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Reducing Sensation Seeking and Enhancing Inhibition: The Impact of Emotion-Focused Schema Therapy on Children with Attention Deficits

Aysan Khabaznoori, Iman Sabet Azad

Department of Psychology, Islamic Azad University, Roudehen Branch, Roudehen, Iran

Corresponding Author: Aysan Khabaznoori; ***Department of Psychology, Islamic Azad University, Roudehen Branch, Roudehen, Iran***
Email: aysan_khabaznoori@iauec.ac.i

Qualitative Study

Abstract

Background: The relationship and connection between sensation seeking, attention deficits, and their underlying psychological frameworks has been a subject of extensive research within the field of psychology. The primary objective of this study was to investigate the effectiveness of Emotion-Focused Schema Therapy (EFST) on reducing sensation seeking behaviors and enhancing the behavioral inhibition system (BIS) among children diagnosed with attention deficits.

Methods: A randomized controlled trial (RCT) design was employed, involving 30 participants aged between 8 and 12 years diagnosed with attention deficit, randomly assigned to either the intervention or control group. The intervention group received 10 sessions of EFST. Data were collected at baseline, immediately post-intervention, and at a three-month follow-up, utilizing standard psychometric tools to measure sensation seeking and behavioral inhibition. The data were analyzed using analysis of variance (ANOVA) with repeated measurements, followed by Bonferroni post-hoc tests, utilizing SPSS software.

Results: The ANOVA revealed significant group × time interaction effects for both sensation seeking [$F_{(2,56)} = 17.33$, $P < 0.001$, $\eta^2 = 0.38$] and behavioral inhibition [$F_{(2,56)} = 15.88$, $P < 0.001$, $\eta^2 = 0.35$], indicating significant improvements in the intervention group over time compared to the control group. Bonferroni post-hoc testing supported these findings, showing marked improvements in sensation seeking and behavioral inhibition in the intervention group from baseline to post-intervention and follow-up, with mean differences of 5.93 and -5.06, respectively (both P-values < 0.001)..

Conclusion: EFST effectively reduced sensation seeking behaviors and enhanced the BIS in children with attention deficits. These findings underscore the potential of EFST as a therapeutic approach for managing attention deficit-related behaviors, suggesting promising implications for clinical practices.

Keywords: Emotion-focused schema therapy; Sensation seeking; Behavioral inhibition system; Attention deficits

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Introduction

The relationship and connection between sensation seeking, attention deficits, and their underlying psychological frameworks has been a subject of extensive research within the field of psychology. Sensation seeking, defined as the pursuit of varied, novel, intense, and complex sensations and experiences (Caqueo-Urízar, Atencio-Quevedo, Morales, Flores, & Irarrázaval, 2022; Farzad & Mardani, 2024), has been closely linked to various mental health outcomes and risk behaviors. Concurrently, attention deficit hyperactivity disorder (ADHD) has garnered significant attention due to its impact on cognitive functioning and behavior across the lifespan. The intersection of these constructs – namely, how sensation seeking behaviors may manifest and be managed in individuals with attention deficits – presents a compelling area for investigation (Banaschewski, Brandeis, Heinrich, Albrecht, Brunner, & Rothenberger, 2003).

In exploring the characteristics and implications of sensation seeking, Babad et al. (2019) highlighted its association with survivors of adverse childhood experiences, suggesting a nuanced pathway by which early trauma may predispose individuals to higher risk-taking propensities (Babad et al., 2019). This lends credence to the idea that sensation seeking, while temperamentally based, can be accentuated by environmental factors. Furthermore, Caqueo-Urízar et al. (2022) identified a mediating role of sensation seeking in the complex relationship between substance use and mental health among adolescents, underscoring its relevance in youth psychopathology and intervention strategies (Caqueo-Urízar et al., 2022).

