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# Evaluation of a school-wide trauma-informed approach in primary and secondary schools in the Netherlands: teacher outcomes in the first year of implementation

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**Introduction:** Adverse childhood experiences can negatively affect students' development and classroom functioning, highlighting the need for supportive school environments. This study evaluated teacher-level outcomes of a school-wide trauma-informed approach in eight Dutch mainstream primary and primary and secondary special education schools.

**Methods:** An embedded mixed-methods longitudinal design combined questionnaire data from 110 teachers with five focus groups involving 18 school staff members. Teacher self-efficacy and classroom climate were assessed at six waves across a baseline year and the first implementation year; perceived trauma knowledge was assessed before staff training and after the initial staff training content covering theory and practice.

**Results:** Perceived trauma knowledge increased between these assessments, with a small effect, $t(43) = 2.22$, $p = .03$, $d = .33$. During the implementation year, significant increases were found in overall self-efficacy and perceived efficacy in coping with changes and challenges and cooperating with parents and colleagues. Class atmosphere, student relationships, and classroom order also improved. End-of-year ratings were higher in the implementation year than in the baseline year for class atmosphere ($B = .122$, $p < .05$) and student relationships ($B = .097$, $p < .001$). Student relationships were the only classroom-climate outcome with a significant implementation-year increase but no significant baseline-year increase. However, no baseline-implementation slope differences were statistically significant. Focus-group participants described increased trauma awareness, changes in their interpretations of student behavior, greater confidence, and the importance of peer support and self-care. Translating awareness into consistent practice remained challenging.

**Discussion:** The findings suggest positive developments in teachers' perceptions, but do not establish implementation-specific effects. Longer-term studies with comparison groups are needed to assess sustainability and strengthen causal inference.

KEYWORDS

classroom climate, implementation, primary education, secondary education, self-efficacy, special education, teacher outcomes, trauma-informed education

# 1 Introduction

Adverse childhood experiences (ACEs) are potentially traumatic experiences during childhood (0–18 years) that increase the probability of diverse negative outcomes (Carlson et al., 2020; Karatekin and Hill 2018). Because ACEs and traumatic experiences conceptually overlap (Remmers et al., 2025), ACEs are frequently used as a proxy measure of childhood trauma exposure. However, traumatic experiences differ from ACEs in that they involve direct or indirect exposure to actual or threatened death, serious injury, or sexual violence, as defined by the DSM-5 (American Psychiatric Association, 2013). In contrast, ACEs encompass a broader range of adverse childhood experiences, including emotional, physical, and sexual abuse, emotional and physical neglect, and parental separation or divorce (Felitti et al., 1998). More recent ACE frameworks have further expanded this concept to include adversities such as poverty and peer victimization, including bullying (Cohen-Cline et al., 2020; Finkelhor et al., 2013). Prevalence rates of ACEs vary widely in the literature from 41% to 97%, due to differences in samples, informants, and inconsistencies in the operationalization of ACEs (Carlson et al., 2020). Recent research showed especially high prevalence figures of ACEs among students with emotional and behavioral problems in special education, with 74.5% of students between 8 and 18 (average age 11.58 years) having experienced four or more ACEs (Offerman et al., 2022).

ACEs can negatively impact development by increasing the risk of physical, educational, behavioral, and mental health problems in children and adolescents (Bielas et al., 2016; Bomysoad and Francis, 2020; Kim et al., 2021; Sahle et al., 2021). A growing body of neurodevelopmental research suggests that childhood adversity may alter the development of neural systems involved in emotional regulation, stress responsivity, and cognitive functioning, particularly when exposure is chronic or cumulative (McLaughlin et al., 2019; Nelson and Gabard-Durnam, 2020). Noticeable consequences of ACE exposure at school include difficulties in attention, learning, and executive functioning, particularly in working memory, inhibitory control, and cognitive flexibility (Garcia et al., 2023; Op den Kelder et al., 2018), as well as impairments in self-regulation that may contribute to social, emotional, behavioral, and academic difficulties (Lohmiller et al., 2022).

A recent meta-analysis (Qu et al., 2024) showed that higher ACE-scores are related to poor academic achievement and grade repetition. In addition, research has revealed a dose-response effect between the number of ACEs and the risk of poor school attendance (i.e., absent days, late arrivals, early dismissals), disruptive behavior in the classroom and failure to meet grade level standards in reading, writing or math (Blodgett and Lanigan, 2018). Another study showed children with four or more ACEs to be at greater risk for nonengagement in school, school absenteeism and/or repeating a grade compared to children with exposure to fewer than four ACEs (Crouch et al., 2019). Finally, a recent longitudinal study showed ACEs measured in preschool to be longitudinally directly related to disruptive behavior, verbal and physical aggression reported by teachers in kindergarten and third grade (McDoniel and Bierman, 2023). These findings show that ACEs are associated with several aspects of academic functioning, both indirectly through social, emotional, and behavioral problems and directly through cognitive functioning, school attendance, and academic achievement.

Many teachers working with ACE- and trauma-impacted students are confronted with the impact of ACEs in the school context on a daily basis, which may contribute to teachers' emotional burden, stress, a loss of self-efficacy and anxiety (Alisic, 2012; Blitz et al., 2016; Caringi et al., 2015) and may contribute to teachers' intentions to leave the teaching profession (Christian-Brandt et al., 2020). Confronted with the impact of ACEs on students' behavior and academic success, teachers may start to feel ineffective or helpless in their role (Alisic, 2012). Self-efficacy in teaching includes the belief that one can keep discipline in the classroom, motivate students, give instructions, provide emotional support, and adapt to change (Davis et al., 2024). In past research, teachers identified the need for trauma-focused courses within teacher training to help build self-efficacy in working with traumatized students (Alisic, 2012). In addition, in their relationships with students, teachers may be emotionally affected by students' experiences of adversity, which may place them at risk of secondary trauma (Miller and Flint-Stipp, 2019). Teacher education programs often devote little attention to self-care strategies to buffer against the stress and emotional burden that may come with the profession of teaching, especially when confronted with trauma and its impact (Miller and Flint-Stipp, 2019).

Finally, attention to the needs of teachers working on the front line responding to the impact of ACEs among their students is crucial. Teachers are uniquely positioned to signal the occurrence of ACEs among pupils and mitigate the effects of ACEs (Christian-Brandt et al., 2020). Many teachers, however, have not been educated on the prevalence and impact of ACEs and how to respond to it in a trauma-informed way (Brunzell et al., 2019; Goodwin-Glick, 2017). When teachers do not recognize ACEs as a possible underlying cause of emotional, attention, and behavioral problems, this may contribute to further escalation of these difficulties and can lead to

retraumatization rather than reducing the negative impact of ACEs (McInerney and McKlindon, 2014). In contrast, positive relationships with non-parental adults, such as teachers, can buffer against the impact of ACEs among students (Breedlove et al., 2020; Vinh and Hoan, 2024). These findings highlight the important role teachers can play in either exacerbating or buffering the effects of ACEs in the school context.

