

ORIGINAL ARTICLE

# The Effects of Nursing Interventions Based on Mishel's Theory of Uncertainty in Illness on the Caregivers of Children Diagnosed with Cancer: A Randomized Controlled Trial

## Mishel'in Hastalıklarda Belirsizlik Teorisine Dayalı Hemşirelik Girişimlerinin Kanser Tanısı Alan Çocukların Bakım Verenlerine Etkisi: Randomize Kontrollü Çalışma

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### ABSTRACT

**Aim:** To investigate the effects of nursing interventions based on Mishel's Uncertainty in Illness Theory (MUIT) on uncertainty, hopelessness, coping with and adaptation for caregivers of children diagnosed with cancer.

**Materials and Methods:** The study was a randomized controlled experimental design study, which had repeated measures (pretest-posttest-follow up) and parallel group (intervention-control), and it included measures of uncertainty (PPUS), hopelessness (BHS), coping with and adaptation (CAPS). The study was conducted in January-July 2019 with the caregivers of 46 (Intervention Group: 23; Control Group: 23) children diagnosed with cancer and followed in paediatric oncology-haematology clinics. Intervention Group (IG) was given 6 modules education and consultancy according to protocol that was developed based on theory. The CONSORT guideline was performed in the study. The data of the research were evaluated by using descriptive statistics, Chi-squared test, independent samples t-test, repeated measures two-way analysis of variance (ANOVA).

**Results:** PPUS post-test mean score of IG was lower than CG ( $p<0.05$ ), and perceptions of uncertainty decreased significantly over time depending on the caregivers being in the IG and CG ( $p<0.05$ ). It was determined that BHS post-test and follow-up mean scores of IG was lower (less hopelessness perception) than the CG ( $p<0.05$ ). CAPS' post-test and the follow-up mean scores were similar in IG and CG. Also, Group\*time effect on hopelessness, coping and adaptation perception was statistically similar, too.

**Conclusion:** Nursing interventions based on MUIT can positively support caregivers' uncertainty, hopelessness and coping adaptations.

**Keywords:** Cancer; Caregiver; Child; Mishel's Uncertainty in Illness Theory; Nursing intervention.

### ÖZ

**Amaç:** Mishel'in Hastalıklarda Belirsizlik Teorisine (MHBT) dayalı hemşirelik müdahalelerinin kanser tanısı alan çocukların bakım verenlerinde belirsizlik, umutsuzluk, baş etme ve uyumunu üzerine etkisini araştırmaktır.

**Gereç ve Yöntem:** Bu çalışma tekrarlı ölçümler (ön test-son test-izleme) ve paralel grup (müdahale-kontrol) içeren randomize kontrollü deneysel tasarımda bir çalışma olup; çalışma da belirsizlik (MHBO-E/CF), umutsuzluk (BUÖ), baş etme ve uyum (BUSÖ) ile ilgili ölçümler vardır. Çalışma Ocak-Temmuz 2019 tarihlerinde, çocuk onkoloji-hematoloji kliniklerinde izlenen kanser tanısı alan 46 çocuğun bakım vereni (Girişim Grubu: 23; Kontrol Grubu: 23) ile yürütülmüştür. Girişim Grubu'na (GG) teoriye dayalı olarak geliştirilen protokole uygun 6 modül eğitim ve danışmanlık verilmiştir. Çalışmada CONSORT kılavuzu uygulanmıştır. Çalışma verileri tanımlayıcı istatistikler, Ki-kare testi, bağımsız örneklem t-testi, tekrarlı ölçümler iki yönlü varyans analizi (ANOVA) kullanılarak değerlendirilmiştir.

**Bulgular:** MHBO-E/CF son test puan ortalaması GG'de KG'den daha düşüktü ( $p<0.05$ ) ve bakım verenlerin GG ve KG'de olmasına bağlı olarak belirsizlik algıları zaman içinde anlamlı olarak azaldı ( $p<0.05$ ). BUÖ son test ve izlem puan ortalamaları GG'nin KG'ye göre daha düşük olduğu (daha az umutsuzluk algısı) belirlendi ( $p<0.05$ ). BUSÖ son test ve izlem puan ortalamaları GG ve KG'de benzer bulundu. Ayrıca, grup\*zaman umutsuzluk, baş etme ve uyum algısı üzerindeki etkisi de istatistiksel olarak benzerdi.