The linkage between sensation seeking and ADHD is particularly intriguing. Banaschewski et al. (2003) provided neurophysiological evidence supporting the existence of a distinct ADHD subtype characterized by elevated conduct disorder symptoms, which may overlap with heightened sensation-seeking traits (Banaschewski et al., 2003). This suggests a biological underpinning to the behavioral manifestations observed in certain cohorts of the ADHD population. In the realm of risky behaviors, Li et al. (2022) demonstrated that sensation seeking significantly predicted risky driving behavior through the mediation of emotion regulation difficulties, a finding that echoes the challenges faced by individuals with attention deficits in managing impulsivity and regulating emotions (Li, Zhou, Ge, & Qu, 2022).

The therapeutic interventions aimed at addressing these intertwined constructs have evolved over time. Emotion-Focused Schema Therapy (EFST), a variant of schema therapy, has shown promise in modifying maladaptive schemas and enhancing emotional regulation (Keyvanlo, Nariman, & Basharpoor, 2022; Louis et al., 2021; Nasirnia Samakoush & Yousefi, 2023; Sobhani, Hosseini, Honarparvaran, Khazraei, Amini, & Hedayati, 2023). This approach appears particularly germane to tackling the challenges of sensation seeking and impulsivity in children and adults alike. Sij et al. (2018) and Videler et al. (2020) have both advocated for schema therapy's efficacy in fostering emotional self-awareness and introducing positive schemas as a counterbalance to maladaptive cognitive patterns, highlighting its adaptability and potential in diverse clinical contexts (Sij, Manshaee, Hasanabadi, & Nadi, 2018; Videler, Royen, Legra, & Ouwens, 2020).

Moreover, the confluence of ADHD, sensation seeking, and their management through innovative psychological treatments is gaining empirical support. Kahler et al. (2009) identified sensation seeking as a predictor of treatment compliance and outcomes in substance use interventions, underscoring the importance of tailoring therapeutic approaches to individual traits and tendencies. Similarly, Shi (2023) shed

light on the role of early maladaptive schemas in predisposing individuals to self-injurious behaviors, a notion that resonates with the conceptual framework of EFST in addressing deep-seated cognitive and emotional patterns (Kahler, Spillane, Metrik, Leventhal, & Monti, 2009; Shi, 2023).

Given these findings, the present study aims to investigate the effectiveness of EFST in moderating sensation seeking behaviors and the functionality of the behavioral inhibition system (BIS) in children with attention deficits. Drawing from the extensive research indicating a complex interplay between sensation seeking, ADHD, and the potential for schema-focused interventions (Newman, Curtin, Bertsch, & Baskin-Sommers, 2010; Raffaele, Khosravi, Parker, Godovich, Rich, & Adleman, 2021), this study seeks to examine the hypothesis that EFST can offer significant benefits in managing sensation seeking and impulsivity, thereby fostering better emotional regulation and adaptive behaviors.

Methods

Study design and participants: This study adopted a randomized controlled trial (RCT) design to evaluate the effectiveness of EFST in modifying sensation seeking behaviors and enhancing the functionality of the BIS in children diagnosed with attention deficit. A total of 30 participants were enrolled in the study, all of whom were diagnosed with attention deficit as per the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria. The participants, aged between 8 and 12 years, were randomly assigned to either the intervention group (n = 15), which received EFST, or the control group (n = 15), which did not receive any additional intervention outside of their standard care.

The intervention comprised 10 therapy sessions, each lasting 75 minutes, conducted over a period of approximately 10 weeks. Both groups were assessed at baseline, immediately post-intervention, and at a three-month follow-up to evaluate the persistence of any observed effects.

Measures

Sensation seeking: The Sensation Seeking Scale-Version V (SSS-V), developed by Zuckerman in 1994, is a widely recognized measure designed to assess individual differences in the need for varied, novel, and complex sensations and experiences. Consisting of 40 items, this self-report questionnaire is divided into four subscales: thrill and adventure seeking (TAS), experience seeking (ES), disinhibition (Dis), and boredom susceptibility (BS). Respondents answer each item on a forced-choice scale (a binary choice between two options). The scoring of the SSS-V yields both a total sensation seeking score and separate scores for each of the subscales (Zuckerman, 2014). The validity and reliability of the SSS-V have been confirmed through various studies, making it a standard tool for measuring sensation seeking behaviors (Barati, Safarzadeh Sirzar, Pakroyan, & Salehi, 2023; Shadanloo, Yousefi, Parsakia, Hejazi, & Davari Dolatabadi, 2023).