A trauma-informed educational approach provides an educational environment responsive to the needs of ACE-exposed students and their teachers by developing trauma-informed policies, procedures and practices in the school (Brunzell et al., 2016; Chafouleas et al., 2016). A trauma-informed educational approach aims to create a safe and supportive learning environment for students and teachers. Such a learning environment fosters ACE- and trauma-impacted students' regulation and relational abilities which could help mitigate the impact of ACEs and traumatic experiences in the school context (Perry and Daniels, 2016). In addition, a trauma-informed approach fosters school staff self-efficacy as they may gain confidence in understanding and meeting demands of challenging behavior of trauma-impacted students (Kim et al., 2021). The Substance Abuse and Mental Health Services Administration (SAMHSA, 2014) defines a trauma-informed system (e.g., a school or institute for mental health care) as an organization *realizing* the vast impact of trauma while understanding potential paths for recovery; *recognizing* signs and symptoms of trauma in clients, families, staff, and others involved within the system; *responding* by integrating knowledge about trauma into policies, procedures and practices, and actively *resisting* re-traumatization. In other words, developing trauma-informed educational systems involves a paradigm shift on the level of the organization, educational practice, and policy (Hanson and Lang, 2016; McInerney and McKlindon, 2014). Various models have been developed to shape school-wide trauma-informed education (Avery et al., 2021; Thomas et al., 2019). The principles of nearly all models revolve around providing a safe, predictable environment in which adults are trustworthy and supportive. All models place a strong emphasis on trauma knowledge and awareness among staff, (re)building healthy relationships with teachers and peers and adult role figures. Another core aspect in many models is the importance of self-care when working with trauma-impacted students. Self-care entails awareness of one's own mental health, recognizing when to call for help with trauma-related symptoms, recognizing stress, and connecting with and showing consideration for other school staff. Self-care is a responsibility of school staff individually (e.g., rest), school staff interpersonally (e.g., share workload) and the organization (e.g., policies and supervision). Overall, these models underscore that trauma-informed education requires more than individual teacher awareness; it demands a systemic and sustained commitment to safety, relationships, staff well-being, and organizational change.

Despite the increased attention to trauma-informed education a systematic review concluded that evaluations using randomized controlled trials (RCT)or quasi-experimental designs of school-wide trauma-informed approaches were lacking (Maynard et al., 2019). To our knowledge, since then only one study has been published on trauma-informed approaches on teacher outcomes. This study had a quasi-experimental waitlist-control pre-post intervention design and evaluated a 2-day school-wide professional development workshop over a 6-month period (MacLochlainn et al., 2022). The results showed significant positive changes in trauma-informed care-related attitudes among staff and a decrease in secondary traumatic stress and burnout.

The available evaluation literature on teacher outcomes of school-wide trauma-informed approaches includes pilot and preliminary studies, some of which have not been peer-reviewed, and often provides limited information about participants, locations, and school settings (Thomas et al., 2019). In addition, it is often difficult to determine whether the trauma-informed approach is implemented school-wide.

Based on the non-experimental evaluation studies on teacher outcomes of school-wide trauma-informed education approaches, positive results were found on staff awareness and knowledge on the impact of trauma and positive change in attitudes towards trauma-impacted students, and positive changes in self-efficacy among teachers (Dorado et al., 2016; Kim et al., 2021; Orapallo et al., 2021; Plumb et al., 2016). Evaluation of trauma-informed education with regards to (aspects of) classroom climate (i.e., atmosphere, teacher-student relationship, classroom management, student relationships) from a teacher perspective has mainly been examined in qualitative (e.g., Russell et al., 2024) and case study research (e.g., Opiola et al., 2020). One recent pre-post trauma-informed training study showed improvement in teacher-student closeness following training (Loomis et al., 2025).

In this study we evaluated the outcomes of a school-wide trauma-informed approach implemented in mainstream primary schools and primary and secondary special education schools, focusing on teachers' perceived trauma knowledge, self-efficacy, and perceptions of classroom climate. Classroom climate outcomes comprised class atmosphere, the quality of student relationships, the quality of the teacher-student alliance, and classroom order. We expected increases in teachers' perceived trauma knowledge and self-efficacy, as well as improvements in their perceptions of classroom climate. In addition, we used focus groups with school staff to explore perceived changes among staff and students in relation to implementation.

# 2 Materials and methods

## 2.1 Study context

This study formed part of the longitudinal project "Creating a Trauma-Sensitive School Climate: Implementing Trauma-Informed Practice in Education through Staff Training and Organizational Focus." The larger project examined the implementation of a school-wide trauma-informed approach and changes in outcomes among both teachers and students across a baseline year and an implementation year. Teacher-level measures included perceived trauma knowledge, perceived self-efficacy, and perceptions of classroom climate. Student-level measures addressed trauma-related symptoms, teacher-student relationships, classroom climate, self-regulation, behavioral problems, and resilience. The present study focuses on teacher-level outcomes and school staff members' perceptions of the implementation and its outcomes.

## 2.2 Participants

Participants were recruited from eight schools in the Netherlands: two mainstream primary schools and six schools providing special education at the primary and/or secondary level. Four schools were located in urban areas and four in rural areas.

TABLE 1 Characteristics of the participating schools.

| School | School type | Approximate number of students | Urbanity |
|---|---|---|---|
| A | Mainstream primary education | 270 | Urban |
| B | Mainstream primary education | 170 | Rural |
| C | Primary & secondary special education | 110 | Rural |
| D | Primary special Education | 120 | Urban |
| E | Secondary special education | 130 | Rural |
| F | Secondary special education | 70 | Rural |
| G | Secondary special education | 250 | Urban |
| H | Secondary special education | 240 | Urban |

School sizes are approximate and refer to the total number of students enrolled at each school.

School size ranged from approximately 70 to 270 students. All participating special education schools served students with severe emotional and behavioral difficulties. Further characteristics of the participating schools are presented in Table 1.

Only teachers of students in Grade 3 or above were invited to participate in the data collection because students included in the larger project had to be at least eight years old. At each school, the entire school team received the training, regardless of whether individual staff members participated in the data collection. Participation in the research was voluntary. The exact number of staff members who received the training and the number who declined participation in the data collection were not recorded. However, at least one teacher participated from each class from which student data were collected, and no student data were collected from a class without a participating teacher.

A total of 118 teachers provided informed consent. Eight teachers did not complete measures concerning themselves, although they did provide information about their students, resulting in an analytical sample of 110 teachers. Of the 118 consenting teachers, 36.4% were male ($n = 43$) and 63.6% were female ($n = 75$). Of the 110 teachers included in the analytical sample, 15.5% ($n = 17$) worked in mainstream primary education, 20.0% ($n = 22$) in primary special education, and 64.5% ($n = 71$) in secondary special education.

## 2.3 Design

In this embedded mixed-methods study, qualitative data were used to complement and provide further depth to a longitudinal quantitative design (Creswell and Clark, 2017). Quantitative data were collected in two cohorts across two consecutive academic years, with three measurement waves in each year (see Figure 1). For Cohort 1, data collection covered the 2018–2020 academic

