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The efficacy of finger puppets, distraction cards and kaleidoscope for reducing anxiety in children undergoing day surgery

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ABSTRACT

Aim: This study was conducted to determine the efficacy of finger puppets, distraction cards and kaleidoscope for reducing anxiety in children aged 6–12 years who undergoing day surgery in Turkey.
Methods: The study was conducted using the "pre-post test unmatched group model", one of the quasi-experimental methods. The study was conducted between April 2023 and January 2024 with children aged 6–12 years who were admitted to the pediatric clinic of a hospital for day surgery in the Southern Marmara region of Turkey. A total of 85 children (including 20 children in the control group, 22 children in the finger puppet intervention group, 21 children in the distraction cards intervention group, and 22 children in the kaleidoscope intervention group) who were hospitalized in the pediatric clinic.
Results: It was determined that there was a statistically significant difference between the pre- and post-intervention the Modified Yale Preoperative Anxiety Scale Child Form (m-YPAS) sub-dimension and total mean scores of the children in the kaleidoscope, finger puppet and distraction cards groups, while there was no difference in the control group children.
Conclusion: Kaleidoscope, finger puppet and distraction cards interventions were found to be effective in reducing preoperative anxiety in children and contributed to the national and world literature. It is recommended that further studies be conducted on the effectiveness of the three methods and that other variables that may affect the child's anxiety be addressed.
Contribution to nursing practice: This finding can be interpreted as significant and positive in demonstrating that anxiety induced by surgical procedures in children can be effectively managed with non-pharmacological methods.

Introduction

Illness and hospitalization constitute significant events that can significantly impact the lives of children. Hospitalization typically embodies a negative experience for the child, potentially eliciting manifestations of insecurity and anxiety, including fear, aggression, frequent crying, and heightened stress levels (Koukourikos et al., 2015). The hospital setting, undergoing surgical procedures, anticipated pain, medical interventions, uncertainties, insufficient communication with pediatric patients, and apprehensions regarding separation from family members are factors known to induce anxiety in children (Unver & Yıldırım, 2013). Consequent to such anxiety, manifestations such as treatment refusal, diminished treatment efficacy, sleep disturbances, and persistent tension may ensue in children. Hence, the utilization of therapeutic play proves advantageous in ameliorating the child's anxiety and fostering trust. This approach facilitates a more positive attitude towards treatment, the hospital environment, and the caregivers (Silva et al., 2017; Unver & Yıldırım, 2013).

Therapeutic play represents a modality employed for alleviating anxiety stemming from illness and hospitalization, facilitating the assessment of the child's emotions and perceptions regarding treatment and interventions, and empowering the child to explore coping mechanisms throughout this journey (Athanassiadou et al., 2012). In literature, therapeutic play is posited as a beneficial approach for mitigating anxiety and negative emotional states associated with illness and hospitalization. It is deemed essential for fostering a holistic and high-quality care environment conducive to the physical and psychological development of children, establishing a secure setting that nurtures their well-being (Yayan & Zengin, 2018). A fundamental tenet underpinning the efficacy of therapeutic play lies in its capacity for distraction (Yayan & Zengin, 2018).

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Efficient distraction techniques encompass activities such as finger puppets, diversionary cards, and kaleidoscopes. It is underscored that employing these modalities may effectively alleviate the anxiety associated with surgery by diverting the child's focus towards alternative stimuli (Athanassiadou et al., 2012; Hanrahan & Marie Mccarthy, 2018; Ullan & Belver, 2019). The Cochrane Library has strong recommendations supporting the use of distraction methods for acute procedural anxiety among children and adolescents (Birnie et al., 2018; Inal & Kelleci, 2012). However, many results suggest that the quality of evidence for the effectiveness of these methods is low (Birnie et al., 2018; Inan & Inal, 2019). Therefore, it is recommended to improve the quality of research in this area by conducting new studies among individuals from different populations (Ayan, 2019; Ciftci & Seval, 2019; Inan & Inal, 2019)Several previous studies have used distraction methods to reduce children's anxiety before surgical intervention. However, only a few studies in Turkey have presented statistically significant findings on the effects of distraction methods on children (Ayan, 2019; Buyuk et al., 2021; Ciftci & Seval, 2019; Goktas & Avci, 2023; Tuncay & Tufekci, 2023). Generally, parental presence is used in many hospitals in Turkey as a non-pharmacologic method to reduce procedure anxiety. However, many nurses and care providers do not take any additional intervention. Given that distraction techniques are inexpensive and easy to use, and that reducing children's anxiety may reduce negative feelings towards future procedures, it is important to investigate the effectiveness of such methods (Tork et al., 2017). When the literature is examined, it is seen that there are descriptive studies examining the level of anxiety in children undergoing day surgery (De Moura et al., 2016; Liang et al., 2021) and studies evaluating the effectiveness of various therapeutic methods (Akgun Kostak et al., 2021; Ayan, 2019; Chow et al., 2016; Ciftci & Seval, 2019; Dehghan et al., 2017; Glorioso et al., 2018; Ullan & Belver, 2019). However, a dearth of studies has been identified exploring the impact of three modalities (finger puppets, distraction cards, and kaleidoscope) on the anxiety levels of children undergoing day surgery. Within investigations assessing the efficacy of diverse therapeutic interventions among this demographic, it has been advocated to undertake comparative analyses examining the effects of multiple interventions on children's anxiety (Akgun Kostak et al., 2021; Dehghan et al., 2017; Hamza Taha & Hassan El-Sayed, 2021). Given these considerations, the present study aims to ascertain the efficacy of finger puppets, distraction cards, and kaleidoscope interventions in alleviating anxiety among children slated for day surgery in Turkey. Through this endeavor, we seek to compare the effectiveness of these three highlighted methods in diverting attention among pediatric patients, thereby diminishing anxiety in the context of day surgery. Furthermore, this research endeavors to inform the advancement of pediatric surgical nursing practices.

