

## Effect of Developmental Psychological Preparation on Behavioral Distress of Children Undergoing Endoscopy

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**Abstract: Background:** Children routinely undergoing endoscopy experience severe procedural distress accompanying with negative feelings mainly anxiety. **Purpose:** to evaluate the effect of developmental psychological preparation on behavioral distress 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 78 children who had liver diseases and undergoing endoscopy. **Instruments:** four data collection instruments were used; Social characteristics structured questionnaire, Physiological evaluation likert scale, Observational scale for behavioral distress (OSBD) and Pediatric End Stage Liver Disease (PELD) Score. **Results:** there was highly statistical significant difference in behavioral distress between study and control group on posttests ( $p < .001$ ). **Conclusion:** children in the study group who are engaged in developmental psychological preparation exhibited lower behavioral distress level on posttests than patients in the control group. **Recommendations:** The study recommended that developmental psychological preparation should be importantly integrated in endoscopic units as a routine care to lower negative consequences of this stressful experience.

**Key words:** Behavioral Distress, Developmental 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 exploration and development of interventions to relieve fears and worries concerning this stressful intrusive procedure (Naseri-Salahshour et al., 2019).

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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 in turn 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, developmental 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).

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

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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 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 (Erkan, 2003b). Consequently, we conducted the present study to evaluate the effect of developmental psychological preparation on behavioral distress of pediatric patients undergoing endoscopy.

### **Purpose:**

The purpose of this study is to evaluate the effect of developmental psychological preparation on behavioral distress of children undergoing endoscopy.

### **Research Hypothesis:**

1. Pediatric patients in the study group who are engaged in developmental psychological preparation will exhibit fewer behavioral distress on posttest than patients in the control group.
2. Pediatric patients who are engaged in developmental psychological preparation (study group) will exhibit less level of behavioral distress 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 of National Liver Institute Menoufia University.

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**Sampling:**

A convenient sample of 78 children who had liver diseases were undergoing endoscopy included in the current study. The sample was divided randomly into study group who received developmental psychological preparation and control group who only received routine hospital care. Fifty children were included in each group.

**Instruments: -**

Four 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: Observational scale for behavioral distress (OSBD):**

It was developed by Jay and Elliot (1986) to evaluate the intensity of distress behavior before and after the procedure. It was used for young children <12 years. It was made up of eight behavior categories indicating the child's anxiety (a=.90).

**The Scoring system for each question as follows:**

Scoring items	Score
Absent	0
Present	1

**Total scoring system for observational scale for behavioral distress :**

Scoring items	Score
Low (< 50%)	0-4
High (≥ 50%)	> 4-8

**Instrument four: Pediatric End Stage**

**Liver Disease (PELD) Score:**

It is a disease severity scoring system for children 12 years and younger. It is adopted from McDiarmid, S. (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 albumin, serum bilirubin, and the international normalized ratio for prothrombin time (INR) together with whether the patient is less than 1 year old, and whether the patient has growth failure (<- 2 standard deviation). It was estimated according to the following formula:

$$PELD = 4.80[\text{Ln serum bilirubin (mg/dL)}] + 18.57 [\text{Ln INR}] - 6.87 [\text{Ln albumin (g/dL)}] + 4.36 \text{ (if the patient is < 1 year old)} + 6.67 \text{ (if the patient has growth failure)}.$$

A higher score means a more serious condition.

**Validity**

For validity assurance, the four 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,

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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 8 children (10% of the sample) to test the practicability, applicability and to estimate the needed time to fill the instruments. 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 unit 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- The researcher observed the intensity of behavioral distress of children ranging from 2 months to 12 years old before endoscopy procedure by using instrument three (pretest).
- 6- Values of serum albumin, total bilirubin, and international normalized ratio (INR) were recorded. Also, weight and height were obtained from participants sheets to determine growth failure. The researchers calculated the PELD score by using online PELD score calculator after entering these values.
- 7- Children's were divided equally into study and control groups. A psychological preparation before endoscopy procedure was provided for the study group. While, the control group received only routine hospital care.
- 8- The researcher encouraged the caregivers of children from birth to 2 years old to sooth them by cuddling and patting on them. The researcher gave them attractive toys that produce bright colors and playing sounds to distract their attention and asked the caregivers not leave their children until they become unconscious.
- 9- For children from 3 to 10 years old, the researcher showed them psycho educational video that explain the steps of gastrointestinal endoscopy procedure in a simple way (e.g. Using a teddy bear that undergone endoscopy procedure). The video lasted for approximately 3 minutes. Then, the researcher provided children an opportunity to draw and paint as they want and communicate with them in joking manner about pictures (e.g. picture books of animals, fruits and other common non-live objects) and encourage their interaction. Also, the researcher distributed entertainment toys to distract children and decrease their distress.
- 10- A posttest was done just at endoscopy room following developmental psychological preparation to observe the intensity of distress behavior of children from 2 months to 12 years old by