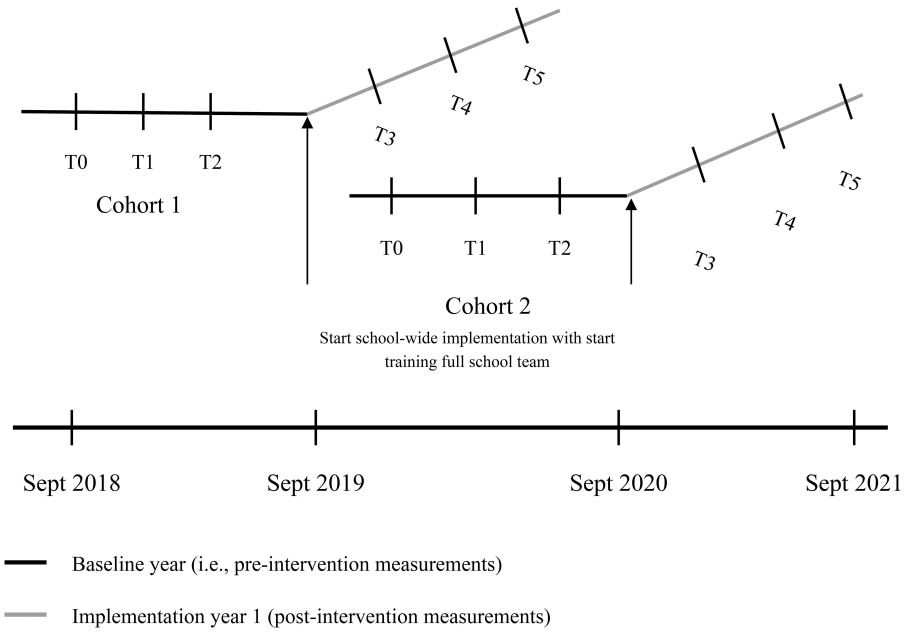



FIGURE 1
An overview of the timeline of this study. Reproduced from Wassink-de Stigter et al. (2024), with permission from Springer Nature. Copyright © 2024 Springer Nature. All rights reserved.

years; for Cohort 2, it covered the 2019–2021 academic years. For a more comprehensive description of the larger project, see Wassink-de Stigter et al. (2024).

The first academic year served as the baseline year. T0, T1, and T2 represented the beginning, middle, and end of this year, respectively. Schools began implementing the trauma-informed approach in the second academic year. T3, T4, and T5 represented the beginning, middle, and end of this implementation year, respectively. Teachers' perceived self-efficacy and classroom climate were assessed at all six measurement waves. Using three measurement waves per academic year allowed us to examine within-year change during both the baseline and implementation years, rather than relying solely on a single measurement in each year. In addition, outcomes at the end of the baseline year (T2) were compared with outcomes at the end of the implementation year (T5).

Perceived trauma knowledge was assessed only at T2 and T3, immediately before and immediately after the staff training, respectively. It was therefore not assessed throughout the implementation year. At all schools, T3 took place after completion of the training modules covering trauma-related theory and opportunities to practice applying this knowledge. The modules delivered after T3 focused on embedding trauma-informed education within the school. The number of participants providing data for each variable at each measurement wave is presented in Table 2.

The focus groups were conducted at the end of the first implementation year. These data were used to provide further insight into staff members' experiences of the school-wide trauma-informed approach, its perceived outcomes, and how trauma-informed education had been translated into practice.

## 2.4 Procedure

All teachers at participating schools received information letters about the project and data collection. Anonymity and confidentiality of the teachers and students were ensured. In addition, at each school a researcher gave a presentation about the project. All participating teachers provided written informed consent. The Ethics Committee of Radboud University approved this study (ECSW-2018-114).

For the quantitative component, teachers completed online questionnaires about themselves and their classrooms at six measurement waves, using a personal access link. For the qualitative component, the aim was to include both teachers and support staff. Staff members who had completed the training externally rather than as part of the participating school team were not eligible. At each school, a date was scheduled for the focus group, after which the school leader was asked to invite the entire eligible team. School leaders were explicitly encouraged to motivate staff members with critical or less positive views to participate. Participants were therefore not recruited through an advance open-registration procedure. Nevertheless, attendance remained dependent on staff members' availability and willingness to participate.

In total, 18 staff members (12 teachers and six support staff members) participated in five focus groups, with two to five participants per group. The focus groups were co-facilitated by the authors and a junior researcher and were conducted either online or at the participating schools. Each focus group lasted approximately 90 min. With participants' consent, the discussions were audio-recorded and subsequently transcribed by researchers or research assistants.

## 2.5 The intervention

The intervention evaluated in this study was Trauma-sensitive Education, a Dutch school-wide approach to trauma-informed education. The approach includes a train-the-trainer course, a book provided to all school staff [Lesgeven aan getraumatiseerde kinderen (Teaching Traumatized Children); Coppens et al., 2021], a 12-hour staff training comprising eight 1.5-hour modules, and a school-wide implementation manual for trainers and school staff (Asselman et al., 2019).

The book and staff training address how trauma may affect students' physical, behavioral, emotional, and academic functioning. In this way, the training supports school staff in realizing the potential impact of trauma and recognizing how it may manifest in students (SAMHSA, 2014). It also prepares staff to respond to trauma in educational settings, both within and beyond the classroom. This includes supporting students through self-regulation and co-regulation, interacting with colleagues, and collaborating with caregivers and relevant care services. In addition, the training addresses self-care as a means of preventing burnout and compassion fatigue. The implementation manual translates these principles into a practical, stepwise process for developing a trauma-informed school climate. It draws on an international review of the implementation of trauma-informed approaches (Wassink-de Stigter et al., 2022), research into the implementation experiences of Dutch schools (Wassink-de Stigter et al., 2022), and insights from implementation science. The manual describes successive stages of school-wide development and supports schools

TABLE 2 Number of participants with data per variable per measurement wave.

| Measurement wave | Trauma knowledge | Teacher self-efficacy | Classroom climate |
|---|---|---|---|
| T0 | | 67 | 68 |
| T1 | | 58 | 58 |
| T2 | 48 | 59 | 58 |
| T3 | 67 | 68 | 68 |
| T4 | | 71 | 71 |
| T5 | | 71 | 71 |

in formulating and reflecting on short- and long-term implementation objectives. Its implementation approach is aligned with the knowledge, attitudes, and skills addressed in the staff training.

During the baseline year, each participating school selected one or two staff members to attend the train-the-trainer course. Preferably, a school psychologist participated together with either a teacher or another school psychologist. These staff members are referred to hereafter as internal trainers. Toward the end of the baseline year, the internal trainers met with school management and one or two members of the research project group for an initial implementation meeting. Topics included the planned timing of the staff training and wider implementation process, the school's perceived need for trauma-informed education, characteristics of the school team, such as feelings of safety and management support, and relevant school policies and ongoing developments.

At the beginning of the implementation year, the internal trainers partnered with an experienced external trainer to provide the eight training modules to the entire school team. The program comprised 12 h of training, originally planned as face-to-face sessions. COVID-19 restrictions affected both the format and timing of the training. Two schools (25%) had to replace face-to-face sessions with online training, while three schools (37.5%) postponed most modules until the second half of the implementation year. Of the eight participating schools, four had completed all modules before T4, the second assessment during the implementation year. Two further schools completed the training before T5, the final assessment. The remaining two schools had not completed the full program by T5: one had delivered seven modules and the other four.

Modules 1 through 7 addressed topics including knowledge about trauma, adopting a trauma lens, stable relationships, self-regulation, and self-care. The modules combined theoretical content with practice-based examples and experiential exercises. Following each module, staff members were asked to apply one of the concepts covered to an individual student. Module 8 focused specifically on school-wide implementation. In preparation for this module, the internal trainers and several selected colleagues established an implementation team. This team identified the themes and actions to be discussed with the full staff during the final module.

After completing Module 8, each implementation team developed and carried out an action plan for the remainder of the school year. Both the content discussed during the module and the resulting action plan were tailored to the needs and preferences of the individual school and its staff. Actions therefore varied across schools. Examples included introducing daily check-in and debriefing opportunities for staff, organizing peer consultation and teacher supervision, further developing student support and guidance plans, and redesigning classrooms to create calmer and safer environments with more opportunities for student self-regulation.