Methods

Aim and design

This study was conducted to determine the efficacy of finger puppets, distraction cards and kaleidoscope for reducing anxiety in children aged 6–12 years who undergoing day surgery. The study was conducted using the “pre-post test unpaired group model”, one of the quasi-experimental methods. The study was recorded in the Clinicaltrials.gov PRS system (ID: NCT06361069).

The research was conducted between April 2023 and January 2024 with children aged 6–12 years admitted to the pediatric clinic of a teaching and research hospital for day surgery (tonsillectomy, circumcision, adenotonsillectomy etc.) to the pediatric clinic of a training and research hospital in the Southern Marmara region of Turkey. Notably, the nursing care provided at the hospital does not incorporate distraction techniques aimed at alleviating anxiety in children. In addition, researchers have no clinical responsibilities towards children.

Sample

The sample required for the study was calculated using the G*Power (3.1.9.4) computer program. Based on the Type I error of 5%, Type II error of 95%, SD = 6.20, and Type I error of 5% in the study by Dehghan et al. (2017), the desired effect size for this study was 0.55 and the total required sample size was 64 children (approximately 21 children for each group) (Dehghan et al., 2017). A total of 85 children, comprising 20 children in the control group, 22 in the finger puppet intervention group, 21 in the distraction cards intervention group, and 22 in the kaleidoscope intervention group, was recruited from the pediatric clinic between April 2023 and January 2024, meeting the study's inclusion criteria.

Notably, no randomization method was employed in the selection process. The study complies with the guidelines of the Consolidated Standards of Reporting Trials (CONSORT). The CONSORT 2010 checklist of information to include when reporting a randomized trial is included in Fig. 1.

The study comprised children aged 6–12 years scheduled for day surgery, devoid of prior surgical experiences, and who willingly consented to participation. Exclusion criteria encompassed children undergoing major surgeries (e.g., cardiac procedures), emergency surgical interventions, individuals with mental retardation, as well as those with visual or auditory impairments.

Data collection

Pre- and post-intervention data were gathered utilizing the Descriptive Information Form and the Modified Yale Preoperative Anxiety Scale Child Form (m-YPAS). The researchers received education on the methods used in the study from both an expert in pediatric nursing and a person educated in play therapy. Given the single-center design of the study and concerns regarding potential cross-group contamination, interventions were administered sequentially. Initial data collection was conducted with the experimental groups undergoing interventions involving kaleidoscope, finger puppet, and distraction cards, followed by data collection from the control group upon completion of the experimental group assessments.

The information form

The form consists of 16 questions, which are used to obtain descriptive data about the child (Akgun Kostak et al., 2021; Gerceker Ozalp et al., 2018; Hamza Taha & Hassan El-Sayed, 2021; Yildizeli Topcu et al., 2020).

