

Effect of Psychological Preparation on Coping Strategies of children Undergoing Endoscopy

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Abstract: Background: Nowadays endoscopies become routine clinical procedures which produce intense anxiety, stress and dissatisfaction for children. **Purpose:** to evaluate the effect of psychological preparation on coping strategies of children undergoing endoscopy. **Research design:** A quasi experimental design. It was conducted at endoscopy unit of National Liver Institute Menoufia University. **Sample:** A convenient sample of 22 children who had liver diseases and undergoing endoscopy. **Instruments:** five data collection instruments were used; characteristics structured questionnaire, Physiological evaluation sheet, Children's Coping Strategies Checklist (CCSC), Spielberg State-Trait Anxiety Inventory (SSTAI) and Model for End Stage Liver Disease (MELD) Score. **Results:** there was highly statistical significant difference in coping between study and control group on posttests ($p < .001$). As well, there was highly statistical significant difference in anxiety level between study and control group on posttest ($p < .01$). **Conclusion:** children in the study group who are engaged in psychological preparation exhibited more effective coping strategies, lower anxiety level on posttests than patients in the control group. **Recommendations:** The study recommended that psychological preparation should be importantly integrated in endoscopic units as a routine care to enhance children ' coping strategies and lower the negative consequences of this stressful experience.

Key words: Coping, Psychological Preparation, Endoscopy

Introduction

Endoscopy is one of the most frequently performed procedures in medicine today. Gastrointestinal endoscopy is highly stressful procedure associated with anxiety. Endoscopy is a highly real-life stressor. Although,

numerous studies document the efficacy of psychological preprocedure preparation for children and adolescents, implementation of these interventions remains inconsistent. So that, there was an urgent need for the

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exploration and development of interventions to relieve fears and worries concerning this stressful intrusive procedure (Naseri-Salahshour et al., 2019).

In the United States, 228,000 biliary endoscopies were performed in 2009 as an emergency diagnostic procedure for children (Peery et al., 2012). The number of first-time pediatric esophagogastroduodenoscopy (EGD) procedures rose dramatically from 107 in 1985 to 1294 in 2005 (Franciosi et al., 2010). However, there is a major advance in pediatric endoscopies combined with increasing indications which result in an increased number of endoscopic procedures performed in infancy. Indeed, there is no statistics about children undergoing gastrointestinal endoscopy in Egypt. But, in the National Liver Institute children who undergo endoscopy were about 180 in October, November and December 2021.

Endoscopy is a stressful and anxiety provoking experience for children. The majority of children experience significant preprocedure anxiety which intern can affect their recovery. Preprocedure anxiety may bring about physical and psychological changes in children. Physical symptoms are heart palpitations, tremors, dizziness, nausea, fatigue and insomnia. Psychological symptoms are tension, nervousness, fear, irritability, agitation, restlessness and concentration difficulties. So that, it is essential to use the age appropriate and individualized methods in preparing children for invasive medical procedures (Aranha, Sams, & Saldanha, 2017).

The effects of stress due to invasive medical procedures such as endoscopy are multifaceted, resulting in physiological, emotional, cognitive, behavioral, and interpersonal changes.

Physiological effects reflect sympathetic activation and include elevated heart rate, respiratory rate, blood pressure, and skin temperature. Emotional responses include anger, fear, and depression. These emotions can result in cognitive changes, particularly changes in information processing that result in an overly pessimistic or hopeless outlook. Behavioral responses can include avoidance, soothing behaviors (nail biting, thumb sucking, or hypervigilance), resistance, restlessness, and/or inability to concentrate. Interpersonal changes include alterations in communication, perceptions of others, and group functioning. That's why children need more preparation and training for coping with medical procedures (Tong, Turpin, & Uzark, 2003).

The National Institute for Health Clinical Guidelines concluded that preoperative psychological preparation is effective in reducing anxiety for children. However, how to best provide this psychological preparation is currently debated (Aranha et al., 2017)

So, psychological preparation for children undergoing endoscopy is an intense need and one of the most important nursing interventions for these children. It has beneficial effects for the child. It helps in understanding his/her illness and treatment options, corrects any misconceptions or fantasies that a child may have, gives a child an opportunity to express his/her feelings (i.e., anxiety, fear), encourages a child to trust in hospital staff, reduce the short- and long-term psychological effects of hospital admission and enhance coping with stress of endoscopic procedure, then the recovery of the child is speeded (Tanaka et al., 2011).