## 2.6 Measurements

### 2.6.1 Perceived trauma knowledge

Teachers' perceived trauma knowledge and skills were assessed using the evaluation form of the Teaching Traumatized Children training (Coppens et al., 2021). This self-report instrument consists of seven items assessing teachers' perceptions of their ability to recognize and respond to trauma in students. Example items are: "You recognize how trauma manifests in the behavior of your students" and "You know how to help traumatized children build greater confidence in themselves and in others." Responses are provided on a seven-point scale ranging from 1 (you absolutely do not possess the knowledge and skills) to 7 (you fully possess the knowledge and skills). A mean score was calculated across the seven items. The instrument therefore measures perceived knowledge and skills rather than objectively demonstrated trauma-related knowledge.

### 2.6.2 Teachers' perceived self-efficacy

The Dutch version of the Teacher Self-Efficacy Scale (TSES) (Buttner et al., 2015; Skaalvik and Skaalvik, 2007) was used to assess teachers' self-efficacy beliefs. This scale consists of 24 items, divided into six subscales: adapting instruction to the students' individual needs (four items), keeping discipline in the classroom (four items), motivating students (four items), general instruction (four items), coping with changes and challDe enges (four items) and cooperation with parents and colleagues (four items). Teachers were instructed to 'Indicate how confident you are that you:', for example 'collaborate effectively with the parents of students with behavioral problems' or 'answer questions from students with behavioral problems in a way that helps them understand complex issues'. Responses are rated on a four-point scale: (1) not at all confident, (2) somewhat uncertain, (3) somewhat confident, and (4) absolutely confident. A mean total score and mean subscale scores were calculated using the corresponding items. Previous research has identified the TSES as a reliable and valid instrument (Skaalvik and Skaalvik, 2007).

### 2.6.3 Classroom climate

Teachers reported on classroom climate using the Climate Scale (Donkers and Vermulst, 2014). This scale consists of two parts: a general part with 16 questions on the class the teacher is teaching and 17 questions about the teachers themselves. Example items are: 'Students get along well with each other' and 'I can quickly start the lesson because the classroom is calm'. The Climate Scale is divided into four subscales: the quality of peer relationships among students (eight items), the general classroom atmosphere (eight items), the level of order within the classroom (six items), and the quality of the teacher-student alliance (11 items). Responses are rated on a four-point scale: (1) (almost) never, (2) sometimes, (3) regularly, and (4) often. Negatively worded items were reverse-scored, and a mean score was computed for each subscale based on its corresponding items. Previous research has identified the Climate Scale as a reliable and valid instrument (Donkers and Vermulst, 2014).

The internal consistencies of all instruments (i.e., total scales and subscales) were acceptable to excellent. The specific values are available from the first author upon request.

### 2.6.4 Focus groups

The focus-group protocol was developed for the present study. It comprised four overarching questions, each of which was operationalized through several subquestions suitable for a group discussion. One overarching question was: "What outcomes did teachers perceive following the implementation of Trauma-Informed Education in their schools?" To explore this question, participants were asked, for example: "What have you started doing differently since last year as a result of the Teaching Traumatized Children training and the implementation of Trauma-Informed Education?" and "What do you no longer do as a result of the Teaching Traumatized Children training and the implementation of Trauma-Informed Education?"

## 2.7 Analytic strategy

The difference in perceived trauma knowledge between T2 and T3 was examined by a paired-samples *t* test in SPSS. We investigated changes in teacher self-efficacy and classroom climate across the two consecutive academic years by means of a series of piecewise latent growth curve models. In these models, different growth factors were specified for different phases. More specifically, level and slope discontinuity latent growth models were specified (see Rioux et al., 2021).

These models (Figure 2) estimate whether an event (i.e., implementation of trauma-informed education) is associated with changes in levels (i.e., a level difference) as well as a different growth pattern (slope) pre- and post-event. Figure 2 shows the general path diagram of the level and slope discontinuity latent growth models that were specified. As a result of our coding of time through the slope factor loadings, Intercept (I) represents the level of the outcome variable at T2 (i.e., in June of the baseline year). Slope 1 (S1) represents the linear rate of change from T0 (i.e., November baseline year) to T2 (i.e., June baseline year), which is the rate of change during the baseline year or year of pre-intervention measurements. Event represents the difference between the levels of the outcome variable at T2 (i.e., June of the baseline year) and T5 (i.e., June of the implementation year). Slope 2 (S2) represents the linear rate of change from T3 (i.e., November implementation year) to T5 (i.e., June implementation year), which is the (first) year of implementation of trauma-informed education. Thus, the Event factor represents the model-estimated difference between the end of the baseline year (T2) and the end of the implementation year (T5). It was not interpreted as a difference adjusted for the pre-existing baseline trend. Differences between change during the baseline and implementation years were examined separately by comparing the means of S1 and S2.

Through the Event factor, we could investigate differences between the levels of the outcome variables at the end of the first and second school year in June (i.e., at T2 and T5). Furthermore, we could investigate differences in the rate of change in the outcome variables between the first and second year based on the slope factor means. These differences were tested using Satorra-Bentler chi-square difference tests, comparing a model in which the means of S1 and S2 were constrained to be equal with a model in which both means were freely estimated. The latent growth curve analyses were conducted in Mplus 7.4 (Muthén and Muthén, 1998–2012). Missing data were handled using full information maximum likelihood estimation with robust standard errors, allowing the models to use all available observations. We accounted for the non-independence of the data due to cluster sampling (teachers nested within schools) by adjusting the standard errors using the COMPLEX module in Mplus. Because these cluster-robust standard errors were based on only eight school clusters, statistical significance was interpreted cautiously, as further discussed in the limitations.

No formal adjustment for multiple testing across all outcomes and growth parameters was applied, as these represent *a priori* specified, conceptually distinct outcomes and parameters addressing different aspects of change. Accordingly, findings are

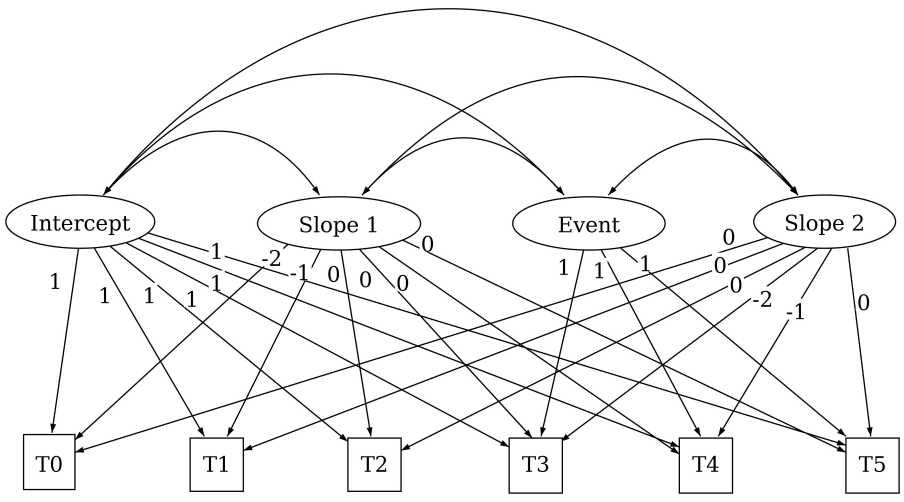



FIGURE 2
Path diagram of the estimated level and slope discontinuity latent growth models. Reproduced from Wassink-de Stigter et al. (2024), with permission from Springer Nature. Copyright © 2024 Springer Nature. All rights reserved.

interpreted based on effect magnitude and consistency across outcomes in addition to statistical significance.