Modified Yale Preoperative Anxiety Scale Child Form (m-YPAS)

The Yale Preoperative Anxiety Scale (YPAS), developed by Kain et al. in 1995 to assess the anxiety levels of children undergoing surgical intervention, was revised in 1997 and updated as the modified Yale Preoperative Anxiety (m-YPAS) Scale (Kain et al., 1997). The Cronbach's alpha value of the scale developed with children aged 5–12 years was reported to be 0.92, and it was also observed to have high reliability and ease of use in children aged 2–12 years, and it was stated that it is an anxiety measurement tool that can be used in the preoperative period in children. The Turkish validity and reliability study of the shortened form of the scale was conducted by Ciftci and Seval as the Modified Yale Preoperative Anxiety Scale Child Form (m-YPAS). In the scale consisting of four categories, each category is scored within itself and divided by the highest scoring degree in the group. The scores from all categories are summed, divided by 4 again and finally multiplied by 100. As a result of this calculation, scores between 22.92 and 100 are obtained. A high score indicates high anxiety and worry. Cronbach's alpha value of the scale was reported as 0.92 by Ciftci and

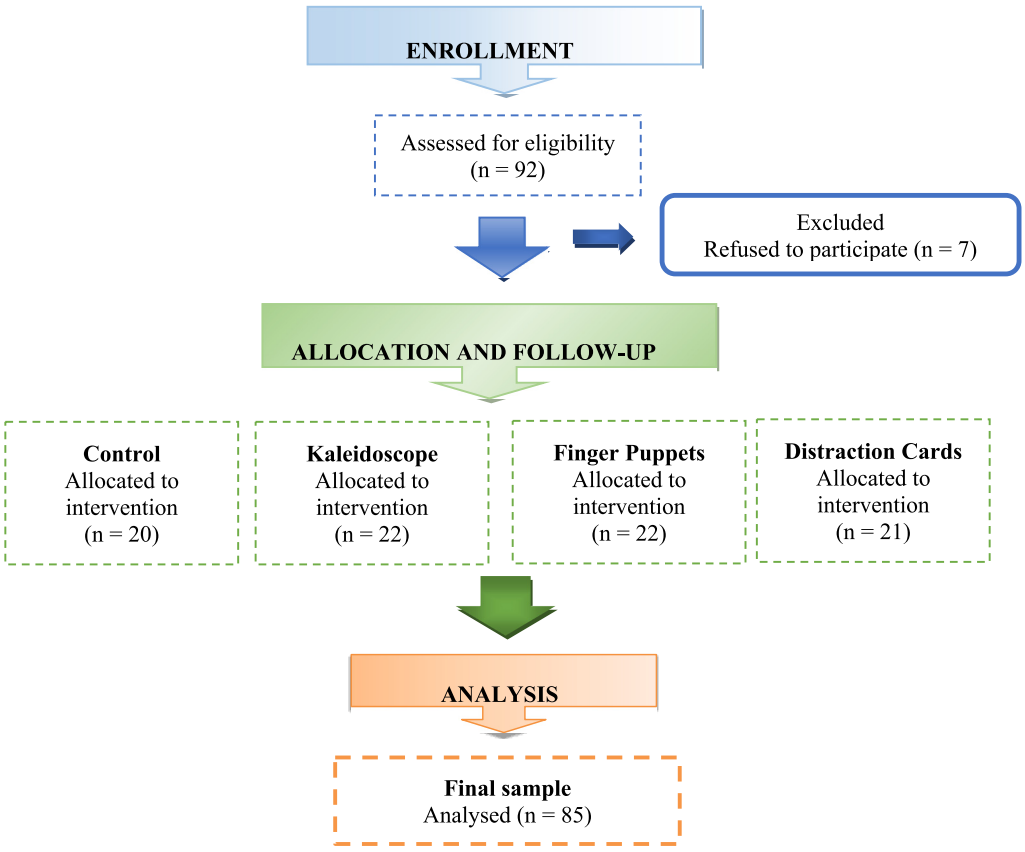

Fig. 1. Consort flow diagram.

Seval (Ciftci & Seval, 2019). In this study, the Cronbach's alpha value of the scale was 0.85.

Procedure

Pre-intervention procedure

The children to participate in the study were divided into three groups using a computer-generated random number table before surgery. The researchers informed the children and parents about the study and obtained their verbal and written informed consent. Scale forms were administered in 5–10 min. Five minutes before the intervention, the researchers showed the kaleidoscope, finger puppet and distracter cards to the children in the experimental groups for observation.

Procedure during the intervention

The researchers implemented the distraction method (kaleidoscope, distraction cards, or finger puppets) on the children within their respective groups for a duration of 15–20 min.

Experimental groups

During the data collection phase, the daily surgery schedule was reviewed in the morning to ascertain the list of patients and their estimated surgery start times. Pretest data were collected one hour prior to the commencement of children's procedures in the operating room. Subsequently, one of the distraction methods employed in the study was administered to the children. Following the conclusion of the intervention, posttest data were obtained.