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Preparation for endoscopy in pediatric patients requires attention to physiologic issues as well as emotional and psychosocial issues in both the patient and the parent or guardian. Some of the anxiety engendered by endoscopy stems from preprocedure elements of intravenous line placement and separation from parents. Provision of optimal age-appropriate information and counseling to the patients and their parents aids in procedure tolerance by the child (Lightdale et al., 2014).

Parents and children often have intense anxiety during the procedure so that, Understanding the methods and preparations for gastrointestinal endoscopy can assist the child and their family in order to better cope with the procedure and allow for the procedure to be performed smoothly and elicit satisfactory results. Psychological preparation for endoscopy in pediatric patients should consider the physiological, psychosocial and emotional characteristics of pediatric patients, as well as the reactivity of their parents. For young children, Parents' presence is necessary before the procedure and during the anesthesia-induction period. For older children procedural counseling significantly reduces the anxiety in the patient and can generate considerable effects on the patients' behavior throughout the procedure (Diaconescu et al., 2015).

Stress levels are often heightened because the process of anesthesia can be difficult to comprehend for school age children and younger because it is abstract in nature. Psychosocial preoperative preparation can enhance coping and minimize the potential stress children may experience in the preoperative setting. Psychosocial preoperative preparation in pediatrics has been seen to lower children's stress levels, enhance understanding, increase

compliance, decrease length of time in recovery, and decrease analgesic use. preoperative preparation that addresses children's psychological or psychosocial needs is not offered everywhere (Fricke, 2021).

Further, Psychological preparation utilizes demonstration and explanations of events that will occur during the child's procedure. This can significantly reduce the child's and the family's anxiety levels and increase their coping skills. Providing developmental psychological preparation before endoscopy should carefully base on level of cognitive development of pediatric patient. Use of appropriate approaches based on developmental stages can provide a more comfortable, less stressful procedure experience and positive coping (Ercan, 2003b). Consequently, we conducted the present study to evaluate the effect of developmental psychological preparation on coping strategies of pediatric patients undergoing endoscopy.

Purpose:

The purpose of this study is to evaluate the effect of psychological preparation on coping strategies of children undergoing endoscopy.

Research Hypothesis:

1. Patients in the study group who engaged in psychological preparation will exhibit more adequate coping strategies on posttest than patients in the control group.
2. Patients who are engaged in psychological preparation (study group) will exhibit more adequate coping strategies on posttest than pretest.
3. Patients in the study group who are engaged in psychological preparation will exhibit less anxiety

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level on posttest than patients in the control group.

4. patients who are engaged in psychological preparation (study group) will exhibit less level of anxiety on posttest than pretest.

Methods

Research Design:

A quasi-experimental design (study and control groups) was utilized for this study.

Research Setting:

This study was conducted at Endoscopy unit in the National Liver Institute Menoufia University.

Sampling:

A convenient sample of 22 children who had liver diseases were undergoing endoscopy included in the current study.

The sample was divided randomly into study group who received psychological preparation on coping strategies and control group who only received routine hospital care. Eleven children were included in each group.

Instruments: -

Five instruments were utilized for data collection: -

Instrument one: characteristics structured questionnaire:

It was developed by the researcher to collect data about children. It includes child's name, age, diagnosis, educational level, indication for endoscopy and previous experience of endoscopy or any other medical procedure.

Instrument two: Physiological evaluation sheet:

It was developed by Lee et al. (2006). It included assessment of heart rate and breathing rate. Heart rate and breathing

rate were used to evaluate the effects of psychological preparation on the suppression of stress in children.

Instrument three: Children's Coping Strategies Checklist (CCSC):

It was developed by Ayers and Sandler (1999) and adapted by the researcher according of review literature. It was a self-report inventory in which children described their coping efforts. It was used for children aged from 9 to 14 years to evaluate the cooperation levels and self-coping behaviors of them. It included active coping, distraction strategies, avoidance strategies, and support seeking strategies ($\alpha=0.86$).

The Scoring system for each item as follows:

Scoring items	Score
Most of the time	4
Often	3
Sometimes	2
Never	1

Total scoring system for children's coping strategies checklist:

Scoring items	Score
Poor Coping (< 60%)	20-48
Good Coping (\geq 60%)	49-80

Instrument four: Spielberg State-Trait Anxiety Inventory:

It is likert scale that was developed in 1970 by Spielberg and colleagues. This scale was translated into Arabic and modified by Ibrahim (2015). It was used to evaluate the children's (6-14 years old) feelings of apprehension, tension, nervousness, and worry. It consisted of 20 statements such as I feel calm, I feel secure, ect..... which indicated how persons felt at the moment in a certain situation ($\alpha=0.90$).

