



Quantifying Cognitive Impact: Trauma-Informed Practices and Executive Functions in Special Education

Dr. Mohamad Ahmad Saleem Khasawneh,

Assistant Professor, Special Education Department, King Khalid University, Saudi Arabia,
mkhasawneh@kku.edu.sa. <https://orcid.org/0000-0002-1390-3765>

Abstract

This research investigates the correlation between trauma-informed practices and executive functioning in kids who are getting special education services. 150 pupils, aged 8 to 12 years, and their instructors took part in the research. The implementation of trauma-informed treatment was evaluated using the Trauma-Informed Treatment Implementation Scale (TICIS), while executive functions were examined using the Behavior Rating Inventory of Executive Function (BRIEF). Descriptive statistics, Pearson correlation coefficients, hierarchical regression analysis, independent samples t-tests, and analysis of covariance (ANCOVA) were used to analyze the data. The study found a strong beneficial correlation between the adoption of trauma-informed treatment and executive functioning, namely in the areas of inhibition and shifting. The research found that being exposed to trauma-informed therapies was linked to improved executive functioning, even when accounting for factors like age and gender. These results emphasize the significance of using trauma-informed strategies in special education environments to aid in the cognitive growth and academic achievement of kids who have experienced trauma.

Keywords: trauma-informed practices, executive functions, special education, cognitive impact.

Received: 3 March 2024 **Revised:** 27 May 2024 **Accepted:** 15 June 2024

Introduction

Educational methods have evolved to recognize the varied requirements of pupils, particularly those encountering obstacles or hardships. An important field of study is examining how trauma-informed practices connect with cognitive development, including executive skills. Experiencing trauma in childhood, such as abuse or neglect, may significantly impact cognitive processes important for academic success and learning (Huang et al., 2022). Executive skills such as self-regulation, cognitive flexibility, and problem-solving are particularly susceptible to the effects of trauma (Mørkved et al., 2020).

Educational settings are increasingly embracing trauma-informed practices, which reflect a shift towards holistic approaches that address students' social, emotional, and cognitive needs (Rahimi & Liston, 2023). Highlighting trauma-informed practices means giving importance to creating safe and supportive settings, fostering resilience, and aiding in the healing process for those who have experienced trauma (Knoche et al., 2018). Studying the effects of these activities on cognitive performance, particularly executive skills, is a topic that needs further research despite the positive outcomes shown so far.

Individuals in need of special education services form a distinct population that often faces a range of academic, social, and emotional challenges (Kim, 2022). Understanding the cognitive impacts of trauma-informed techniques is essential in special education settings due to the increased likelihood of meeting

trauma. Studies in this area have mostly focused on qualitative research methods or clinical groups, leading to a lack of understanding of the quantitative relationship between trauma-informed strategies and executive functions in special education settings (William Hunter et al., 2021).

This study aims to address this gap by quantitatively analyzing how trauma-informed interventions impact executive functioning in the field of special education. This study seeks to provide empirical data that demonstrates the efficacy of trauma-informed strategies in enhancing cognitive capacities in adolescents with disabilities using rigorous research methodologies and standardized assessments. This research might greatly influence the creation of targeted therapies and support networks, eventually improving outcomes for kids with disabilities who have experienced trauma.

Problem of Study

There is a significant lack of expertise in the field of special education about the specific effects of trauma-informed approaches on executive functioning. Although trauma-informed techniques are acknowledged as crucial for establishing supportive settings, especially for children who have faced hardship, the precise cognitive pathways by which these practices impact executive functions are not yet understood. Moreover, current research in this field often utilizes qualitative methods or concentrates on clinical groups, which restricts the applicability of results to educational settings. Therefore, there is an urgent need for quantitative research to clarify the connection between trauma-informed practices and executive functioning in the specific setting of special education.

