ORIGINAL ARTICLE

Establishing and validating a survey for trauma-informed, culturally responsive change across multiple systems

Alisha Moreland-Capuia[1,2] · Nathalie M. Dumornay[3] · Alexandra Mangus[1] · Caitlin Ravichandran[1,2,4,5] · Shelly F. Greenfield[1,2] · Kerry J. Ressler[1,2]

© The Author(s) 2022, corrected publication 2024

Abstract

Aim The purpose of the present study was to establish and validate the Survey for Trauma-Informed Systems Change (STISC), a measure of culturally responsive trauma-informed care (TIC) and services that can be administered to professionals in any field or industry.

Subject/methods The current study with 262 respondents from judicial, healthcare, political, non-profit, and for-profit settings examined the internal consistency reliability and factor structure of the STISC.

Results A total of 262 respondents from various industries accessed the pre-training survey. Seven of the 59 items were reassigned to alternate subscales and three subscales were merged following correlation analysis. Internal consistency reliability for subscales based on the final item assignments was good or excellent (lower 95% confidence limits for hierarchical omega ≥ 0.85). The root mean square error of approximation estimate for the confirmatory factor analysis based on final item assignments was acceptable (0.073; 90% CI 0.071, 0.076). Neither the comparative fit index value of 0.76 nor the Tucker–Lewis fit index value of 0.75 approached conventional thresholds for acceptable fit.

Conclusion Given the absence of a validated alternative, this study supports use of the STISC tool to measure the degree of an individual's trauma-informed knowledge and positive attitudes toward trauma-informed systems change, as well as trauma-informed practices in the workplace. Further study and refinement will aim to determine whether the STISC survey is sensitive to change, which will provide stronger support for the survey's potential usefulness as a cost-effective method of standardizing trauma-informed systems change programs across multiple fields and industries.

✉ Alisha Moreland-Capuia
   amoreland@mclean.harvard.edu

✉ Nathalie M. Dumornay
   dumor003@umn.edu

1   Division of Depression and Anxiety Disorders, McLean Hospital, 115 Mill St., Mailstop #, Belmont, MA 02478, USA

2   Department of Psychiatry, Harvard Medical School, Boston, USA

3   University of Minnesota – Twin Cities, Minneapolis, USA

4   Lurie Center for Autism, 1 Maguire Road, Lexington, MA, USA

5   Massachusetts General Hospital, 55 Fruit St, Boston, USA

Introduction

Traumatic stress and trauma are pervasive public health concerns that impact the daily lives of many Americans (Bassuk et al. 2017; Magruder et al. 2017). More than 60% of American adults have experienced at least one adverse childhood experience (CDC 2019). Similarly, 60% of children experience at least one trauma each year (Finkelhor et al. 2005). Those rates increase when examining the global population, where 70% of people reported at least one traumatic event in their lifetime (Kessler and Ustün 2008). Rates of trauma exposure further increase when examining marginalized populations (Adams 2010; Alim et al. 2006; Bassuk et al. 1996; Goodman et al. 1997; Hatch and Dohrenwend 2007; Hayes et al. 2013).

Exposure to traumatic events can have long-lasting consequences, both physical and mental (Drury et al. 2012;

Copeland et al. 2007; Felitti et al. 1998). However, evidence has demonstrated that people can overcome traumatic experiences with appropriate interventions and support (Covington 2008; Dozier et al. 1994; SAMHSA 2014). As a result, many researchers, clinicians, and legislators are looking for ways to not only prevent trauma but to interact with and support individuals who are traumatized. As the majority of both the US and global populations have experienced a traumatic event in their lifetimes, it is becoming increasingly necessary that individuals and organizations examine how their policies and procedures can impact individuals who have experienced trauma. Trauma-informed systems change has multiple layers and demands the support of leadership in any given system, adjusting policies and practices to focus on safety and reduce re-traumatization, and providing inter- and multi-disciplinary training and coaching of members of a system (Oehlberg 2008).

Within the mental health field, the acknowledgment of trauma is evolving. As the public and mental health professionals are learning more about the importance of addressing trauma, trauma-informed care is becoming increasingly prevalent (SAMHSA 2014). However, there is an opportunity for mental health systems to more consistently integrate an understanding of trauma and its impact on the biopsychosocial framework as a means of improving treatment and outcomes, as this is not a general practice in mental health systems currently (Sweeney et al. 2018). For example, Hepworth and McGowan (2013) demonstrated that while many mental health professionals recognized the significance of trauma and the need to inquire about it, there is inconsistency in trauma inquiry during mental health assessments in acute settings, and even less consistency in routine inquiry about childhood sexual trauma in acute mental health settings. One study of general practitioners' routine assessment of trauma found that they may feel reluctant to assess trauma for a variety of reasons, such as a lack of sufficient training in trauma-informed care and how to employ trauma-informed practices or a fear of causing harm when discussing a patient's more complex issues (Tomaz and Castro-Vale 2020).

Importantly, research has demonstrated that trauma-informed interventions can improve attitudes and knowledge about trauma-informed practices and approaches and show promise for encouraging trauma-informed change on an individual and group level in both clinical and non-clinical (e.g., child welfare, school, business, government) settings (Damian et al. 2019; Kenny et al. 2017; Kramer et al. 2013; Lang et al. 2016; Niimura et al. 2019; Palfrey et al. 2019; William and Smith 2017; Haime 2020; SAMHSA 2020; Schreiber et al. 2006). Yet, as highlighted by Niimura et al. (2019), few studies have examined the effectiveness of trauma-informed care training programs using standardized measures with follow-up assessments. Even fewer have used measures validated for use across multiple systems (Champine et al. 2019).

Even outside of mental health, there is a desire to become more trauma-informed in fields ranging from dentistry to children's sports leagues (Donisch et al. 2016; D'Andrea et al. 2013; Purtle 2020; Raja et al. 2015). However, as in health care fields, there is an absence of standardization in measuring the effectiveness of trauma-informed initiatives. A recent meta-analysis that included 33 studies on the implementation of trauma-informed practices and approaches in education pointed out that multiple disciplines have employed different methods in examining trauma-informed practices in schools, but examination of the impact of trauma-informed practices and approaches on educators is limited in current literature (Thomas et al. 2019). This analysis also showed limits to the effectiveness of school-based trauma-informed interventions because of the absence of evaluation and standardization of trauma-informed systems change.