The Scoring system for each statement:

Scoring items	Score
Not at all	1
Some what	2
Moderately	3
Very much	4

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Total scoring system for Spielberg State-Trait Anxiety Inventory:

Scoring items	Score
Not anxious	1-20
Mild anxiety	21-40
Moderate anxiety	41-60
sever anxiety	More than 61

Instrument five: Model for End Stage Liver Disease (MELD):

It is a liver disease severity scoring system for children older than 12 years. It was adopted from Kamath and Kim (2007). It was used to exclude bias due to severity of child's liver disease. It was calculated from the patient's values of serum Creatinine, serum Bilirubin and INR. It was estimated according to the following formula:

$$\text{MELD Score} = 3.78 \times \ln [\text{serum bilirubin (mg/dL)}] + 11.2 \times \ln [\text{INR}] + 9.57 \times \ln [\text{serum creatinine (mg/dL)}] + 6.43$$

A higher score means a more serious condition.

Validity

For validity assurance, the five instruments were submitted to a jury of five experts in the pediatric field (three professors in Pediatric Nursing and two professors in Pediatrics) to modify any required items of the instruments. All required modifications were done.

Ethical considerations

An official approval was obtained from the Ethical Research Committee in the Faculty of Nursing, Menoufia University. A written consent was obtained from nurses who participated in the study. An initial interview was done to inform participants (nurses, children and parents) about the purpose, benefits of the study and explain that participation in the study was voluntary and the participants

could withdraw from the study at any time without penalty.

Pilot study

It was carried out on 3 children (10% of the sample) to test the practicability, applicability and to estimate the needed time to fill the instruments. The results of the data obtained from the pilot study helped in the modification of the study instruments where some items were modified. The researcher modified instrument three. All children involved in the pilot study were excluded from the study sample.

Procedure

1. Prior to data collection, a written permission to carry out the study was obtained from the director of Pediatric Endoscopy Department at National Liver Institute.
2. Data collection was conducted for a period of 6 months extending from October 2020 to the end of March 2021.
3. The researcher introduced herself to the children's care givers and adolescents, who participated in the study, explained the purpose of study and methods of data collection.
4. The researcher interviewed Participants and care givers to assess their Social characteristics by using instrument one. Assessment of heart rate and respiratory rate also done by using instrument two (pretest).
5. Instrument three and instrument four were utilized to assess their coping strategies and anxiety level before endoscopy procedure (pretest).
6. Values of serum creatinine, serum bilirubin and international normalized ratio (INR) were recorded. The researchers calculated the MELD score by using online

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MELD score calculator after entering these values.

7. Adolescents were divided equally into study and control groups. Psychological preparation before endoscopy procedure was provided for the study group. While, the control group received only routine hospital care.
8. Adolescents $12 \leq 18$ years provided with a well-designed booklet that have all information about what will happen before, during and after upper and lower gastrointestinal endoscopy. The procedure was explained to them by the researcher. The booklet contained coping skills (conscious breathing, progressive muscle relaxation and guided imagery). The researcher demonstrated coping skills' techniques for adolescents and allowed them to re-demonstrate techniques and apply it while waiting for endoscopy and during any stressful situations facing them in the future.
9. The researcher also evaluated adolescents coping strategies and anxiety level by using instrument three and instrument four (posttest). heart rates and respiratory rates were evaluated by using instrument two (posttest).

Statistical analysis:

Data was coded and transformed into specially designed form to be suitable for computer entry process. Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 22. Graphics were done using Excel program. Quantitative data was presented by mean (\bar{x}) and standard deviation (SD). It was analyzed by using student t-test for comparison between means and ANOVA (F) test for comparison between more than two means.

Qualitative data was presented in the form of frequency distribution tables, number and percentage. It was analyzed by using chi-square (χ^2) test. However, if an expected value of any cell in the table was less than 5, Fisher Exact test was used (if the table was 4 cells), or Likelihood Ratio (LR) test (if the table was more than 4 cells). Pearson correlation was used for explaining relationship between normally distributed quantitative variable. A statistical significant difference was considered if P value < 0.05 . A highly statistical significant difference was considered if P value < 0.01 . A very highly statistical significant difference was considered if P value < 0.001 .

