practice settings that hindered implementation of TIC, including institutional barriers (Berg-Poppe et al., 2022; Cerny et al., 2023; Dueweke et al., 2019), isolated practice or a sense of working in silos (Berg-Poppe et al., 2022; Cerny et al., 2023), time constraints (Cerny et al., 2023; Dublin et al., 2021; Gamal Badawy et al., 2023) and concerns about vicarious re-traumatisation (Cerny et al., 2023; Chokshi et al., 2020; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019). Heavy caseloads and limited time was a strong thread, as HCP's expressed their daily schedules of interacting with clients/students and the expectations of their roles did not afford the flexibility necessary for genuine TIC (Cerny et al., 2023; Schmitz et al., 2019): *I think our biggest thing is that time constraint … we have too many patients to get in to make*

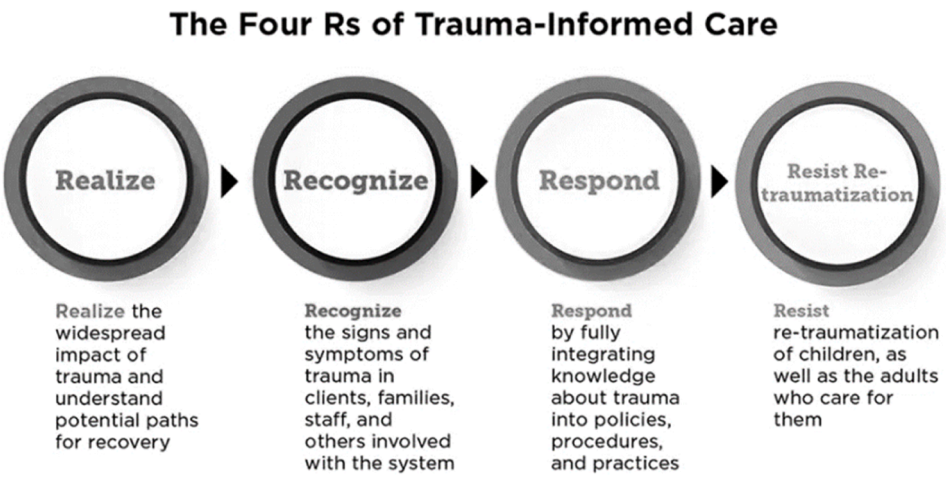

Fig. 1. The Four Rs of Trauma Informed Care. This figure is adapted from Substance Abuse and Mental Health Services Administration (2014).

