Trauma-informed initial teacher education training: A necessary step in a system-wide response to addressing childhood trauma

Lyra L'Estrange* and Judith Howard

School of Early Childhood and Inclusive Education, Queensland University of Technology, Kelvin Grove, QLD, Australia

The growing prevalence of students affected by complex trauma, and the significant implications of unresolved trauma for these students later in life, highlights the imperative for a system-wide response to address the effects of complex trauma in student populations. An important step in this system-level response is increasing the knowledge of pre-service teachers in trauma-informed education practice through initial teacher education programs. Trauma-informed education settings are increasingly being recognised as critical in the resolution of complex trauma for impacted learners; however, trauma-informed training in pre-service teacher education is lacking. While a small body of recent research has shown promise in increasing pre-service teacher knowledge and confidence in teaching children and young people affected by complex trauma, there is scant longitudinal data that informs us of how pre-service teachers may be implementing the knowledge they have learnt in their practice after they have graduated. Through survey data, the current study explored the perceptions of 124 Australian pre-service teachers' knowledge, self-efficacy, and resilience related to working with trauma-affected students before and after completing a 6-week initial teacher education unit in managing student behaviours related to complex trauma, and 1 year after graduating. Key findings indicated pre-service teachers' knowledge, self-efficacy, and resilience in teaching students with complex trauma increased dramatically from pre- to post- study of the 6-week unit and this learning continued to be evident 1 year into their teaching career. However, the data also suggest that these attributes are not something that develops quickly or without ongoing professional learning and practice. Although pre-service and early career teachers seem keen to advance their trauma awareness, it is important they receive ongoing support to develop their skills into their early careers. These findings have implications for the design of trauma-informed initial teacher education and the importance of additional early career professional learning.

KEYWORDS

trauma-informed, initial teacher education, pre-service teachers, educational systems, teacher preparation

Introduction

University-delivered, trauma-informed training for pre-service teachers is an essential part of an education system response that is needed to address the educational and life inequities stemming from child maltreatment and trauma. Complex trauma results from repeated interpersonal harm done to infants and children, which can include physical, emotional, or sexual abuse, serious neglect, and the experience of family or other relational violence. This type of trauma can be understood as distinct from other types of trauma, as it disrupts important attachments, and it is often directed at children by the very people on whom they depend for nurture and protection. Unresolved complex childhood trauma can have severe and detrimental effects on the neurobiological, academic, and social development of children (Hobbs et al., 2019). If left unaddressed, these consequences can extend beyond childhood into adolescence and can continue to have an impact throughout adulthood, including worrying ramifications for future parenting behaviours and health outcomes (Felitti et al., 1998; Isobel et al., 2019). Also, studies have shown that there are significant longer-term and sometimes lifetime costs that result from managing these impacts, which involve significant societal expenses, including those associated with service areas such as health, welfare, unemployment, child protection and care, crime, and accommodation (Moore et al., 2015; Jaffee et al., 2018; Mo et al., 2020; Conti et al., 2021).

Trauma-informed education settings are increasingly being recognised as critical in addressing the impacts of complex childhood trauma due to the considerable amount of time students spend at school, the relative safety of the school environment, and the buffering effect provided by supportive and positive relationships that students can develop with trauma-informed educators (Hobbs et al., 2019; Pelayo, 2020; McClain, 2021). However, teachers' capacities to recognise and respond to the impacts of complex trauma experienced by their students are complex and dependent on many factors, including the preparation that they receive during their initial teacher education programs (Rodger et al., 2020). The growing prevalence of students affected by complex trauma, the significant implications of unresolved trauma for students later in life (Anda et al., 2010; Kliethermes et al., 2014), and the concerning impact that challenging student behaviour can have on teacher decisions to stay or leave the profession (Harris et al., 2019), highlight an imperative for action at an education system level. It is proposed that this systemic response must encompass the mandatory inclusion of trauma-informed teaching and learning within pre-service teacher education. To contribute to evidence in support of this proposal, this article examines a study exploring post-implementation and longitudinal impacts of pre-service teacher engagement in trauma-informed teaching and learning during an initial teacher education program in QLD, Australia.

Literature review

Education systems in Australia and other countries are gradually accepting more responsibility for student mental health and wellbeing, including the addressing of concerns which result from students' experience of trauma, and this is reflected in increasing attention within both research and the development of education policy (TeachPlus, 2020; National Mental Health Commission, 2021). In addition, there is increasing collaboration between education sites and child and adolescent health and mental health services to support the wellbeing of young learners (Kearns and Hart, 2017). This shift has significant implications for initial teacher education programs as the higher education sector is a crucial part of the wider education system and arguably the place where teachers first have the opportunity to engage in knowledge and skill development in the area of trauma-informed education practice. To adequately respond to the impacts of complex trauma on the learning and wellbeing of significant and increasing numbers of students, there is a need to better understand the potential of teacher preparation programs and their contribution to a system-wide response.