Results

Table 1:- shows social characteristic of children in the study and control groups. It was obvious from this table that about two thirds of studied children (62.0%) were males (in the study and control group). The main diagnosis of 26.0% of children in the study group was portal vein thrombosis. Meanwhile, 28.0% of children in the control group were diagnosed biliary atresia and underwent Kasai operation (post kasai).

Table 2:- shows mean and standard deviations of the level of coping for children ($12 \leq 18$ years) in the study and control groups on pre and posttests. As clarified in the table, while, the mean and standard deviation of the level of coping for children ($12 \leq 18$ years) in the study group pre and post intervention was 42.20 ± 11.06 compared to 62.20 ± 7.81 respectively. So, there was very highly statistical significant difference between pre and posttest in study group ($p < .001$). The mean of the level of coping for children ($12 \leq 18$ years) in the study and control group on pretest was 42.20

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± 11.06 compared to 44.33 ± 10.59 respectively. So, there was no statistical significant difference between the study and control group on pretest. The mean and standard deviation of the level of coping for children ($12 \leq 18$ years) in the study and control group on posttest was 62.20 ± 7.81 compared to 43.50 ± 10.78 respectively. So, there was very highly statistical significant difference between study and control group on posttest ($p < .001$).

Table 3:- illustrate level of coping in children $12 \leq 18$ years in the study and control group on pre and posttests. The majority of studied children $12 \leq 18$ years old (100%) had high level of coping on posttest in the study group. So, there was a statistical significant difference between pre and post intervention in study group ($p < .05$). However, there was no statistical significant difference between pre and post intervention in control group. So, there was a highly statistical significant difference between children in the study and control group on posttest ($p < .01$).

Table 4:- represented Pearson correlation between MELD score and childrens' ($12 \leq 18$ years) coping strategies in the study and control groups. There was no statistical significant correlation between MELD score and children's coping strategies in the study group at 5% level of statistical significance. While, there was a statistical significant negative correlation between MELD score and children's coping strategies in the control group. This could reflect the lower severity of liver disease the higher the level of coping. So, there was a statistical significant difference between MELD score and coping strategies for children $12 \leq 18$ years in control group ($p < .05$).

Table 5:- shows mean of state-trait anxiety (STAI) for children $12 \leq 18$ years old in the study and control group pre and posttests. As clarified in the table, mean of state-trait anxiety (STAI) for studied children $12 \leq 18$ years old in the study group pre and posttests was 57.00 ± 8.23 compared to 46.50 ± 12.33 respectively. So, there was highly statistical significant difference between pre and posttests in the study group ($p < .01$). The mean of state-trait anxiety (STAI) for children $12 \leq 18$ years old in the control group on pre and post intervention was 53.00 ± 6.52 compared to 59.08 ± 7.79 respectively. So, there was statistical significant difference between pre and posttest in the control group ($p < .01$). The mean of state-trait anxiety (STAI) for children in the study and control group on post intervention was 46.50 ± 12.33 compared to 59.08 ± 7.79 respectively. So, there was a highly significant statistical difference between study and control group on posttest ($p < .01$).

Table 6:- illustrate level of state-trait anxiety (STAI) for studied children in the study and control group on pre and posttests. Less than one third (30%) of children had severe anxiety on pretest versus none on posttest in the study group. So, there was a statistical significant difference between pre and posttests in the study group ($p < .05$). But, 41.7% had severe anxiety on posttest versus 25% on pretest in the control group. On the other hand, none of children (0.0%) versus 41.7% had severe anxiety on posttest in study and control group respectively. So, there was a highly statistical significant difference between study and control groups on posttest ($p \leq .01$).

Table 7:- represented Pearson correlation between MELD score and state-trait anxiety in children ($12 \leq 18$ years) in the study and control groups.

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There was no correlation between MELD score and state-trait anxiety in study group. So, there was no statistical significant difference between MELD score and state-trait anxiety in children (12 ≤ 18 years) in the study group (p>.05). While, there was a significant positive correlation between MELD score and state-trait anxiety in the control group. The lower liver disease severity the lower anxiety level. So, there was a statistical significant difference between MELD score and state-trait anxiety for

children (12 ≤ 18 years) in control group (p<.05).