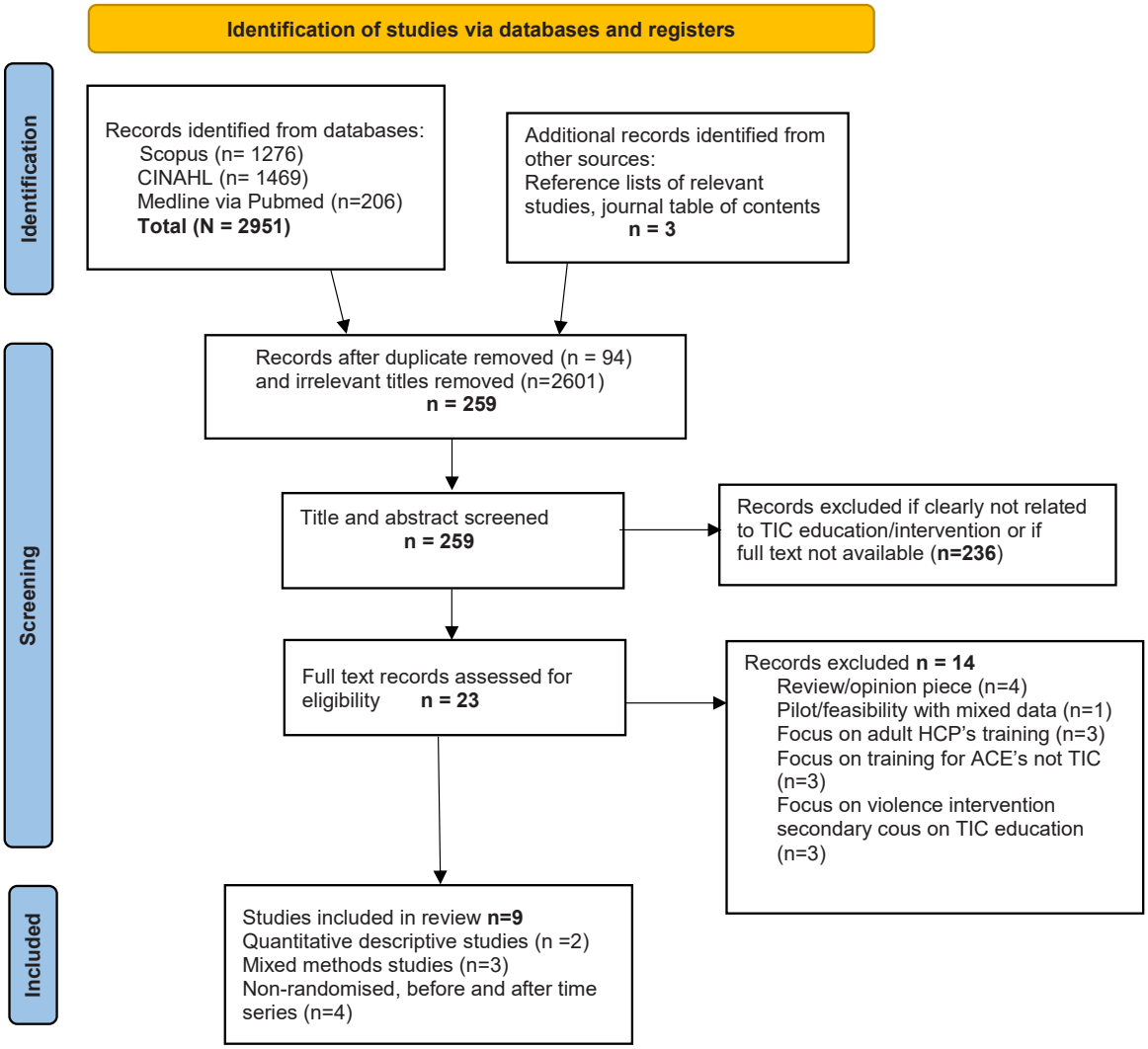

Fig. 2. PRISMA Flow Diagram (Page et al., 2021). *From:* Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.

that possible (Cerny et al., 2023), p. 291)

Palfrey et al. (Palfrey et al., 2019) reported one of the biggest barriers to TIC was the view among HCPs that 'trauma' was specialised area outside of their scope of practice. This thinking led to HCP's presenting concerns about causing re-traumatisation for healthcare consumers and their family through their practice and this acted as a barrier to

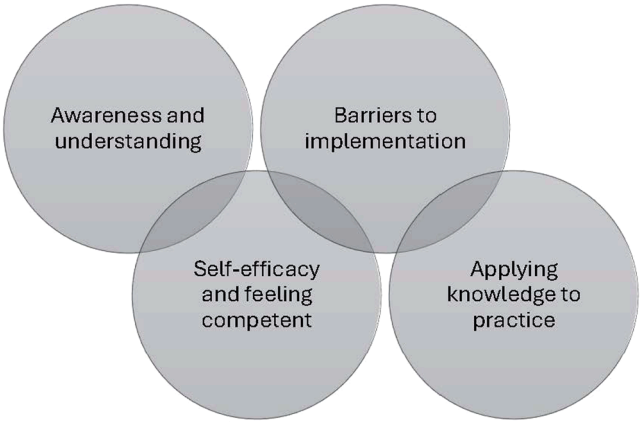

Fig. 3. Four themes.

providing TIC (Cerny et al., 2023; Chokshi et al., 2020; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019). Of interest, Dueweke et al. (Dueweke et al., 2019) reported a decrease in perception that, '*time constraints, lack of training and confusing information interfered with provision of trauma-informed care practices*' (p.1245) after a TIC intervention.

5. Discussion

In this review the paediatric TIC literature was examined with a focus on the impact of TIC education on paediatric HCP's self-reported knowledge and practice. This resulted in key themes which highlighted how HCP's reported an improvement in awareness and understanding, an overall increase in feelings of competency and self-efficacy in relation to TIC as well as improved insight into how they might apply this knowledge in practice. The fourth theme although indirectly related to the research question, tells us important information about the barriers to TIC education, and is important when considering the factors that influence successful implementation of TIC education in paediatric settings.

The first three themes 'awareness and understanding', 'self-efficacy and feeling competent' and 'applying knowledge to practice' relate closely to the key elements of TIC (realise, recognise, respond) (Bartlett and Steber, 2019) and thus demonstrate the importance of these key elements and their interconnectedness with education that has an impact on trauma knowledge and TIC approaches. Participants across studies in this review all reported an increased awareness of trauma informed concepts following education (Berg-Poppe et al., 2022; Cerny et al., 2023; Chokshi et al., 2020; Dublin et al., 2021; Dublin et al., 2022; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019; Schmitz et al., 2019). These findings are in keeping with previous research where education has been reported to improve clinicians knowledge and understanding of TIC in emergency settings (Hall et al., 2016), primary care clinics (Powers et al., 2023), surgical settings and with medical trainees (Grossman et al., 2021).