Kaleidoscope

A kaleidoscope, characterized by vibrant patterns visible through rotation of its cylinders, operates on the principle of light refraction, producing dynamic and ever-changing visual displays. Comprising adjacent mirrors set at a 60-degree angle, interspersed with colored glass, feathers, sequins, and beads, the kaleidoscope captivates and diverts the child's attention from the immediate task. With its ability to engage both visual and auditory senses, the kaleidoscope serves as an effective tool for distraction from anxiety-inducing stimuli. Previous research attests to its efficacy in reducing anxiety among children, rendering it a reliable intervention method selected for inclusion in the present study (Canbulat Sahiner & Turkmen, 2019; Koç Ozkan & Polat, 2020; Tufekci et al., 2009).

Distraction cards

Distraction cards feature an array of images and shapes, each measuring approximately 5–8 cm in length. These intricate designs are discernible only upon careful examination of the cards. Throughout the distraction process, the child engages in interactive dialogue, responding to queries such as “How many ladybugs can you count in the image?” and “Can you locate the elephant within the picture?” This face-to-face and verbal interaction characterizes the cards as an active distraction technique. Efficacy demonstrated across multiple studies supports their utility in anxiety reduction, thereby justifying their inclusion in the present investigation (Canbulat et al., 2014; Canbulat Sahiner & Turkmen, 2019; Erdogan & Aytekin Ozdemir, 2021; Tork et al., 2017).

Finger puppet

Puppets, as a therapeutic intervention tool, significantly influence children's personal, social, and emotional development, facilitating their comfortable expression of emotions. Since the 1950s, play therapists and healthcare practitioners have employed puppets to discern, observe, educate, bolster, and evoke nuanced emotional responses (Sparapani et al., 2013). Recent studies have reported that puppets

can be used to assess children's anxiety (Glorioso et al., 2018; Sposito et al., 2016). Finger puppets are a type of puppet often used to help children express themselves. While children enjoy the pleasure of putting visually beautiful puppets on their fingers, they also find the courage to express themselves with the confidence that puppets give them (Korosec & Korošec, 2013). Nurses' use of puppets can help them understand children's feelings about medical procedures and build relationships with children (Silva et al., 2017). Playing with finger puppets, a therapeutic tool in the preoperative period, can be an effective strategy to reduce anxiety in children undergoing surgery (Athanassiadou et al., 2012). In addition to studies showing that puppets are an effective communication tool in the field of pediatric nursing, the number of studies documenting that puppets are effective in reducing preoperative and postoperative anxiety is limited (Sposito et al., 2016; Ullan & Belver, 2019).

Control groups

No intervention was applied to the control group as there was no distraction procedure applied in the unit where the research was to be conducted.

Post intervention procedure

The scale forms were administered to the children included in the study within 5–10 min.

Data analysis

IBM SPSS Statistics for Windows (Version 23.0. Armonk, NY: IBM Corp.) program was used to evaluate the data. Mean and percentage calculations were used to evaluate descriptive data. Mann-Whitney *U* test and Kruskal-Wallis test were used to compare the mean m-YPAS scores of the children according to the groups. The rate of interventions predicting the change in children's anxiety levels was evaluated by linear regression analysis. Tolerance and variance inflation values (VIF) were used to determine whether there was a multicollinearity between the interventions and m-PAS and whether regression analysis could be performed with the variables. Independent variables with VIF values below 10, tolerance values above 0.2 and condition index values below 15 were included in the regression analysis. The power and effect size of the study were calculated based on regression analysis. The results were evaluated at 95% confidence interval and significance level $p < 0.05$.

Results

The mean ages of the children participating in the study were 7.90 ± 2.65, 7.05 ± 1.49, 7.68 ± 1.24, and 8.05 ± 1.47 in the control, kaleidoscope, finger puppet, and distraction card groups, respectively. It was found that 70%, 72.7%, 86.4% and 85.7% of the parents who provided care to the children from the hospital were mothers in the control, kaleidoscope, finger puppet and distraction card groups, respectively. The mean ages of the parents of the children who participated in the study were 33.01 ± 5.18, 31.14 ± 5.69, 29.36 ± 4.21 and 33.00 ± 5.14 in the control, kaleydescope, finger puppet and distraction card groups, respectively. When the genders of the children participating in the study were analyzed, it was found that 50%, 54.5%, 40.9% and 42.9% of the children in the control, kaleydeskop, finger puppet and distraction card groups, respectively, were male. When the surgery performed on the children was analyzed, it was determined that 25%, 54.5%, 36.9% and 9.52% of the children in the control, kaleydeskop, finger puppet and distraction card groups, respectively, were circumcised. Descriptive characteristics of the children and their parents are given in Table 1.