Table 8:- represented Pearson Correlation between state-trait anxiety and age of children (12 ≤ 18 years) in the study and control groups. There was no correlation between state-trait anxiety and age of children in the study and control group. So, there was no statistical significant difference between age and state-trait anxiety for children 12 ≤ 18 years in study and control group (p>.05).

Table (1) Social Characteristics of children in the study and control groups (n=22).

Social Characteristics	Study group (n=10)		Control group (n=12)		Total		X ²	P - value
	No	%	No	%	No	%		
Sex								
Male	6	60	8	66.7	14	63.6	.105 ^{ns}	.746
Female	4	40	4	33.3	8	36.4		
Age								
12 to <14 years	8	80	9	75	17	77.3	.078 ^{ns}	0.781
14 ≤ 18 years	2	20	3	25	5	22.7		
Diagnosis								
portal vein thrombosis	1	10	3	25	4	18.2	.852 ^{ns}	0.935
post kasai	3	30	3	25	6	27.3		
Congenital liver fibrosis	1	10	1	8.3	2	9		
Budcharri syndrome	2	20	2	16.7	4	18.2		
Other pediatric liver diseases	3	30	3	25	6	27.3		
Indication of endoscopy								
Follow up and injection or banding esophageal varices	10	100	12	100	22	100	NA	
Previous experience of endoscopy								
No	1	10	1	8.3	2	9.1	0.018 ^{ns}	0.892
Yes	9	90	11	91.7	20	90.9		

Table (2): Mean and standard deviations of the level of coping for children (12 ≤ 18years) in the study and control groups on pre and posttests (n=22).

Mean and standard deviations of coping strategies	Study group (N=10)	Control group (N=12)	t test	P 2
	X ± SD	X ± SD		
Pre intervention	42.20 ± 11.06	44.33 ± 10.59	-1.959- ns	.064
Post intervention	62.20 ± 7.81	43.50 ± 10.78	4.700***	.000
Paired t test	-6.523-***	.213 ns		
p1	.000	.833		

NB: P1: comparison between pre and posttest for both groups.

P2: comparison between study and control group at pre and posttest.

ns = not significant (p>.05), * = significant (p≤.05).

*** = very highly statistical significant (p≤.001)

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Table (3): Level of coping in children 12 ≤ 18 years in the study and control groups on pre and posttests (n=22).

level of coping for children	Study group(N=10)				Control group(N=12)				X22	X23
	Pre		Post		Pre		Post		P2	P3
	No	%	No	%	No	%	No	%		
Low coping	5	50.0%	0	0.0%	5	41.7%	6	50.0%	.153 ns	9.900**
High coping	5	50.0%	10	100.0%	7	58.3%	6	50.0%	.696	.007
X21	9.091**				.168 ns					
P1	.011				.682					

NB: X²1 & P1: comparison between level of coping on pre and posttest for both groups.
X²2 & P2: comparison between level of coping on study and control group on pretest.
X²3 & P3: comparison between level of coping on study and control group on posttest.
ns = not significant (p>.05), ** = highly significant (p≤01)

Table (4) Pearson correlation between MELD score and childrens' (12 ≤ 18 years) coping strategies in the study and control groups (n=22).

Items	MELD score			
	Study group (N=10)		Control group (N=12)	
	r1	P1	r2	P2
Children's Coping Strategies	.048	.918	-.899-*	.038

Table (5): Mean of state-Trait anxiety (STAI) for children 12 ≤ 18 years old in the study and control groups pre and posttests (n=22).

Spielberg State-Trait Anxiety Inventory	Study group (N=10)	Control group (N=12)	t test	P 2
	X ± SD	X ± SD		
Pre intervention	57.00 ± 8.23	53.00 ± 6.52	1.219 ns	.237
Post intervention	46.50 ± 12.33	59.08 ± 7.79	-3.050-**	.006
Paired t test	3.768**	-2.621-*		
P1	.004	.024		

NB: P1: comparison between mean of state trait anxiety of children pre and posttest for both groups.
P2: comparison between mean of state trait anxiety of children study and control groups on pre and posttest.
ns = not significant (p>.05), *= significant (p≤05),
** = highly significant (p≤ 01),

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Table (6): Level of state-trait anxiety (STAI) for studied children in the study and control group on pre and posttests (N=22).