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using instrument three (posttest). Also, the children's 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 ( $\chi^2$ ) 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 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 deviation of the level of behavioral distress in children (birth to 12 years) in the study and control group on pre and posttest. As indicated in this table, mean and standard deviation of levels of behavioral distress in the study and control group on pretest was  $5.62 \pm 2.02$  compared to  $5.81 \pm 1.97$  on posttest. So, there was no statistical significant difference between study and control group on pretest at 5% level of statistical significance. Mean and standard deviation of the level of behavioral distress in the control group was  $5.81 \pm 1.97$  on pretest compared to  $6.52 \pm 1.75$  on posttest. So, there was a highly statistical significant difference between pre and post intervention in the control group ( $p < .01$ ). Because there was a reduction in the mean level of behavioral distress on posttest in study group, there was a very highly statistical significant difference between study and control groups ( $p < .001$ ).

**Table 3:-** represented mean and standard deviations of behavioral distress among children in the study and control groups according to their age group on pre and posttest. Study group children showed reduced level of behavioral distress on posttest than pretest. However, control group children showed increased level of behavioral distress on posttest than pretest. Therefore, there was a statistical significant difference between levels of behavioral distress of children from birth to 12 years in the study and control groups on post intervention ( $p < .05$ ). Also, it was obvious that children had reduced behavioral distress as they grow-up more.

**Table 4:-** represented Pearson correlation between PELD score and total behavioral distress of children (birth to 12 years) in the study and control groups. There was no statistical significant correlation between PELD

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score and total behavioral distress of children (birth to 12 years) in the study and control groups ( $p > .05$ ). So that, the severity of liver disease had no effect on level of behavioral distress of children.

**Table 5:-** represented Pearson correlation between total behavioral distress and age of children in the study and control groups. There was a

statistical significant negative correlation between level of behavioral distress and age of children in the study and control groups. It means that the less age, the more behavioral distress. So, there was statistical significant difference between total behavioral distress and age in study and control group ( $p < .05$ )

**Table (1) Social Characteristics of children in the study and control groups (n=78).**

Social Characteristics	Study group (n=40)		Control group (n=38)		Total		X2	P -value
	No	%	No	%	No	%		
<b>Sex</b>								
Male	25	62.5	24	63.2	49	62.8	.004ns	0.952
Female	15	37.5	14	36.8	29	37.2		
<b>Age</b>								
Birth to < 1 years	3	7.5%	2	5.3	5	6.4	3.02 ns	0.389
1 to < 3	9	22.5%	12	31.6	21	26.9		
3 to < 6	15	37.5%	8	21.1	23	29.9		
6 to ≤ 12 years	13	32.5%	16	42.1	29	37.5		
<b>Diagnosis</b>								
portal vein thrombosis	13	32.5	12	31.6	25	32.1	.055ns	1.000
post kasai	8	20	7	18.4	15	19.2		
Congenital liver fibrosis	7	17.5	7	18.4	14	17.9		
Budcharri syndrome	4	10	4	10.5	8	10.3		
Caroli syndrome	3	7.5	3	7.9	6	7.7		
Other pediatric liver diseases	5	12.5	5	13.2	10	12.8		
<b>Indication of endoscopy</b>								
Follow up and injection or banding esophageal varices	40	100.0%	38	100.0%	78	100.0%	NA	
<b>Previous experience of endoscopy</b>								
No	3	7.5	1	2.6	4	5.1	.949ns	0.330
Yes	37	92.5	37	97.4	74	94.9		

**Table (2): Mean and standard deviation of the level of behavioral distress in children (birth to 12 years) in the study and control group on pre and posttest (N=78).**

Variables	Study group (N=40)	Control group (N=38)	t test	P 2
	X ± SD	X ± SD		
Pre intervention	5.62 ± 2.02	5.81 ± 1.97	.178ns	.674
Post intervention	2.63 ± 1.53	6.52 ± 1.75	110.040 ***	.000
<b>Paired t test</b>	7.464 ***	-2.945 **		
<b>P1</b>	.000	.006		

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

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

ns = not significant ( $p > .05$ ), \*\* = highly significant ( $p \leq .01$ ), \*\*\* = very highly statistical significant ( $p \leq .001$ ).

