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The impact of trauma-informed practices on academic outcomes of First Nations children: a pilot study of culturally responsive supports in Australia

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This pilot observational study examined the effectiveness of trauma-informed and culturally responsive behavior support practices on the academic outcomes of predominantly First Nations children in an Australian primary school. The research supports integrating culturally relevant ways of knowing, being and doing into prevalent pedagogical and behavior support practices. The cohort study found that the co-designed, multi-tier Trauma-informed Behaviour Support program improved students' literacy and numeracy scores over 2 years. The findings highlight the complex relationship between behavioral difficulties and academic abilities. Changes in numeracy scores were significantly higher for students with improved teacher-reported rates of disruptive behaviors. In contrast, changes in literacy scores were equivalent between students with and without such improvements. The findings suggest that educators can improve academic outcomes by promoting cultural safety across the school and making the curriculum more flexible, engaging, and relevant. Further implications for educators, policymakers, and researchers working with First Nations students are discussed.

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Introduction

Aboriginal and Torres Strait Islander peoples and communities (respectfully referred to hereafter as First Nations) practice the oldest living cultures in the world. First Nations peoples have exhibited great strength and resilience in the face of colonization, dispossession, and racism. The trauma of colonization continues to this day and must be addressed to promote First Nations peoples' and communities' empowerment, engagement, and enrichment. The current research project explores culturally responsive trauma-informed strengths-based approaches in partnership with First Nations students. Whilst it is not intended to place this paper in a deficit discourse, there will be some discussion of the impacts of current and previous contexts that First Nations peoples have been subjected to, creating *othering* and dislocation from cultures in what is now known as Australia.

The intergenerational and transgenerational effects of colonialism in countries like Australia have profoundly impacted the education of First Nations students. In Australia, the forced removal of First Nations children from their families and communities (Stolen Generations) has been linked to disrupted intergenerational knowledge transfer and loss of cultural identity (Gatwiri et al., 2021; Menzies, 2019). Historical government policies and systems have further contributed to the disconnection and dispossession of First Nations children from their cultures, causing significant social and economic disadvantage and discrimination (Atkinson, 2002; Miller and Berger, 2022). These factors have also contributed to the ongoing disparities in academic achievement between First Nations and non-Indigenous students in Australia. These disparities are related to the lack of culturally safe educational practices, punitive disciplinary actions, and the lack of culturally responsive trauma-informed practices (Miller and Berger, 2022). First Nations students are likelier to leave school early, have lower attendance rates, and have poorer academic outcomes than their non-Indigenous peers (Australian Curriculum, Assessment and Reporting Authority (ACARA), 2023).

In Queensland, Australia, Graham et al. (2022) found that First Nations students had a higher rate of suspensions for minor infringements, such as disruptive/disengaged behavior, than non-Indigenous peers. However, disciplinary measures, such as suspension and expulsion, can reinforce discriminatory cultural stereotypes and trigger previous and current trauma. Disciplinary actions also contribute to the "school-to-prison pipeline", in which students are pushed out of the educational system and into the criminal justice system (Wilson, 2014). The impact of disciplinary actions on First Nations students' academic achievement is significant. Studies have shown that suspended or expelled First Nations students are more likely to disengage from school, experience academic failure, and drop out of school (Graham et al., 2022; Menzies, 2019). In addition, First Nations students scored 30% lower than non-Indigenous students on measures of literacy and numeracy, which could have origins in a punitive and discriminatory schooling system (Australian Institute of Health and Welfare [AIHW], 2021). Given this evidence, Australia has focused on the "Closing the Gap" campaign to ensure that First Nations students may experience literacy and numeracy improvements, among other priorities (Holland, 2014; Qi Lu et al., 2022). However, programs implemented in the "Closing the Gap" campaign thus far have had limited success (AIHW, 2021).

Trauma-informed and culturally responsive practices are promising strengths-based approaches to addressing the academic disparities experienced by First Nations students. Trauma-informed practices recognize the impact of trauma on students' behavior and emotions and aim to create safe, supportive, and

healing-centered environments that promote student health and wellbeing (Krishnamoorthy et al., 2023; Hunter et al., 2021; National Child Traumatic Stress Network, 2017). Culturally responsive practices assess and incorporate students' cultural knowledges, values, and perspectives into the curriculum, teaching practices, and school environment. These practices promote a sense of strong and empowered cultural identity, deep-rooted belonging, and sustained engagement for First Nations students (Bamblett et al., 2014).