As a further example, a 2019 systematic review of organization-wide implementation of trauma-informed initiatives in the child welfare system demonstrated that some form of trauma-informed training (each study had different dosages and content of training) was effective in positively impacting staff knowledge, skills and / or confidence. However, their analysis also showed weaknesses in study designs, and a *lack of standardization or consistency in evaluation* of service user, treatment, and training outcomes (Bunting et al. 2019).

There is also an effort to standardize trauma-informed training efforts for police officers and criminal justice professionals. Much of this work has been led by the Substance Abuse and Mental Health Services Administration (SAMHSA) GAINS Center, which created a trauma-informed response tool for criminal justice professionals with the stated goals of: (1) increasing understanding and improving awareness of trauma, (2) equipping members of the criminal justice system with trauma-informed tools and practices, and (3) providing a framework for trauma-informed policy change. This is an emerging training, and validation of the tool and its impact is yet to be determined. Equally, it is unclear how case studies that highlight cultural and gender issues (which is critical in any trauma-informed training model) is employed in the framework (SAMHSA, Trauma Training for Criminal Justice Professionals 2014). It is encouraging to see the criminal justice system focus on trauma-informed practices and approaches and move toward making trauma-informed change. However, consistent evaluation with validated measures is lacking, and it will be most important to be able to evaluate and measure the impact of trauma-informed systems change. A key part of measuring trauma-informed systems change is including cultural and historical components in a scale, such as the impact of racism and discrimination.

Meeting the need for a standardized and culturally responsive measure of trauma-informed systems change

Because trauma is ubiquitous and experienced widely in society across various systems (education, family, community, workplace, business, government, criminal justice, healthcare), it is imperative that every system promote a trauma-informed environment. It is clear from these examples that there is a desire to be trauma-informed, but there is no consistent framework on how to implement and/or measure trauma-informed systems change across fields. Moreover, core to trauma-informed principles are historical, cultural, and gender considerations. Many systems, including mental healthcare, have engaged with trauma-informed training, practices and approaches but were inadequate in considering historical and cultural factors.

Here we describe the Survey for Trauma-informed Systems Change (STISC), which was established to standardize the assessment of trauma-informed care, practices, and approaches in a multidisciplinary, cross-systems fashion (see Fig. 1). There is a lack of existing scales quantifying trauma-informed care that measure culturally responsive systems change. Some scales were designed for one specific field, such as education (e.g., ARTIC) (Baker et al. 2016) or health and human services (e.g., TIC Grade; TICOMETER, "Knowledge, Attitude, and Practice Related to Trauma-informed Practice" tool) (Bassuk et al. 2017; King et al. 2019; Sinko et al. 2020a, b), but these may not be generalizable. Because trauma impacts every system and field, there would be great utility in a scale that is generalizable across contexts (i.e., a comprehensive assessment of a trauma-informed, culturally responsive system that can be used in any system); however, a scale like this does not currently exist. To meet this need, we developed a scale (STISC) that could be administered to any professional, in any field, for assessment of trauma-informed and cultural responsivity of individuals and organizations. Availability of the measurement tool is critical to the development and evaluation of trainings and interventions aimed at improving trauma-informed practices across a broad range of systems and settings. This paper outlines the process of validating the STISC, a comprehensive assessment tool that measures trauma-informed, culturally responsive knowledge, attitudes, and practices across fields and systems.

Methods

Institutional Review Board (IRB) approval was granted by Massachusetts General Brigham, IRB2021P002889for evaluating the impact of trauma-informed training on a

Fig. 1 Pre and post Survey for Trauma-informed Systems Change (STISC)

Trauma-Informed Systems Change: Pre Survey

Thank you for participating in our Trauma-Informed Systems Change workshop. The purpose of this survey is to assess your knowledge and attitudes around trauma-informed practices and approaches. Your responses to this survey are anonymous and confidential.

Please enter your age:

_____

Please indicate your race/ethnicity (check all that apply):

☐ White
☐ Black or African American
☐ American Indian or Alaska Native
☐ Asian
☐ Native Hawaiian or Other Pacific Islander
☐ Hispanic or Latinx

How do you identify your gender?

○ Man
○ Woman
○ Transgender Man
○ Transgender Woman
○ Non-binary or gender-nonconforming
○ Other
○ Prefer not to say

Please indicate your highest education level:

○ Highschool diploma or GED
○ Some college
○ Associates degree
○ Bachelor's degree
○ Master's degree
○ Professional degree beyond bachelor's (e.g. JD, DDS, MD)
○ Doctoral degree

Fig. 1 (continued)

Assessing Knowledge and Attitudes					
Please indicate the extent to which you agree or disagree with the following statements:					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I understand the physiology of fear.	○	○	○	○	○
I understand how trauma affects the brain.	○	○	○	○	○
I am familiar with trauma-informed care.	○	○	○	○	○
I can recognize how fear operates in a system.	○	○	○	○	○
I understand how adverse childhood experiences (ACEs) impact an individual throughout the lifespan.	○	○	○	○	○
I am familiar with the long-term physical and behavioral effects of ACEs.	○	○	○	○	○
I am familiar with historical trauma.	○	○	○	○	○
I understand how racism and stereotype threat contribute to ACEs.	○	○	○	○	○
I understand how the brain develops.	○	○	○	○	○
I can identify threats to healthy brain development.	○	○	○	○	○
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am familiar with attachment theory.	○	○	○	○	○
I am familiar with mindfulness as a trauma-informed practice.	○	○	○	○	○
I understand the reward pathway.	○	○	○	○	○
I understand the effects of alcohol and cannabis on the brain.	○	○	○	○	○
I understand the effects of cocaine, methamphetamine, and nicotine on the brain.	○	○	○	○	○

multidisciplinary, cross-sectional group in a virtual setting. This study had three main stages: (a) development of the survey used for pre- and post-training assessment; (b) administration of the survey to participants 24 hours prior to two-day, 12-hour interactive trauma-informed training workshops and within 48 hours of completion of the workshops; (c) preliminary psychometric validation of the survey as a tool to evaluate and measure trauma-informed, culturally responsive knowledge, attitudes, and practices.