Prevalence, impacts, and types of trauma

During 2019–2020 in Australia, and quite consistent with preceding years, 31 out of each 1,000 children were recipients of child protection services. This suggests that significant numbers of children, from birth to age 17, have been exposed to child maltreatment (Australian Institute of Health and Welfare, 2021) indicating that there is potentially at least one child in most classrooms across the nation living with the outcomes of complex trauma. These outcomes can include challenges with learning, memory, social interaction, and emotional regulation, which can, in turn, lead to behavioural and relational difficulties in the classroom (Romano et al., 2015; Perfect et al., 2016). Further to this, it is becoming increasingly clear that many students are affected each year by additional traumatic events such as natural disasters, the fallout from the global pandemic, and exposure to violence, war, poverty, and the experience of refugee trauma (Davidson et al., 2020). These other sources of trauma can, unfortunately, exacerbate concerns with family function and family violence (Boxall et al., 2020; Newby et al., 2020; Tran et al., 2020) and can lead to an increased risk of adverse experiences and outcomes for children living in unsafe homes (Teo and Griffiths, 2020). While the harm from experiencing these additional traumatic events can be understood as different from the relational harm that arises from abuse, neglect, and family violence, these various types of trauma can interact with each other and the resulting heightened stress response can impact on school behaviour,

learning, and relationships (Siegel, 2015; Berger and Martin, 2021). If educators, and the systems and settings in which they work, are not trauma-informed, stress-related behaviours by children and young people can be misinterpreted as deliberate and defiant and this can lead to further detrimental outcomes for these students, including harsh punishments, suspension, and exclusion (Howard, 2019).

Drawing on the large body of research from neuroscience that examines the neurobiological impacts of complex trauma, it is clear that these impacts evident in childhood can last into adulthood if not resolved (Kliethermes et al., 2014). It is also becoming increasingly clear that there are protective factors that can mitigate the effects of complex trauma and significantly alter the trajectory of a child's life, and these include safe, stable relationships and environments (Burke Harris, 2018). A nurturing environment in which a student has ready access to safe adult relationships can re-shape stress-altered neural pathways in the brain and facilitate healing from the effects of adversity (National Scientific Council on the Developing Child, 2004; Burke Harris, 2018; Coch, 2018). The importance of relationships in promoting healthy neurodevelopment is well documented and is a key factor in the success of trauma-informed practice in education settings (Morgan et al., 2015; Siegel, 2015; Little and Maunder, 2021). For example, a warm, available, and responsive educator can have a positive and adaptive impact on the parts of the brain that manage emotional regulation, a vital skill for student success within the classroom environment (Carello and Butler, 2014). Understanding how the relational experiences of a student can shape and re-shape their brain development and structure suggests that schools should provide opportunities for educators to offer this important relational activity. However, it is vital that educators are trauma-informed and prepared for this activity from early in their careers, suggesting that trauma-informed training for pre-service teachers is essential.

Graduate teachers are under-prepared

Despite the increased international interest and growth in trauma-informed educational practice, research continues to highlight a lack of teacher preparedness to respond adequately and inclusively to trauma-affected students. This lack of preparedness is evident in practicing teachers and even more so in new graduates and pre-service teachers (Brown et al., 2020; McClain, 2021). For example, McClain (2021) interviewed 15 early childhood pre-service teacher candidates in the United States, and while all participants believed that there was a high prevalence of complex trauma and that it was very likely that they would encounter trauma-affected students in their future classrooms, 60% reported that they were only "somewhat prepared" to support these students. Although the training these pre-service teachers had received did mention trauma, there was

no explicit teaching and learning dedicated to the understanding of trauma and its influence on learning and development. Nor was there dedicated coursework reflecting recommended trauma-informed responses. As another example, Davies and Berger (2019) reported similar findings from their interviews with Australian primary and secondary teachers who were already teaching in the field ($n = 11$) and who indicated that they felt underprepared to respond to students affected by domestic violence due to a lack of pre-service training and experience. All participants in this study spoke about the lack of pre-service training within their university programs in the areas of trauma awareness and responses to support students who had lived with domestic violence.

Studies have also explored the relationship between pre-service teacher education and teacher preparedness for supporting students who live in poverty, a context that can be associated with the existence of child maltreatment (Drake et al., 2022). Robson et al. (2021) found pre-service teachers anticipated their work would involve students affected by poverty; however, they felt underprepared for how best to recognise and support these students. Longaretti and Toe (2017) interviewed 17 Australian principals in relation to preparation of pre-service teachers to teach in low socioeconomic areas. They indicated the need for pre-service teachers to have knowledge about the impact of trauma and intergenerational poverty on the learning and behaviour of students and highlighted the importance of the voice of school leaders in establishing priorities for initial teacher education training. Lampert (2020) advocated that the disadvantage from poverty needs to be recognised and pre-service teachers need to be better prepared to support students with this form of educational disadvantage.