Research has shown that these practices positively impact the academic outcomes of First Nations students. A 2021 systematic review concluded that trauma-informed practices improve literacy and other academic outcomes for First Nations students (Trimmer, 2021). Similarly, trauma-informed practices have been linked to improved student behavior, attendance, and engagement, leading to higher academic performance (Miller and Berger, 2020; Dorado et al., 2016). These practices also contribute to a more inclusive and culturally safe school environment, which can reduce the impact of cultural biases on the use of disciplinary practices (Bellamy et al., 2022; Schimke et al., 2022). Efforts to sustainably implement these approaches have looked to incorporate them with existing evidence-based practices.

The Trauma-informed Behaviour Support (TIBS; Ayre and Krishnamoorthy, 2020) program is a promising approach to address the gaps in school-wide behavior support practices for First Nations students. The program integrates trauma-informed care with culturally responsive pedagogy and behavior support practices. TIBS was co-designed with First Nations students, their families, and educators, incorporating cultural knowledge and practices. Utilizing implementation science and public health frameworks, TIBS takes a stepped, multi-tiered approach to support students with childhood adversity and traumatic stress by adding trauma-informed practices into behavior support systems (Krishnamoorthy and Ayre, 2022; Gavin et al., 2022). Preliminary research has demonstrated the efficacy of TIBS in improving First Nations students' behavior (Bellamy et al., 2022). These findings are notable, given the limited evidence on culturally responsive and trauma-informed programs in Australian educational settings (Burgess et al., 2019; Collier et al., 2020). Building on these findings, the current study aims to understand the program's impact on First Nations students' academic achievement. Specifically, the study investigated the relationship between certain flagged behaviors and changes in literacy and numeracy outcomes before and after implementing the TIBS program. It was hypothesized that there would be an improvement in literacy and numeracy levels following the implementation of the TIBS program. The influence of changes in behavioral concerns on literacy and numeracy scores was also explored.

Methods

Study context. This study was conducted in a regional primary school in the Northern Territory of Australia. Primary schools in Australia cater for students aged between five and ~12 years of age. In 2017, the school population was 230 students, with an average class size of 23 students. The student group consisted of 92% First Nations students, and 68% identified as having a disability. Approximately 40% of the students lived in government-funded public housing facilities (housing subsidized by the Australian Government for people and families experiencing financial hardship). The staff consisted of 10 classroom teachers and five teacher aides. In 2018, one new teacher aide was appointed to the school. Researchers KW and KA are Aboriginal. All other researchers are non-Indigenous.

Table 1 Demographic characteristics of the final sample of the study.	
Variable	n (%)
Gender	
Male	33 (62.3)
Female	20 (37.7)
Grade (in 2017)	
Preparatory	8 (15.1)
1	14 (26.4)
2	10 (18.9)
3	12 (22.6)
4	3 (5.7)
5	6 (11.3)
First Nations Status	
First Nations	49 (92.5)
Non-indigenous	4 (7.5)
English as a second language	
Yes	11 (20.8)
No	40 (75.4)
Not mentioned	2 (3.8)

Participants. 134 students who attended primary school in 2017 and 2018 (when the TIBS program was implemented) were included in this study. However, the final sample included 53 students who completed all required assessments (aged 5–11 years old; $M=7$, $SD=1.4$). Initial participants who did not complete all the required assessments over the 2 years were not included in the study. The non-completion of the assessments primarily related to the transient nature of the families and competing demands—which contributed to student absences and school changes. The study did not include students enrolled in Grade 6 in 2017 as they would have graduated from primary school, resulting in no post-program data for 2018. Similarly, students enrolled in kindergarten were not included as baseline data (2017) was not collated for this grade. The demographic information of the final sample included in the analyses is presented in Table 1.

Trauma-Informed Behaviour Support Program (TIBS). The TIBS program (Ayre and Krishnamoorthy, 2020) is a comprehensive, co-designed, multi-tiered approach implemented over 3 years (2017–2019). The co-design process of including culturally responsive elements involved the educators, program developers, and key cultural brokers working closely on planning for whole-of-school activities and incorporating these activities into classroom-based instruction (See Bellamy et al., 2022; for program co-design process; Schimke et al., 2022).