Research Questions

1. What is the nature of the relationship between trauma-informed practices and executive functions in special education settings?
2. How do trauma-informed practices influence the development and functioning of executive functions among students receiving special education services?
3. What are the potential implications of understanding this relationship for the design and implementation of interventions aimed at improving outcomes for students with disabilities who have experienced trauma?

Significance of the Study

This study has important implications for both research and practice in the special education profession. This research seeks to analyze the cognitive effects of trauma-informed practices on executive functions. It aims to address a significant gap in the existing literature by offering empirical evidence to validate the efficacy of trauma-informed strategies in improving cognitive abilities in students with disabilities. This study aims to clarify how trauma-informed practices impact executive functions, and to enhance the design of specific interventions and support systems to improve outcomes for students who have encountered trauma in educational environments.

Terms of the Study

The research spanned twelve months and started with recruiting participants from special education programs in a specific school district. The study used a quantitative correlational design and standardized assessments to evaluate trauma-informed practices and executive functioning in kids who receive special education services. Data collection included distributing questionnaires and evaluations to children and instructors to acquire information on trauma exposure, adoption of trauma-informed practices, and executive functioning skills.

Limitations of the Study

This research attempts to provide vital insights into the correlation between trauma-informed practices and executive functions in special education, however, it is important to recognize numerous limitations. Self-report assessments and surveys might introduce response bias, which can affect the reliability of the obtained data. The study's dependence on a particular school district for recruiting participants may restrict the applicability of results to other educational settings. The intricate and multidimensional characteristics of trauma and executive processes need detailed knowledge that may not be completely reflected in a single research study. Although limited, this study is a crucial advancement in our comprehension of the cognitive effects of trauma-informed methods in special education.

Literature review and Previous studies

The theoretical basis of trauma-informed care establishes a fundamental structure for comprehending the cognitive effects of trauma in educational environments. Trauma-informed treatment highlights the need to acknowledge the common occurrence of trauma and its possible effects on persons' cognitive, emotional, and behavioral abilities (Faccini & Allely, 2021; Nowakowski-Sims & Rowe, 2015). Educators and practitioners aim to provide safe, supportive settings that foster healing and resilience in kids who have undergone trauma by using a trauma-informed approach.

Executive functioning is defined as a group of advanced cognitive processes that control goal-oriented behavior, self-regulation, and cognitive adaptability within a cognitive framework (Chaku et al., 2021; Ouhmad et al., 2024). These functions are crucial for academic achievement and are strongly connected to several facets of learning, such as attention, memory, and problem-solving.

Prior research has offered useful insights into the correlation between trauma-informed practices and cognitive performance, especially in educational settings. Sullivan et al. (2015) performed research to assess the impact of trauma-informed parenting seminars on enhancing executive functioning abilities in children inside the child welfare system. Their research indicated that engaging in trauma-informed therapies led to enhancements in self-regulation and emotional control.

Tomlinson et al. (2022) performed a meta-analysis investigating the link between parental PTSD/depression symptoms and child PTSD symptoms. The research mainly examined mental health outcomes but emphasized the link between trauma exposure and cognitive performance, emphasizing the need for comprehensive, trauma-informed treatments in educational environments.

The current body of research on trauma-informed practices and executive functions in special education is still lacking despite the contributions made thus far. Several studies have employed qualitative approaches or concentrated on clinical populations, neglecting the distinct problems and requirements of kids who are receiving special education services (Kim & Lee, 2020; Southall, 2023; Long et al., 2024). Moreover, there is a lack of research using quantitative methods to investigate the precise ways in which trauma-informed practices impact executive functioning in special education environments.

A quantitative study is required to thoroughly investigate the correlation between trauma-informed practices and executive functioning in the special education setting. Existing research has mostly focused on mental health outcomes, neglecting the cognitive consequences of trauma exposure and the possible impact of trauma-informed strategies in reducing these effects. Therefore, there is a distinct need for empirical studies that investigate the cognitive effects of trauma-informed practices in special education and clarify the processes that connect the two.

Methods

This study used a quantitative correlational research approach to examine how trauma-informed practices are related to executive functioning in special education environments. The technique included participant recruiting, data collecting, and statistical analysis.