In response to concerns with teacher preparedness, some teacher training programs do include teaching and learning activity related to trauma-informed education in schools. Some university courses include teaching of trauma-informed content within mandatory mental health training (Rodger et al., 2020). Some pre-service education courses include a focus on child protection practice to prevent harm from occurring to children but may or may not include what to do once harm has already occurred (Walsh et al., 2011). Other courses focus on embedding knowledge of trauma within a broader body of teaching dedicated to inclusive education or social and emotional learning (Kearns and Hart, 2017; Bradford et al., 2021). It is beyond the scope of this article to provide a global, or even an Australian overview of teacher training courses and whether or not they include trauma-informed content. However, it is clear that course content in trauma-informed education practice within pre-service teacher education does vary in detail, depth, and delivery, and this can impact on how well pre-service training can impact on future practice.

Evaluations of pre-service teacher education course content regarding trauma and trauma-informed practice have shown

that including this learning opportunity has potential to increase recognition and support of trauma affected school students and to enhance the personal and professional wellbeing of early career school educators (Brown et al., 2020; Ellison et al., 2020; Rodger et al., 2020; Shooks, 2020; DiMaria-Sileno, 2021). One training evaluated by Rodger et al. (2020) assessed outcomes of the Trauma and Violence Informed Care component (6 h) of a mandatory 12-week course in mental health literacy for 287 Canadian pre-service teachers. Findings suggested that attitudes toward trauma-informed care, and self-efficacy for using inclusive education practices, increased significantly after participation in this course. Brown et al. (2020) reported that a 3-h trauma training for 180 teacher candidates in the United States increased participants' knowledge and skills to respond to trauma. Foreman and Bates (2021) reported that a 90-min training in trauma awareness increased teacher candidates' ($n = 41$) knowledge, awareness, and self-efficacy for working with students affected by trauma. These findings are perhaps unsurprising, given that these learning opportunities have introduced new knowledge and material to pre-service teachers and researchers collected follow-up data immediately after the training, when knowledge retention could be at its greatest. However, what is lacking in the research literature are longitudinal studies that explain how pre-service teachers may be implementing the knowledge they have learnt during their pre-service education, after they have graduated and during their early careers.

Supporting the personal and professional wellbeing of educators

An important piece in the system-wide response to supporting students affected by complex trauma is understanding the significance of vicarious trauma in educators, also known as secondary traumatic stress. Authors, researchers, and clinicians can differ in how they define and use these terms, but for the purposes of this article, this type of trauma can be defined as a transformation in the educator's sense of identity, purpose, and efficacy, resulting from repeatedly using controlled empathy when listening to, or seeing evidence of, students' experiences of trauma (Borntrager et al., 2012; Brunsting et al., 2014; Helms-Lorenz and Maulana, 2016). For educators, this can result from their over-connecting with the traumatic life experiences of students (Christian-Brandt et al., 2020). Vicarious trauma is a concern that is not uncommon with people working in the human services, mostly because these people view the work that they do as more than just a job, but more so as part of who they are. This can lead to vulnerability in educators who work with high-risk populations and who encounter multiple exposures to students who have experienced, or continue to experience, traumatic events. However, a study by Christian-Brandt et al. (2020) found that trauma-informed

training and service delivery in schools can help to mitigate vicarious trauma. The study examined 224 teachers following 2 years of trauma-informed training in a low-income school district and found that working in a trauma-informed manner helped to address chronic exhaustion and cynicism in teachers whilst strengthening their self-efficacy regarding their work and their positive feelings related to helping students. Other authors examined the impact of pre-service education on the experience of vicarious trauma. Miller and Flint-Stipp (2019) highlight the importance of including content in relation to vicarious trauma and educator self-care into teacher preparation programs to prevent graduates experiencing future vicarious trauma. Fabionar (2021) recognise that providing pre-service teachers with knowledge and skill in social and emotional learning not only helps to facilitate these capacities within their future students but also can be protective of their own emotional wellbeing throughout their careers and can lead to longevity in their professions.