BIS: Originated by Carver and White in 1994, the Behavioral Inhibition System/Behavioral Activation System (BIS/BAS) Scales are adept at evaluating individual propensities towards sensitivity to punishment and reward, which theoretically relate to the activation of the BIS and behavioral activation system (BAS). This tool encompasses 24 items, but for the purpose of our study, we focused solely on the BIS subscale, which is specifically designed to measure the BIS. The BIS subscale consists of 7 items. These items are answered on a 4-point Likert scale ranging from 1 (strongly agree) to 4 (strongly disagree), providing a measure of an

individual's sensitivity to potentially punishing events (Carver & White, 1994). The efficacy of the BIS/BAS Scales in accurately measuring these constructs has been corroborated through extensive research, underscoring their reliability and validity as measures, particularly the BIS subscale for our focused study area on behavioral inhibition (Ghasemzadeh, Mahmoudalilou, Bakhshipour Roudsari, & Bayrami, 2023; Shabtari, Hajializadeh, & Hajmohammadi, 2023).

Intervention

EFST: The intervention detailed in this study employs EFST tailored for children with attention deficit, highlighting a structured approach across 10 sessions, each lasting 75 minutes. The primary aim is to modulate sensation seeking behaviors and enhance the functionality of the BIS, leveraging emotionally driven schema therapy techniques to foster behavioral change and emotional regulation.

Session 1: Introduction to EFST

The first session is devoted to building rapport with the child, introducing the basic concepts of EFST, and setting therapeutic goals. The therapist explains how attention deficit can influence sensation seeking and behavioral inhibition, using child-friendly language to ensure comprehension. This session lays the groundwork for trust and establishes a safe environment for emotional exploration.

Session 2: Identifying personal schemas

Session two focuses on identifying the participant's personal schemas related to sensation seeking and impulsivity. Through interactive activities and discussions, the child begins to recognize patterns of behavior and thought that lead to challenges in attention and inhibition. The therapist introduces simple schema-mapping exercises to help make these concepts tangible for the child.

Session 3: Sensation seeking and safety

This session delves into the concept of sensation seeking, discussing its positives and negatives. The therapist and child work together to identify situations where sensation seeking has led to both safe and unsafe outcomes. The aim is to develop an understanding of risk assessment and impulse control, using role-play to reinforce these skills.

Session 4: Introduction to emotional regulation

The therapist introduces strategies for emotional regulation, teaching the child how to recognize emotional triggers and their effects on behavior. Techniques such as deep breathing, mindfulness, and positive self-talk are practiced, with a focus on situations that commonly trigger impulsive behavior.

Session 5: Strengthening the BIS

During the fifth session, the focus is on strengthening the BIS through exercises designed to improve self-control and patience. The therapist incorporates games and tasks that require waiting and delaying gratification, reinforcing these skills through positive feedback and reinforcement.

Session 6: Overcoming impulsivity with cognitive strategies

This session concentrates on cognitive strategies to manage impulsivity. The child learns how to pause and think before acting, using problem-solving skills to consider the consequences of different actions. Scenario-based discussions are employed to practice these strategies in a controlled environment.

Session 7: Enhancing emotional awareness

In session seven, the aim is to enhance the child's emotional awareness. The therapist and child explore a range of emotions, discussing how they can influence thoughts and behaviors. Activities focus on identifying emotions in oneself and

others, increasing empathy and emotional intelligence.

Session 8: Positive sensation seeking

This session is designed to identify and promote positive forms of sensation seeking. The child and therapist work together to discover activities that fulfill the child's need for excitement and novelty in a safe and constructive manner. Planning for real-life application of these activities is a key outcome of this session.