Participants were recruited from special education programs in a chosen school district using a convenience sample method. 150 kids who received special education assistance, ages 8 to 12, together with their instructors, participated in the research.

The research included two primary tools for data collection: the Trauma-Informed Care Implementation Scale (TICIS) and the Behavior Rating Inventory of Executive Function (BRIEF). The TICIS was used to evaluate the execution of trauma-informed strategies in special education environments. The self-report questionnaire has 25 questions scored on a Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Previous studies have shown that the TICIS has robust internal consistency and validity. The BRIEF was used to assess many components of executive functioning such as inhibition, shifting, emotional regulation, and arrangement of contents. The standardized rating scale has 86 elements that instructors evaluate based on their observations of students' conduct. The BRIEF is reliable and valid in evaluating executive functioning in children and adolescents.

Before collecting data, both instruments were subjected to thorough validation processes to confirm their reliability and validity. The TICIS was verified by content validation by professionals in trauma-informed

care, whereas the BRIEF received validation through factor analysis and comparison with other executive functioning measures.

The gathered data underwent statistical analysis using SPSS software. Pearson correlation coefficients were calculated to analyze the connection between trauma-informed practices and executive functioning. Hierarchical regression analysis was used to determine how well trauma-informed practices predict executive functions while accounting for confounders including age and gender. Moreover, independent samples t-tests were used to assess executive functioning differences between students who were exposed to trauma-informed therapies and those who were not. Analysis of covariance (ANCOVA) was used to investigate variations in executive functioning based on various degrees of trauma exposure while accounting for relevant factors.

Results

Table 1: Descriptive Statistics for Trauma-Informed Care Implementation Scale (TICIS)

Variable	Mean	Standard Deviation	Minimum	Maximum
TICIS Score	3.45	0.72	2.10	4.80

The average TICIS score reflects the overall degree of trauma-informed activities implemented by participants. The standard deviation indicates the dispersion of scores around the average, indicating the degree to which implementation levels differ within the sample. The lowest and highest scores provide insights into the variation in implementation ratings across participants.

Table 2: Descriptive Statistics for Behavior Rating Inventory of Executive Function (BRIEF)

Subscale	Mean	Standard Deviation	Minimum	Maximum
Inhibition	55.20	9.83	40.00	70.00
Shifting	60.45	7.91	45.00	75.00
Emotional Control	58.10	8.20	42.00	72.00
Organization	52.75	10.60	35.00	68.00

The descriptive statistics of several subscales of the BRIEF provide insights into the individuals' executive functioning. The mean scores represent the average executive functioning level in each domain, while the standard deviations show the range in results. The lowest and highest scores show the range of performance seen in various executive function areas.

Table 3: Pearson Correlation Coefficients between Trauma-Informed Care Implementation Scale (TICIS) and Behavior Rating Inventory of Executive Function (BRIEF) Subscales

	Inhibition	Shifting	Emotional Control	Organization
TICIS Score	0.35	0.42	0.30	0.25

A correlation value of 0.35 suggests a modest positive association between TICIS score and inhibition. This indicates that higher levels of implementing trauma-informed treatment are associated with enhanced inhibitory abilities. A correlation value of 0.42 indicates a modest positive association between TICIS score and shifting, showing that greater levels of trauma-informed care implementation are associated with enhanced shifting skills.

A correlation value of 0.30 suggests a modest positive association between TICIS score and emotional control, indicating that higher levels of trauma-informed care implementation are associated with enhanced emotional control abilities. A correlation value of 0.25 indicates a modest positive relationship between TICIS score and organization, suggesting that higher levels of trauma-informed care implementation are associated with somewhat enhanced organizational capacities.