The mean scores of the children in the kaleidoscope, finger-tapping, distraction card and control groups before and after the intervention are given in Table 2. It was determined that there was a statistically significant difference between the pre- and post-intervention m-YPAS activity sub-dimension (U = 3.245; $p < 0.001$), vocalization sub-dimension (U = 4.141; p < 0.001), expressing emotions sub-dimension (U = 3.421; p < 0.001), alertness sub-dimension (U = 3.441; p < 0.001) and total mean scores sub-dimension (U = 7.901; p < 0.001) of the children in the Kaleidoscope group. It was determined that there was a statistically significant difference between the m-YPAS activity sub-dimension (U = 3.464; p < 0.001), vocalization sub-dimension (U = 4.242; p < 0.001), expressing emotions sub-dimension (U = 3.505; $p < 0.001$), alertness sub-dimension (U = 3.745; p < 0.001) and total mean scores sub-dimension (U = 7.945; $p < 0.001$) of the children in the finger puppet group before and after the intervention. It was determined that there was a statistically significant difference between the pre- and post-intervention m-YPAS activity sub-dimension (U = 3.516; $p < 0.001$), vocalization sub-dimension (U = 4.516; p < 0.001), expressing emotions sub-dimension (U = 3.566; p < 0.001), alertness sub-dimension (U = 3.906; p < 0.001) and total mean scores sub-dimension (U = 7.996; p < 0.001) of the children in the distraction card group. There was no statistically significant difference between the pre- and post-intervention m-YPAS activity sub-dimension (KW = 3.524; $p = 0.599$), vocalization sub-dimension (KW = 4.900; $p = 0.914$), expressing emotions sub-dimension (KW = 3.655; $p = 0.622$), alertness sub-dimension (KW = 3.350; $p = 0.674$) and total mean scores sub-dimension (KW = 8.290; $p = 0.547$) of the children in the control group.

It was examined whether there was a difference between the mean total scores of the kaleidoscope, finger puppet, distraction card and control groups of the children participating in the study before and after the intervention. There was no statistically significant difference between the pre-intervention m-YPAS activity sub-dimension (KW = 4.569; $p = 0.567$), vocalization sub-dimension (KW = 3.609; $p = 0.345$),

Table 1
Descriptive characteristics.

Descriptive Characteristics	Control group		Kaleidoscope Group		Finger puppet group		Distraction card group	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Age of the child	7.90	2.65	7.05	1.49	7.68	1.24	8.05	1.47
Age of the caregiver parent	33.01	5.18	31.14	5.69	29.36	4.21	33.00	5.14
Number of brothers and sisters	1.20	0.89	1.68	1.21	1.18	1.00	1.76	1.13
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Gender								
Boy	10	50.0	12	54.5	9	40.9	9	42.9
Girl	10	50.0	10	45.5	13	59.1	12	57.1
Day Surgery Operation								
Tonsillectomy	7	35.0	7	31.8	3	13.6	5	23.8
Circumcision	5	25.,0	12	54.5	8	36.4	2	9.52
Fracture repair	3	15.0	–	–	1	4.5	6	28.6
Bilateral ventilation tube	–	–	–	–	2	9.1	–	–
Adenoidectomy	2	10.0	2	9.1	5	22.7	5	23.8
Adenotonsillectomy	1	5.0	1	4.5	3	13.6	–	–
Appendectomy	2	10.0	–	–	–	–	3	14.3
Presence of chronic disease								
Yes	4	20.0	2	9.1	5	22.7	3	14.3
No	16	80.0	20	90.9	17	77.3	18	85.7
If yes, the name of the chronic disease								
No	16	80.0	20	90.9	17	77.3	18	85.7
Asthma	3	15.0	2	9.1	5	22.7	2	9.5
Type 1 diabetes	–	–	–	–	–	–	1	4.8
Hyperactivity and attention disorder	1	5.0	–	–	–	–	–	–
Caregiving parent								
Father	6	30.0	6	27.3	3	13.6	3	14.3
Mother	14	70.0	16	72.7	19	86.4	18	85.7

SD: Standard deviation.