Level of anxiety	Study group(n=10)				Control group(n=12)				X22	X23
	Pre		Post		Pre		Post		P2	P3
	No	%	No	%	No	%	No	%		
Mild anxiety	0	0.0%	4	40.0%	0	0.0%	0	0.0%	.069 ns	8.969* *
Moderate anxiety	7	70.0%	6	60.0%	9	75.0%	7	58.3%	.793	.011
Severe anxiety	3	30.0%	0	0.0%	3	25.0%	5	41.7%		
X21	7.07*				0.750 ns					
P1	.029				0.386					

Note: X²1 & P1: comparison between pre and post intervention for both groups.
X²2 & P2: comparison between study and control group at pre intervention.
X²3 & P3: comparison between study and control group at post intervention.
ns = not significant (p>.05), * = significant (p≤05), ** = highly significant (p≤01).

Table (7): Pearson correlation between MELD score and state-trait anxiety in children 12 ≤ 18 years in the study and control groups (n=22).

Items	MELD score			
	Study group (N=10)		Control group (N=12)	
	r1	P 1	r2	P 2
Spielberg State-Trait Anxiety	-.025-	.958	.781*	.042

NB: P1: p-value for study group. r1: correlation in study group
P2: p-value for control group. r2: correlation in control group
*Correlation is significant at the 0.05 level (2-tailed).

Table (8): Pearson Correlation between state-trait anxiety and age of children (12 ≤ 18 years) in the study and control groups (N=22).

Items	Age			
	Study group (N=10)		Control group (N=12)	
	r1	P1	r2	P 2
State-Trait Anxiety	-.286	.423	-.158	.624

NB: P1: p-value for study group. r1: correlation for study group
P2: p-value for control group. r2: correlation for control group

Discussion

Children are often difficult and uncooperative patients, their comfort during the procedure is the key for an effective and satisfactory diagnostic or therapeutic endoscopic investigation(Gimiga, Bors, ȘTEFĂNESCU, Iorga, & Diaconescu, 2016). Pediatric endoscopy has become an almost routine invasive

procedure for pediatric gastroenterologists (Cam, 2021). Pediatric procedural anxiety and behavioral distress is a common occurrence across medical procedures and can have long standing negative psychological effects. Therefore, developmental Psychological preparation was shown to have

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beneficial effects among children (Lamparyk et al., 2019). Accordingly, the current study hypothesized that pediatric patients in the study group who are engaged in developmental psychological preparation would exhibit more adequate coping strategies on post intervention than patients in the control group (hypothesis one). In addition, pediatric patients who are engaged in developmental psychological preparation (study group) will exhibit more adequate coping strategies on posttest than pretest (hypothesis two). As well, pediatric patients in the study group who are engaged in developmental psychological preparation would exhibit less anxiety level on post intervention than patients in the control group (hypothesis three). Also, pediatric patients who are engaged in developmental psychological preparation (study group) would exhibit fewer level of anxiety on posttest than pretest (hypothesis four). Fortunately, the present study will investigate the effect of developmental psychological preparation on coping strategies of pediatric patients undergoing endoscopy.

Concerning hypothesis one, the current study revealed that children $12 \leq 18$ years demonstrated significant increase in the level of coping on posttest in the study group than control group. This result agreed with Ercan (2003a) who conducted a study about the effect of psychological preparation on preoperative and postoperative anxiety, and coping strategies in children and adolescents undergoing. They found that children who received information alone or in combination with mothers reported more positive coping strategies than control group. This result was in line with Steinhardt and Dolbier (2008) who conducted a

study about evaluation of a resilience intervention to enhance coping strategies and protective factors and decrease symptomatology. They mentioned that students who received a psychoeducational intervention had more effective coping strategies. Also, it was in line with Tanaka et al. (2011) who conducted a study about evaluation of psychological preparation for children undergoing endoscopy. They found that level of coping behavior was significantly higher in children who received an explanation in combination with a guidebook.

Perhaps, the agreement between the present study and the previously discussed ones could be due to similarities in utilized developmental psychological preparation interventions (e.g. booklet, parental presence, toys, cuddling and patting).

In the same context, the current study found that children $12 \leq 18$ years demonstrated significant increase in the level of coping on posttest than pretest in the study group. This result agreed with Cordray, Patel, and Prickett (2021) who conducted a study about reducing children's preoperative fear with an educational pop-up book. They found that booklet preparation empowered children with positive expectations and coping strategies as they approached surgery. Therefore, they could cope adaptively and have fewer preoperative fears.