Development of the survey for trauma-informed systems change

We used the methodology for scale development and validation of Boateng et al. (2018). Following this methodology, we began generating items for the survey. To begin drafting an instrument, the study team initially focused on knowledge and attitude-based questions related to trauma and cultural responsivity. In our review of the literature, we found that there were scales that already measured attitudes and perceptions related to trauma and trauma-informed care, but not necessarily behaviors and/or cultural responsivity (e.g., ARTIC, TICS-10) (Hales et al. 2019). As a result, we focused on developing a scale that measured practices and behaviors and cultural sensitivity in addition to knowledge and attitudes. We further found that current scales measuring trauma-informed change focus on specific systems, such as healthcare, social services (TIC Grade, TICOMETER) or child welfare (Trauma-informed Systems Change Instrument) (Richardson et al. 2012). Our goal was to design a measure that was applicable to all industries and professions.

Fig. 1 (continued)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I understand the connection between substance use disorders and trauma.	○	○	○	○	○
I understand vicarious trauma.	○	○	○	○	○
I understand trauma stewardship.	○	○	○	○	○
I am familiar with racism as a form of trauma.	○	○	○	○	○
I can identify fear and trauma in a system.	○	○	○	○	○

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I understand what it means to be trauma-informed.	○	○	○	○	○
I can identify whether a practice is trauma-informed.	○	○	○	○	○
I can take my knowledge of trauma-informed practice and approaches and change a practice and/or policy in the system in which I work.	○	○	○	○	○
I care about whether my work is trauma-informed.	○	○	○	○	○
Learning about trauma-informed practices and approaches is important for the work I do.	○	○	○	○	○
Applying a trauma-informed lens to my work can improve how I provide service in my system/organization.	○	○	○	○	○
Applying a trauma-informed lens to my work can improve the outcomes I (and the system/organization) seek to achieve.	○	○	○	○	○
It is important that our organization has a budget specifically allocated for trauma-informed trainings and care.	○	○	○	○	○
Acknowledging cultural differences is an important component of a trauma-informed approach.	○	○	○	○	○

The instrument was divided into four sections covering the four domains to be assessed by the scale. These sections are *knowledge and attitudes; trauma-informed, culturally responsive practices in the workplace*; *assessing interactions with clients; and assessing safety and acceptance*. Items corresponding to each section were chosen using SAMHSA's key principles of a trauma-informed approach (safety; trustworthiness and transparency; peer support; collaboration and mutuality; empowerment, voice, and choice; cultural, historical, and gender issues), as well as their 10 implementation domains (governance and leadership; policy; physical environment; engagement and involvement; cross sector collaboration; screening, assessment, treatment services; training and workforce development; progress monitoring and quality assurance; financing; evaluation) (SAMHSA 2014). As suggested by Boateng et al.

(2018) once questions for each section were drafted and reviewed as a study team, we reviewed our proposed scale with experts in the fields of trauma, psychology, and psychiatry. After discussing each item with leaders in the field of trauma research, they helped pare the scale down to 59 items that were appropriate, interpretable, and accurate. After the content of the scale was verified, we then administered the draft to multiple additional experts to receive feedback, administered in two rounds of feedback. From a qualitative perspective, we asked the target groups to verbalize their thought process when providing their answers to ensure that the questions were gathering the information we wished to capture. Before administering the scale to actual participants in trauma-informed trainings, we performed another round of mock-administration to determine how long the survey would take to complete. This was done by sending the

Fig. 1 (continued)

Measuring Trauma-Informed Practices in the Workplace					
Please indicate the extent to which you agree or disagree with the following statements:					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Trauma-informed practices and approaches are common knowledge in the system in which I work.	○	○	○	○	○
All employees in my system/organization are adequately trained on trauma-informed care.	○	○	○	○	○
Our employee handbook and on-boarding material sufficiently references trauma and trauma-informed practices.	○	○	○	○	○
Most employees understand trauma and how it might show up in our system.	○	○	○	○	○
Our organization cares about trauma.	○	○	○	○	○
Our organization is interested in learning about ways to reduce re-traumatization.	○	○	○	○	○
Our office of Human Resources provides adequate initial training and maintenance training on trauma-informed practices and approaches.	○	○	○	○	○
Our organization can provide resources to support employees when they feel burnt-out.	○	○	○	○	○
Our organization is concerned about vicarious trauma and provides resources to employees who may be feeling traumatized.	○	○	○	○	○
Our organization prioritizes emotional, mental, and physical wellness.	○	○	○	○	○

link to the survey to [10] trauma researchers and having them complete the survey in its entirety.

Participants and procedure

Because the scale was created to generalize across industries and professions, we wished to include participants from a wide variety of fields for validation. Our participants were recruited from monthly trainings conducted by the Institute for Trauma-Informed Systems Change within McLean Hospital. These seven trainings took place between July 2021 and February 2022. All participants were sent an electronic pre-survey before the training. If the pre-survey was completed, the participant was sent a post-survey at the conclusion of training. In addition to the 59 items selected for the scale, the pre-training survey included questions on demographics (race/ethnicity, gender, and education level) and both the pre-survey and post-survey included a question on elements that define the respondent's culture.

For survey administration with the target groups, participants were sent an individualized link to a REDCap survey before their scheduled workshop. The pre-survey expired on the day of their training before participants learned any content from the training. The 262 participants (including lawyers, doctors, government agencies, community-based organizations, fortune 500 CEO's, healthcare, government and business leaders from the UK and Africa) received 12 hours of core trauma-informed teaching and training in two days on the fundamentals of trauma, fear, human development, trauma-informed systems change, the psychological impact of racism, and cultural responsivity. They were given tools and an active challenge to meaningfully apply the learning in making trauma responsive changes in their

Fig. 1 (continued)

Assessing Interactions with Clients

Please indicate the extent to which you agree or disagree with the following statements:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I believe that our clients can identify at least one practice or policy that reflects our system's desire to be trauma-informed.	○	○	○	○	○
I believe that our clients feel safe within our system.	○	○	○	○	○
I believe that our organization has strong partnerships with trauma-informed community-trusted organizations to further support our clients in need.	○	○	○	○	○
I believe that our organization has a thoughful and effective process for addressing and incorporating feedback from clients into current practices.	○	○	○	○	○
I believe that our organization makes every effort to provide trauma-informed services to our clients.	○	○	○	○	○

Assessing Safety and Acceptance

My culture is defined by (check all that apply):

☐ My race
☐ My ethnicity
☐ Where I grew up or where I live
☐ Where I work or what I do for a living
☐ My gender identity or sexual orientation
☐ My socioeconomic status
☐ My education
☐ Other (please indicate below)

Please tell us how you define your culture:

_____

respective work systems. After the two-day, 12-hour training, participants that had completed a pre-survey received an individualized electronic link to the post-survey. All survey responses were anonymous, but the pre- and post-surveys were linked to each other via unique, nonidentifiable subject keys.

