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The Effects of Painting Activities on Children's Post-Discharge Sleep Habits: A Clinical Trial

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ABSTRACT

Sleep disorders among children are frequently reported during hospitalization and after discharge, which negatively impacts the quality of life of children and their families. Therapeutic interventions are necessary to improve sleep quality. This study aimed to evaluate the effects of painting activities on children's post-discharge sleep habits. In this randomized clinical trial, 108 children hospitalized in Bu-Ali Sina Hospital in Sari, Amirkola Hospital in Babol, Rasoul Akram, and Ali Asghar Hospital in Tehran were randomly assigned to the intervention (n=54) and control (n=54) groups. Ultimately, 50 subjects in the control group and 32 in the intervention group completed the study. The family completed the electronic Children's Sleep Quality Questionnaire regarding the child's sleep status one week after discharge. From the submitted forms, families whose child's score increased compared to the calculated score before hospitalization were selected. In the intervention group, painting activities were conducted for 10 nights over three weeks, commencing one-week post-discharge, under parental supervision. After one week of intervention, the participants were requested to complete the electronic questionnaire again. Data were analyzed using SPSS version 16 software and descriptive and analytical statistics (t-tests, Mann-Whitney, Chi-square, analysis of covariance, etc.). The majority of subjects were female, with a mean age of 72.8 ± 20.6 months in the intervention group and 80.8 ± 20.9 months in the control group. Most of the study subjects in the intervention group had bedtime story and lullaby habits and, in the control, had other sleep habits. The intervention did not significantly affect overall sleep habits; however, there were significant differences observed in the domains of sleep duration and nighttime walking. Although painting activities did not improve the overall score of sleep habits in children, they did enhance sleep duration and some other subcategories. Therefore, post-discharge painting intervention is recommended for children.

Keywords: Children; Sleep habits; Discharge; Acute illness; Painting

Introduction

Patients reported experiencing sleep disorders during hospitalization and after discharge. Approximately one-third of hospitalized patients present with preexisting sleep difficulties. Early diagnosis and treatment of sleep complaints may enhance recovery in hospitalized individuals [1]. Given that sleep problems are often acute, they can lead to ongoing parental concern regarding their child's health and potential consequences for family sleep patterns. Simple interventions such as teaching relaxation techniques can significantly improve sleep in patients and help prevent sleep disorders after discharge [2]. A systematic review demonstrated an inverse relationship between shorter sleep durations and physical and mental health. This evidence-based study underscores the importance of continuous efforts to promote healthy sleep patterns for overall public health [3]. A study of sleep characteristics among children aged 3-9 years before and after outpatient surgery revealed that 47% of children in the surgical group experienced postoperative sleep

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disorders [4]. In a study conducted on children undergoing simple therapeutic action in the hospital, the completion of the Post-Hospitalization Behavior Questionnaire (PHBQ) revealed that 20% of the children experienced negative behavioral changes, the most common of which were separation anxiety and changes in sleep, at a rate of 11.7%. This indicated that attending the emergency department even for a minor, painless procedure can cause immediate stress for children and noticeable changes in their behavior afterward [5]. Sleep is a crucial and influential factor in children's health, as it serves as an indicator of a person's social, family, and emotional functioning, and psychological issues can affect sleep quality [6]. The American Academy of Sleep Medicine recommends that preschool children aged 3-5 years, in addition to naps during a 24-hour period, require 10–13 hours of sleep [7]. Children aged 6–13 years old require 9-11 hours of sleep per night [8]. Furthermore, one-third of Canadian children suffer from insomnia, which influences their physical and mental health. Numerous studies have indicated that sleep problems affect 25-40% of children aged 4-10 years, with 15% resisting bedtime and approximately 11% experiencing sleep-related anxiety [9]. Among 350 preschool children aged 4-6 years in Isfahan, Iran, 144 (41.14%) were identified as having sleep disorders [10]. Similarly, sleep disorders among preschool children in Hamadan Province, Iran, include delayed bedtime, daytime sleepiness, nocturnal awakenings, and sleep-related breathing problems [11].