5.1. Realise

'Awareness and understanding' in this review, relates to the first element of TIC, realise, which encompasses understanding and/or knowledge that trauma exposure can have an impact on neurological, biological, psychological and social development (Guest, 2021). Realising is a defining attribute of TIC and involves becoming not only aware but more knowledgeable about the impact and consequences of traumatic experiences (Substance Abuse and Mental Health Services Administration, 2014). Participants in this review, described how after the educational intervention, they had wider knowledge of TIC concepts, beliefs about trauma and improved knowledge regarding prevention and ongoing recovery for children of different ages (Cerny et al., 2023; Chokshi et al., 2020; Dublin et al., 2021; Dublin et al., 2022; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019). Literature has previously described knowledge within the context of TIC, as encompassing a deeper understanding of the psychosocial support, available resources as well as the health disparities that have an impact on a child and families experiences of trauma (Bruce et al., 2018; Guerrero et al., 2022; Isobel and Delgado, 2018). The findings of this review support this notion with several studies noting how HCPs developed pragmatic knowledge of processes and techniques such as screening assessments, making referrals and coming to know more about available resources (Dueweke et al., 2019; Palfrey et al., 2019; Schmitz et al., 2019). The shift in understanding that underpins the TIC concept of 'realising' has been described by some as developing and using a 'trauma informed lens' (Forkey, 2019; Gonzalez, 2024), which means HCPs must develop the ability to understand children and families behaviour and way of being, as a natural response to trauma, deserving of support and responsiveness (Goddard et al., 2022a). In addition to improving general knowledge of TIC concepts, some participants in this review developed wider realisation and understanding of how trauma had an impact on children and families and subsequently had an increased sense of empathy and understanding towards them (Cerny et al., 2023; Dublin et al., 2021; Palfrey et al., 2019). This improved understanding (realising) which promoted a family focused approach where HCP's acknowledged how trauma propagates across all family members and therefore a family centered approach to care is paramount (Cerny et al., 2023; Dublin et al., 2021; Palfrey et al., 2019). Other literature has previously pointed to the complimentary nature of patient and family centered care and TIC, as each are associated with improved health outcomes and better patient and family experiences in healthcare settings (Auerbach et al., 2021; Kassam-Adams et al., 2023).

5.2. Recognise

The second theme from this review 'self-efficacy and feeling competent' illustrated how HCPs following educational interventions reported an increase in confidence to acknowledge trauma among the patients and families they cared for (Berg-Poppe et al., 2022; Chokshi et al., 2020; Dueweke et al., 2019; Palfrey et al., 2019). This relates closely to the TIC concept of 'recognise' which strictly defined is about accepting that something exists or is true (Guest, 2021). In the TIC literature recognising has much to do with a shift in mindset from wondering what is wrong with a person that would have made them act the way they do-to what happened to a person that would have them react the way they do (Jee et al., 2020; Marsac et al., 2016; Substance Abuse and Mental Health Services Administration, 2014). For children and families this includes consideration of their identity, cultural values, trauma histories and to gain perspective on how things look through that child and families' eyes. The HCPs in this review felt the educational intervention aided in their ability to understand this complexity and enabled them to move from negative assumptions to a more supportive and holistic approach to care (Cerny et al., 2023; Chokshi et al., 2020; Dublin et al., 2021; Dublin et al., 2022; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019). Guest (2021) in their concept analysis of TIC highlights the need for self-efficacy and shared decision-making. There are several validated scales for measuring Affective Commitment to TIC (Herscovitch and Meyer, 2002), Principle Support for TIC (Armenakis et al., 2007) and also TIC Self-Efficacy (Holt et al., 2007). In this review one of the studies used these tools directly (Berg-Poppe et al., 2022) whereas others used modified or developed tools (Cerny et al., 2023; Chokshi et al., 2020; Dueweke et al., 2019; Palfrey et al., 2019) to measure pre and post impact of educational interventions. Overall, the improvement of HCP's ability and confidence to recognise trauma improved post TIC education. Using surveys early on as a way of providing baseline data about staff awareness, attitudes

and beliefs about trauma and TIC have been described as helpful for awareness building, identifying gaps and aiding in implementation of TIC culture within teams (King et al., 2019; Sundborg, 2019).

Creating awareness and recognition among healthcare professionals has been described as an important strategy for prevention of further harm as well as a way to develop greater empathy (Guest, 2021; Jee et al., 2020; Substance Abuse and Mental Health Services Administration, 2014). For HCPs processing empathy as a quality is likely a part of who they are, however with increased stress and high acuity workplaces, HCPs may find that empathising with individuals in their care to be challenging at times. However, education and increased understanding of trauma may enable them to develop deeper empathy skills and foster greater connections with those they care for (Jee et al., 2020).