Statistical approach

Prior to analysis, items were assigned to one of seven subscales by the first author (AM) according to measurement domain and assessment of the domain at the individual (I), system (S), or individual-within-system (I-S) level: self-assessed knowledge and attitudes (I), system-wide knowledge and attitudes (S), training and employee support (S), interactions with clients (I-S), personal safety and acceptance at work (I), promotion of safety, acceptance and inclusion by system (S), and acceptance of cultural differences (I-S). Likert ratings for each item were assigned numeric values from 1 to 5 and summed to obtain subscale scores. To assess item performance, Spearman item-total correlations were calculated for each item and for each subscale. Items correlating substantially higher on an alternate subscale than their assigned subscale were candidates for reassignment. Items with no more than a weak correlation (< 0.30) with any subscale were candidates for removal or regrouping with other items. Subscales sharing a substantial number of items with moderate (> 0.40) or stronger correlation were considered for merging into a larger, more general subscale. All modifications of item assignments to subscales were undertaken with consideration of the theory underlying the scale's development and the face validity and comprehensiveness of the subscales. Internal consistency reliability of the subscales based on original item assignment and final modified item assignments was quantified using hierarchical omega (Kelley and Pornprasertmanit 2016).

Fig. 1 (continued)

Please indicate the extent to which you agree or disagree with the following statements:					
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I have thought about how my cultural background impacts my sense of safety and well-being at work.	○	○	○	○	○
I have thought about how my cultural background affects the way I am perceived by others (e.g., colleagues, clients) at work.	○	○	○	○	○
I have thought about how my cultural background affects the way I engage with others (e.g., colleagues, clients) at work.	○	○	○	○	○
I am confident that my organization thoughtfully embraces and celebrates cultural differences.	○	○	○	○	○
I am confident that my organization makes sure that everyone feels included.	○	○	○	○	○
I am confident that my organization understands racialized trauma.	○	○	○	○	○
I am confident that my organization understands and values diversity, equity, and inclusion.	○	○	○	○	○
I am confident that my organization intentionally encourages employees to consider cultural differences when delivering services.	○	○	○	○	○
My cultural background is respected in the system in which I serve.	○	○	○	○	○
I feel seen and heard at work.	○	○	○	○	○
My unique cultural experience is valued at work.	○	○	○	○	○
I feel understood at work.	○	○	○	○	○
I feel accepted at work.	○	○	○	○	○
I feel supported at work.	○	○	○	○	○
I feel safe at work.	○	○	○	○	○

To evaluate the factor structure of the scale, the model corresponding to the final modified item assignments was submitted for confirmatory factor analysis (CFA) in MPLUS version 8 using robust maximum likelihood estimation and treating the item scores as continuous, consistent with guidance for Likert items with five or more categories (Rhemtulla et al. 2012). Overall fit of the model was evaluated using the root mean square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker–Lewis fit index (TLI).

For the purpose of summarizing results, correlation estimates of magnitude greater or equal to 0.40 and less than 0.60 are described as moderate, and correlation estimates of magnitude greater or equal to 0.60 are described

as strong. Surveys with missing item-level data were excluded from calculations of item-total correlations and hierarchical omega for the corresponding subscale. All partially observed item data contributed to estimation for CFA, consistent with treatment of missing data in implementation of maximum likelihood estimation in MPLUS. The analysis plan included submission of the model corresponding to original item assignments for CFA and accommodation of clustering of responses by training date for the CFA; however, the CFA model associated with the original item assignments was not identifiable, and our data did not support fitting a model accommodating clustering. Item-total correlations and estimates of hierarchical omega were calculated using version 4.1.2 of

R statistical software. Calculation of hierarchical omega used the MBESS package (Kelley 2007).

Results

Characteristics of the respondents

Two hundred sixty-two respondents accessed the pre-training survey, of whom 249 (95%) provided complete responses. Of the 13 (5%) respondents who did not complete all questions, 5 (2% of total) provided only partial or complete demographic information, and 8 (3% of total) provided responses for only some items, with a range of 1–39 of the 59 item ratings missing. Demographic characteristics of the respondents are summarized in Table 1. Two hundred fifty-eight (99%) reported

Table 1 Demographic characteristics of the n = 262[1] survey respondents

	Mean (SD; range) or n (%)
Age	46.3 (10.7; 25–71)
Race/ethnicity[1]	
White	191 (73%)
Black or African American	41 (16%)
American Indian or Alaska Native	6 (2%)
Asian	21 (8%)
Native Hawaiian or Other Pacific Islander	1 (<1%)
Hispanic or Latinx	24 (9%)
Gender[2]	
Man	78 (30%)
Woman	178 (68%)
Transgender man	1 (<1%)
Non-binary or gender-nonconforming	3 (1%)
Prefer not to say	2 (1%)
Highest education level	
Highschool diploma or GED	3 (1%)
Some college	15 (6%)
Associates degree	9 (3%)
Bachelor's degree	84 (32%)
Master's degree	73 (28%)
Professional degree beyond bachelor's	32 (12%)
Doctoral degree	45 (17%)

1. Five of the 262 respondents completed only the demographic portion of the survey. Four of the five provide completed demographic information, and one provided race/ethnicity and gender but not age or education.