The high prevalence of sleep problems and neuropsychological issues among preschool children highlights the importance of addressing these concerns [12]. Providing parents with preventive information by the primary health care provider and the child health nurse at the appropriate time is a determinant in reducing the severity and frequency of sleep behavior disorders [13]. Nurses, especially pediatric nurses, are the primary healthcare professionals to address parental concerns regarding their children's sleep and educate them about the impact of sleep routines on sleep quality [14]. Behavioral interventions are effective in reducing sleep onset latency, nocturnal awakenings, and sleepwalking in children. Given the limited evidence to support the long-term efficacy of these treatments, controlled clinical trials are required to identify effective behavioral interventions for treating insomnia in young children [15]. Although the use of medications such as antipsychotics or delirium is increasing in pediatric hospitals to improve sleep, the associated complications and adverse effects on children are not properly identified. Therefore, a non-invasive and low-risk intervention is required to improve sleep among hospitalized children who are neurodevelopmentally immature [16]. Numerous non-invasive interventions have been examined in this area such as the impact of storytelling therapy on improving sleep habits among children with cancer undergoing chemotherapy [17], the impact of sleep hygiene education and relaxation interventions on sleep quality among children with leukemia [18], the impact of sleep hygiene education on sleep quality among children with type 1 diabetes [19], and the impact of sleep education by school teachers on sleep quality among children [20]. The majority of these studies exhibited methodological limitations such as the lack of a control group, lack of blinding, and reliance on self-reported data, leading to the low-quality evidence [21]. One effective strategy involves the use of art, as non-verbal communication with children is crucial and interpreting children's paintings activities leads to a deeper understanding of their perceptions. This communication channel with sick children appears to have been neglected [22]. Painting activities serves as a fun, inexpensive, and straightforward method allowing school-aged children to express their feelings and attitudes and a reliable resource to gather information reflecting their thoughts about matters relevant to them [23]. Painting provides children with the most diverse and satisfying environment, fostering natural creativity and offering freedom to express ideas and feelings through color, design, shape, and form [24]. Considering that the study and interpretation of children's paintings in Iran

has been sparse and restricted, many parents, instructors, and teachers do not recognize the significance of children's artwork. Children through painting can express themselves beyond restrictions and communicate with others about their concerns, discoveries, and fears subconsciously. Children's paintings can reflect their emotional difficulties and behavioural challenges [25]. A study on preschool children demonstrated that painting activities reduces depression, anxiety, and aggression [26]. In addition, examining the separation anxiety among elementary school boys in Iran illustrated that painting decreases separation anxiety disorder [27]. In another study on children with stuttering, painting leads to a reduction in their anxiety [28]. Accordingly, implementing interventions to reduce children's sleep disorders after discharge from the hospital is crucial. Given the lack of study on sleep status of children with acute illnesses and interventions for its improvement after discharge, the present study aimed to evaluate the effect of painting activities on post-discharge sleep habits. Considering that the age range of hospitalization in the pediatric ward in Iran is between one month and 12 years, and based on the experience, children under 3-year-old neglect painting, the present study was performed on the age range between 4-10 years due to the study tool.

Materials and Methods

In this clinical trial with a control group, following the ethical committee approval, children aged 4-10 years with the first or second hospitalization experience in the pediatric ward of Bu Ali Sina Hospital in Sari, Amirkola Children's Educational and Therapeutic Center, in Hamedan, and wards of Ali-Asghar Hospital and pediatric ward of Hazrat Rasoul Hospital in Tehran were recruited using a convenience sampling method.

The inclusion criteria were children aged 4 - 10 years, a maximum of two previous hospitalizations, no anticipated surgery for the child, no chronic diseases such as chronic allergic rhinitis, chronic pain, craniofacial anomalies, and gastrointestinal reflux, no hospitalization due to head trauma or burns, internet access, an increase in the child's sleep habits score after discharge compared to pre-hospitalization score, and no use of sedative medications prior to hospitalization. The exclusion criteria were: the use of sedative medications such as benzodiazepines after discharge and failure to complete the intervention at least 10 times within three weeks. The required sample size was calculated using the formula below:

$$\mathrm{n} = \frac{\sigma^2(Z_{2-\beta} + Z_{\alpha/2})^2}{(d)^2}$$

In this study, the power was considered 80%, and the type I error was regarded as 5%. Similar study [2] showed that the standard deviation for children's sleep score was 7.82 in the control group and 7.17 in the intervention group. The accuracy rate for differentiating the mean sleep score of the two groups was considered to be 3. Accordingly, the pooled standard deviation was calculated as σ=7.5 and d=3. Consequently, the required sample size was calculated to be 49 per group.