To facilitate interpretation of effect magnitude, growth-model effects discussed in the Results were expressed in standard-deviation units by dividing the model-estimated change by the pooled standard deviation of the outcome at the corresponding beginning and end measurement occasions; for slope parameters, the estimated change across the full period was used.

The focus-group data were analyzed using a combination of inductive and deductive thematic analysis (Braun and Clarke, 2006). Given the limited knowledge about the perceived outcomes of trauma-informed approaches, codes concerning these outcomes were primarily developed inductively from the data. Simultaneously, the seven key concepts of the Teaching Traumatized Children training—trauma knowledge, trauma lens, safety and trust, stable relationships, self-regulation, collaboration, and self-care—were used as sensitizing concepts. Emerging insights were systematically compared, and the codebook was iteratively refined.

One author who had not been involved in the data collection coded all transcripts in MAXQDA 2022. A second author reviewed the assigned codes and emerging themes. Differences in interpretation were discussed until consensus was reached. Both authors used analytic memos to document reflections and analytical decisions. The final themes captured teachers' and other school staff members' experiences of the implementation and their perceptions of its outcomes.

# 3 Results

## 3.1 Mixed methods outcomes

We examined teacher-level outcomes during the first implementation year of trauma-informed education (see Table 3).

### 3.1.1 Perceived trauma knowledge

We examined whether teachers perceived a change in their trauma knowledge after the trauma-informed education team training. A paired-samples $t$ test revealed a significant increase in teachers' perceived trauma knowledge from before the team training (T2; $M = 4.90$, $SD = 1.24$) to T3, following the initial training content covering theory and practice (T3; $M = 5.21$, $SD = 1.00$) with a small effect size [$t(43) = 2.22$, $p = .03$, Cohen's d = .33].

Qualitative data supported this result. In focus groups, many teachers described becoming more aware of trauma and its impact on student behavior. One teacher noted, "You are more aware of the traumas children carry and how this affects their behavior at school." Some participants initially reported not having consciously changed their behavior, but upon reflection, acknowledged shifts in their perspective and practices. Others mentioned that their actions had already been aligned with trauma-informed principles but were now enacted with increased awareness and intentionality.

An important qualitative theme related to perceived trauma knowledge was a shift in perspective, often described by participants as learning to view student behavior "through a trauma lens." This metaphor is used in the training and expresses a deeper, more nuanced understanding of behavior as potentially trauma-related. As one participant explained, "Some label certain behaviors as trauma-related or ask questions about it." While this shift in perspective increased awareness and reflection, participants noted that translating this into consistent changes in professionals' behavior and practice remained a challenge.

### 3.1.2 Teachers' perceived self-efficacy

We examined changes in teachers' perceived self-efficacy across the baseline and implementation years using piecewise latent growth curve models. First we fitted the models. Table 4

TABLE 3 Means and standard deviations at each measurement wave.

| Variable | T0 | | T1 | | T2 | | T3 | | T4 | | T5 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *M* | SD | *M* | SD | *M* | SD | *M* | SD | *M* | SD | *M* | SD |
| Trauma knowledge | | | | | 4.90 | 1.24 | 5.21 | 1.00 | | | | |
| Self-efficacy | | | | | | | | | | | | |
| Adapting | 3.15 | 0.49 | 3.23 | 0.51 | 3.16 | 0.44 | 3.15 | 0.44 | 3.15 | 0.47 | 3.15 | 0.53 |
| Discipline | 3.11 | 0.44 | 3.15 | 0.48 | 3.19 | 0.49 | 3.14 | 0.38 | 3.27 | 0.43 | 3.19 | 0.51 |
| Motivating | 3.14 | 0.51 | 3.21 | 0.46 | 3.25 | 0.42 | 3.11 | 0.40 | 3.25 | 0.43 | 3.17 | 0.50 |
| Instruction | 3.16 | 0.41 | 3.22 | 0.35 | 3.19 | 0.35 | 3.13 | 0.37 | 3.14 | 0.35 | 3.15 | 0.41 |
| Coping | 3.00 | 0.44 | 3.01 | 0.49 | 3.08 | 0.48 | 2.99 | 0.43 | 3.05 | 0.40 | 3.06 | 0.45 |
| Cooperation | 3.12 | 0.44 | 3.23 | 0.43 | 3.26 | 0.45 | 3.10 | 0.43 | 3.18 | 0.48 | 3.23 | 0.43 |
| Total | 3.11 | 0.34 | 3.17 | 0.35 | 3.19 | 0.34 | 3.10 | 0.31 | 3.17 | 0.34 | 3.16 | 0.40 |
| School climate | | | | | | | | | | | | |
| Class atmosphere | 3.14 | 0.48 | 3.16 | 0.48 | 3.23 | 0.47 | 3.28 | 0.46 | 3.37 | 0.42 | 3.37 | 0.44 |
| Student relationships | 2.98 | 0.51 | 2.98 | 0.41 | 3.05 | 0.47 | 3.08 | 0.45 | 3.15 | 0.42 | 3.12 | 0.47 |
| Teacher-student alliance | 3.51 | 0.34 | 3.56 | 0.35 | 3.61 | 0.34 | 3.57 | 0.35 | 3.65 | 0.33 | 3.58 | 0.38 |
| Order in the classroom | 3.13 | .57 | 3.20 | .48 | 3.26 | 0.52 | 3.17 | 0.53 | 3.27 | 0.44 | 3.35 | 0.53 |

TABLE 4 Fit indices of the level and slope discontinuity latent growth models.

| Variable | $\chi^2$ | df | *p* | CFI | RMSEA | SRMR |
|---|---|---|---|---|---|---|
| **Self-efficacy** | | | | | | |
| Adapting | 7.911 | 6 | .245 | .990 | .054 | .044 |
| Discipline | 20.963 | 7 | .004 | .949 | .135 | .209 |
| Motivating | 8.680 | 6 | .192 | .992 | .064 | .105 |
| Instruction | 5.045 | 7 | .654 | 1.000 | .000 | .084 |
| Coping | 2.917 | 7 | .945 | 1.000 | .000 | .033 |
| Cooperation | 5.523 | 7 | .596 | 1.000 | .000 | .041 |
| Total | 10.111 | 7 | .182 | .984 | .064 | .122 |
| **School climate** | | | | | | |
| Class atmosphere | 2.274 | 7 | .943 | 1.000 | .000 | .090 |
| Student relationships | 1.687 | 7 | .975 | 1.000 | .000 | .024 |
| Teacher-student alliance | 10.187 | 6 | .117 | .988 | .080 | .190 |
| Order in the classroom | 1.533 | 6 | .957 | 1.000 | .000 | .017 |

CFI, comparative fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.

shows the fit indices of the level and slope discontinuity latent growth models. Model fit was evaluated across multiple indices. Although CFI and RMSEA generally indicated adequate to good fit, SRMR values exceeded conventional guidelines for several models, indicating mixed evidence regarding model fit for some outcomes. The classroom-discipline model, in particular, showed mixed fit, with an acceptable CFI (.949) but elevated RMSEA (.135) and SRMR (.209) values. Results for this model should therefore be interpreted with caution. In Table 5 we show the estimated means of the growth curve factors from the level and slope discontinuity latent growth models.