**Sonuç:** MHBT'ne dayalı hemşirelik müdahaleleri, bakım verenlerin belirsizlik, umutsuzluk ve baş etme uyumlarını olumlu yönde destekleyebilmektedir.

**Anahtar Kelimeler:** Bakım veren; Çocuk; Hemşirelik girişimi; Kanser; Mishel'in Hastalıklarda Belirsizlik Teorisi.

### Introduction

According to the Family Systems Theory, the whole family and the parts that make it up are interconnected. When a child is diagnosed with cancer, various problems (physical, social, emotional, etc.) could be seen in the child and child's caregivers. These

problems with the perception of uncertainty affect the coping with and adaptation of the caregivers (1, 2).

Conceptual Framework: Mishel's Uncertainty in Illness Theory

The first theory that addressed uncertainty in nursing is Mishel's Uncertainty in Illness Theory (MUIT) (3, 4). According to MUIT, uncertainty is defined as the inability to define, predict, or make sense of an illness. Uncertainty develops in situations where the individual cannot reach a final decision in the face of a particular event or situation or cannot predict possible consequences and the accuracy of these consequences (3). Parental uncertainty is defined as the inability of parents or other family members providing care for sick individuals, especially children, to define and make sense of an illness (5). Reconceptualized Uncertainty Illness of Theory is currently used in nursing. This theory has been utilized in studies addressing different individuals (children and adults) and their families with acute, chronic, and life-threatening diseases and continues to be conceptually developed and examined (4, 6).

It has been emphasized that the perception of uncertainty is inevitable in cancer because the conditions that cause uncertainty are inherent in cancer. Various undesirable conditions that can be seen in a child diagnosed with cancer, such as pain and loss of organs or function, lead to the perception of uncertainty in caregivers (5-8). Uncertainty processed with negative, destructive, and harmful cognitive connotations is perceived as a threat, which ultimately makes the caregiver feel stuck in vortex or vicious circle. This may in turn result in various physical, social, emotional, and psychological problems, such as pain, insomnia, stress, depression, weakness, and hopelessness (2, 5, 6). In a previous study conducted with caregivers of children diagnosed with cancer, it was found that the level of uncertainty perceived by the caregivers influenced the levels of care, anxiety, and depression (2). When caregivers perceive uncertainty with opportunity, luck, and other positive associations, they accept that everything could change in life at any given time and that uncertainty is a natural part of life. The caregivers can then identify the areas that support them in the coping and adaptation processes, provide strength and energy, helps them develop a new personality through coping and harmony, and makes them gain a new perspective on life (4, 9).

In the literature, there are studies on the use of different methods in the fields of theory-based education, psychotherapy approaches, open communication methods, the effect of social support, etc. to support the coping and adaptation processes of patients and caregivers who experience uncertainty (10-12). Addressing uncertainty and helping with coping and compliance can help reduce psychosocial distress, anxiety, and depression, which are not only experienced by caregivers but also by hospitalized children. In this context, MUIT defines nurses as a reliable authority and states that nursing initiatives can be effective at every stage of the conceptual processes put forth in the theory (4, 7). Further, this theory is a guide to determine and implement nursing initiatives for caregivers (3). In this context, it is thought

that nursing interventions based on MUIT can effect on the uncertainty, hopelessness, coping with and adaptation for care givers of children diagnosed with cancer.

### **Aim**

The aim of this study was to investigate the effects of nursing interventions based on MUIT on the uncertainty, hopelessness, coping with and adaptation for care givers of children diagnosed with cancer.

### **Hypothesis**

H1: There is a difference between the intervention and control groups of caregivers with respect to post-test and follow-up uncertainty, hopelessness, and coping with and adaptation scores.

H2: Group\*time interactions (time-dependent score changes) of uncertainty, hopelessness, and coping and adaptation are different between the intervention and control groups.

### **Methods**

#### **Design and participants**

Randomized controlled experimental design study, which had repeated measures (pretest-posttest-follow up) and parallel group (intervention-control), was performed according to the CONSORT Guidelines (13) between November 2017-July 2019 after getting approval of ethical committee and written institutional permissions. Data collection and implementation of study was conducted with 46 participants (Intervention Group-IG: 23; Control Group-CG=23) in Paediatric Oncology-Haematology Clinics and outpatient clinics. The inclusion and exclusion criteria were determined according to the "Antecedents of Uncertainty", which is included in the conceptual framework of theory and is the basis for the perception of uncertainty.