The program consists of three tiers, each tailored to address different levels of support within the school. Tier 1 focused on whole-school practices, training all staff on trauma-informed care principles and culturally responsive practices. Examples of whole-of-school changes included implementing a daily “morning muster” assembly celebrating student achievements and promoting physiological and emotional regulation through culturally significant activities like song, dance, and celebrations. Local Indigenous elders replaced The school bell with songs, enhancing cultural relevance. Tier 2 targeted classroom-specific practices, offering training on curriculum modification and pedagogical approaches. This tier emphasized incorporating cultural and linguistic diversity into social-emotional learning activities, managing multi-sensory aspects of the classroom environment, and integrating movement into classroom routines. Tier 3 provided intensive, individualized, wrap-around support for students with complex needs, which included trauma-informed

functional behavioral assessments and wrap-around support sessions involving classroom teachers, school leadership, and First Nations cultural brokers.

Throughout all tiers, cultural responsiveness was prioritized. Consultations were conducted with First Nations staff, elders, and community members, highlighting the impacts of historical trauma and power differentials, promoting cultural safety, and affirming First Nations families as knowledge holders. The program incorporated First Nations languages, artwork, and cultural content into the curriculum and utilized culturally relevant play-based learning approaches. Implementation involved a blended learning approach with online and in-person components, guided analytic processes for staff to apply concepts, and regular meetings between program facilitators and school leadership. These approaches were used to support teachers and school staff to implement tiers 1 to 3 in the school (see Schimke et al., 2022, for the program logic model and details about culturally responsive elements of the program; for further information about the program, please see Ayre and Krishnamoorthy, 2020).

To ensure program fidelity, the program developers met regularly with the school leadership to review intervention adherence for whole-of-school strategies (Tier 1). Meetings were also held with the program champion (teacher with school counseling experience in a social-emotional wellbeing officer role), who reviewed the implementation of the program by educators in classrooms and offered in small groups (Tier 2). The program champion supported educators across all grades to implement program elements in their classrooms. The program champion also attended wrap-around meetings for students with complex needs and was part of educator coaching sessions (Tier 3).

Measures

Progressive Achievement Test. The Progressive Achievement Test (PAT) is a measurement tool designed to assess students’ progress on their learning pathway. This test is recommended by the Australian Council for Educational Research (ACER, 2008) and includes various assessments addressing different learning domains. The PAT is designed to measure student growth over time. While some improvement in scores is expected due to normal developmental progression, the tests are standardized to allow for comparison against age-based norms. However, in this study, we did not directly compare our results against normative data to distinguish between expected developmental changes and intervention-related improvements.

The current study delivered PAT-Reading (used to assess literacy) and the PAT-Maths (used to assess numeracy) to the students. For this study, PAT-Maths and PAT-Reading were administered in Term 1, 2017 and Term 3, 2018. Students were provided with age-level equivalent versions of the PAT-M and PAT-R assessments. The tests contained 30–40 multiple-choice questions selected against the national curriculum. In previous studies, good internal consistency (Cronbach’s $\alpha = 0.88$ – 0.90 ; ACER, 2008) and high concurrent and predictive validity (ACER, 2008) have been reported for these tests. The PAT tests are a suitable measure of literacy and numeracy in First Nations students (Reid O’Connor, 2023; Dumuid et al., 2021). Please note that the non-adaptive version of the PAT tests was utilized, as there were limited norms to support the use with First Nations children at the time of the research.

Behaviors. Flagged behaviors were assessed through a school-wide information system database already set in the school. The staff were familiar with the documenting procedure. Relevant staff

members submitted behavior referrals by completing written documentation when a student’s behavior was of concern or inappropriate for the classroom. Flagged behaviors could be labeled as either minor (i.e., managed in the classroom) or major (i.e., requiring the student to attend the office). This database was consistently used throughout 2017 and 2018 to measure flagged behavior frequency.

Procedure. The research was conducted following approval from the University of Southern Queensland (USQ) Human Research and Ethics Committee (No. H15REA191). In the first term of 2017, the PAT-Reading and PAT-Maths were administered to gain baseline data before implementing the TIBS program. Tier one of the TIBS program was implemented at the school in the fourth term of 2017. The second tier was conducted during the first term of 2018. The third tier (Level 3 Supports) commenced in the third term of 2017 and continued into the third term of 2018 (Schimke et al., 2022). Finally, the second PAT-Reading and PAT-Maths were administered in term three of 2018 to collect post-program data. The school moderated examinations and calculated test scores using the website linked to the assessment tools. The website provided the school with a score report, which included scaled scores and descriptions of the scores as compared against a normative sample. The school provided the researchers with scaled score data utilized for the data analyses of the current study.