2. Respondents could select zero or more categories. Fifteen respondents (6%) selected no categories, 235 (90%) selected one category, 10 (4%) selected two categories, and 1 (<1%) selected four categories.
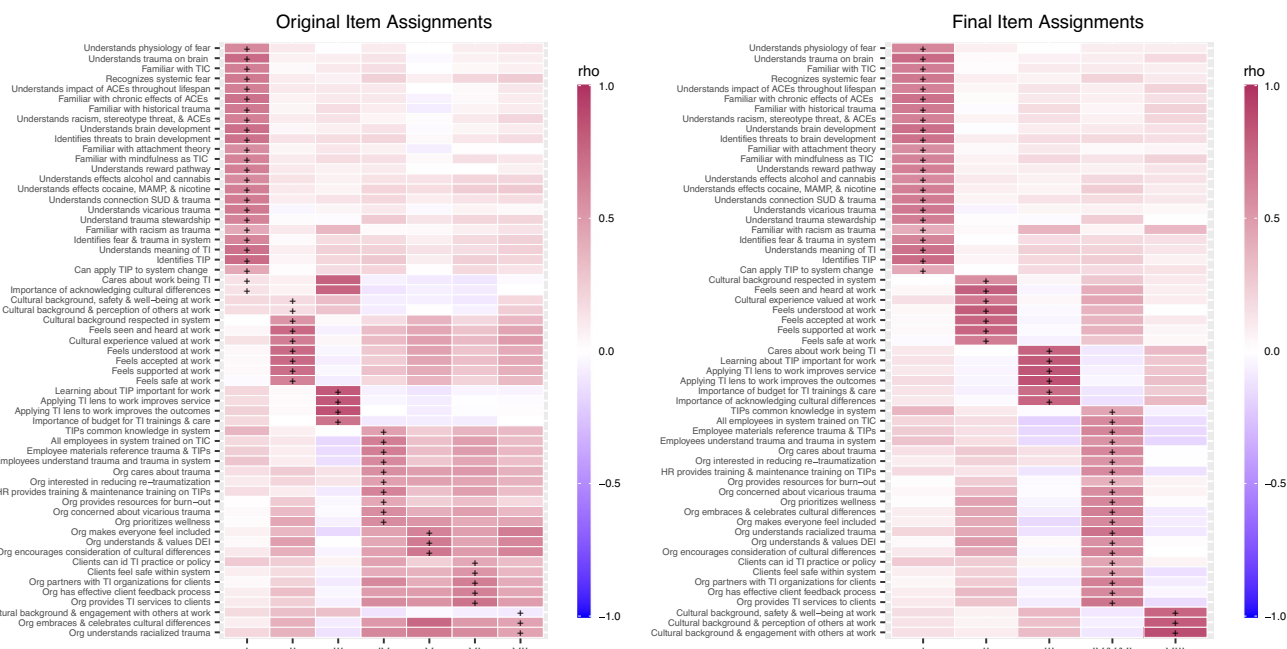
3. No respondents selected transgender woman or other.

postsecondary education, with 150 (57%) reporting a master's degree or more education.

Assignment of items to subscales

Original and final modified assignment of items to subscales, magnitude of item-total correlations with assigned scales, and cross-correlations with alternate scales are provided in Fig. 2. Cross-correlations calculated using the original item assignments suggested that some reassignment of items to alternate subscales was appropriate. Items were reassigned in three stages, between which item-total correlations were recalculated and item performance re-assessed. In the first stage, two of the 25 items assigned to the self-assessed knowledge and attitudes subscale, "I care about whether my work is trauma-informed" and "Acknowledging cultural differences is an important component of a trauma-informed approach," were reassigned to the system-wide knowledge and attitudes subscale based on weak correlation estimates (< 0.20) with the former and strong estimated cross-correlations with the latter. In addition, three items asking about "reflection on impact of cultural background on work" that did not correlate moderately or strongly with any subscale (magnitude of estimated correlations < 0.40) were assigned to their own subscale: "Awareness of cultural background at work." This left only two items, "I am confident that my organization thoughtfully embraces and celebrates cultural differences" and "I am confident that my organization understands racialized trauma," in the acceptance of cultural differences subscale. Because only two items remained in this subscale, and they cross-correlated strongly with the promotion of safety, acceptance and inclusion subscale, the items were reassigned.

Following the first stage of item reassignment, item-total correlations still reflected moderate or greater correlation of multiple items with more than one subscale for all but the self-assessed knowledge and attitudes, system-wide knowledge and attitudes, and awareness of cultural background at work subscales. Because all items on the promotion of safety, equity, and inclusion subscale correlated moderately with the training and employee support total score, and because both scores were thought to reflect trauma-informed practices at the systems level, items assigned to these two subscales were merged into a single subscale. For the final reassignment, because four of five items on the "interactions with clients" subscale correlated moderately with the merged subscale, and items on the interactions with clients' subscale also rated trauma-informed practices of the system, its items were added to the merged system subscale, which was labeled the "training, support, interaction and environment" subscale. After this final reassignment, multiple items on the

Fig. 2 Spearman item-total correlations (rhos) of the 59 scale items with their assigned subscales (+) and cross-correlations with alternate subscales, for the original and final item assignments to subscales. Items performing as expected have strong correlations with their assigned subscales and weak or no correlations with other subscales. TI, trauma-informed; TIC, trauma-informed care; TIP, trauma-informed practice; ACEs, adverse childhood experiences; MAMP, methamphetamine; SUD, substance use disorder; org, organization; HR, human resources; DEI, diversity, equity, and inclusion. I, self-assessed knowledge and attitudes subscale; II, safety and acceptance at work subscale; III, system-wide knowledge and attitudes subscale; IV, training and employee support subscale; V, promotion of safety, acceptance, and inclusion subscale; VI, interaction with clients' subscale; VII, acceptance of cultural differences subscale; VIII, awareness of cultural background at work subscale. Prior to final item assignments, subscale VII was eliminated, subscale VIII was created, and subscales IV, V, and VII were combined into a single training, support, interaction, and environment subscale (IV/V/VI)

training, support, interaction, and environment subscale still correlated moderately with the safety and acceptance at work total score. However, items on these two subscales were not combined because items on the former were included to assess experience of trauma-informed practices on the individual level rather than to assess practices at the systems level. Estimates of internal consistency reliability as quantified by hierarchical omega for the original and final modified item assignments are presented in Table 2.

Table 2 Estimates of internal consistency reliability (95% confidence intervals) as quantified by hierarchical omega, original item assignments and final modified item assignments

Subscale		Original item assignments	Final modified item assignments
I	Self-assessed knowledge and attitudes	0.95 (0.93, 0.96)	0.95 (0.94, 0.96)
II	Safety and acceptance at work	0.84 (0.80, 0.88)	0.92 (0.90, 0.94)
III	System-wide knowledge and attitudes	0.93 (0.91, 0.95)	0.94 (0.92, 0.95)
IV	Training and employee support	0.81 (0.71, 0.88)	0.92 (0.90, 0.94)
V	Promotion of safety, acceptance, and inclusion	0.83 (0.78, 0.87)	
VI	Interaction with clients	0.84 (0.78, 0.88)	
VII	Acceptance of cultural differences	0.67 (0.55, 1.00)	n/a
VIII	Awareness of cultural background at work	n/a	0.89 (0.85, 0.92)

Prior to final item assignments, subscale VII was eliminated, subscale VIII was created, and subscales IV, V, and VII were combined into a single training, support, interaction, and environment subscale. Seven of 59 items were moved from their originally assigned subscales to an alternate subscale: two from subscale I to subscale III, two from subscale VII to subscale V, and two from subscale II and one from subscale VII to subscale VIII.