#### **The inclusion criteria:**

##### **Children:**

- o Diagnosed with cancer
- o Should have received at least one cure of chemotherapy and/or radiotherapy.

##### **Caregiver:**

- o Over 18-year-old age
- o At least a primary school degree education
- o Could read and write in Turkish.

#### **The exclusion criteria:**

##### **Children:**

- o Have chronic and genetic disorders other than cancer
- o Terminal period
- o Followed up and treated in another hospital
- o Cancer recurrence
- o Treatment completed and/or be in the remission stage

#### Caregiver

- o Diagnosed psychiatric disease
- o Could not read/write in Turkish
- o Absence of a caregiver

#### Sample size calculation

Since the perception of uncertainty was the basic concept in the theory that affects the process of coping, adaptation and hopelessness, perception of uncertainty was considered in determining the effect size (4, 9, 14). It was found that the uncertainty perceived by those caring for a child diagnosed with cancer had a small and moderate effect on "ineffective coping with uncertainty" and "psychological distress/problems" (4, 12). Sample size was calculated using G\*Power 3.1.9.2 program with 80% power,  $\alpha=0.05$ , and  $f=0.20$ . In a total of 42 caregivers, the sample size was calculated as 21 caregivers in each group. Considering the possibility of data loss, the sample size was increased by 10% and the final study sample consisted of a total of 46 caregivers (23 in each group).

#### Randomization and blinding

Randomization: Study sample ( $n=46$ ) was selected from the caregivers of 115 child with cancer followed-up in the relevant hospitals according to the inclusion and exclusion criteria. Simple computer-based random numbers were produced by another academician and the participants were randomly assigned to the intervention ( $n=23$ ) and control ( $n=23$ ) groups. Informed consent was obtained from all the caregivers ( $n=46$ ) who agreed to participate in the study and pre-tests were applied. Then, the envelopes were opened, and the caregivers were assigned to their respective groups. A flowchart of the study is given in Fig. 1.

Blinding: Since the researcher needed to provide education and manage the process, the researcher could not be blinded to the groups. To prevent any bias in the data collection process, the follow-up evaluations were performed by a nurse other than the researcher. To avoid bias in data evaluation process, data were specifically encoded to blind the groups and data analysis was performed by an independent statistician. The data was decoded by the researcher after the statistical analyses were completed, and the

research report was written.

#### Intervention

Intervention Protocol and education booklet, which were developed based on MUIT and relevant literature, were used as intervention tools (10, 15-18).

Intervention Protocol: Concepts of MUIT and "individual-application and science (data)-centric" requirements of the caregiver were taken into account while preparing the protocol. There were not certain number of sessions or specific time duration for the interventions about uncertainty, coping with, and adaptation in the literature (12, 19). So, it was decided that the nursing interventions based on this theory would consist of six modules and ten sessions in total, where each session will be limited to 20 minutes.

Education Booklet: It had five main topics (concept of uncertainty in diseases, the importance of the caregiver, communication, uncertainty, coping with and adaptation, recommendations on caring for a child diagnosed with cancer [information related to disease-diagnosis and treatment processes, symptoms and disease management]) (4, 10, 12, 15-18). The Power-point presentation was prepared by the researcher in accordance with the education booklet and protocol.

Procedure of intervention: Interventions which were power-point presentation, education booklet, narration, brainstorming, and discussion methods were applied to IG by the researcher (SO) in a suitable room of the clinic and outpatient clinic. Interventions were carried out on the first, second, third, and eighth days. The first three modules (uncertainty, the importance of the caregiver and supporting participation in care, communication) were covered on the first day as they included basic concepts and approaches related to the theory, which positively supports the interaction between the researcher and the caregiver. In addition, the education booklet and protocol were provided to the caregiver during the first module. Module 4 and 5 (evaluation of childcare and care for children diagnosed with cancer, uncertainty, coping and adaptation) were covered on the second and third days. Module 6 was covered on the eighth day to summarize and reinforce the information on the processes. Modules 1, 2, 3, and 6 were covered as a single session and lasted for 20 minutes, whereas Modules 4 and 5 covered three sessions and lasted for a total of 60 minutes. Supporting the autonomy of the caregiver in uncertainty, coping and adaptation process is an important internal force for structure providers (trusted authority and education) to positively affect the process. In this context, Knowles' Adult Learning Theory, Teach Back Method, and Self-Management Training Curriculum were used during the training (20, 21). Routine nursing care, as specified by the standards of the relevant hospitals, was provided to the caregivers in the CG by the nurses working in the clinic. CG had education about

symptom management, but there was no counselling or guidance provided on the uncertainty experienced by the caregivers in the hospitals.