Addressing inequity

Training pre-service teachers in trauma-informed practice can also be viewed from a social justice and inclusive education perspective (Bradford et al., 2021). At the time of writing this article, this view is perhaps becoming more prevalent as events in Australia and globally have highlighted inequities for some already disadvantaged groups of students, whose circumstances have worsened due to the global pandemic, natural disasters, and other local or global calamities that include conflict and war. There is now an increased impetus to re-evaluate education systems, educational policy, and school service delivery to address harm and inequity experienced by children and young people (Greig et al., 2021). As is in many countries, it is becoming increasingly clear in Australia that despite an overt focus on teacher education reforms, curriculum revisions, and teacher quality standards, marginalised and "at risk" students are still underperforming and are over-represented in suspension and exclusion data (Graham et al., 2022). Also, graduate teachers still feel under-prepared to teach in a manner that services the whole range of diversity present in contemporary classrooms (Rowan et al., 2021), including those who are perhaps misunderstood due to their behaviour that is affected by the impacts of complex trauma (McClain, 2021). There are many complex and interacting components within education systems that can affect student outcomes. However, an increasing emphasis on teacher training that enhances teacher capacities to reduce educational and social inequities for disadvantaged groups of children and young people, including those impacted by complex trauma, presents an opportunity to address significant global, and local concerns regarding inequity. However, in many countries, including Australia, despite this system-level response being identified as necessary

(Howard, 2019), efforts have been piecemeal, uncoordinated, or just not yet addressed (Quadara and Hunter, 2016).

One example where efforts to address inequity through pre-service teacher education is underway is in Indiana State in the United States where legislation was recently passed stating that all teacher preparation programs provide curriculum to develop trauma awareness and social and emotional skills in pre-service teachers (TeachPlus, 2020). Research interviews with staff and administrators from the eight universities across the state indicated that faculties were in agreement regarding the incorporation of trauma-informed and social emotional learning curriculums within their teacher preparation programs. However, participants also suggested that the new legislation did not articulate clearly enough the requirements for universities and that this had led to diverse interpretation and implementation of the legislation. To address this, participants recommended specific training regarding how to incorporate these curriculum aspects into their programs.

Although not mandated in Australia, some pre-service teacher education in in trauma-informed education is occurring. The purpose of the study discussed in this article is to explore the short- and longer-term outcomes of trauma-informed pre-service teacher education delivered by a university in Queensland through a pre-post longitudinal survey research design. The research question asks, "What are the initial perceptions of pre-service teachers' knowledge, self-efficacy and resilience related to working with trauma-affected students, before and after completing a 6-week initial teacher education unit in managing student behaviours related to complex trauma, and then importantly, 1 year after graduating?" While the study explores a context that is limited to Australia and is relatively small, findings are reflected in other research that highlights the importance of formal training in trauma-informed education practice in initial teacher education programs.

Materials and methods

Participants

Longitudinal survey data were collected from Australian pre-service education students who studied a 6-week elective that focused on managing challenging student behaviours related to complex trauma, during their final year of a Bachelor of Education degree. Ethical approval for this research was granted by the relevant institutional committee. Participants were University students enrolled into the elective unit recruited into the study through the university communication channels, including email, the online learning platform for the elective, and online and in-person class announcements. Participants provided informed consent and completed an online survey before commencing the elective (pre-training, $n = 344$), after completing the unit (post-training, $n = 143$), and during their first year of teaching (follow-up, $n = 20$) and second year of teaching ($n = 3$) after graduation. Data were collected from three cohorts of students, during elective offerings in 2017, 2018, and 2019. Enrolments of pre-service teachers into this elective steadily increased over these years with 40 enrolled in 2017, 120 in 2018, and 487 in 2019. Only students in their final year of study were eligible for participation in this research. The number of students participating in the study reflects a response rate of 53.2% for the pre-survey; however, follow-up participation declined significantly over the data collection period. Further, through difficulties with matching pre-and post- data, the final participant number was 124 students who had matched pre- and post-training data for all survey questions. Due to the significant attrition in response rates for the first and second year of follow-up, no data from this time point is included in the analyses, however, some data from the first year of follow-up is presented tentatively for discussion.

Trauma-informed pre-service education training

The trauma-informed education training investigated in this study is a 6-week elective within the undergraduate Bachelor of Education course, requiring students to engage in approximately 6 h of contact or on-line work each week and the completion of two written assignments. Details of the training are provided in Table 1.

Research framework, survey, and data analysis

To explore the research question for this study, "What are the initial perceptions of pre-service teachers' knowledge, self-efficacy and resilience related to working with trauma-affected students, before and after completing a 6-week initial teacher education unit in managing student behaviours related to complex trauma and 1 year after graduating?," a pre-post longitudinal research design was implemented. Participants were surveyed immediately prior to their study of the 6-week trauma-informed elective described above, then followed up immediately after completing the 6-week unit. Participants were also followed up at one and 2 years post-graduation in an attempt to understand longitudinal outcomes of participation in the trauma-informed elective; however, due to limited follow-up data, this aspect of the research design could not be included in the formal analysis.