Table 4: Hierarchical Regression Analysis Predicting Executive Functioning from Trauma-Informed Care Implementation

	Step 1	Step 2
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Predictor	B	β
Constant	22.15	
TICIS Score	0.45**	0.35**
Age	-0.12	-0.08
Gender (Male = 1)	1.20	0.10
R ²	0.25	0.30
ΔR^2		0.05**
F	18.20**	12.40**

During Step 1, the Trauma-Informed Care Implementation Score (TICIS) was included as a predictor of executive functioning. The beta coefficient (β) of 0.45** suggests that trauma-informed care implementation is a significant predictor of executive functioning when analyzed independently ($p < 0.01$). Age and gender were included as additional factors in Step 2. The beta coefficient (β) for the TICIS score remained statistically significant at 0.35, showing that trauma-informed care implementation still predicted executive functioning even when accounting for age and gender.

The ΔR^2 value of 0.05** indicates that including age and gender as variables led to a substantial enhancement in the model's predictive capability ($p < 0.01$). The F-statistic of 12.40** in Step 2 signifies that the combined model, which includes trauma-informed care implementation, age, and gender, effectively predicts executive functioning with statistical significance ($p < 0.01$).

Table 5: Independent Samples t-tests Comparing Executive Functioning between Groups Exposed to Trauma-Informed Care Implementation and Non-Exposed Groups

Subscale	Mean (Exposed Group)	Mean (Non-Exposed Group)	t-value	p-value
Inhibition	56.80	52.40	3.10**	<0.01
Shifting	61.20	57.80	2.45*	0.02
Emotional Control	59.00	55.50	2.80**	0.01
Organization	53.50	50.80	1.80	0.08

The mean score for the Inhibition subscale was substantially higher in the exposed group (56.80) compared to the non-exposed group (52.40), $t(98) = 3.10^{**}$, $p < 0.01$, suggesting superior inhibition abilities in the exposed group. The mean score for the Shifting subscale was substantially higher in the exposed group ($M = 61.20$) compared to the non-exposed group ($M = 57.80$), $t(98) = 2.45^*$, $p = 0.02$, indicating superior shifting ability in the exposed group.

The mean score for the Emotional Control subscale was substantially higher in the exposed group (59.00) compared to the non-exposed group (55.50), $t(98) = 2.80^{**}$, $p = 0.01$, suggesting superior emotional control abilities in the exposed group. The mean score for the Organization subscale was 53.50 for the exposed group and 50.80 for the non-exposed group. However, the difference was not statistically significant, $t(98) = 1.80$, $p = 0.08$.

Table 6: Analysis of Covariance (ANCOVA) Comparing Executive Functioning Across Levels of Trauma Exposure

Subscale	Mean (Low Trauma Exposure)	Mean (High Trauma Exposure)	Adjusted Difference	Mean	F-value	p-value
Inhibition	55.20	52.80	2.50**		5.20*	0.03
Shifting	60.50	58.00	2.50**		4.80*	0.04
Emotional Control	58.00	56.20	1.80		2.10	0.15

Organization	52.00	51.50	0.50	0.30	0.60
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The adjusted mean difference between low and high trauma exposure groups on the Inhibition subscale was 2.50, $F(1, 96) = 5.20$, $p = 0.03$, showing considerably higher inhibition abilities in the low trauma exposure group. After accounting for variables, the adjusted mean difference between low and high trauma exposure groups on the Shifting subscale was 2.50**, $F(1, 96) = 4.80$, $p = 0.04$. This indicates considerably superior shifting ability in the low trauma exposure group compared to the high trauma exposure group.

The adjusted mean difference between low and high trauma exposure groups on the Emotional Control subscale was 1.80, although it was not statistically significant ($F(1, 96) = 2.10$, $p = 0.15$). After controlling for variables, the Organization subscale showed an adjusted mean difference of 0.50 between low and high trauma exposure groups. This difference was minor and not statistically significant, as shown by $F(1, 96) = 0.30$, $p = 0.60$.

These findings indicate that even accounting for relevant factors, there are significant disparities in inhibition and shifting skills between groups with low and high levels of trauma exposure. There were no notable disparities in emotional regulation and organizational abilities across the two groups.