The results showed that during the baseline year (S1), significant increases in teachers' perceived self-efficacy were found for Motivating and Cooperation (both $p < .05$), whereas no significant growth was observed for the other self-efficacy outcomes. The implementation year (S2) was associated with significant increases in teacher self-efficacy, specifically regarding coping, cooperation (both $p < .01$), and overall self-efficacy ($p < .05$). During the implementation year, teachers reported greater overall self-efficacy, particularly in dealing with changes and challenges and cooperating with parents and colleagues.

We tested whether the increases were larger during the implementation year than during the baseline year. Satorra-Bentler chi-square difference tests revealed no significant differences between the means of S1 and S2, indicating no significant differences in the amount of change between the baseline and implementation years. The statistically significant changes in teacher self-efficacy were small in magnitude based on conventional benchmarks for standardized effects.

Focus group discussions mirrored the development in teacher self-efficacy. Teachers reported greater confidence in handling complex classroom situations. One participant reflected, "When you reflect on how you've been doing and realize, 'That actually went well,' it boosts confidence." Self-care emerged as a key theme, with teachers emphasizing both individual and collective responsibility. Mental health flowcharts were introduced as a supportive tool to prevent burnout and enhance collegial accountability. However, some participants noted that external factors, particularly the COVID-19 pandemic, disrupted these efforts—highlighting the need for more robust, structured support systems. Peer consultation was also widely valued as a mechanism for building self-efficacy. Teachers shared experiences and strategies, which fostered a sense of team competence: "We learn a lot from each other in this manner."

TABLE 5 Growth curve factor means from level and slope discontinuity latent growth models.

| Variable | I | Event | Slope 1 | Slope 2 |
|---|---|---|---|---|
| **Self-efficacy** | | | | |
| Adapting | 3.118 | 0.041 | 0.001 | 0.030 |
| Discipline[a] | 3.168 | 0.047 | 0.015 | 0.057* |
| Motivating | 3.223 | −0.031 | 0.067* | 0.049 |
| Instruction | 3.166 | 0.001 | 0.008 | 0.037 |
| Coping | 3.033 | 0.043 | 0.039 | 0.059** |
| Cooperation | 3.204 | 0.014 | 0.044* | 0.064** |
| Total | 3.150 | 0.026 | 0.028 | 0.051* |
| **School climate** | | | | |
| Class atmosphere | 3.260 | 0.122* | 0.074** | 0.055* |
| Student relationships | 3.041 | 0.097*** | 0.022 | 0.046* |
| Teacher-student alliance | 3.565 | 0.032 | 0.038*** | 0.010 |
| Order in the classroom | 3.288 | 0.071 | 0.075** | 0.116*** |

I = model-estimated outcome level at T2 (end of the baseline year); Event=model-estimated difference between T5 (end of the implementation year) and T2 (T5−T2), without adjustment for the pre-existing baseline trend; Slope 1 = linear rate of change during the baseline year (T0–T2); Slope 2 = linear rate of change during the implementation year (T3–T5). Positive values for Event indicate higher scores at T5 than at T2; positive slope values indicate increasing scores within the respective year.

[a]Estimates for the discipline subscale should be interpreted with caution because model fit was poor on RMSEA and SRMR.

*$p < .05$,
**$p < .01$,
***$p < .001$.

### 3.1.3 Classroom climate

We also examined changes in teachers' perceived classroom climate across the baseline and implementation years using piecewise latent growth curve models. In Table 5 we show the estimated means of the growth curve factors from the level and slope discontinuity latent growth models.

The Event factor mean was significantly positive for class atmosphere ($p < .05$) and student relationships ($p < .001$). These findings indicate that teachers perceived the class atmosphere and the quality of student relationships as more positive at the end of the first implementation year (T5) than at the end of the baseline year (T2). No significant differences were found between teacher perceptions at the end of the baseline year (T2) and the end of the first implementation year (T5) with regard to changes in order in the classroom and the teacher-student alliance.

Furthermore, we examined whether teachers perceived changes in classroom climate during the baseline year and during the implementation year by analyzing the slopes of these years, respectively S1 and S2. Teachers perceived significant increases (S1) across the baseline year (i.e., from T0 to T2) for classroom climate variables: class atmosphere, teacher-student alliance, and order in the classroom. In addition, teachers perceived significant increases (S2) across the implementation year (i.e., from T3 to T5) regarding classroom climate variables: class atmosphere, student relationships, and order in the classroom. We tested whether the increases were larger during the implementation year than during the baseline year. Satorra-Bentler chi-square difference tests revealed no significant differences between the means of S1 and S2, indicating no significant differences in the amount of change between the baseline and implementation years. The statistically significant changes in classroom climate were small in magnitude based on conventional benchmarks for standardized effects.

In the focus groups, teachers reported improvements in classroom climate that they attributed to the implementation of trauma-informed education. Teachers described a calmer, more relaxed classroom environment. One participant noted, "I noticed a calmer atmosphere in the class." Initially, one focus group did not identify changes in student outcomes, but during the discussion, participants revised their view and acknowledged positive shifts in classroom climate.

Teachers also described improvements in student self-regulation that they attributed to implementation of trauma-informed education. Teachers reported that many students independently requested time-outs or used other coping strategies. One teacher explained, "They often say, 'Teacher, can I go to time out for a moment?' And I almost always try to comply." Participants also reported increased feelings of safety among students, and stable relationships with staff were highlighted as key contributors to a supportive learning environment.

## 3.2 Additional qualitative outcomes

### 3.2.1 Future aspirations and needs

In each focus group, participants articulated aspirations for the future. While several participants discussed changes in approach strategies, a support staff member highlighted a key area for improvement: "For example, I think how you treat someone is really important. Everything hinges on that for me. And I think in terms of how we treat the young people here at school, there is still quite a bit of progress that we can make." Teachers and staff identified several necessities to achieve their goals, including deploying external staff, ensuring adequate time and flexibility, establishing a clear plan or focus, creating visibility, forming implementation working groups, appointing driving forces, and providing ongoing training. Examples of schools' future plans included expanding self-care initiatives and monitoring the impact of a new intervention. Participants across schools expressed a strong commitment to continuing the trauma-informed journey, while also recognizing the importance of addressing systemic and contextual barriers—such as those introduced by the COVID-19 pandemic.

# 4 Discussion

In this two-year longitudinal study, we examined teacher-level outcomes during the year preceding implementation and the first year of implementation of a school-wide trauma-informed approach. Teachers' perceived trauma knowledge was assessed at T2 and T3, before training and after the initial training content covering theory and practice, respectively. Teachers' perceived self-efficacy and four aspects of classroom climate—class atmosphere, student relationships, teacher-student alliance, and classroom order—were assessed repeatedly across the baseline and implementation years. Quantitative findings were complemented by focus groups with school staff conducted at the end of the implementation year.

Teachers reported higher perceived trauma knowledge and skills immediately after the initial staff training than immediately before it. This increase is consistent with previous studies reporting improvements in perceived trauma-related knowledge following trauma-informed training (Dorado et al., 2016; Orapallo et al., 2021). However, perceived trauma knowledge and skills were not assessed later in the implementation year. The present findings therefore concern teachers' immediate responses to the initial training and do not demonstrate that the reported increase was sustained over time.