$$n = \frac{56.25\ (0.84\ + 1.96)^2}{(3)^2} = 49$$

Considering a 10% attrition rate, the final sample size was determined to be 54 per group. This study applied a researcher-developed demographic questionnaire encompassing the child's and family's physical and social characteristics, number of previous hospitalizations, reason for hospitalization, length of stay, child's age and gender, parents' age and education level, number of siblings, birth order, underlying medical conditions, place of birth and residence, use of specific medications, and family conflicts, as well as contact number and email address, if available.

The study employed the short form of the Children's Sleep Habits Questionnaire (CSHQ) developed by Owen et al. [1], with a 33-item using a 3-point Likert scale (rarely, sometimes, often). Higher scores signify poorer sleep habits in children [34]. This instrument

demonstrated acceptable test-retest reliability ranging from 0.62-0.79. Its validity was reported as 0.68 for community and 0.78 for clinical samples. Ozgoli et al. established the content validity of the CSHQ for children aged 4–6 years, with an internal consistency (Cronbach's alpha) of 0.82 [6]. In the present study, the validity of the questionnaire was calculated with a Cronbach's alpha of 0.67, which was deemed acceptable. The CSHQ assesses children's sleep habits across eight domains: bedtime resistance, sleep-onset delay, sleep duration, sleep anxiety, sleepwalking, parasomnias, sleep-disordered breathing, and daytime sleepiness. In this instrument, questions 1 and 2 (bedtime resistance), 9 and 10 (sleep duration), and 26 (daytime sleepiness) were reverse scored. The sum of the scores across all domains reflects the child's sleep disorder, with higher scores indicating more severe sleep problems. Within each subscale, scores were calculated by summing the scores of the items and considering the reverse scores [35].

After collecting information about the child's medical history and obtaining informed parental consent, families were provided with the CSHQ and requested to complete the questionnaire based on their child's last condition before the illness when they were at home. For post-discharge follow-up, a contact number or email address was obtained from the family. Families of 325 children completed this step. The families were asked to inform the researcher at the time of discharge. To mitigate potential recall bias, the researcher contacted the families less than a week after completing the initial questionnaire to inquire about the child's discharge status and timing, and the child's discharge time was determined at this stage. Due to reasons such as unwillingness to continue participation or unsuccessful re-establishment of contact due to incorrect contact information or unresponsiveness, 68 families were excluded from the study as the study continued with the remaining 257 subjects. Given that negative behaviors in children typically arise after one week [29, 30], and based on a study conducted by the developer of the CSHQ tool within a one-week interval [31], families were informed via text messages, emails, or phone calls to complete an electronic questionnaire assessing the children's sleep quality based on their sleep patterns in the week following discharge. Families completed this stage with the assistance of the internet. For families with difficulty accessing the Internet, the form was completed through a phone call. After receiving responses from each family member, the total score was calculated based on the reversed questions and their negative scores. From the submitted forms, families whose children's CSHQ scores increased compared to their pre-hospitalization scores were selected. Considering that a score above 41 indicates disorders in the child's sleep habits, 29 children in the second stage were excluded from the study regardless of their pre-hospitalization score, and 112 families were excluded from the study because their children's sleep score (41>) declined compared to their pre-admission score. Throughout the sampling process, the samples were gradually assigned to the control and intervention groups using a blocked randomization method with a block size of six from each study center. To implement this, 17 permutations with a block size of six were randomly selected, and to ensure unbiased group assignment, different conditions documented on six cards, each placed in a sealed, opaque envelope, were situated in a box. The researcher was blind to the contents and selected one envelope to determine the group allocation for each pair. This process continued until all 17 envelopes were elected and the desired sample size was achieved. This method effectively neutralized the influence of potential confounding variables, such as family disputes and pre-sleep TV-watching habits, on the intervention outcomes. Subsequently, based on the statistical formulas, 108 children were randomly assigned to intervention (n=54) and control (n=54) groups. They received guidance regarding the study procedures.