Factor structure

The RMSEA value for the CFA model corresponding to the final modified item assignments was 0.073 (90% CI 0.071, 0.076), a value associated with acceptable but not close fit. Neither the CFI value of 0.76 nor the TLI value of 0.75 approached the conventional threshold for acceptable fit of 0.90.

Standardized factor loadings for the CFA based on the final item reassignment ranged from 0.46 to 0.78 for self-assessed knowledge and attitudes, 0.59 to 0.87 for safety and acceptance at work, 0.76 to 0.93 for system-side knowledge and attitudes, 0.42 to 0.75 for training, support, interaction, and environment, and 0.75 to 0.97 for awareness of cultural background at work. All factor loadings were significantly different than zero.

Discussion

Our goal was to develop and validate a comprehensive assessment tool that measures trauma-informed, culturally responsive systems change across fields and systems. After development of the scale with a several step qualitative process, we obtained pre-survey measures from over 250 multi-disciplinary participants of a trauma-informed system change program. Following survey administration, analyses of the item-total correlations generally support expectations regarding the association of items with the underlying constructs measured by the scales. With the exception of five items that were reassigned to alternate subscales, items correlated moderately or more strongly with the total scores of their assigned subscales based on pre-specified item assignments. Estimates of internal consistency reliability quantified using hierarchical omega were also favorable after item reassignments, with lower limits of 95% CIs exceeding the common threshold of 0.80 for all subscales.

Low values for the CFI and TLI after final item reassignment likely reflect the correlation of some items with multiple underlying domains targeted by the scale. For the original item assignments, cross-correlations were particularly high among items intended to measure practices of the system and individuals within the system: training and employee support; promotion of safety, acceptance and inclusion, and interactions with clients. Combining items from these subscales reduced, but did not eliminate, moderate or greater cross-correlation. After the final item reassignment, items assigned to the *knowledge and attitudes* subscales and the *awareness of cultural background at work* subscales did not cross-correlate moderately or more strongly with any total score, but some moderately cross-correlating items remained for the *safety and acceptance at work* and *training, support, interaction, and environment* subscales.

This cross-correlation of items for both the original and final modified item assignments could reflect the items' association with a shared dimension underlying several of the domains targeted for measurement. For example, a workplace culture valuing diversity, inclusivity, and empathy may support adoption of a variety of trauma-informed practices at the systems level as well as a sense of safety and acceptance at the individual level.

Given that no alternative scale has been validated for evaluating trauma-informed knowledge, attitudes, and practices across industries and professions, this study demonstrates the STISC scale's favorable overall performance. Furthermore, this study supports the use of the scale pending further study and refinement. Because of the high observed cross-correlations among items included to measure different aspects of trauma-informed workplace practices, we recommend scoring based on the final modified item assignments, which combine items corresponding to training and employee support, promotion of safety, acceptance, and inclusion by the system, and interaction with clients into a single subscale, rather than reporting totals for these workplace practices separately.

Study limitations and future directions

Limitations of the study include the small sample size relative to the number of items included on the scale, which prevented assessment of its factor structure using models of greater complexity and may have resulted in overestimation of the RMSEA and underestimation of the CFI and TLI (Shi et al. 2019). Items were not randomly ordered, and no items were reversed scored, which could make the scale susceptible to socially desirable response patterns. Respondents were highly educated, so results may not generalize to those without postsecondary education. Finally, the motivation for this work – the absence of a gold standard of measurement for trauma-informed practices in the general setting and research associating trauma-informed practices with characteristics of systems, knowledge, and attitudes – limited our ability to establish convergent and divergent validity.

Future studies investigating changes in scale scores following trauma-informed systems training and their predictors, and validating the scale using larger samples, will help to meet the need for measurement tools and understanding of the impact of trauma-informed practices. Further, in future studies, exploratory structural equation modeling using a larger sample of respondents can provide further insight into associations among the domains targeted by the scale and which items can best distinguish them. In addition, because modifications to item assignments were made based on the same data used to confirm the fit of the underlying model and estimate the internal consistency reliability

of the subscales, results for the modified item assignments should be replicated using an independent sample. Lastly, sensitivity of the survey to change and degree of change in knowledge, attitudes, and practices following training will be addressed in a future study.

Implications and conclusion

Despite the need for further investigation using larger samples, our study demonstrates preliminary support for the STISC survey tool as a useful measure of trauma-informed practices and a cost-effective method of assessing trauma-informed systems change programs across multiple fields and industries. At 59 items, the Survey for Trauma-Informed Systems Change is brief, and easily administered and scored. Importantly, our survey is designed to be applicable in any setting. Trauma-informed care is becoming widely discussed in the media, government, and scientific literature (Becker-Blease 2017). Consequently, various systems have engaged with trauma-informed training absent cultural responsivity training and/or a standardized way to measure the impact of the training. Many existing validated scales measuring trauma-informed practices are limited in that they are designed for one specific system, such as education or health and human services, or they fail to adequately address the critical role of cultural responsivity in trauma-informed care. The goal of this study was to fill a gap by developing and validating a scale that can be administered to professionals in any field and will assess cultural responsivity at the individual and organization level. Our chosen subscales were based on SAMHSA's key principles of a trauma-informed approach and their 10 implementation domains (SAMHSA 2014). The survey was hence designed to comprehensively capture the aspects of trauma-informed attitudes and practices that are predictive of positive outcomes for individuals, organizations, and systems, to include integrating knowledge about the consequences of trauma, fostering safety, trustworthiness, and transparency in the workplace through trauma-informed practices and services, and remaining sensitive to cultural, historical, and gender issues.