Table 2
Comparison of the mean scores of the children according to the groups.

m-YPAS	Time	Kaleidoscope group	Finger puppet group	Distraction card group	Control group	*KW*	p
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
Activity	Pre-test	3.51 ± 1.54	3.40 ± 1.36	3.38 ± 1.68	3.44 ± 1.46	3.512	0.567
	Post-test	1.42 ± 0.62	1.62 ± 0.74	1.80 ± 0.50	3.23 ± 1.28	4.569	0.000
U		3.245	3.464	3.516	3.524		
p		0.000	0.000	0.000	0.599		
Vocalization	Pre-test	5.31 ± 1.34	5.23 ± 1.36	5.34 ± 1.96	5.18 ± 1.16	3.609	0.345
	Post-test	1.72 ± 0.66	1.96 ± 0.89	2.08 ± 0.92	5.13 ± 1.23	6.773	0.000
U		4.141	4.242	4.516	4.900		
p		0.000	0.000	0.000	0.914		
Emotional expressivity	Pre-test	3.44 ± 1.46	3.30 ± 1.22	3.28 ± 1.78	3.34 ± 1.36	1.497	0.462
	Post-test	1.22 ± 0.62	1.46 ± 0.72	1.58 ± 0.75	3.28 ± 1.18	1.164	0.000
U		3.421	3.505	3.566	3.655		
p		0.000	0.000	0.000	0.622		
State of arousal	Pre-test	3.16 ± 1.64	3.22 ± 1.02	3.29 ± 1.74	3.36 ± 1.32	1.228	0.507
	Post-test	1.12 ± 0.42	1.26 ± 0.66	1.48 ± 0.95	3.32 ± 1.26	3.246	0.000
U		3.441	3.745	3.906	3.350		
p		0.000	0.000	0.000	0.674		
General anxiety	Pre-test	63.44 ± 10.43	63.30 ± 10.12	63.28 ± 11.18	63.34 ± 11.06	4.017	0.921
	Post-test	21.22 ± 6.65	22.46 ± 6.74	23.58 ± 6.76	62.28 ± 10.78	5.484	0.000
U		7.901	7.945	7.996	8.290		
p		0.000	0.000	0.000	0.547		

m-YPAS: Modified Yale Preoperative Anxiety Scale Child Form; SD: Standard deviation; *U*: Mann Whitney U test; *KW*: Kruskal Wallis Test.

expressing emotions sub-dimension (KW = 1.497; $p = 0.462$), alertness sub-dimension (KW = 1.228; $p = 0.507$) and total mean scores sub-dimension (KW = 4.017; $p = 0.921$). After the intervention, it was determined that there was a statistically significant difference between the activity sub-dimension (KW = 4.569; $p < 0.001$), vocalization sub-dimension (KW = 6.773; $p < 0.001$), expressing emotions sub-dimension (KW = 1.164; $p < 0.001$), alertness sub-dimension (KW = 3.246; $p < 0.001$) and total mean scores sub-dimension (KW = 5.484; $p < 0.001$, Table 2).

The rate of influence of the changes in preoperative anxiety levels of children who participated in the kaleidoscope, finger puppet and distraction card intervention program was examined (Table 3). The kaleidoscope intervention explained 32% (R2 = 0.322) of the decrease in the m-YPAS level, and the kaleidoscope intervention decreased the m-YPAS score by 0.649 times ($\beta = -0.649$). While the finger puppet intervention explained 25% (R2 = 0.259) of the decrease in m-PAS level, the finger puppet intervention decreased the m-YPAS score by 0.598 times ($\beta = -0.598$). While the distraction intervention program explains 21% (R2 = 0.215) of the decrease in the m-YPAS level, the distraction intervention program decreases the m-YPAS score by 0.410 times ($\beta = -0.410$).

The power and effect size of the study were evaluated according to regression analysis. For the kaleidoscope intervention, the power of the study was 0.95 and the effect size (f2) was 0.790. For the finger puppet intervention, the power of the study was 0.89 and the effect size (f2) was 0.680. For the distraction card intervention, the power of the study was 0.71 and the effect size (f2) was 0.590.

Discussion

A diverse array of therapeutic modalities are employed to alleviate anxiety in children, encompassing music therapy, yoga, kaleidoscope imagery, finger puppet interventions, and the use of distraction cards (Chow et al., 2016; De Moura et al., 2016; Unver & Yıldırım, 2013). Literature extensively examines the impact of these methods on mitigating fear, anxiety, and pain in pediatric populations, albeit with a predominant focus on invasive procedures such as blood sampling and port needle insertions. However, research investigating the efficacy of these interventions specifically for preoperative anxiety remains relatively scarce (Akgun Kostak et al., 2021; Ayan, 2019; Canbulat Sahiner & Turkmen, 2019; Dehghan et al., 2017; Erdogan & Aytekin Ozdemir, 2021; Koç Ozkan & Polat, 2020; Silva et al., 2017; Sparapani et al., 2013; Tork et al., 2017; Tufekci et al., 2009). The existing studies concerning these methods are relatively recent and frequently concentrate on the efficacy of singular or paired interventions. This study represents a pioneering effort in investigating the

Table 3
The power of intervention programs to predict the change in preoperative anxiety level according to children's self-assessment.