During the implementation year, significant increases were found in teachers' overall perceived self-efficacy and, specifically, in their perceived efficacy in coping with changes and challenges and cooperating with parents and colleagues. These developments are consistent with previous findings indicating improvements in teacher self-efficacy following the implementation of trauma-informed education (MacLochlainn et al., 2022). However, the increases in the present study were not significantly larger than those observed during the baseline year. The findings therefore do not provide clear evidence that the changes in self-efficacy were specifically associated with the implementation of the trauma-informed approach.

The classroom-climate findings also require differentiation. Class atmosphere, teacher-student alliance, and classroom

order were already improving during the baseline year. The increases in class atmosphere and classroom order during the implementation year may therefore partly reflect a continuation of pre-existing trends or other processes, such as maturation or students becoming more settled within their classrooms. The relatively high teacher-student alliance and classroom-order scores at the end of the baseline year may also have limited the scope for measurable improvement on these scales. Student relationships showed the clearest pattern in relation to implementation: this was the only classroom-climate outcome that did not improve significantly during the baseline year but did improve during the implementation year. In addition, student-relationship scores were significantly higher at the end of the implementation year than at the end of the baseline year. Nevertheless, the difference between the baseline and implementation slopes was not statistically significant. Consequently, although student relationships improved during the implementation year, the findings do not provide strong evidence that this improvement was specifically associated with the implementation of trauma-sensitive education rather than with other concurrent influences.

The improvement in student relationships may have been supported by a more positive classroom atmosphere and greater calm and predictability in the classroom. Broader improvements in the school climate may also have created conditions that supported more positive relationships among students. These possible mechanisms were not directly tested and should therefore be regarded as tentative interpretations. The focus-group findings nevertheless provided examples of perceived changes in classroom atmosphere, student self-regulation, feelings of safety, and relationships with staff.

The qualitative findings suggest that staff were developing their awareness and recognition of trauma while beginning to translate this understanding into practice. These developments are consistent with the processes of realizing, recognizing, and responding described by SAMHSA (2014). Teachers reported greater awareness of students' traumatic experiences and described linking these experiences to classroom behavior. They also described viewing disruptive behavior differently and seeking alternative ways to respond to and support students. Staff described initial efforts to integrate trauma-related knowledge into school policies, procedures, and practices, including supporting students' self-regulation, adapting the school environment, and introducing student support plans. However, participants also indicated that translating this awareness into consistent practice remained challenging. As developing trauma-informed educational systems involves a paradigm shift at the organizational level, educational practice, and policy (Hanson and Lang, 2016; McInerney and McKlindon, 2014), and schools are not yet fully into the *responding* phase, longer follow-up is needed to determine whether further improvements of perceived classroom climate and self-efficacy emerge. Implementation research shows that achieving intended outcomes through implementing well-constructed, defined, and researched programs takes two to four years (Fixsen et al., 2005), and more specifically for trauma-informed education at least three years before full implementation (Greer, 2023; SAMHSA, 2014).

## 4.1 Limitations, strengths and suggestions for future research

The implementation took place during the COVID-19 pandemic, which affected both the format and timing of the training. In the Netherlands, schools first closed on March 16, 2020; primary schools reopened partially on May 11 and fully on June 8, before closing again from December 14, 2020, to February 8, 2021. Two participating schools replaced face-to-face sessions with online training, while three schools postponed most training modules until the second half of the implementation year. By the final measurement, two schools had not completed all eight modules: one had completed seven modules and the other four. School staff also faced considerable pressure, including illness and the death of family members or friends. Previous research indicates that heightened educator stress can hinder the adoption of new practices and interventions (Baker et al., 2021; Koslouski, 2022). Focus-group participants similarly indicated that the pandemic disrupted self-care initiatives and created contextual barriers to continuing the trauma-informed implementation process. These circumstances may have reduced the intensity and consistency of implementation and made the intended outcomes less likely to emerge within the first implementation year. Because the study was not designed to isolate the effects of the pandemic, it is not possible to determine which outcomes were affected or the extent of this influence.

The teacher sample was predominantly drawn from special education schools serving students with severe emotional and behavioral difficulties. This educational setting is particularly relevant because of the elevated prevalence of adverse childhood experiences among students in special education (Offerman et al., 2022). However, the composition of the sample limits the generalizability of the findings to mainstream educational settings and other student populations. Moreover, the uneven distribution of schools and teachers across educational settings did not allow for meaningful comparisons between mainstream and special education or between primary and secondary education. Future research involving a larger and more balanced sample should examine whether implementation processes and outcomes differ across these settings. A further statistical limitation concerns the relatively small number of school clusters. Although the COMPLEX procedure was used to account for the non-independence of teachers within schools, cluster-robust standard errors can be downward biased when based on a small number of clusters. With only eight schools included in the present study, statistical significance may consequently be overstated and should be interpreted cautiously. This caution is particularly relevant because SRMR values exceeded conventional guidelines for several models, indicating mixed evidence regarding model fit for some outcomes.

No formal adjustment for multiple testing across outcomes and growth parameters was applied. Although the analyses concerned *a priori* specified and conceptually distinct outcomes and parameters, the number of statistical tests increases the possibility of chance findings. Individual significant results should therefore be interpreted cautiously, with greater weight placed on effect magnitude, consistency across related outcomes, and convergence with the qualitative findings.

This study employed a longitudinal design, with the first year serving as a baseline and the second year marking the initial phase of implementation. While this design allows for tracking developments over time, we did not control for external influences, such as other interventions introduced at participating schools, which could have affected measured outcomes. Although schools had agreed in advance that trauma-sensitive education would be the only major intervention during the study period, we had no direct control over additional initiatives implemented in practice. Consequently, attributing observed changes solely to the implementation of trauma-informed education remains tentative. The alignment between the quantitative and qualitative findings, together with the convergence of classroom-climate findings across teacher and student perspectives (Wassink-de Stigter et al., 2024), supports the interpretation that participants perceived changes in classroom experiences and practices. However, this convergence does not establish that implementation caused these changes. To control for external influences, a randomized controlled trial would be favorable, but would be challenging to conduct in everyday school settings. Trauma-informed education is not a protocolized intervention, but consists of a set of common elements, implementation strategies and actions. In addition, schools usually differ in their starting levels across relevant variables. To strengthen causal inferences of the outcomes of trauma-informed education in future research, a randomized or quasi-experimental repeated-measures design is recommended—one that also accounts for the time required for sustainable implementation of trauma-informed practices.

A further limitation concerns the reliance on teachers' self-reports. Because the training explicitly aimed to change how teachers understand and interpret student behavior, teachers may have recalibrated the standards or frames of reference they used when completing the measures after the training. The observed changes may therefore partly reflect response-shift bias (Sprangers and Schwartz, 1999). However, the focus groups also provided concrete examples of perceived changes in teachers' interpretations, responses, and classroom practices. In addition, improvements in classroom atmosphere were also reported by students in the larger project (Wassink-de Stigter et al., 2024), whose ratings would not have been affected by a response shift among teachers. This convergence across informants and methods provides some support for the interpretation that classroom experiences and practices changed, but it does not eliminate self-report bias or establish causality.

Selection bias in the qualitative component cannot be ruled out. Although school leaders were asked to invite the entire eligible team and were explicitly encouraged to motivate staff members with critical or less positive views to participate, attendance ultimately depended on staff members' availability and willingness. This concern is particularly relevant because some focus groups consisted of only two participants. These smaller groups may have included a narrower range of perspectives and provided fewer opportunities for interaction between participants. Although the facilitators observed both positive and critical contributions during the discussions, this observation does not remove the possibility of self-selection.