The intervention group were contacted via telephone, and detailed instructions regarding the study procedure were provided. Families were asked to select an evening suitable for the painting task. On the chosen day, following the

evening meal and before the child's pre-sleep activities (e.g., toothbrushing), the child, alone in conjunction with one or both parents, started painting with a free theme and then colored it. The finished painting was then separated from the painting pad and displayed on the wall of the child's bedroom, near his/her bed, where it would be readily visible. After painting, children without sleep rituals and those who already had sleep rituals performed them and then went to bed as usual. Based on the studies, the intervention was performed for the families in the intervention group for at least 10 nights during three weeks [38, 32]. After the three-week intervention, the families were requested to photograph their children's paintings and send them to the researcher to ensure the fidelity of the intervention. A painting notebook and colored pencils were sent to the families in the intervention group by mail, along with a sticker as a gift to the child. The control group was asked to perform regular routines, including pre-admission activities, without additional tasks. As the researcher was involved in all stages of the study, blinding was impossible. However, the blocked randomization method ensured that group assignment was out of the researcher's control. After three weeks of painting activities, families resumed their normal routines for one week without any study-related expectations or obligations. After the one-week interval, families were again asked to complete the CSHQ questionnaire based on the previous week's experiences, either electronically or via phone call. The one-week interval was implemented because the sleep habits assessment tool measures habits over a one-week period [33].

The data was analyzed using SPSS version 16. Descriptive indices and central and dispersion indices, including frequency tables, mean, and standard deviation, were used for descriptive objectives. To achieve the analytical objectives, paired t-tests and independent t-tests were employed, and if the assumptions were met, the analysis of covariance test was employed.

Results

Finally, 50 subjects in the control group and 32 in the intervention group completed the study (figure1).

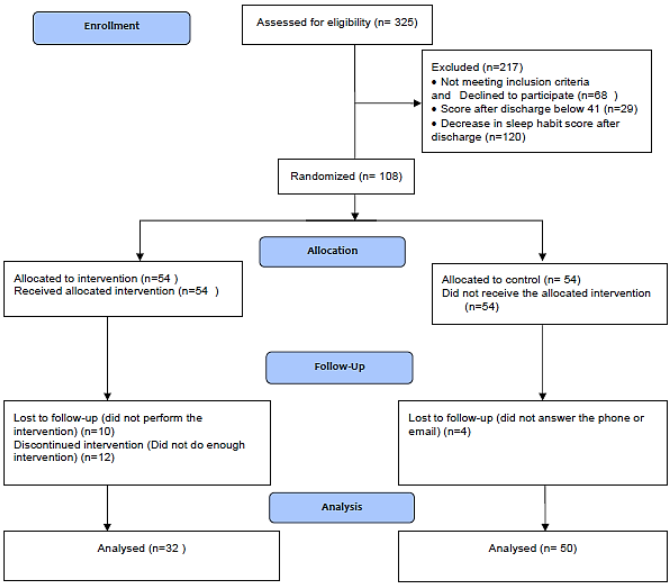

Figure1. Consort flowchart of study participants

The mean age of children was 72.84±20.64 in the intervention group and 80.8220.95 in the control group. The average length of hospital stay was 6.12 days for the intervention group and 6.74 days for the control group.

Most children in both groups were female and firstborn, and urban residency was prevalent. Most participants in both groups reported no history of underlying medical conditions, medication use, or family conflict The demographic characteristics of both groups showed no significant difference in most variables examined. (Table 1). There was no significant difference between the intervention and control groups regarding the cause of hospitalization (Table 2).

There was an equal distribution of pre-sleep routines in the intervention group, whereas most participants in the control group lacked such routines. Table 3 illustrates the distribution of pre-sleep routines among the study participants. Storytelling and lullabies were everyday pre-sleep habits in the intervention group, and other sleep-related routines were more frequent in the control group. No statistically significant difference was found between the two groups regarding the types of pre-sleep routines, demonstrating homogeneity(p=0.184).

Table 4 shows that the two intervention and control groups were homogeneous regarding sleep characteristics in most areas before the intervention. The data analysis revealed that after the intervention, there was a significant difference only in the areas of sleep length and sleepwalking, and the changes were not significant in sleep-related breathing disorders, Sleep delay, and daytime somnolence in the intervention group.