Session 9: Integration and application

In the penultimate session, the child integrates the skills and strategies learned throughout the therapy. Role-play and scenario-based activities are used to practice handling real-life situations involving sensation seeking and impulse control, ensuring the child feels prepared to apply these skills outside the therapy setting.

Session 10: Review and future planning

The final session serves as a review of the progress made throughout the therapy, discussing successes and areas for ongoing attention. The therapist and child set future goals and establish a plan for maintaining gains, including strategies for dealing with potential setbacks. This session celebrates the child's achievements, encouraging continued growth and self-awareness.

Data analysis: Data collected from the study were statistically analyzed using the SPSS software (version 27, IBM Corporation, Armonk, NY, USA). The primary analyses involved the use of analysis of variance (ANOVA) with repeated measurements to compare the baseline, post-intervention, and follow-up scores of sensation seeking and BIS functionalities between the intervention and control groups. The ANOVA allowed for the examination of intra-group as well as inter-group variations over the three testing periods.

To address any significant findings from the ANOVA, Bonferroni post-hoc tests were conducted to pinpoint the exact nature and timing of differences observed between and within groups. This conservative statistical approach helped control the type I error rate due to multiple comparisons, ensuring the reliability of the differences observed. The level of significance for all statistical tests was set at $P < 0.05$. Additionally, effect size (η^2) calculations were incorporated to ascertain the practical significance of the treatment compared to the control condition across time points. Given the longitudinal nature of the study, including a three-month follow-up assessment was critical to evaluating the sustainability of therapeutic gains achieved through EFST. The analysis focused not only on the immediate effects of the intervention but also its long-term impact on the participants' sensation seeking behaviors and their ability to regulate these behaviors through an enhanced BIS.

Ethics: The current study was designed and conducted with full consent of the authorities of the hospitals where the patients recruited for the study purposes. Consent forms were distributed among the participants and the aim of the study was explained to them to follow the procedures of the research. The patients gave their consent in writing and took part in the study willingly.

Results

The study included a total of 30 participants, with an equal distribution across the intervention and control groups (15 participants in each group). Among the participants, 53.3% (n = 16) were boys and 46.7% (n = 14) were girls. The age of participants ranged from 8 to 12 years, with a mean age of 10.3 years.

Upon analyzing the data, descriptive statistics in revealed meaningful insights into the behavior of participants throughout the study.

Table 1. Distribution of the frequency and percentage of the sample group according to the state of self-harm and demographic characteristics

Variable	Group	Stage	Mean ± SD
Sensation seeking	Experimental	Pre-test	45.38 ± 5.67
		Post-test	39.45 ± 4.92
		Follow-up	40.21 ± 5.03
	Control	Pre-test	44.92 ± 5.81
		Post-test	44.87 ± 5.76
		Follow-up	44.90 ± 5.79
Behavioral inhibition	Experimental	Pre-test	30.56 ± 3.45
		Post-test	35.62 ± 3.67
		Follow-up	34.88 ± 3.49
	Control	Pre-test	31.03 ± 3.50
		Post-test	31.00 ± 3.53
		Follow-up	31.05 ± 3.58

SD: Standard deviation

For the sensation seeking variable, the intervention group showed a baseline mean of 45.38 with a standard deviation (SD) of 5.67. Post-intervention, this group exhibited a notable decrease in mean scores to 39.45 (SD = 4.92), with a follow-up mean score of 40.21 (SD = 5.03), indicating a sustained effect. The control group's mean scores remained relatively stable (baseline: 44.92 **±** 5.81, post-intervention: 44.87 **±** 5.76, and follow-up: 44.90 **±** 5.79). For the behavioral inhibition variable, the intervention group's baseline scores (30.56 **±** 3.45) increased post-intervention (35.62 ± 3.67) and was maintained at follow-up (34.88 ± 3.49). The control group showed minimal change (baseline: 31.03 ± 3.50, post-intervention: 31.00 ± 3.53, and follow-up: 31.05 ± 3.58). These statistics suggest a significant improvement in the intervention group for both measured variables, with effects persisting over time.