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**Table (3): Mean and standard deviations of level of behavioral distress among children in the study and control groups according to their age group on pre and posttest (N=78).**

Age group	Study group (N=40)		Control group (N=38)	
	Pre X ± SD	Post X ± SD	Pre X ± SD	Post X ± SD
<b>Age</b>				
Birth to < 1 years	6.00 ±1.73	4.00 ±1.73	5.50 ±2.12	5.50 ±2.12
1 to < 3	5.67 ±1.87	5.92 ±1.79	5.75 ±1.95	7.00 ±1.85
3 to <6	5.26 ±1.66	2.55 ±1.33	6.50 ±2.07	6.66 ±1.61
6 to ≤12 years	5.92 ±2.62	2.23 ±1.23	5.56 ±2.03	6.31 ±1.85
<i>ANOVA test</i>	.271 ns	2.138*	.410 ns	2.508*
<i>P-value</i>	.846	.047	.746	.049

**NB:** ns = not significant ( $p>.05$ ). \* = significant ( $p\le.05$ ).

### **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 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 behavioral distress 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 behavioral distress 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 behavioral distress of pediatric patients undergoing endoscopy.

Concerning hypothesis one, this study showed significant reduction in the level of behavioral distress of children (birth to 12 years) on posttest in the study group than control group. This finding was consistent with Manimala, Blount, and Cohen (2000) who conducted a study about "The Effects of Parental Reassurance Versus Distraction on Child Distress and Coping During Immunizations". They found that children in the



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distraction group showed the least level of distress compared to children in the control group.

This finding agreed with Landier and Alice (2010) who conducted a research about use of complementary and alternative medical interventions for the management of procedure-related pain, anxiety, and distress in Pediatric Oncology. The results suggested that distraction may be effective alone or with pharmacological interventions in managing procedure-related pain, anxiety and distress.

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

In addition, this result was consistent with Ranieri, Guerra, Cilli, and Di Giacomo (2020) conducted study about integrated approach for a new pattern in pediatric primary care. They found that distraction before medical care can positively influence children's behavior and increase their cooperation in medical settings.

As well, this result was in line with Leroy and Stuart (2021) who stated that one of the comprehensive procedural comfort care in children was the psychological and cognitive strategies which include utilization of age-appropriate distraction techniques developmental tasks for young children or a focused communication for older children.

Furthermore, this result comes in agreement with Fricke (2021) who conducted a study about psychosocial preoperative preparation in a non-children's hospital without child life supports. It was mentioned that toys that have visual, tactile, or audio

stimulus could be provided to reduce young children's preoperative distress.

However, this finding contradicted with Rasti, Jahanpour, and Motamed (2014) who conducted study about effect of parental presence on anxiety during anesthesia induction in children 2 to 11 years of age undergoing surgery. They found that parental presence during induction of anesthesia was not useful for children's anxiety. This could be related to the utilization of different technique (e.g. cuddling, patting, toys that elicit comforting sounds and lights in the present study.

Regarding hypothesis two, the current study found that there was a significant reduction in the level of behavioral distress in children (birth to 12 years) in the study group on posttest than pretest. This finding comes in line with Cohen (2002) who studied reducing infant immunization distress through distraction. Their results indicated that infants engaged in distraction experienced reduced behavioral distress. Besides, Cohen et al. (2006) who conducted a study about distraction for infant immunization pain found that a simple and practical distraction intervention can relieve distress of infants during routine injections

Also, Trottier, Doré-Bergeron, Chauvin-Kimoff, Baerg, and Ali (2019) mentioned that rocking or holding an infant can lower distress. For older children, the most effective distractions focus on empowerment by asking about and attending to their preferences (either offering them an age-appropriate active distraction [e.g., an electronic game] or something more passive [e.g., a video]). Engaging children in nonprocedural related conversation also helps to shift their attention away from stressful stimuli and, when appropriate, humor can be used to alleviate distress.

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Furthermore, this finding was in line with Bizzio et al. (2020) who conducted study about exploring non-pharmacological management among anesthesia providers to reduce preoperative distress in children. They found that non-pharmacological interventions (e.g. parental presence) were effective in reducing preoperative distress in children. Similarities between the previous studies and the present study can be attributed to the sense of control that was acquired by the child after their selection of their preferable distraction technique.