Evaluating the attitudes, beliefs, and practices surrounding trauma-informed care is becoming increasingly relevant as trauma remains a debilitating public health concern, pervasive across all systems. Thus, a standard way to measure trauma-informed care across all systems is needed. We echo the sentiment of previous scholars that critical to trauma-informed systems change efforts are psychometrically sound tools to measure the extent to which an organization or system is trauma-informed (Champine et al. 2019). Our hope is that the STISC can be used to help systems determine whether they are trauma-informed, to screen for and identify areas needing to be addressed and improved, and to guide trauma-informed intervention efforts and evaluate change in knowledge, attitudes, and practices in response to these efforts. As a next step in the validation process, we will need to determine whether our tool is sensitive to change. Further, pairing our survey results with outcome data that demonstrates meaningful change for stakeholders and those served will be important for showing that our tool is useful.

In sum, the Survey for Trauma-Informed Systems Change shows potential for providing the first psychometrically reliable and valid tool to help professionals from multiple systems, such as lawyers, judges, law enforcement officials, physicians, mental health care providers, educators, politicians, and many others, evaluate their culturally responsive trauma-informed practices.

Declarations

References

Adams EJ (2010) Healing invisible wounds: Why investing in trauma-informed care for children makes sense. Washington, DC: Justice Policy Institute. https://justicepolicy.org/wp-content/uploads/2022/02/10-07_REP_HealingInvisibleWounds_JJ-PS.pdf. Accessed 12 Jan 2022

Alim TN, Graves E, Mellman TA, Aigbogun N, Gray E, Lawson W, Charney DS (2006) Trauma exposure, posttraumatic stress disorder and depression in an African American primary care population. J Natl Med Assoc 98(10):16–30

Baker C, Brown S, Wilcox P, Overstreet S, Arora P (2016) Development and psychometric evaluation of the Attitudes Related to Trauma-Informed Care scale. Sch Ment Heal 8:61–76. https://doi.org/10.1007/s12310-015-9161-0

Bassuk EL, Weinreb LF, Buckner JC, Browne A, Salomon A, Bassuk SS (1996) The characteristics and needs of sheltered homeless and low-income housed mothers. J Am Med Assoc 276:640–646. https://doi.org/10.1001/jama.1996.03540080062031

Bassuk EL, Unick GJ, Paquette K, Richard MK (2017) Developing an instrument to measure organizational trauma-informed care in human services: the TICOMETER. Psychol Violence 7:150–157. https://doi.org/10.1037/vio0000030

Becker-Blease KA (2017) As the world becomes trauma–informed, work to do. J Trauma Dissociat 18(2):131–138. https://doi.org/10.1080/15299732.2017.1253401

Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL (2018) Best practices for developing and validating scales for health, social, and behavioral research: a primer. Front Public Health 6(149). https://doi.org/10.3389/fpubh.2018.00149

Bunting L, Montgomery L, Mooney S, MacDonald M, Coulter S, Hayes D, Davidson G (2019) Trauma-informed child welfare systems-a rapid evidence review. Int J Environ Res Public Health 16(13):2365. https://doi.org/10.3390/ijerph16132365

Center for Disease Control (2019 November 5) Preventing Adverse Childhood Experiences (ACEs) to improve US health [Press release]. https://www.cdc.gov/media/releases/2019/p1105-prevent-aces.html. Accessed 12 Jan 2022

Champine RB, Lang JM, Nelson AM, Hanson RF, Tebes JK (2019) Systems measures of a trauma-informed approach: a systematic review. Am J Community Psychol 64(3–4):418–437. https://doi.org/10.1002/ajcp.12388

Copeland WE, Keeler G, Angold A, Costello EJ (2007) Traumatic events and posttraumatic stress in childhood. Arch Gen Psychiatry 64(5):577–584. https://doi.org/10.1001/archpsyc.64.5.577

Covington SS (2008) Women and addiction: a trauma-informed approach. J Psychoactive Drugs 5:377–385. https://doi.org/10.1080/02791072.2008.10400665

D'Andrea W, Bergholz L, Fortunato A, Spinazzola J (2013) Play to the whistle: a pilot investigation of a sports-based intervention for traumatized girls in residential treatment. J Fam Violence 28:739–749. https://doi.org/10.1007/s10896-013-9533-x

Damian AJ, Mendelson T, Bowie J, Gallo JJ (2019) A mixed methods exploratory assessment of the usefulness of Baltimore City Health Department's trauma-informed care training intervention. Am J Orthopsychiatry 89(2):228–236. https://doi.org/10.1037/ort0000357

Donisk K, Bray C, Gewirtz A (2016) Child welfare, juvenile justice, mental health, and education providers' conceptualizations of trauma-informed practice. Child Maltreatment 21(2):125–134. https://doi.org/10.1177/1077559516633304

Dozier M, Davis K, Barnett L (1994) Clinicians as caregivers: role of attachment organization in treatment. J Consult Clin Psychol 62:793–800. https://doi.org/10.1037/0022-006X.62.4.793

Drury SS, Theall K, Gleason MM, Smyke AT, De Vivo I, Wong JYY et al (2012) Telomere length and early severe social deprivation: linking early adversity and cellular aging. Mol Psychiatry 17(7):719–727. https://doi.org/10.1038/mp.2011.53

Felitti VJ, Anda RF, Nordenberg D et al (1998) 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 14:245–258. https://doi.org/10.1016/s0749-3797(98)00017-8

Finkelhor D, Ormrod RK, Turner HA, Hamby SL (2005) Measuring poly victimization using the Juvenile Victimization Questionnaire. J Child Abuse Neglect 29(11):1297–1312. https://doi.org/10.1016/j.chiabu.2005.06.005

Goodman LA, Johnson M, Dutton MA, Harris M (1997) Prevalence and impact of sexual and physical abuse in women with severe mental illness. In: Harris M, Landis CL (eds.) Sexual abuse in the lives of women diagnosed with serious mental illness. Harwood Academic Publishers, pp 277–299

Haime J (2020) Trauma-informed practices necessary for police, experts say. Concord Monitor. Granite State News Collaborative. https://www.concordmonitor.com/Trauma-informed-policing-35032160. Accessed 12 Jan 2022

Hales T, Kusmaul N, Sundborg S, Nochajski T (2019) The trauma-informed climate scale-10 (TICS-10): a reduced measure of staff perceptions of the service environment. Human Service Organizations: Manag, Leadership & Governance 43(5):443–453. https://doi.org/10.1080/23303131.2019.1671928

Hatch S, Dohrenwend B (2007) Distribution of traumatic and other stressful life events by race/ethnicity, gender, SES and age: a review of the research. Am J Community Psychol 40:313–332. https://doi.org/10.1007/s10464-007-9134-z