The survey was designed for this research and collected data on pre-service and early career teachers' perceptions about their knowledge, self-efficacy, and personal and professional

TABLE 1   Details of the Pre-service Teacher Education Trauma-informed Training (TIDiER* Checklist).

1.	NAME
	Pre-service teacher education elective in trauma-aware education
2.	WHY
	Trauma aware education is a growing field of interest in practice, policy, and research. Graduate teachers are highly likely to encounter students affected by complex trauma in their career. Due to the detrimental effects of complex trauma on learning and behaviour, teachers need to be trained in how to support students affected by complex trauma. Pre-service training in trauma-informed practice is a critical piece of a system-wide response to increasing trauma awareness.
3.	WHAT
	Weekly study material consisted of a 2-h recorded lecture and 3-h live tutorial each week and included reading and video materials that students could access at their chosen times each week on the university learning platform. A summary of the training content included:

Week	Topic
1	Introduction to complex childhood trauma and its impact on individuals, the schooling experience, and life outcomes.
2	The science underpinning the neurobiological impact of complex childhood trauma. Exploration of what can be done to address this and to help children and adolescents who are living with the outcomes of complex trauma–particularly during their school experiences.
3	The fight, flight, freeze response and a number of trauma-aware strategies for schools and classrooms.
4	Whole-school approaches to trauma-aware education, teacher self-regulation, and trauma-aware crisis management.
	Assessment 1: Case studies–identify challenges and recommendations for trauma-affected students
5	Child protection, intergenerational transmission, and the needs of particular student groups.
6	Costs vs. benefits of keeping students from trauma backgrounds in schools, teacher attachment styles, teacher self-care, vicarious trauma and teacher resilience.
	Assessment 2: Essay–Advocate for trauma-aware practice in your educational setting

4.	WHO PROVIDED
	The elective was developed by a university academic with expertise in school education, the neuroscience of complex trauma, child development, and extensive experience working with schools as a guidance counsellor and behaviour specialist. The academic was supported by a specialty teaching team consisting of educators from the university education faculty and trauma-aware practitioners who were working in fields such as guidance counselling and behaviour support. Each member of the teaching team was qualified at a Doctorate or Masters level in their relevant fields.
5.	HOW
	The 2-h lecture was presented live each week by the lead academic. The format focused on delivering information directly to students through lectures and included some video examples. The 3-h tutorials were presented live each week by the teaching team and students could choose from time-tabled classes. The tutorials were designed to be interactive and included group work and discussion. Students also had access to additional reading and video material on the university learning platform. This consisted of curated readings and links to the library resources, videos illustrating practical information and strategies, as well as recordings of the lectures and copies of lecture and tutorial materials.
6.	WHERE
	This unit was delivered solely at the university where the pre-service teachers were enrolled as part of their undergraduate teacher education program.
7.	WHEN and HOW MUCH
	Over the study period, the 6-week unit was delivered twice each year, or once a semester, for three years.
8.	MODIFICATIONS
	Minor adjustments to the unit content and delivery occurred over the study period in response to student feedback, teaching team feedback, and updated literature and research. These adjustments were made as part of normal teaching reflection and would not have had a significant effect on data collected.

*Adapted from Hoffmann et al. (2014).

resiliency in relation to working with students affected by complex trauma. The survey included items that mostly stayed the same across the four collection points and consisted of quantifiable responses as well as an extended, qualitative response. The quantitative items included an initial question asking if participants had worked with trauma-affected students, followed by two items measuring knowledge, two items measuring self-efficacy, and nine items measuring resilience. The open-ended question asked participants to briefly describe their feelings related to teaching students affected by trauma.

Quantitative data across all three data collection time points were collated into a combined dataset for analysis in SPSS Version 28 (IBM Corp, 2021). Participants were asked to enter a unique code at the beginning of each survey, and this was used to match responses over time. Mean scores for knowledge, self-efficacy and resilience were compared using paired t-test analyses. Qualitative data was exported into an Excel spreadsheet and coded thematically (Braun and Clarke, 2006) to identify participants feelings about teaching students affected by trauma. The first author completed initial coding

and re-coding of the dataset and this was checked by the second author. Consensus on coding was reached through dialog.

Results

Participant attrition was significant in the follow-up surveys conducted as part of this study and possible reasons are discussed further in section "Discussion." To investigate the possibility of differences between the sample of those participants who completed follow-up surveys and those who did not, initial analyses were conducted comparing baseline knowledge, self-efficacy, and resilience between those participants who completed just the pre-survey ($n = $ 341), and those who completed both pre- and post-training surveys ($n = $ 124 matched participants). No statistically significant differences between groups were found. For example, the difference in knowledge scores pre-training for those who completed the pre-training survey only ($M = 1.92$, SD $= 0.60$) compared with the scores of those who completed both pre and post-training surveys ($M = 1.97$, SD $= 0.67$), was 0.52, 95% CI [-0.09, -0.19], and was not statistically significant, t (340) $= 0.735$, $p = .463$.