On the contrary, this finding contradicted with Rasti-Emad-Abadi, Naboureh, Nasiri, Motamed, and Jahanpour (2017) who conducted a study about the effects of preanesthetic parental presence on preoperative anxiety of children and their parents. Their results showed that parental presence during the preanesthetic period was not successful in reducing their children's preoperative anxiety. This difference could be attributed to their utilization of distraction techniques that were unsuitable for children's age or culture.

But there was a significant increase in the mean of behavioral distress level in children (birth to 12 years) in the control group on posttest than pretest. This finding comes in agreement with Lamparyk, Mahajan, Debeljak, and Steffen (2017) who conducted a study about anxiety associated with high-resolution anorectal manometry in pediatric patients and parents and found that children have increased observed distress during the procedure. This may be because children in the control group didn't receive developmental psychological preparation before the procedure.

Furthermore, findings of this study revealed that level of behavioral distress in children from birth to 12 years was decreased as children get

older in the study and control groups. This associative relation was consistent with Carlson, Broome, and Vessey (2000) who conducted a study about using distraction to reduce reported pain, fear, and behavioral distress in children and adolescents. They found that younger children were significantly more distressed than older ones.

Besides, Brown et al. (2018) who conducted study about review of a parent's influence on pediatric procedural distress and recovery. It was mentioned that children less than 6 years old were particularly at increased risk of distress during medical procedures.

Meanwhile, the findings of the present study agreed with Talabi et al. (2021) who conducted a study about effect of parental presence on anxiety during induction of anaesthesia in children undergoing elective day case surgery. They found that the anxiety state of the children decreases as the age increases. This finding could be due to difficult management of these children because of their young developmental level and their need for developmental psychological preparation. Also, when children's age increase, they acquire more cognitive developmental abilities that allow them to reason, identify and utilize measures to relieve distress associated with endoscopy procedure. As well, they get less egocentric and more logic as they make more logic conclusions.

On the contrary, This finding contradicted with Kolk, Hoof, and Dop (2000) who conducted a study about preparing children for venipuncture. Their findings showed that distress level in children before and during venipuncture wasn't affected by the children's age.

However, the findings of the current study revealed that there wasn't statistical significant difference in

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relation to information seeking between pre and posttests. This finding contradicted with Claar, Walker, and Barnard (2002) who conducted a study about children's knowledge, anticipatory anxiety, procedural distress, and recall of esophagogastroduodenoscopy. They found that children with greater knowledge experienced less distress and reported that they would be less anxious and upset when undergoing future esophagogastroduodenoscopy.

Also, Smith and Callery (2005) who conducted a study about children's accounts of their preoperative information needs contradicted with the current study. They concluded that children aged 7–11 years can identify their own information needs that contribute to the development of preadmission education.

As well, findings of the current study contradicted with Fortier et al. (2009) who conducted study about children's desire for perioperative information. They indicated that the vast majority of children aged 7-17 years old had a desire for comprehensive information including procedural information.

Furthermore, this finding contradicted with Dai and Livesley (2018) who conducted study about mixed -method systematic review of the effectiveness and acceptability of preoperative psychological preparation programmes to reduce pediatric preoperative anxiety in elective surgery. They stated that both children and their parents seek information to gain an understanding of surgery-related procedure. From the researcher point of view, contradiction could be due to the impact of children's previous experience of endoscopy. However, these children were in need for appropriate developmental psychological preparation.

Regarding the effect size of developmental psychological preparation on childrens' behavioral distress, the current study clarified that developmental psychological preparation had a large effect size on childrens' behavioral distress and moderate effect size on children's coping and anxiety. This finding was similar to Birnie, Noel, Chambers, Uman, and Parker (2018) who conducted study about psychological interventions for needle-related procedural pain and distress in children and adolescents. Their results supported that psychological strategies reduced children's distress.

### **Conclusion**

Based on the results of the present study, it was concluded that children in the study group who are engaged in developmental psychological preparation exhibited fewer behavioral distress and less anxiety level on posttest than patients in the control group. Also, children in the study group who are engaged in developmental psychological preparation exhibited fewer behavioral distress 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 developmental 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 developmental psychological preparation of children undergoing endoscopy.

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3. Future studies should be applied to evaluate the effect of online developmental psychological preparation on behavioral distress of pediatric patients undergoing endoscopy.

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