Table 1. Frequency distribution of demographic characteristics

Variable	Category	Intervention group		Control group		p-value
		Frequency	Percentage	Frequency	Percentage	
Gender	Boy	11	34.0	25	50.0	0.18
	Girl	21	66.0	25	50.0	
Birth rank	First	20	62.0	24	48.0	0.15
	Second	11	34.0	18	36.0	
	Third and above	1	4.0	8	16.0	
Place of residence	Rural	2	6.0	15	30.0	0.01
	Urban	30	94.0	35	70.0	
Underlying disease	have	7	22.0	18	36.0	0.175
	Do not have	25	78.0	32	64.0	
Medication	have	11	34.0	22	44.0	0.47
	Do not have	21	64.0	28	56.0	
Mother's education	Low-educated	2	6.0	13	26.0	≤0.001
	Secondary	11	34	28	56.0	
	University	19	60.0	9	18.0	
Father's education	Low-educated	2	6.3	12	24.0	0.014
	Secondary	16	50.0	27	54.0	
	University	14	43.7	11	22.0	
Mother's occupation	Housewife	19	59.0	42	84.0	0.019
	Employed	13	41.0	8	16.0	
History of hospitalization	No	22	69.0	30	60.0	0.422
	Once	10	31.0	20	40.0	
Family disputes	Have	4	12.5	5	10.0	0.671
	Do not have	28	87.5	45	90.0	
Existence of sleep habits	Yes	16	50.0	22	44.0	0.595
	No	16	50.0	28	56.0	

Table 2. Frequency distribution of cause of hospitalization

Reason for hospitalization	Intervention Frequency (%)	Control Frequency(%)	Test
Digestive problems	3(9.4)	5(10.0)	
Fever and infection	7(21.9)	7(14.0)	
Urinary problems	4(12.5)	9(18.0)	χ^2=1.155 Df=4 p=0.855
Respiratory problems	5(15.6)	9(18.0)	
Other problems	13(40.6)	20(40.0)	

Table 3. Frequency distribution of bedtime habits

Presence of sleep habits	Type	Intervention Frequency (%)	Control Frequency (%)
Yes	Storytelling and lullabies	10 (31.2)	9(18.0)
	Other sleep habits	6 (18.8)	13(26.0)
No		16(50.0)	28(56.0)

Table 4. Comparison of sleep characteristics in the two groups before and after the intervention

Sleep characteristics	Time	Control group	Intervention group	Mann–Whitney test
Resistance to sleep	Before	13.00±2.64	11.68±2.87	Mann-u= 592.5; p-value=0.04
	After	12.12±0.42	11.47±0.57	Mann-u= 705; p-value=0.36
Sleep delay	Before	1.9±0.89	1.78±0.88	Mann-u= 737; p-value =0.51
	After	1.42±0.1	1.72±0.14	Mann-u=635.5; p-value=0.07
Sleep duration	Before	4.00±1.32	3.80±1.32	Mann-u= 710; p-value =0.33
	After	3.42±0.15	3.97±0.25	Mann-u=575.5; p-value=0.008
Bedtime anxiety	Before	4.18±1.51	4.34±1.38	Mann-u= 760; p-value = 0.69
	After	4.04±0.21	3.97±0.27	Mann-u=779; p-value=0.83
Night walking	Before	4.16±1.11	4.66±1.76	Mann-u=707.5; p-value = 0.36
	After	4.60±0.22	3.72±0.18	Mann-u= 526.5; p-value=0.006
Parasomnias	Before	9.06±1.39	8.98±1.67	Mann-u=751.5 P-value = 0.63
	After	8.90±0.23	8.80±0.29	Mann-u= 759.5; p-value= 0.69
Sleep-disordered breathing	Before	3.25±0.62	3.36±0.87	Mann-u=794 P-value=0.99
	After	3.26±0.09	3.06±0.04	Mann-u=717; P-value= 0.16
Daytime sleepiness	Before	13.09±2.20	12.34±2.79	Mann-u=654 P-value=0.16
	After	12.94±0.5	12.28±0.37	Mann-u=774.5; P-value = 0.80

Discussion

The findings revealed that the sleep habits score for both groups, prior to the painting intervention and following hospital discharge, exceeded 41, indicating that the children experienced disturbances in sleep habits, thereby underscoring the necessity of the intervention. Several studies have documented the presence of sleep disorders among children post-discharge [5,4]. In one study, despite the initiation of the intervention at the time of discharge, sleep disorders persisted in both groups after discharge [36], which may be attributed to the pre-existing sleep disorders before the intervention. In the current study, the variation in sleep habit scores was considered before and after hospitalization for inclusion in the randomization process. No studies were identified that contradicted the presence of sleep habit disorders among children post-hospital discharge.