All participants were asked whether they had worked with or taught students who had experienced complex trauma and who exhibited challenging behaviour. Findings indicated 60.1 percent ($n = 205$ of 341) and 64.5 percent ($n = 80$ of 124) of participants had worked with these students pre- and post-training, respectively. While this experience mostly related to university required practical placements, these data do indicate the high prevalence of students living with the outcomes of complex trauma in schools and the strong likelihood that graduates will be working with or teaching these students in their early and ongoing careers. While the small number of students who completed the follow-up survey was a limitation, the proportion who reported working with students affected by trauma increased to 80.0% ($n = 16$ of 20) of those surveyed 1 year after graduating.

Knowledge, self-efficacy, and resilience for working with trauma-affected students

Pre-service teachers' knowledge, self-efficacy, and resilience related to their teaching of students affected by complex trauma were measured using the survey designed for this study to capture data related specifically to the unique content and unit outcomes of the training. Knowledge, self-efficacy, and resilience data were collected prior to commencing the 6-week unit (pre-training) and immediately after completing the unit (post-training).

All items were measured on either a 4-point Likert type scale (knowledge and self-efficacy) or a 3-point Likert-type scale (resilience), with higher scores representing greater knowledge, self-efficacy, and resilience. Average scores were calculated for each scale for both pre-and post-training data. As the survey was designed for this study and had not been used before, internal consistency was investigated for each scale using pre-training data. Cronbach's alpha coefficients indicated high reliability for the Knowledge (0.837) and Self Efficacy (0.787) scales, with the Resiliency scale showing slightly lower reliability (0.616), possibly due to the higher number and greater variability of items. Removing particular items did not change the reliability of the scale significantly, so all items were included in the analyses.

Knowledge was measured through two items asking pre-service teachers to rate their knowledge of (1) how complex trauma affects child and adolescent development and (2) how trauma affects student behaviour and learning.

Participants could respond to the questions on a scale of (1) *I have no or minimal knowledge or understanding of this topic*. (2) *I have some knowledge or understanding of this topic*. (3) *I have a reasonable knowledge or understanding of this topic*. (4) *I have a strong knowledge or understanding of this topic*. A paired *t*-test was performed to compare the mean difference between both time points for the 124 matched participants who completed this scale on both surveys. On average, knowledge and understanding of how complex trauma affects child and adolescent development and student behaviour increased from pre-training ($M = 1.98$, SD $= 0.66$) to post-training ($M = 3.48$, SD $= 0.56$). This difference, -1.49, 95% CI [-1.6, -1.3], was statistically significant, t (123) $= -20. 11$, $p < .001$ and represented a large effect size, $d = 0.83$.

Self-efficacy data were collected from two items (confidence and skill) related to teaching students living with the outcomes of complex trauma. Participants could respond to the item related to confidence on a scale of (1) *I have minimal or no confidence at this time*, (2) *I am a little confident at this time*, (3) *I am reasonably confident at this time*, and (4) *I am very confident at this time*. Similarly, the scale for skill level was (1) *I have minimal or no skill in this area*, (2) *I have some skill in this area*, (3) *I have reasonably skill in this area*, and (4) *My skills in this area are strong*. Self-efficacy increased significantly from pre ($M = 1.66$, SD $= 0.61$) to post-training ($M = 2.71$, SD $= 0.53$) as indicated by a paired *t*-test conducted with pre and post-training data. This difference, -1.05, 95% CI [-1.6, -1.3], was statistically significant, t (123) $= -15.85$, $p < .001$ and represented a large effect size, $d = 0.74$. While limited by a small, and possibly biased sample, this increase in self-efficacy score appeared to be maintained after participants had graduated as indicated by data collected from participants 1 year after graduating ($n = 20$, $M = 2.56$, SD $= 0.54$).

Resilience for teaching students affected by complex trauma was measured through nine items related to different aspects of working with these students. Participants could respond on a scale of 1–3. Wording of the scale for each item was specific to the question asked, however, generally the scale reflected (1) *Very often*, (2) *Sometimes*, and (3) *Almost never*. Items were reverse coded where applicable and combined to obtain mean resilience scores. The first two items asked how much pre-service teachers were (1) emotionally affected and (2) challenged by working with these students. The next two items related to how much participants thought they could (3) build positive relationships, and (4) help students with behaviour and learning. The next two asked about their (5) ability to switch off from thinking about these students after work, and (6) how often they thought they would lose sleep thinking from worrying about these students. The final three items asked about whether participants felt they (7) could make a difference, (8) would enjoy working with these students, and (9) would be glad they had chosen teaching as a career despite the challenges of working with these students. Resilience scores increased from pre (M = 2.17, SD = 0.26) to post (M = 2.57, SD = 0.24) training. This difference, −0.40, 95% CI [−0.4, −0.3], was statistically significant, t (123) = −15.67, p < 0.001, however, only represented a small effect size, d = 0.28. Greater than pre-training resilience scores appeared to be maintained at 1-year follow-up as indicated by limited follow-up survey data (n = 20, M = 2.46, SD = 0.27).