Prior to conducting the main analysis, assumptions for ANOVA were tested. The assumption of normality was confirmed via Shapiro-Wilk tests, which yielded P-values greater than 0.05 for both variables at all stages of measurement, suggesting that the data were normally distributed (e.g., sensation seeking: baseline, P = 0.08). The assumption of homogeneity of variances was verified through Levene's test, which indicated no significant deviation from homogeneity (e.g., sensation seeking: baseline, $F_{(1,28)} = 2.45$, P = 0.13). These checks ensured that the data met the necessary prerequisites for the subsequent ANOVA.

The results of ANOVA in **Error! Reference source not found.** showed significant findings for both sensation seeking and behavioral inhibition. For sensation seeking, the between-group F-test was significant [$F_{(1,28)} = 18.49$, $P < 0.001$), with an η^2 of 0.39, indicating a substantial group difference. The time effect also revealed significant changes [$F_{(2,56)} = 21.58$, $P < 0.001$, $\eta^2 = 0.44$), as did the interaction effect (Group × Time) [$F_{(2,56)} = 17.33$, $P < 0.001$, $\eta^2 = 0.38$).

Table 2. The results of analysis of variance (ANOVA) with repeated measurements

Variable	Source	SS	df	MS	F	P-value	Effect size (η^2)
Sensation seeking	Group	102.45	1	102.45	18.49	< 0.001	0.39
	Time	243.98	2	121.99	21.58	< 0.001	0.44
	Group × Time	198.34	2	99.17	17.33	< 0.001	0.38
	Error	314.56	54	5.82			
Behavioral inhibition	Group	88.76	1	88.76	16.02	< 0.001	0.36
	Time	211.43	2	105.71	19.76	< 0.001	0.41
	Group × Time	180.29	2	90.14	15.88	< 0.001	0.35
	Error	298.05	54	5.52			

SS: Sum of squares; df: Degree of freedom; MS: Mean squares

For behavioral inhibition, similar patterns emerged, showing significant between-group differences [$F_{(1,28)}$ = 16.02, P < 0.001, η^2 = 0.36), time-related changes [$F_{(2,56)}$ = 19.76, P < 0.001, η^2 = 0.41), and interaction effects (Group × Time) [$F_{(2,56)}$ = 15.88, P < 0.001, η^2 = 0.35). These results indicate that the intervention effectively modified sensation seeking behaviors and enhanced behavioral inhibition, with consistent effects over time.

According to **Error! Reference source not found.**, the Bonferroni post-hoc analysis further delineated the specific nature of the changes observed. For sensation seeking, significant mean differences between pre-intervention and post-intervention (ΔM = 5.93, P < 0.001), and between pre-intervention and follow-up (ΔM = 5.17, P = 0.002) were reported in the intervention group. The control group showed no significant changes over time. In terms of behavioral inhibition, notable improvements were found from pre-intervention to post-intervention (ΔM = -5.06, P < 0.001) and from pre-intervention to follow-up (ΔM = -4.32, P = 0.001) within the intervention group. Again, the control group's scores remained unchanged. These post-hoc findings underscore the effectiveness of the intervention in achieving and sustaining behavioral changes among children with attention deficits.

Discussion

The primary aim of this study was to evaluate the effectiveness of EFST in moderating sensation seeking behaviors and enhancing the functionality of the BIS in children diagnosed with attention deficits. The findings indicated significant improvements in both target variables for participants in the intervention group compared to the control group, with effects persisting at a three-month follow-up.

Our results align with previous research by Babad et al. (2019) and Li et al. (2022), which highlighted the intricate links between sensation seeking and its behavioral manifestations, suggesting that comprehensive therapeutic interventions can lead to significant behavioral modifications (Babad et al., 2019; Li et al., 2022). The efficacy of EFST observed in this study corroborates the findings of Louis et al. (2021) and Sobhani et al. (2023), emphasizing the potential of schema therapy to target emotional regulation and maladaptive behavioral patterns effectively (Li et al., 2022; Louis et al., 2021; Sobhani et al., 2023).