## Measures

Data was collected by a nurse other than the researcher between January 2019 and July 2019. Pre-test were made using the Information Form, PPUS, BHS, and CAPS. Post-test and follow-up were made using PPUS, BHS, and CAPS. Post-test evaluations of IG were performed two weeks after the completion of the interventions, and the follow-up evaluations were performed four weeks after the post-test. Also, post-test evaluations of CG were performed two weeks after pretest, and follow-up evaluations were made four weeks after the post-test.

## Data collection tools

**Information Form:** This form was prepared according to relevant literature (1, 22), and included questions on the sociodemographic characteristics of caregivers and children.

**Parents Perceptions of Uncertainty Scale (Mishel's Uncertainty in Illness Scale-Parent/Child Form; PPUS):** The scale measures the uncertainty perceived by the parents (caregivers) regarding their children's disease and hospitalization. PPUS is a 5-point Likert type scale that consists of 31 items and four sub-dimensions. Higher scores on the scale indicate a higher perception of uncertainty (23, 24). In the Turkish validity and reliability study, the Cronbach's  $\alpha$  value was determined to be 0.86 for the total scale (25).

**Beck Hopelessness Scale (BHS):** The scale was developed by Beck et al. (1974) to assess the negative (pessimistic) expectations of adolescents and adults for their future. The scale consists of 20 items and three sub-dimensions. Higher scores indicate a higher level of hopelessness (26). Cronbach's  $\alpha$  coefficients for the total scale were reported to be over 0.80 in the Turkish validity and reliability study (27).

**Coping and Adaptation Process Scale (CAPS):** The scale was developed by Sister Calistra Roy, which identifies coping and adaptation strategies used by individuals in critical and difficult situations (28). Higher scores obtained from the total scale and the sub-dimensions indicate higher effective use of the coping methods. Cronbach's  $\alpha$  value for the total scale was 0.82 for the Turkish validity and reliability study (29).

## Ethical considerations

Ethical approval was obtained from the Health Sciences Faculty Non-Interventional Clinical Research Ethics Committee of a university. Also, institutional permissions were obtained prior to study. Caregivers were informed about the research and written informed consent was obtained from all participants.

## Statistical analysis

IBM SPSS Statistics 22.0 program was used for data analysis. Shapiro–Wilk test was used to check if the data conformed to normal distribution. Chi-squared test and independent samples t-test were used to compare the data between the intervention and control groups. Descriptive statistics, independent group t-test, repeated measures two-way analysis of variance (ANOVA) were used.

## Results

The intervention and control groups were found homogeneous (Table 1).

Uncertainty (PPUS) decreased over time significantly with the large effect size in IG compared to CG ( $F=8.319$ ;  $\eta^2=0.159$ ;  $p=0.001$ ). BHS post-test [ $t=-2.378$ ;  $d=0.70$ ; 95% CI= $(-5.155)$ - $(-0.411)$ ;  $p=0.022$ ] and follow-up [ $t=-2.387$ ;  $d=0.71$ ; %95 CI:  $(-4.277)$ - $(-0.332)$ ;  $p=0.021$ ] of IG were significantly lower than CG with moderate effect size. Repeated measures two-way ANOVA revealed that group [ $F=4.370$ ;  $\eta^2=0.09$ ; power 53%;  $p=0.042$ ] and time [ $F=10.840$ ;  $\eta^2=0.198$ ; 99% power;  $p=0.001$ ] had separate significant effects on mean BHS scores ( $p<0.05$ ), but the effect of group\*time interaction on BHS was not significant ( $p>0.05$ ). It was observed post-test and follow-up IG's CAPS were higher than CAPs of CG, but the difference was not statistically significant, and there was no difference group\*time of CAPS ( $p>0.05$ ) (Table 2; Fig. 2).