Variable	Kaleidoscope group*			Finger puppet group*			Distraction card group*		
	B	SE	β	B	SE	β	B	SE	β
m-YPAS	−2.227	0.443	−0.649	−2.500	1.112	−0.598	−3.400	2.112	−0.410
			t: −5.122			*t: −2.604*			*t: −2.704*
			p:0.000			*p:0.013*			*p:0.011*
R			**0.649**			**0.398**			**0.410**
R^2			**0.322**			**0.259**			**0.215**
Adjusted R^2			**0.405**			**0.135**			**0.172**
F			**26.231**			**6.763**			**6.893**
P			**0.000**			**0.013**			**0.011**
DW			**1.509**			**1.860**			**1.910**

m-YPAS: Modified Yale Preoperative Anxiety Scale Child Form; DW: Durbin Watson; B: Unstandardized Beta; SE: Standard Error; β: Standardized Beta β; R: Correlation; R2: Correlation Coefficient (Explained Variance Rate); F: Model Statistic; p: Significance Level.

* When coding the study program, the intervention group was coded as "1" and the control group as "0."

effects of three distinct methods (finger puppets, distraction cards, and kaleidoscope) imagery on the anxiety levels of children undergoing day surgery.

In this study, it was observed that while the pre-test mean scores of children in the kaleidoscope, finger puppet, distraction cards, and control groups were similar, the post-test mean scores of the kaleidoscope, finger puppet, and distraction cards groups were higher than the pre-test mean scores, and there was a statistically significant difference between the pre-test and post-test mean scores ($p < 0.001$; Table 2). The most important reason for the difference in mean scale scores between the intervention groups and the control group is thought to be the use of distraction methods that target many different sensory areas to reduce preoperative anxiety in children. Literature findings indicate that distraction methods are an effective approach (Akgun Kostak et al., 2021; Canbulat et al., 2014; Dehghan et al., 2017; Koç Ozkan & Polat, 2020; Tufekci et al., 2009). Invasive and procedural interventions, particularly surgical procedures, often evoke anxiety in children (Gunay et al., 2017).

Distraction methods have the potential to mitigate potential long-term psychological and physiological repercussions of anxiety in children (Aytekin et al., 2016; Liang et al., 2021). A proficiently executed distraction technique, effectively managing the child's anxiety, can positively influence the child's receptiveness to subsequent medical interventions (Aytekin et al., 2016; De Moura et al., 2016; Liang et al., 2021). In the study of Goktas and Avci (2023), kaleidoscope, music therapy and virtual reality were applied as distraction methods to children who underwent invasive procedures, and it was concluded that all three methods were effective in reducing the anxiety level in children before the invasive procedure (Goktas & Avci, 2023). In another study, virtual reality application was used as a distraction method in children planned for circumcision and was found effective in reducing the level of anxiety (Buyuk et al., 2021). It is seen that different distraction methods are used in the studies in the literatüre In this study, it was seen that kaleidoscope, finger puppet and distraction cards were effective in reducing the child's preoperative anxiety and similar results were obtained with the literature.

In this study, kaleidoscope, finger puppet, and distraction cards accounted for 32%, 25%, and 21% of the reduction in mean total m-PAS scores among children, respectively (Table 3, $p < 0.001$). Literature indicates that investigations assessing the efficacy of various distraction techniques predominantly focus on children undergoing intravenous access and blood sampling procedures (Erdogan & Aytekin Ozdemir, 2021; Tork et al., 2017; Tufekci et al., 2009). Furthermore, while individual studies demonstrate the effectiveness of the three methods in alleviating preoperative anxiety (Aytekin et al., 2016; Bulut et al., 2020; Suzan et al., 2020; Tuncay & Tufekci, 2023), there is a lack of research elucidating the extent to which each method contributes to the reduction in preoperative anxiety levels. Aytekin et al. (2016) demonstrated the efficacy of distraction methods administered in the operating room for reducing preoperative anxiety (Aytekin et al., 2016). In the study by Bulut et al. (2020), while the effectiveness of kaleidoscope in reducing postoperative anxiety was found, its efficacy in alleviating preoperative anxiety was not measured (Bulut et al., 2020). In the study by Suzan et al. (2020), it was concluded that puppet shows implemented with finger puppets were effective in reducing anxiety in children during surgery (Suzan et al., 2020). In the study by Tuncay and Tufekci (2023), it was determined that therapeutic puppet intervention implemented with finger puppets was effective in reducing preoperative anxiety in male children undergoing circumcision (Tuncay & Tufekci, 2023). It is hypothesized that kaleidoscope, finger puppet, and distraction cards, established as effective interventions in the literature, are significant measures for mitigating preoperative and postoperative anxiety in children. The findings indicating that these three methods collectively accounted for 32%, 25%, and 21% reductions in the mean total score of m-YPAS in this study underscore their importance. Consequently, this study is regarded as a pivotal contribution to understanding the impact of kaleidoscope, finger puppet, and distraction card interventions in alleviating preoperative anxiety among children.