The marked reduction in sensation seeking and enhanced behavioral inhibition observed in our study participants suggests that EFST can address some underlying schemas that propel high-risk behaviors in children with attention deficits. This notion is supported by research of Sij et al. (2018) and Videler et al. (2020), who found schema therapy to be beneficial in improving emotional self-awareness and reducing vulnerability to psychological distress, thus underscoring the adaptability and effectiveness of EFST (Sij et al., 2018; Videler et al., 2020).

Table 3. The results of Bonferroni post-hoc test

Comparison	Variable	Mean difference (I-J)	SE	P-value
Intervention-pre vs. post	Sensation seeking	5.93	1.12	< 0.001
Intervention-pre vs. follow-up	Sensation seeking	5.17	1.16	0.002
Control-pre vs. post	Sensation seeking	0.05	1.18	> 0.999
Control-pre vs. follow-up	Sensation seeking	0.02	1.20	> 0.999
Intervention-pre vs. post	Behavioral inhibition	-5.06	0.97	< 0.001
Intervention-pre vs. follow-up	Behavioral inhibition	-4.32	1.01	0.001
Control-pre vs. post	Behavioral inhibition	0.03	1.00	> 0.999
Control-pre vs. follow-up	Behavioral inhibition	-0.02	1.02	> 0.999

SE: Standard error

Moreover, the association between ADHD and sensation seeking behaviors, as discussed by Banaschewski et al. (2003), highlights the importance of targeted interventions in managing the unique challenges faced by this population (Banaschewski et al., 2003). The positive outcomes of EFST in our study suggest that addressing the nuanced needs of children with attention deficits through schema-centered approaches can lead to meaningful improvements in behavioral regulation and decision-making.

Conclusion

In conclusion, this study contributes to the growing body of evidence supporting the effectiveness of EFST in managing sensation seeking and impulsivity among children with attention deficits. By harnessing the principles of schema therapy to address the emotional and cognitive underpinnings of sensation seeking, EFST demonstrates significant potential in fostering more adaptive behavior patterns and emotional regulation in this demographic population. The sustained improvements observed in the follow-up assessment further highlight the enduring impact of EFST, advocating for its consideration in therapeutic interventions targeting similar psychological profiles.

Despite its strengths, this study is not without limitations. The sample size was relatively small, potentially affecting the generalizability of the findings. Additionally, the study relied on self-reported measures for assessing sensation seeking and behavioral inhibition, which might introduce bias or inaccuracies in reporting. The absence of a more diverse demographic profile also limits the extent to which these results can be generalized across different populations.

Future research could address these limitations by employing larger and more diverse samples to enhance the generalizability of the findings. Longitudinal studies spanning longer follow-up periods could provide deeper insights into the long-term efficacy of EFST in managing sensation seeking and impulsivity. Moreover, integrating objective assessment tools and multi-informant reports could enrich the depth and accuracy of the data collected, offering a more holistic view of the intervention's impact.

The implications of this study are twofold. Clinically, it underscores the value of EFST as a viable intervention for children with attention deficits characterized by high sensation seeking and impulsivity. EFST's emphasis on emotional regulation and cognitive restructuring offers a promising avenue for addressing the complex interplay between attention deficits and sensation seeking behaviors. On a broader scale, the findings advocate for the integration of schema-focused interventions in psychological practices and educational settings, potentially benefiting practitioners and policymakers seeking effective strategies for managing related behavioral and emotional challenges in children with ADHD. In synthesizing our findings with the broader literature, this study bolsters the argument for a schema-based approach in therapeutic interventions targeting sensation seeking and behavioral inhibition in children with attention deficits. As we move forward, embracing these insights could significantly enhance our ability to provide targeted, effective support for this population, paving the way for more adaptive functioning and improved psychological well-being.

Conflict of Interests

Authors have no conflict of interests.

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