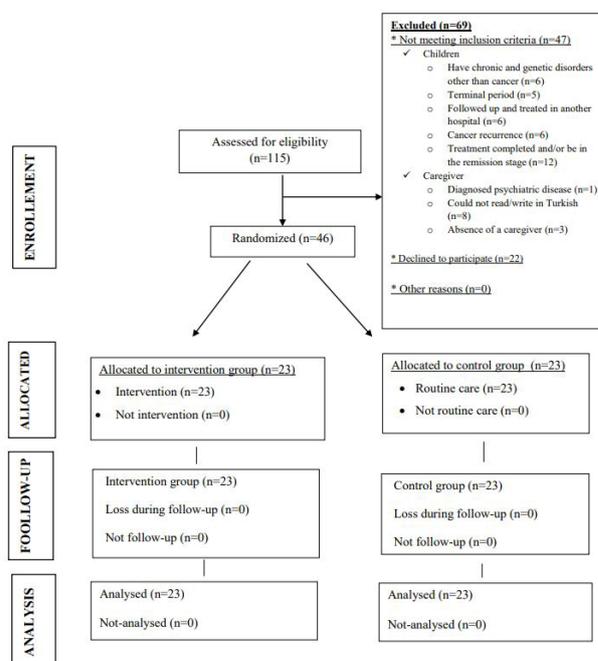


Fig. 1. Flow diagram of the randomized controlled study (CONSORT)

**Table 1:** Descriptive characteristics (N=46).

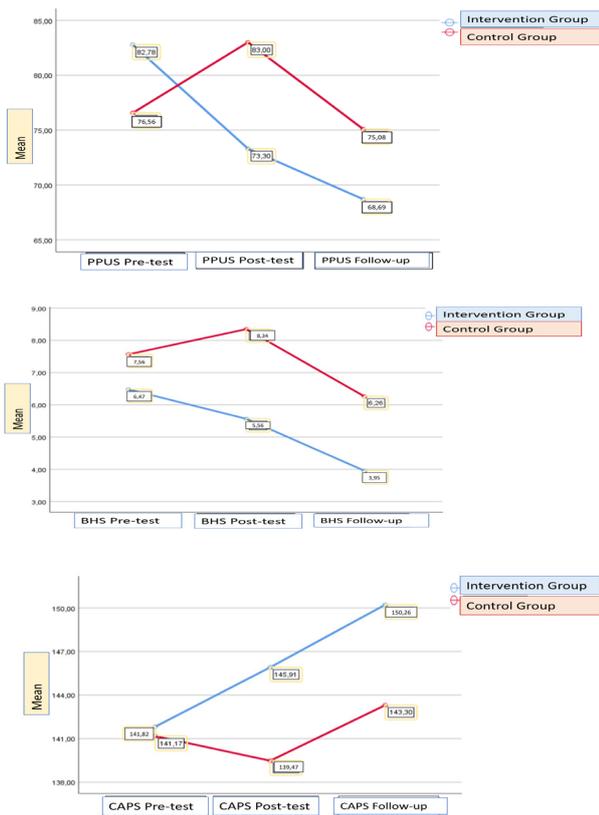
	Intervention Group (n=23)		Control Group (n=23)		t	p
	Min-Max	X±SD	Min-Max	X±SD		
Caregiver's age	22-44	34.30±7.39	19-44	32.56±6.45	0.850	0.40
Child's age (year)	0.3-18	8.63±7.04	0.9-17	7.04±4.15	1.037	0.306
Time since diagnosis (month)	1-11	4.02±2.94	1-9	3.84±2.64	0.211	0.834
	n	%	n	%	X2	p
<b>Caregivers' Educational Status</b>						
Primary school	15	65.2	16	69.6	0.000 Y	1.000
High school and above	8	34.8	7	30.4		
<b>Caregivers' Employment Status</b>						
Employed	6	26.1	8	34.8	0.103 Y	0.75
Unemployed	17	73.9	15	65.2		
<b>Perception of Economic Status</b>						
Low income	14	60.9	18	69.6	0.924 Y	
	0.34					
Equal income-expense or more income	9	39.1	5	30.4		
<b>Diagnosis</b>						
Hematological cancer	9	39.1	10	43.5	0.001 Y	1.000
Solid tumors and other cancer	14	60.9	13	56.5		
<b>Treatments</b>						
Only Chemotherapy	16	69.6	18	78.3	0.113 Y	0.74
2 and more treatment methods	7	30.4	5	21.7		
	Min-Max	X±SD	Min-Max	X±SD	t	p
<b>Pre-test</b>						
PPUS	45-109	82.78±13.98	44-113	76.56±19.20	1.255	0.216
BHS	2-14	6.47±2.95	1-18	7.56±5.02	-0.894	0.377
CAPS	106-170	141.82±15.57	108-172	141.17±14.44	0.147	0.883