This research found a strong beneficial correlation between the application of trauma-informed treatment and many aspects of executive functioning, such as inhibition, shifting, and emotional regulation. The results are consistent with other studies that emphasize the positive impact of trauma-informed approaches on cognitive results (Warfield, 2013; Joiner & Buttell, 2018; Springer et al., 2023). This study provides quantitative evidence linking trauma-informed practices with executive functions in special education, supporting existing literature and highlighting the significance of incorporating trauma-informed strategies in educational environments.

This study builds upon prior research by accounting for important confounders including age and gender, offering a more detailed insight into the connection between trauma exposure, trauma-informed care adoption, and executive functioning. Including covariates improved the accuracy of evaluating the specific impact of trauma-informed practices on cognitive outcomes, which addressed a common problem in prior research that failed to include possible confounding factors. This research provides a thorough investigation of the intricate relationship among trauma exposure, trauma-informed behaviors, and executive functioning using advanced statistical approaches including hierarchical regression and analysis of covariance.

The study's results enhance comprehension of the cognitive effects of trauma exposure in special education environments. This study discovered that the relationship between trauma exposure and executive functions differs based on the extent of trauma-informed care implementation, contrary to other studies that indicated a consistent detrimental effect of trauma exposure on executive functioning (B.Nooner & D.Leaberry, 2013). Students who were exposed to more trauma-informed techniques showed improved inhibition and shifting skills compared to those with less experience. This research emphasizes how trauma-informed techniques may help improve cognitive outcomes, emphasizing the need to use these practices to assist the cognitive development of kids in special education settings.

This study's results enhance comprehension of the intricate relationship among trauma exposure, trauma-informed treatment implementation, and executive functioning. They agree with previous research that highlights the need to use trauma-informed strategies to address the comprehensive needs of adolescents in educational environments (Henshaw, 2022; Skiba, 2020). This research highlights the potential of trauma-informed techniques to reduce the negative cognitive impacts of trauma by objectively showing a favorable link with executive functioning.

The detailed results of this research emphasize the need for customized therapies that target the precise cognitive requirements of kids who have experienced trauma. The strong correlation between implementing trauma-informed care and inhibition and shifting skills indicates that therapies targeting these executive function areas might be especially helpful for kids with a trauma background (Chen et al., 2020; Kundu et al., 2022). This research identifies the executive functioning areas most affected by trauma-informed practices, aiding in the creation of more precise treatments for kids in special education.

Additionally, using variables like age and gender in the analysis enhances the methodological rigor of the research and offers a more detailed insight into the factors affecting executive functioning in students with a trauma history. This method is in line with contemporary demands for thorough and multifaceted

examinations to include the intricate interaction of personal and environmental elements in influencing cognitive results (Grefe et al., 2020). This research improves the validity of its findings and broadens the applicability of results to other groups in special education settings by accounting for key factors.

Recommendations

According to the study's results, several suggestions may be provided to guide research and application in the special education sector. Educational institutions and policymakers must prioritize implementing trauma-informed approaches in special education settings. This involves offering thorough training and assistance to educators and staff to help them successfully identify and address the specific needs of pupils who have undergone trauma. Furthermore, further research is required to investigate the lasting impact of trauma-informed therapies on cognitive outcomes and academic success in special education kids. Future research might explore the moderating variables that impact the connection between trauma exposure, trauma-informed care adoption, and executive functioning, including individual variations and contextual influences. Efforts should be made to share the study findings with educators, administrators, and policymakers to promote evidence-based practices that aid in the cognitive development and academic success of students with trauma history in special education environments. By focusing on trauma-informed strategies and allocating resources to research and dissemination, we can provide more supportive and inclusive learning settings that enhance the well-being and academic success of all kids in special education.

Acknowledgments

The authors extend their appreciation to the Deanship of Scientific Research at King Khalid University for funding this work through Small Research Groups under grant number (RGP.2 /439 /44).

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