Furthermore, it was supported by S. LeRoy et al. (2003) who recommended that information giving and coping-skills training (controlled breathing, progressive muscle relaxation and guided imagery) for children was associated with a positive coping effect on children's stress-related behaviors both during and after hospitalization.

For correlation between MELD score and childrens' coping in the study

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group, there was no correlation. This finding agreed with Hager, Mager, Robert, Nicholas, and Gilmour (2021) who conducted study about health-related quality of life 10 years after liver transplantation. It was reported that no statistical significant association was found between coping and MELD score. Above all, there was a negative correlation between coping and MELD score in the control group. So, this finding contradicted with the previously mentioned study. This could be because control group didn't receive any developmental psychological preparation.

Regarding hypothesis three, this study found that the level of anxiety in children $12 \leq 18$ years was reduced significantly on posttest in study group as compared with control group. This result agreed with Fernandes, Arriaga, and Esteves (2014) who conducted a study about providing preoperative information for children undergoing surgery . It was concluded that providing preoperative materials (e.g. booklet) could reduce children's preoperative worries.

Also, this result was consistent with Katherine Lamparyk et al. (2019) who conducted a study about effects of a psychological preparation intervention on anxiety associated with pediatric anorectal manometry. They found that anxiety was significantly less in children who received child-centric educational video.

Consistently, results of the present study agreed with Alvarez-Garcia and Yaban (2020) who conducted a study about effects of preoperative guided imagery interventions on preoperative anxiety and postoperative pain. It was found that guided imagery preoperative intervention was effective in relieving preoperative state anxiety in children.

In the same context, Härter et al. (2021) conducted study about effects of

educational video on pre-operative anxiety in children. They found that anxiety was significantly reduced in both groups after receiving educational video intervention plus standard information or the standard information only.

Furthermore, this finding agreed with Kaur and Williams (2022) who conducted a study about effectiveness of relaxation technique on level of anxiety before upper gastrointestinal endoscopy. They found that relaxation technique was effective in reducing their anxiety in patients subjected to endoscopy.

Regarding hypothesis four, the current study found that the level of anxiety in children $12 \leq 18$ years in the study group was reduced significantly on posttest than pretest. This finding was similar to Ercan (2003b) who conducted a study about effect of psychological preparation on preoperative and postoperative anxiety, and coping strategies in children and adolescents undergoing surgery. It was clarified that age appropriate psychological preparation decreased anxiety scores in treatment groups.

This finding was in the line with Dai and Livesley (2018) who conducted a study about systematic review of the effectiveness and acceptability of preoperative psychological preparation programmes. They concluded that providing matched information to each parent and child, actively involving children and their parents and teaching them coping skills were the essential hallmarks of a successful preoperative psychological preparation.

As well , this result was in agreement with Volkan, Bayrak, Ucar, Kara, and Yıldız (2019) who conducted a study about preparatory information to reduce gastroscopy-related stress in children and found that anxiety score were significantly reduced in children

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who received information about endoscopy

In addition, results of the current study were consistent with Kim, Chiesa, Raazi, and Wright (2019) who conducted study about a systematic review of technology-based preoperative preparation interventions for child and parent anxiety. They found that preoperative preparation videos were a viable option to decrease preoperative anxiety in children

Furthermore, this finding was in line with Vagnoli, Bettini, Amore, De Masi, and Messeri (2019) who studied the effect of relaxation-guided imagery on perioperative anxiety and pain in children. They found that children in the study group had fewer level of anxiety than children in the control group.

On the other hand, this finding contradicted with Riddhiputra and Ukarapol (2006) who conducted study about the effect of systematic psychological preparation using visual illustration prior to gastrointestinal endoscopy on the anxiety of both pediatric patients and parents. They found that there was no statistical significant difference between anxiety in children who are older than 5 years of age before and after providing systematic information.

As well, this finding contradicted with Tanaka et al. (2011) who conducted study about evaluations of psychological preparation for children undergoing endoscopy. They found that endoscopy caused anxiety in children even when a preparatory guidebook was provided.

In addition, the current study contradicted with Nilsson, Forsner, Finnström, and Mörelius (2015) who conducted a study about relaxation and guided imagery. It was found that they do not reduce stress, pain and unpleasantness for 11 to 12 years old

girls during vaccinations. Furthermore, they couldn't improve their relaxation or reduce anxiety. Also, this finding was similar to Liu, Liu, and Petrini (2018) who conducted study about effect of information of patients' coping style on pre-gastroscopy anxiety. They found that no significant differences were found in state anxiety score in both groups.