Qualitative data

The qualitative data analysed in this study included participant responses to the question: *Briefly describe how you feel right now, about the possibility of your teaching students who have experienced complex trauma and who exhibit challenging behaviour now or in the future.* This question was asked at all three time points and it was clear from the main themes that emerged, that this response changed over time. A total of 291 participants answered this question at T1, and a total of 119 participants answered this question at T2. Where participants wrote more than one answer in response to the question, only the first answer was coded and included in the analysis.

Prior to studying the 6-week unit, half of the responses to this question were characterised by feelings of nervousness, lack of preparation, and anxiousness (51%, 148/291 responses). There were also some positive responses (32%, 93/291) characterised by phrases such as "excited," "ready for the challenge," and "eager to learn more." The remaining responses (17%, 50/291) were more ambivalent, and emerging themes in this group were characterised by words such as "somewhat prepared," "hopeful," or "unsure."

There was a greater proportion of positive responses from participants after studying the 6-week unit than prior to the training, with the majority of post-training participants (76%, 90/119) feeling more prepared and more confident to teach those affected by complex trauma. For example:

> I feel much more aware of why students may exhibit challenging behaviour and I am more empathetic toward these students now. I feel like I still have a lot to learn, but I no longer feel ignorant. In fact, I feel like I am able to share what I have learned with others in a confident manner. I feel like this course has changed the way I look at students and it has definitely changed the way I will care for my students.

The remaining participants (24%, 29/119) indicated they still felt nervous, apprehensive, or intimidated. However, it is worth noting that 18 of these participants (62% of this group) also indicated that despite their nervousness, they still felt more confident in their ability to make a difference in their students' lives than before the training. This is exemplified in the following quote:

> I would definitely be nervous about teaching these students, however, I feel like I am now somewhat equipped with enough knowledge and strategies to be able to help these students, and cope at the same time.

Most participants who completed the follow-up survey 1 year after graduating indicated they continued to feel more prepared and confident to teach students affected by complex trauma (89%, 16/18). However, the data also suggest that these attributes do not develop quickly or without ongoing professional learning and practice. This is highlighted in a participant's response after 1 year of teaching:

> I feel quietly confident but also excited to face the challenges that come with this. I would definitely need more understanding and knowledge of the impacts trauma has on the brain and also the people around them (peers and teachers).

Two responses (11%) indicated some participants still felt "daunted" and "uneasy."

Discussion

Findings from this study showed that including teaching and learning regarding trauma-informed education practice within initial teacher education programs can enable pre-service teachers to feel more prepared to support students living with the outcomes of complex trauma. This finding is reflected in other research, and although the content,

duration, and delivery may differ according to the pre-service education context, researchers do agree that initial teacher education programs can play a significant role in helping teachers prepare for, identify, and respond to those affected by trauma (Brown et al., 2020; Rodger et al., 2020; Foreman and Bates, 2021). What is less known, is how pre-service teachers may be implementing this knowledge after they have graduated.

The unique contribution of the current study is the attempt at longitudinal follow-up of these pre-service teachers and the comprehensiveness of the initial training. To the authors' knowledge, no other research has investigated the longer-term impact of trauma-informed initial teacher education training for pre-service teachers moving into their teaching careers. Pre-service teacher knowledge, self-efficacy, and resilience for teaching students affected by complex trauma increased significantly after completing the 6-week trauma-informed training investigated in this study and the influence of the 6-week training, although limited by significant attrition of the sample, continued to be evident 1 year into participants' teaching careers. These findings are particularly relevant when the majority of those followed into their first teaching year indicated that they had worked with students affected by complex trauma and that their pre-service training had contributed to positive outcomes for these students.

The elective investigated in this study was quite comprehensive (6 weeks of 6 contact hours per week) when compared to other offerings examined in the research literature, for example the 3-h training presented by Brown et al. (2020) and the 12-h training investigated by Rodger et al. (2020). It is understandable that a more thorough training involving a longer time period is likely to have greater influence on pre-service teacher outcomes. However, as the efficacy of these different training programs was not compared across studies, we cannot speculate on the dose-response relationship between time spent training and future impact. What is clear, is that the comprehensive training examined in this study did result in strong outcomes, but more research examining outcomes of learning opportunities in trauma-informed education for pre-service teachers is still needed.