Hayes M, Zonneville M, Bassuk E (2013) The SHIFT Study final report: Service and housing interventions for families in transition. Newton, MA: National Center on Family Homelessness. https://www.homelesshub.ca/resource/shift-study-final-report. Accessed 12 Jan 2022

Hepworth I, McGowan L (2013) Do mental health professionals enquire about childhood sexual abuse during routine mental health assessment in acute mental health settings? A substantive literature review. J Psychiatr Ment Health Nurs 20:473–483. https://doi.org/10.1111/j.1365-2850.2012.01939.x

Kelley K (2007) Methods for the behavioral, educational, and social sciences: an R package. Behav Res Methods 39:979–984. https://doi.org/10.3758/BF03192993

Kelley K, Pornprasertmanit S (2016) Confidence intervals for population reliability coefficients: evaluation of methods, recommendations, and software for composite measures. Psychol Methods 21(1):69–92. https://doi.org/10.1037/a0040086

Kenny MC, Vazquez A, Long H, Thompson D (2017) Implementation and program evaluation of trauma-informed care training across state child advocacy centers: an exploratory study. Child Youth Serv Rev 73:15–23. https://doi.org/10.1016/j.childyouth.2016.11.030

Kessler RC, Ustün B (2008) The WHO World Mental Health Surveys: global perspectives on the epidemiology of mental disorders (1st ed.). Cambridge University Press

King S, Chen KLD, Chokshi B (2019) Becoming trauma-informed: validating a tool to assess health professional's knowledge, attitude, and practice. Pediat Qual Safe 4(5):e215. https://doi.org/10.1097/pq9.0000000000000215

Kramer TL, Sigel BA, Conners-Burrow NA, Savary PE, Tempel A (2013) A statewide introduction of trauma-informed care in a child welfare system. Child Youth Serv Rev 35(1):19–24. https://doi.org/10.1016/j.childyouth.2012.10.014

Lang JM, Campbell K, Shanley P, Crusto CA, Connell CM (2016) Building Capacity for Trauma-Informed Care in the Child Welfare System: Initial Results of a Statewide Implementation. Child Maltreatment 21(2):113–124. https://doi.org/10.1177/1077559516635273

Magruder KM, McLaughlin KA, Elmore DL (2017) Trauma is a public health issue. Eur J Psychotraumatol 8(1). https://doi.org/10.1080/20008198.2017.1375338

Niimura J, Nakanishi M, Okumura Y, Kawano M, Nishida A (2019) Effectiveness of 1-day trauma-informed care training programme on attitudes in psychiatric hospitals: a pre-post study. Int J Ment Health Nurs 28(4):980–988. https://doi.org/10.1111/inm.12603

Oehlberg B (2008) Why schools need to be trauma-informed. Trauma Loss: Res Intervent 8(2):1–4 http://www.traumainformedcareproject.org/resources/WhySchoolsNeedToBeTraumaInformed(2).pdf. Accessed 12 Feb 2022

Palfrey N, Reay RE, Aplin V, Cubis JC, McAndrew V, Riordan DM, Raphael B (2019) Achieving service change through the implementation of a trauma-informed care training program within a mental health service. Community Ment Health J 55(3):467–475. https://doi.org/10.1007/s10597-018-0272-6

Purtle J (2020) Systematic review of evaluations of trauma-informed organizational interventions that include staff trainings. Trauma Violence Abuse 21(4):725–740. https://doi.org/10.1177/1524838018791304

Raja S, Rajagopalan CF, Kruthoff M, Kuperschmidt A, Chang P, Hoersch M (2015) Teaching dental students to interact with survivors of traumatic events: development of a two-day module. J Dent Educ 79:47–55

Rhemtulla M, Brosseau-Liard PÉ, Savalei V (2012) When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. Psychol Methods 17(3):354–373. https://doi.org/10.1037/a0029315

Richardson MM, Coryn CLS, Henry J, Black-Pond C, Unrau Y (2012) Development and evaluation of the trauma-informed system change instrument: factorial validity and implications for use. Child Adolesc Soc Work J 29(3):167–184. https://doi.org/10.1007/s10560-012-0259-z

SAMHSA (2020) Trauma training for criminal justice professionals. https://www.samhsa.gov/gains-center/trauma-training-criminal-justice-professionals last updated on 06/29/2020 on November 1, 2021. Accessed 26 Mar 2022

Schreiber JB, Nora A, Stage FK, Barlow EA, King J (2006) Reporting structural equation modeling and confirmatory factor analysis results: a review. J Educ Res 99(6):323–337. https://doi.org/10.3200/JOER.99.6.323-338

Shi D, Lee T, Maydeu-Olivares A (2019) Understanding the model size effect on SEM fit indices. Educ Psychol Meas 79(2):310–334. https://doi.org/10.1177/0013164418783530

Sinko L, Beck D, Seng J (2020a) Developing the TIC grade: a youth self-report measure of perceptions of trauma-informed care. J Am Psychiatric Nurses Assoc. Advance online publication. https://doi.org/10.1177/1078390320970652

Sinko L, Beck D, Seng J (2020b) Developing the TIC grade: a youth self-report measure of perceptions of trauma-informed care. J Am Psychiatric Nurses Associat. https://doi.org/10.1177/1078390320970652

Substance Abuse and Mental Health Services Administration (2014) SAMHSA's concept of trauma and guidance for a trauma-informed approach. https://ncsacw.acf.hhs.gov/userfiles/files/SAMHSA_Trauma.pdf. Accessed 26 Mar 2022

Sweeney A, Filson B, Kennedy A, Collinson L, Gillard S (2018) A paradigm shift: relationships in trauma-informed mental health services. BJPsych advances 24(5):319–333. https://doi.org/10.1192/bja.2018.29

Thomas MS, Crosby S, Vanderhaar J (2019) Trauma-informed practices in schools across two decades: an interdisciplinary review of research. Rev Res Educ 43(1):422–452. https://doi.org/10.3102/0091732X18821123

Tomaz T, Castro-Vale I (2020) Trauma-informed care in primary health settings-which is even more needed in times of COVID-19. Healthcare (Basel, Switzerland) 8(3):340. https://doi.org/10.3390/healthcare8030340

William TM, Smith GP (2017) Does training change practice? A survey of clinicians and managers one year after training in trauma-informed care. J Ment Health Train Educ Pract 12(3):188–198. https://doi.org/10.1108/JMHTEP-02-2016-0016