Meanwhile, this study found that level of anxiety of children in the control group increased significantly on posttest. This result was in line with Aytakin, Doru, and Kucukoglu (2016) who conducted a study about the effects of distraction on preoperative anxiety level in children. They showed that children in the control group had higher mean score of Spielberg State-Trait Anxiety than children in the study group.

Furthermore, finding in the present study contradicted with Ercan (2003b) who conducted study about the effect of psychological preparation on preoperative and postoperative anxiety, and coping strategies in children and adolescents undergoing surgery. It was found that there was no statistical significant difference in anxiety level in the control group.

The current study found that there was no statistical significant correlation between anxiety and age of children in the study and control group. This finding was consistent with Havis (2021) who conducted study about the effect of age on the success of electronic distraction interventions and found that there was no correlation between anxiety and age of children.

Also, this study agreed with Riddhiputra and Ukarapol (2006) who studied the effect of systematic psychological preparation using visual illustration prior to gastrointestinal endoscopy on the anxiety of pediatric patients and parents. They found that

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there was no a statistical significant impact of childrens' age on the level of anxiety. Also, contradicted with Hazırlık (2015) who stated that young children were at higher risk for preoperative anxiety than older ones.

However, this finding contradicted with Arıcan et al. (2020) who conducted study about anxiety level and risk factors among pediatric patients in endoscopic procedures outside the operating room. They found that young age is an independent risk factor for the development of anxiety in the child.

The current study showed that there was a statistical significant positive correlation between MELD score and state-Trait anxiety in the control group. It meant that the less liver disease severity the less anxiety level and conversely. This finding was in line with García-Rodríguez et al. (2015) who stated that studies showed that more severe liver dysfunction is associated with a higher level of anxiety. However, there was no correlation between MELD score and state-trait anxiety in the study group. So that, this finding contradicted with the previously mentioned study. This contradiction could be due to the developmental psychological preparation that the study group received.

The current study found that heart rate and breathing rate decreased in the study group and increased in the control group. This finding was in line with Meshki, Basir, Alidadi, Behbudi, and Rakhshan (2018) who mentioned that preparing children for dental procedures caused reduced heart rate in children.

On the other hand, results of the current study disagreed with Lamparyk et al. (2019) who conducted a study about effects of a psychological preparation intervention on anxiety

associated with pediatric anorectal manometry. They found that no statistical significant difference between heart rates of children in the study and control group. Also, it contradicted with Liu, Liu, and Petrini (2018) who conducted study about effect of information of patients' coping style on pre-gastroscopy anxiety. They found no statistical significant difference in pulse rate between children in the two groups.

Regarding the effect size of developmental psychological preparation on childrens' coping and anxiety, the current study clarified that developmental psychological preparation had a moderate effect size on children's coping and anxiety. this finding was supported by Eman, Youssria, Nagla, and Naglaa (2016) who conducted study about effect of preparation program on anxiety level of children undergoing endoscopy. They concluded that children undergoing endoscopy had a reduction in anxiety level after receiving the preparation program.

Furthermore, Meletti, Meletti, Camargo, Silva, and Módolo (2019) conducted study about psychological preparation reduces preoperative anxiety in children and revealed that psychological preparation was effective in reducing anxiety level in children. In addition, Dalley and McMurtry (2016) conducted study about educational intervention teaching children coping strategies for managing procedure-related pain and fear and their results suggested that an evidence-based interactive educational program can be effective in teaching young children the procedural coping strategies.

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Conclusion

Based on the results of the present study, it was concluded that children in the study group who engaged in psychological preparation exhibited more adequate coping strategies and less anxiety level on posttest than patients in the control group. Also, children in the study group who engaged in developmental psychological preparation exhibited more adequate coping strategies and less anxiety level on posttest than pretest.

Recommendations

Based on the conclusion of the present study, the following recommendations can be suggested:

1. Ongoing in-service education programs about psychological preparation of pediatric patients before endoscopy should be designed and implemented in all pediatric endoscopy departments to improve nurses' practices and skills.
2. In each hospital, there should be specialized room for psychological preparation of children undergoing endoscopy.
3. Future studies should be applied to evaluate the effect of online developmental psychological preparation on coping strategies of pediatric patients undergoing endoscopy.

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