Data analyses. *T*-tests were used to investigate the main effects of the program on the outcomes of interest. Paired samples and independent samples were used. Since the assumptions of parametric tests (e.g., normality and equal variances) were slightly violated for the dependent variables, equal non-parametric tests were used, including Mann-Whitney *U* and Wilcoxon tests, to ensure that the assumption violation did not affect our hypothesis testing.

Results

Power analysis. The results of power analysis (using G*Power 3.1) suggested that a sample size of 24 would be required to achieve the power of 0.80 ($\alpha = 0.05$) to report a potential small to moderate effect size ($f^2 = 0.30$). The estimated effect size was consistent with previous research examining the changes in academic achievement amongst First Nations students (e.g., Pegg and Graham, 2013). Therefore, the sample size used for the statistical analyses of this study ($n = 53$) was considered sufficient.

Changes in progressive achievement. Means and standard deviations for the scores of PAT tests in two categories of literacy and numeracy across pre-program and post-program assessments are presented in Table 2. A paired samples *t*-test was used to assess the main pre-post program effects for changes in progressive achievement. The results showed a significant increase for both literacy ($t_{44} = -6.43$; $p < 0.001$) and numeracy ($t_{50} = -5.48$; $p < 0.001$) from pre-program to post-program

assessments. The results of the non-parametric test of Wilcoxon also confirmed the significant changes for both literacy ($Z = -5.006$; $p < 0.001$) and numeracy ($Z = -5.77$; $p < 0.001$).

Changes in flagged behaviors. Descriptive statistics for the recorded frequency of flagged behaviors (minor, major, and total) across pre-program and post-program assessments are presented in Table 3. The results of paired samples *t*-test showed no significant differences in any measurement of flagged behaviors, including minor ($t_{52} = -0.09$; $p = 0.46$), major ($t_{52} = 0.19$; $p = 0.42$), and total number of flagged behaviors ($t_{52} = 0.13$; $p = 0.44$). The results of the non-parametric test of Wilcoxon also were consistent showing no significant difference for minor ($Z = -0.525$; $p = 0.60$), major ($Z = -0.521$; $p = 0.60$), and total number of flagged behaviors ($Z = -0.51$; $p = 0.60$).

In summary, the main effects of changing flagged behaviors were insignificant. However, our data showed that 50% of the students had reduced rates of flagged behaviors from pre-program to post-program. As such, these students were likely to perform better on the PAT assessments if they displayed reductions in their behavioral flags compared to those who did not.

To test the second hypothesis that changes in rates of flagged behaviors are associated with changes in literacy and numeracy scores over time., we divided the participants into two groups: (1) students showing an improvement in flagged behavior (i.e. reduced frequency of referrals for major and minor flagged behaviors) and (2) students showing no improvement in flagged behavior (i.e. no change in frequency of major and minor behavior referrals). Then, we computed the mean differences between pre-program and post-program scores for the literacy and numeracy variables. Finally, the literacy and numeracy improvement rates were compared across the two groups using independent samples *t*-test (see Table 4).

Since the assumptions of independent samples *t*-test (e.g., normality and equal variances) were not completely met, we conducted an equal non-parametric test (Mann-Witney *U*) to ensure that the violation of this assumption did not affect the hypotheses testing. The non-parametric results were entirely consistent with the parametric results for both numeracy ($U = 168$, $Z = -2.94$, $p = 0.003$) and literacy ($U = 237$, $Z = -0.21$, $p = 0.82$). Therefore, the results show that those students with an improvement in flagged behaviors (compared to students without such improvement) showed a significantly higher level of improvement in numeracy scores over 2 years. However, the level of improvement in literacy scores was similar across the two groups.