In the current study we did not assess implementation fidelity. At the time of the current study, no instrument to measure implementation fidelity of trauma-informed education was available. As indicated by the focus group findings, schools did differ in their specific actions in the implementation of trauma-informed education. This aligns with the current school-wide trauma-informed approach. In this approach, securing and maintaining buy-in is facilitated by responding to the specific needs of both staff and students, as well as by integrating existing programs that are compatible with trauma-informed education (Wassink-de Stigter et al., 2022). However, schools were comparable in the way they followed the step-by-step implementation process in the implementation manual that was provided to them (Asselman et al., 2019). For future research, we recommend assessing implementation fidelity of core trauma-informed education elements. Future research should examine whether implementation fidelity, changes in fidelity over time, and specific implementation activities are associated with outcomes.

The measure of trauma-related knowledge assessed teachers' perceptions of their knowledge and skills rather than objectively demonstrated knowledge. The observed increase may therefore reflect greater confidence or a positive response to the training rather than an actual increase in knowledge. Moreover, perceived knowledge was measured only immediately before and after the initial training. Consequently, the study provides no information about whether the increase was sustained during the subsequent implementation period. Future research should include objective assessments of trauma-related knowledge, repeated follow-up measurements, observational measures of trauma-informed classroom practices, and measures of trauma-informed attitudes.

Moreover, future research could benefit from examining the role of trauma-related knowledge and trauma-informed attitudes (see Baker et al., 2021 for a measurement of attitudes) as potential mediators in the relationship between the implementation of trauma-informed education and its outcomes at the teacher level. Effectively embedding trauma-informed practices across the whole school system requires a deeper understanding of the mechanisms that underlie their impact. It also demands greater insight into how trauma-informed knowledge is translated into attitudes (Baker et al., 2021) and subsequently behavior. Specifically, investigating whether and how increases in trauma-related knowledge among teachers contribute to changes in outcome variables (e.g., classroom climate, teacher self-efficacy) at both the teacher and student levels could provide valuable insights. A quantitative mediation analysis would allow researchers to examine whether trauma knowledge serves as a key pathway through which positive changes in classroom climate, teacher self-efficacy and student outcomes (e.g., resilience) are realized.

## 4.2 Implications

The findings suggest potential value in supporting teachers through a school-wide trauma-informed approach, particularly in relation to self-care, peer support, and the translation of trauma-informed principles into practice. Improvements in team cohesion and staff well-being are crucial elements of a trauma-informed school climate (Gibbs et al., 2025; Morton and Berardi, 2018). Within the context of staff well-being, self-care emerged in participating schools as a salient and desired focus

in the implementation process. A stronger emphasis on self-care may contribute to reducing teacher absenteeism, burnout, and compassion fatigue (Turgeon-Brown, 2025). In addition, when teachers feel supported and emotionally safe at school, this has a positive spillover effect on students (Hascher and Waber, 2021). Hence, self-care among staff should be a standard part of trauma-informed education implementation and requires more attention in the general literature on trauma-informed education. Staff working with traumatized students need adequate tools to manage the emotional demands of their work (Loomis and Felt, 2021; Oberg et al., 2023).

The qualitative findings further underline the importance of a carefully structured implementation process. Fully achieving intended outcomes of trauma-informed education may take at least three years (Greer, 2023; SAMHSA, 2014). Hence, for successful implementation, it is essential to secure commitment at multiple levels, particularly among school leaders (Wassink-de Stigter et al., 2022). Leadership plays a key role in fostering commitment among staff, facilitating the implementation of trauma-informed practices, and enabling both internal and external collaboration. Ensuring an inclusive and well-supported trajectory may facilitate the long-term integration of trauma-informed education into school culture and practice. This is consistent with the future aspirations expressed in the focus groups, in which participants emphasized the need for ongoing training, clear implementation structures, designated implementation leads, and sufficient time and support to continue the trauma-informed journey.

The trauma-informed education framework, as presented in the handbook, outlines tangible steps for schools to follow (Asselman et al., 2019). These steps are in line with the four "Rs" of SAMHSA (2014) and may help schools to grow within a few years of implementation from *realizing* the impact of trauma and *recognizing* trauma symptoms to *responding* to the (impact of) traumatic experiences and *resisting re-traumatization.* For example, the handbook comes with an overview of how a fully implemented school-wide trauma-informed climate might look in terms of knowledge development among staff and relationships with caregivers and stakeholders.

In addition to what emerged from the focus groups, it became clear during the project that schools and teachers needed more practical support for implementation. Although schools had received the handbook and had been supported to some extent in implementing its different phases, it seems likely that additional support, or more explicit attention to the implementation process itself, is needed to achieve more effective and sustained implementation. In daily practice, teachers often indicated that, while they understood the principles of trauma-informed education, they needed more tangible tools to translate these into classroom practice and interactions with students. Examples of such support include peer consultation sessions focused on trauma-informed case discussions, refresher training and continued professional development, coaching on the job, and modules that offer tangible tools for discussing trauma and practicing regulation strategies in the classroom. Schools also appeared to need more support in approaching implementation systematically and in embedding trauma-informed education more sustainably in school practice. These informal practice-based observations suggest that, beyond content-focused training, schools may need more intensive and ongoing support to implement and sustain trauma-informed education effectively.

### 4.3 Conclusion

This mixed-methods study identified an immediate increase in teachers' perceived trauma knowledge following initial training and more positive ratings of classroom atmosphere and student relationships at the end of the first implementation year than at the end of the baseline year. Student relationships were the only classroom-climate outcome with a significant increase during the implementation year but not during the baseline year. However, none of the differences between the baseline and implementation slopes was statistically significant, limiting causal interpretation. Qualitative findings highlighted perceived changes in teachers' understanding and practices, as well as the importance of individual and collective self-care. Longer-term studies with comparison groups are needed to examine whether these developments are sustained and can be attributed to the trauma-informed approach. Implementation of trauma-informed education has the potential to be beneficial and have significant value for both teachers and students.

## Data availability statement

The datasets presented in this article are not readily available because the raw data supporting the conclusions of this article will be made available on Data Archiving and Networking Services (DANS), the Dutch National Centre of Expertise and repository of research data. Requests to access the datasets should be directed to w.nelen@praktikon.nl.

## Ethics statement

The studies involving humans were approved by Radboud University Nijmegen Social Research Ethics Committee (ECSW-2018-114). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study regarding teachers was provided by teachers themselves. For the overall project, regarding students younger than 16 years the student and the legal guardian/next of kin provided written informed consent. For students 16 years or older, only written consent from the student was required.

## Author contributions

WN: Writing – original draft, Funding acquisition, Visualization, Methodology, Project administration, Investigation, Conceptualization, Data curation, Writing – review & editing. RW: Writing – review & editing, Conceptualization, Investigation, Methodology, Writing – original draft, Visualization. EH: Writing – original draft, Formal analysis. AB: Investigation, Writing – original draft, Data curation. MD: Writing – original draft, Formal analysis,

Visualization, Data curation, Methodology. RK: Writing – review & editing, Funding acquisition, Investigation, Writing – original draft, Conceptualization, Methodology. MA: Funding acquisition, Writing – original draft, Conceptualization, Writing – review & editing. EO: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. RL: Writing – review & editing, Supervision, Funding acquisition, Writing – original draft. PH: Conceptualization, Supervision, Investigation, Writing – review & editing, Funding acquisition, Project administration, Writing – original draft, Methodology.

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## Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Generative AI statement

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