5.3. Respond

The third theme described how HCP's felt enabled to apply their knowledge of TIC to practice and this relates to the third R of TCI 'respond'. In this review, HCPs had an increased responsiveness to trauma and identified an increase in trauma screening assessments and referrals (Palfrey et al., 2019) and increase in capacity to implement TIC principles in practice following educational interventions (Berg-Poppe et al., 2022; Dublin et al., 2021; Dublin et al., 2022). The element of 'responding' by applying knowledge about trauma into practice has been noted in the literature to require understanding, the ability to incorporate trauma into routine care and being intentional in practice (Marsac et al., 2018). Responding requires that not only individuals, but organisations are well placed to respond to trauma and unfortunately this is sometimes limited by system, time and other barriers that have an impact on HCP's ability to act on what they have learnt. To support clinicians to not only respond to trauma but also resist re-traumatisation, Substance Abuse and Mental Health Services Administration (2014) recommend that policies, procedures and practices must reflect a holistic TIC approach.

5.4. Barriers

Although this study did not intend to focus on the barriers to implementing TIC post an educational intervention, this theme came through strongly across the responses of participants in the included studies. Not surprisingly the biggest barrier was time (Cerny et al., 2023; Gamal Badawy et al., 2023; Palfrey et al., 2019; Schmitz et al., 2019). Time has been noted in other studies to be a barrier to both 'finding time for education' but also for implementing TIC into practice once education has occurred (Hoysted et al., 2017; Matthew et al., 2022). Self-perceived confidence to enact TIC in practice improved following educational intervention across studies in this review, however there was still a concern from participants about re-traumatisation and this acted a barrier (Cerny et al., 2023; Chokshi et al., 2020; Dueweke et al., 2019; Gamal Badawy et al., 2023; Palfrey et al., 2019). This finding broadly supports the work of other studies (Bruce et al., 2018; Kassam-Adams et al., 2015) that have similarly found that even when provided with TIC education and toolkits there still exists significant concern and fear about re-traumatising patients. Importantly and specifically within the context of nursing education, there remains limited guidance or standardisation around trauma informed education. However, using the literature from other disciplines, Li et al. (Li et al. (2019) have developed recommendations for the content, format and strategies for preventing vicarious traumatisation when learning about TIC, for nurses. Their approach encourages a systematic approach to TIC training in nursing programmes. Some parallels can be drawn between the influence of barriers and the ability of HCPs and their organisation to resist re-traumatisation which is the final R of the four key elements of TIC.

6. Limitations

Despite efforts to use up-to-date resources and conduct a systematic search, there remains a possibility of omitting relevant articles due to the specific keywords used. This suggests that there might be additional evidence available beyond what was captured in the study's search terms. Studies were predominately based in the US and therefore are not reflective of other countries and cultural contexts. For example, countries such as New Zealand where structural and societal violence reflect historical, cultural and transgenerational trauma (Kiyimba and Anderson, 2022; Levine et al., 2021), are not well represented in this literature. Another limitation is the potential for publication bias. By only including published studies there is a risk that studies with significant findings are overrepresented while those with non-significant or negative results are underrepresented or not included. This could skew the overall findings of the review. Furthermore, there is potential for bias in both the data extraction and synthesis processes. Although steps were taken to mitigate this bias, such as quality appraisals and individual checking of themes by the research team, bias may still exist.

7. Conclusions

Given the increased awareness and growing recognition of the influence of trauma on health outcomes, paediatric HCP's must be well-equipped to recognise, assess and confidently provide holistic TIC to children and families in their care. The findings identified four key themes on how this can be achieved including increasing awareness and understanding about TIC, increasing nurse's self-efficacy and competency in applying TIC, offering skills in applying knowledge to practice and being aware of the barriers to implementation. These findings were not dissimilar to the four components of Trauma Informed Care practice: realising the widespread impact of trauma, recognising symptomology, responding through integrating trauma knowledge into policies and practice and resisting re-traumatisation. This review supports the notion that educational interventions aimed at increasing TIC knowledge has a positive impact on knowledge and practice. Furthermore, paediatric HCPs need to not only understand TIC but incorporate it into their everyday practice. Education and training on child trauma, is an important first step.

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Megan Thornton: Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Data curation. **Julie Blamires:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Conceptualization. **Mandie Foster:** Writing – review & editing, Validation, Investigation, Conceptualization. **Rebecca Mowat:** Writing – review & editing, Validation. **Stephanie Haven:** Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.nepr.2024.104227.

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