In this study, power and effect size were computed through regression analysis. Power denotes the statistical significance of the study, whereas effect size offers insights into its practical or clinical significance (Cohen, 1992). In the literature, effect sizes (f2) are defined as $0.02 \geq f2 < 0.15$ as small effect, $0.15 \geq f2 < 0.35$ as medium effect and $0.35 \geq$ large effect (Ellis, 2010). In this study, when these values are taken into consideration, it is seen that kaleidoscope, finger puppet and distraction card methods have a strong effect size in reducing preoperative anxiety in children. In the studies examining the effect of the three methods on preoperative anxiety in the literature, no comparison could be made because power and effect size were not examined. The high effect size in this study reveals that the interventions have high application significance and are feasible and effective interventions; however, the results of this study are only valid for the population studied.

Limitations

This study has several limitations. Firstly, it was conducted at a single institution, which hinders the generalization of the findings. Secondly, the interventions in this study were only applied to children undergoing day surgery procedures, so the results may be particularly applicable to children undergoing day surgery operations. In future studies, it may be recommended to conduct studies on children who underwent a single surgical operation. Furthermore, it is postulated that the outcomes of this study might have been influenced by diverse sample-related factors such as individual characteristics, social support mechanisms, parental anxiety levels, among others. To enhance methodological robustness in subsequent investigations, it is advised to undertake randomized controlled trials wherein potential confounding variables associated with pediatric participants are meticulously controlled. Lastly, this study was conducted with children aged 6–12 years. Therefore, the research findings cannot be generalized to children aged 0–5 years and 13–18 years.

Contribution to nursing practice

In this study, it has been observed that therapeutic methods such as kaleidoscope, finger puppet, and distraction cards are effective in reducing preoperative anxiety in children undergoing day surgery procedures. This finding can be interpreted as significant and positive in demonstrating that anxiety induced by surgical procedures in children can be effectively managed with non-pharmacological methods. Therefore, healthcare professionals working in the field of pediatrics are recommended to utilize all three methods before surgical procedures. Additionally, it is suggested that further research should investigate the superiority of various therapeutic play interventions in reducing preoperative anxiety in children undergoing both day and major surgical procedures. Furthermore, future studies may consider evaluating not only the contribution of distraction methods to reducing both preoperative and postoperative anxiety but also assessing the cost-effectiveness of implementing these methods across all pediatric surgical clinics.

Conclusion

In this study, kaleidoscope, finger puppet and distraction card interventions applied to children scheduled for outpatient surgery were found to be effective in reducing preoperative anxiety. It is recommended that further studies be conducted on the effectiveness of the three methods and that other variables that may affect the child's anxiety be addressed. Although the study findings are valid only for the population studied, it is recommended to evaluate the effectiveness of the

three methods in different populations or larger sample groups. Conducting intervention studies in which these methods will be applied, especially in a randomized controlled design, can increase the effectiveness and applicability of the results. Therefore, it is important to continue studies to evaluate the effectiveness of different distraction methods in reducing preoperative anxiety in children.

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Ethical statement

Before starting the research, permission was obtained by e-mail from the owner of the scale used in the research. Institutional permission was obtained to conduct the study. The study was approved by the Non-Interventional Clinical Research Ethics Committee of a university (Date: 30.03.2023; Decision No: 3/12). The purpose and scope of the study were explained to the children and their parents using the 'Informed Voluntary Consent Form'. Data were collected from children who volunteered to participate in the study. Children and parents were informed that they could leave the study at any time without giving any reason.

NOTE: One of the researchers, AAK, has a doctorate degree in pediatric nursing and works as an associate professor. FB and SŞ are undergraduate students in the field of nursing. This project was carried out under the consultancy of AAK within the scope of "TÜBİTAK 2209-A - University Students Research Projects Support Program" AAK is a researcher who has many national and international studies in the field of pediatric nursing. The researchers are not affiliated with any clinic. This information is included on the title page.

CRediT authorship contribution statement

Fatma Gül Bayar: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Sümeyye Şen:** Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Aslı Akdeniz Kudubes:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors have no conflicts of interest to disclose.

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