Discussion

This study examined the impact of trauma-informed and culturally responsive behavior support practices on the academic outcomes of a sample of predominantly First Nations children in a primary school in Australia. The study’s first hypothesis was supported, with students exhibiting improved literacy and

Table 2 Descriptive statistics for Progressive Achievement Scores.			
		Mean	Std. Deviation
Literacy	Pre-program	63.02	19.42
	Post-program	78.71	22.42
Numeracy	Pre-program	69.90	30.38
	Post-program	87.29	24.96

Table 3 Descriptive statistics for behavior frequency.			
		Mean	Std. Deviation
Minor	Pre-program	1.50	2.43
	Post-program	1.54	2.15
Major	Pre-program	4.16	7.84
	Post-program	3.94	6.77
Total	Pre-program	5.67	9.47
	Post-program	5.49	8.13

Table 4 Comparing students with improved and not-improved flagged behavior on academic outcomes.

Dependant Variable	Group	Mean Difference	t	df	Sig
Literacy improvement	Improved flagged behavior	17.80	-0.02	43	0.49
	Not-improved flagged behavior	15.73			
Numeracy improvement	Improved flagged behavior	29.30	3.77	49	<0.001
	Not-improved flagged behavior	6.46			

Mean difference refers to the difference between pre-program and post-program literacy and numeracy scores as a measure of improvement rate. Independent samples t-test compares the mean differences across the two groups.

numeracy scores from pre- and post-program assessments. This is a noteworthy finding as First Nations students have been shown to have lower English literacy and numeracy abilities than their non-Indigenous peers (AIHW, 2021). This finding offers preliminary support for the efficacy of the TIBS program in improving academic outcomes. Previous research on the program’s implementation suggests several mechanisms by which program elements may have led to these changes.

Firstly, the culturally responsive elements of the program’s implementation (Schimke et al., 2022) may have led to the academic curriculum being more engaging and relevant to the students. Research has found that First Nations students in Australia report markedly lower levels of motivation and engagement in school (Martin et al., 2021; Lu et al., 2022), which could be due to the othering, racism, and stereotyping experienced in such settings. Research on the effectiveness of social-emotional programs for First Nations students has reported that attention must be paid to understanding the unique social contexts, participants’ languages and English literacy levels, engagement with Western education, and exposure to specific factors when determining the appropriateness of programs for First Nations populations when attempting to engage these students in western educational practices (Robinson et al., 2020, p. 13). The co-design process employed to develop the program may have made the current curriculum responsive to the local community and cultural context and provided students with a richer and more engaging learning experience reflective of their cultures (Schimke et al., 2022; Collier et al., 2022b). For example, Martin et al. (2021) found that First Nations students’ positive motivation and engagement significantly predicted academic outcomes in a Western education system. While the collaboration and addition of cultural elements into the school’s activities have been previously explored (Schimke et al., 2022; Krishnamoorthy et al., 2023), investigations into the specific modifications to the literacy and numeracy curriculums may be required. Student perceptions of such diverse cultural and linguistic elements in the curriculum and their relationship to motivational constructs, such as self-efficacy and mastery orientation, may also provide insights into the engaging aspects of the learning experience.

It is also possible that the trauma-informed practice elements of the program led to academic gains assessed by Western standards by helping non-Indigenous educators to better adapt to the student’s social-emotional and mental health needs. Research has emphasized the positive impact of trauma-informed programs on student engagement and academic learning for First Nations students (Miller and Berger, 2020; Miko et al., 2023). With its focus on reducing the risk of re-traumatization and building social-emotional abilities, the student’s capacity to attend to the academic curriculum may have improved in conjunction with gains in their social-emotional capabilities. Such effects would be consistent with research outcomes on the concurrent improvements in social-emotional learning, behavioral, and academic outcomes in students following school-based programs (Kanopka et al., 2020; Bowyer et al., 2023). As the TIBS program focused on

developing these skills through a whole-of-school approach, further research into students who benefitted from such social-emotional learning would be warranted. Specific measurements of social-emotional skills (e.g. self-awareness, growth mindset, and self-regulation) may shed light on the program’s impact. Such findings may also highlight the students who benefitted from these gains in boosting their academic abilities in a Western-based system (Kanopka et al., 2020).

With its focus on promoting cultural and psychological safety, it is also possible that changes in students’ academic outcomes in school may be linked to changes in the school climate and classroom milieus. Previous qualitative research has found that educators in the school utilized strategies of the multi-tiered program to build safe and trustworthy relationships with their students (Ayre et al., 2022). Equally, teachers spoke of increased leadership support for such practices and increased support for the teacher’s mental state and well-being (Schimke et al., 2022; Collier et al., 2022a). A further investigation of student perceptions of educators at the school may be beneficial to test these hypotheses. There is a lack of research on student perceptions of trauma-informed, culturally responsive programs in Australia and internationally.