Moreover, the results demonstrated that changes in sleep habit scores in the control group were statistically significant, aligning with the findings of Zupanec et al. [18], which reported a one-point decrease in sleep habit scores in the control group during the follow-up period. Contrary to the findings of the present study, some studies reported no significant changes in sleep habit scores in the control group before and after the intervention [37, 38]. Regarding subcategories in the control group, bedtime resistance improved post-intervention, consistent with the study results of Tehrani et al. [39]. Additionally, given the significant changes in sleep onset delay within the control group before and after the intervention, the passage of time positively influenced the improvement of children's sleep habits in the present study.

According to the results, the changes in sleep habit scores in the intervention group, despite a 2-point decrease, were not statistically significant, which is consistent with the findings of Ajorloo et al. [17]. Price et al. [40] conducted a 5-year follow-up study on infants with an average age of seven months and parent-reported sleep problems. The behavioral interventions (1-3 sessions of nurse-led family education) did not demonstrate a long-term improvement in sleep problems and habits after 5 years. In another study, the impact of storytelling and positive routines on children's sleep habits was examined, revealing improvements in children's sleep habits [41], which is inconsistent with the results of the present study. The comparison of the two groups indicated that, despite the intervention's lack of a significant effect on the overall sleep habit score, statistically significant changes were observed in sleep duration and sleepwalking following the intervention.

Conclusion

This study represents the first investigation into the impact of painting on children's sleep habits, potentially serving as a foundation for future research. The findings indicated that engaging in painting for 10 sessions over a three-week period before bedtime can reduce the average sleep habit score of children who have experienced the stress of hospitalization after discharge. However, this reduction was not statistically significant, and an improvement in children's sleep habits cannot be anticipated, as a score exceeding 41 denotes improper sleep habits among children [42]. The majority of children exhibited sleep habit scores above 41 post-discharge, indicating prevalent improper sleep habits. Additionally, the sleep habit scores of children decreased over time without any intervention during the five weeks following discharge.

In this study, the intervention task was assigned to the children themselves, as delegating responsibility to the child by parents may result in reluctance to paint on designated nights, thereby diminishing the effectiveness of painting in enhancing sleep habits. Another factor contributing to the lack of impact of painting on children's sleep habits may be the cultural and familial upbringing in Iranian families. Often, children and their families are less inclined to adhere to such routines, as children transition to their own beds at a later age. From the mothers' perspectives, co-sleeping until primary school age is not considered unusual. Furthermore, shared sleeping arrangements between children and their families, or shared rooms with siblings, are unavoidable due to the limited size and single-bedroom nature of some homes, influencing children's sleep patterns.

The intervention demonstrated a positive effect on sleep duration across various subgroups examined. Through painting, children can express themselves, manage stress, and articulate their emotions. Although painting may not enhance overall sleep habits among children, it can be effective in specific areas. Therefore, families should be informed upon the child's discharge, through face-to-face education, that changes in the child's sleep habits are likely to be temporary, and the child may revert to previous sleep patterns over time. Parents should be advised to approach any sleep-related changes with patience and empathy to assist in navigating this phase. Nurses, families of hospitalized children, and

educators can employ this method as a non-invasive approach for children with high sleep habit scores and improper sleep habits.

Limitations

Several limitations should be considered when interpreting the results of this study, including the reliance on parental reports for assessing children's sleep habit scores, which may introduce bias due to subjective perceptions and the challenge of ensuring children's willingness to engage in painting at designated times. Nevertheless, verbal consent was obtained from the children, and both written and verbal consent was obtained from their parents, following a detailed explanation of the study procedure. Moreover, the researcher did not directly observe the children's painting activities with their parents, limiting control over this aspect of the intervention. Finally, the study encountered a relatively high attrition rate due to not meeting the researcher's minimum expectations, which influenced the findings.

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Conflict of Interests

The authors declare that they do not have any conflict of interests.

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