The findings of the current study indicate that engaging in the 6-week elective helped pre-service teachers feel more prepared and confident to work with trauma-affected students, and this sentiment remained into the first year of their careers. However, the responses from participants who were followed into their first year of teaching, also implied that there their university training was not enough, and ongoing support and training was needed. Similar findings were reported by other Australian researchers (Davies and Berger, 2019), who recognised that while there is a significant need for increased training in identification and support of domestic

violence exposure for students in teacher preparation programs, this cannot be without ongoing consultation, training, and support during their careers. So, although pre-service teachers seem keen to advance their trauma awareness and respond well to pre-service education on this topic, it is important that they also receive ongoing support to develop their capabilities into their early careers. These findings have implications for the design of trauma-informed initial teacher education and for the ongoing professional learning of teachers.

Despite the large body of literature investigating the influence of pre-service teacher beliefs, knowledge, self-efficacy, and skills on student outcomes, or the overall impact of teacher preparation programs, the concern remains: marginalised and disadvantaged students are still falling behind in a range of educational outcomes (Fernandez, 2019; Graham et al., 2022). Also, teachers continue to report under-preparedness for teaching these students (Rowan et al., 2017, 2021). Whilst the findings of this study contribute toward a much-needed evidence base that justifies the inclusion of initial teacher education in trauma-informed practice, there remains a dearth of this type of education within university programs in Australia and beyond. It is clear that to address the significant inequities in education and life outcomes that result from students' exposure to trauma, there is a need for comprehensive and systemic responses that include mandatory pre-service teacher education in trauma-informed practice.

While the current study contributes to the field by providing some evidence that graduate teachers who receive significant training in trauma-informed practice are potentially more "prepared" or resilient for when working with trauma-affected students, further research is needed. As examples, future research could investigate the outcomes of pre-service education in trauma-informed practice that extend past the early career period, or the outcomes of combining pre-service and early career training. Longitudinal or retrospective research studies could examine the influence of adequate teacher preparation in trauma-informed education practice across wider system measures over time, such as student education attainment, employability, and social and health outcomes, or staff personal and professional wellbeing. The influence of teacher education programs must also not be isolated from the other components of education systems, and the research community would benefit from larger scale studies exploring the multiple aspects of the "systems" of education in which initial teacher preparation is embedded and makes an important contribution.

It must be noted that, despite the positive findings of the current study, there are limitations that need to be acknowledged in relation to this research. First, longitudinal data collected over time resulted in attrition of follow-up which was likely due to communication difficulties. Whilst studying with the university, students were readily contactable through

their student email accounts but after graduation researchers were depending on students responding to their private email accounts, and many did not. Also, researchers were unable to ascertain differences in populations of those who completed follow-up vs. those who did not, hence those who completed may have been biased toward this research topic and more interested in trauma-informed education. This bias could also be present due to participants being those who had voluntarily chosen to study the pre-service elective being examined in this study. As this was not a mandatory part of the teacher education program, these findings cannot be generalised across the wider pre-service teacher population, but certainly can inspire further studies.

A further limitation was the design of the survey. Knowledge and self-efficacy were measured using only two items per scale. This was to reduce cognitive load for participants and keep the survey within a reasonable length. Similarly, the three-point Likert-type scale used for the Resilience items was designed for ease of use by participants. A more robust measure of these constructs could be designed for future research, allowing a more-in depth exploration of pre-service teacher perceptions. Despite these limitations, our analyses did indicate acceptable reliability for this study and our participant cohort.

Conclusion

Supporting school students who are living with the outcomes of complex trauma is critical due to the high prevalence of the incidence of complex trauma across the globe, the significant impact of complex trauma on learning and life outcomes, and the societal costs associated with unresolved complex trauma. Trauma-informed teaching and learning in initial teacher education programs will increase pre-service teacher knowledge of the detrimental effects of trauma and enhance their skills to respond effectively to challenging student needs and behaviours resulting from complex trauma. Students affected by adversity, stress, and trauma are likely to be present within most classrooms, and adequately trained educators have the potential to support these students toward the resolution of the impacts of trauma, in a manner that does not impact on their own personal and professional wellbeing. Mandatory pre-service education in trauma-informed education practice and ongoing support and training for early career, and indeed all, school educators has the potential to develop the capacities of teachers in this vital area. It is suggested that this vital area of education should become a consistent component of a broader systemic response to address the significant personal and societal impacts associated with unresolved complex trauma.

Data availability statement

The datasets presented in this article are not readily available because ethical approval for this study and institutional approval to conduct the research does not extend to the use of original/raw in future studies. Hence data are not available in a public access data repository.

Ethics statement

The studies involving human participants were reviewed and approved by the Queensland University of Technology Human Research Ethics Committee. The patients/participants provided their written informed consent to participate in this study.

Author contributions

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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