The study’s findings partially supported the second hypothesis —where students with improved flagged behaviors also showed gains in numeracy scores. While some improvements are expected in scores over time due to developmental changes and learning, the magnitude of improvement observed in this study (mean increase of 15.69 points in literacy and 17.39 points in numeracy) exceeds typical yearly gains reported in normative samples (~5–10 points per year, depending on grade level). Changes in literacy scores were found to be equivalent between students with and without improvements in their flagged behaviors. This finding highlights the complex relationship between behavioral difficulties and academic abilities. Other studies have previously reported the positive influence of behavior support practice on academic outcomes (Gage et al., 2015). The hypothesized mechanism of change is that students should have increased exposure to classroom instruction by reducing the frequency of flagged behaviors. These gains may facilitate learning and academic gains in the Western system to complement Traditional ways of knowing, being and doing (Gage et al., 2015).

Limitations. Culturally responsive measures of academic and social-emotional capacities may support a more accurate and complex assessment of trauma-informed practices’ impact (Robinson et al., 2020). It is important to note that the PAT measures have been used with First Nations students and found suitable (Reid O’Connor, 2023). However, given the large number of First Nations students in this study, measures such as the Progressive Achievement Test-Adaptive (PAT-A) could be implemented for future research. The PAT-A is built upon a similar foundation to traditional PAT measures; however, the adaptive model assesses individual student responses to

determine test content and pathways. The adaptive model was created as a fairer way of testing a range of students with differing cultures, ethnicities, and needs (ACER, 2021). Additionally, we did not track the “dose” of intervention each student received, which could have varied based on individual needs and circumstances. These limitations highlight the need for more comprehensive data collection in future studies—including measures of implementation fidelity, classroom environments, teacher-student relationships, individual learning needs, and differences in exposure to adverse and potentially traumatic experiences.

Further limitations of this pilot study relate to the cross-sectional analyses and small sample size. Longitudinal evaluation of student academic gains over time due to the TIBS program would be beneficial. Research could draw from a nationally consistent collection of school data, such as Australia’s National Assessment Program—Literacy and Numeracy data, collected every 2 years with students in year levels 3, 5, 7, and 9 (Berger et al., 2023). Finally, hearing from the students about their perspectives on the school’s behavioral support system and practices would be valuable. This study represents one of few studies evaluating a trauma-sensitive program with First Nations students. The outcomes can be used to improve future research assessing the impact and uptake of culturally responsive, trauma-informed programs for First Nations students.

Conclusions

The educational outcomes of First Nations students continue to be a challenge across Australia. This is not due to the students but rather a failure by the Western education system pervading colonization, dispossession, and a lack of cultural safety. Emerging theories and research into the impact of historical and community-level programs have informed the development of novel educational approaches that build on cultural assets and strengths. The current study is the first to demonstrate First Nations students’ academic gains after implementing a multi-tiered, trauma-informed educational program. With trauma-informed educational practices increasingly disseminated in schools, the present research provides evidence to support the use of programs such as TIBS. The findings highlight the importance of educational leaders and policymakers prioritizing evaluations of trauma-informed and culturally responsive practices. A replication of the study with larger samples of students from diverse settings is warranted. The differential impact of changes in behavior flags on the literacy and numeracy of students highlights the need for further research on the mediators and moderators of such positive changes in observations. Such research would contribute to building on the success of programs like TIBS in providing First Nations students targeted, personalized, and efficacious social-emotional and academic support.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Author contributions

KA and GK researched the literature and conceived the study. EH wrote the first draft of the manuscript. GK, KA, EB, BR, KW, and NE critically reviewed, added to, and edited

the manuscript. GK and KA engaged in the data collection process. SF and AU contributed to the interpretation and analysis of data. SO and VD contributed to writing the manuscript. All authors approved the final version of the manuscript.

Competing interests

KA and GK are the developers of the TIBS program. There are no other competing interests.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the University of Southern Queensland (USQ) Human Research and Ethics Committee (No. H15REA191).

Informed consent

Parents of all the students in the study provided informed consent in the form of a signed informed consent form. Information about the study was provided to parents through a printed letter and information that was mailed to their homes and invitation to an information session at the school about the study.

Additional information

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