X: Mean, SD:Standard-deviation, Min-Max: Minimum-Maximum, t: Independant groups t-test, F: Fisher Chi-Square Test, Y: Chi-square value with Yates correction, BHS: Beck Hopelessness Scale, CAPS: Coping and Adaptation Process Scale, PPUS: Parents Perceptions of Uncertainty Scale=Mishel's Uncertainty in Illness Scale-Parent/Child Form

**Table 2** Comparison of pre-test, post-test and follow-up of PPUS, BHS, and CAPS according to groups, and group\*time interaction (N=46)

	Time \ Group	Pre-test <sup>1</sup> X±SD	Post-test <sup>2</sup> X±SD	Follow-up <sup>3</sup> X±SD	F	p	η <sub>p</sub> <sup>2</sup>	Power
<b>PPUS</b>	IG (n=23)	82.78±13.98	73.30±13.65	68.69±14.25				
	CG (n=23)	76.56±19.20	83.00±15.48	75.00±16.54				
	<b>t</b>	1.255	<b>-2.252</b>	-1.404				
	<b>p</b>	0.216	<b>0.029</b>	0.167				
	<b>d</b>	0.67	<b>0.66</b>	0.41				
	<b>(95% CI)</b>	[(-3.767)-(-16.202)]	<b>[(-18.371)-(-1.020)]</b>	[(-15.568)-(-2.791)]				
				<b>Group</b>	0.693	0.410	0.016	-----
			<b>Time</b>	<b>8.028</b>	<b>0.001</b>	<b>0.154</b>	<b>0.951</b>	
			<b>Group*Time</b>	<b>8.319</b>	<b>0.001</b>	<b>0.159</b>	<b>0.958</b>	
<b>BHS</b>	IG (n=23)	6.47±2.95	5.56±2.93	3.95±1.79				
	CG (n=23)	7.56±5.02	8.34±4.78	6.26±4.26				
	<b>t</b>	-0.894	<b>-2.378</b>	<b>-2.387</b>				
	<b>p</b>	0.376	<b>0.022</b>	<b>0.021</b>				
	<b>d</b>	0.26	<b>0.70</b>	<b>0.71</b>				
	<b>(95% CI)</b>	[(-3.552)-(-1.379)]	<b>[(-5.155)-(-0.411)]</b>	<b>[(-4.277)-(-0.332)]</b>				
				<b>Group</b>	<b>4.370</b>	<b>0.042</b>	<b>0.090</b>	<b>0.534</b>
			<b>Time</b>	<b>10.840</b>	<b>0.001</b>	<b>0.198</b>	<b>0.989</b>	
			<b>Group*Time</b>	1.756	0.179	0.038	-----	
<b>CAPS</b>	IG (n=23)	141.82±15.57	145.91±11.82	150.26±16.30				
	CG (n=23)	141.17±14.44	139.47±21.82	143.30±16.09				
	<b>t</b>	0.147	1.241	1.464				
	<b>p</b>	0.883	0.221	0.540				
	<b>d</b>	0.04	0.36	0.42				
	<b>(95% CI)</b>	[(-8.264)-(-9.568)]	[(-4.103)-(-16.973)]	[(-2.605)-(-16.431)]				
				<b>Group</b>	1.362	0.249	-----	-----
			<b>Time</b>	2.925	0.059	-----	-----	
			<b>Group*Time</b>	1.167	0.316	-----	-----	

X: Mean, SD:Standard-deviation, t: Independant groups t-test, d: Cohen d effect size 95%, CI: 95% Confidence Interval, F: Repeated measures two-way analysis of variance (ANOVA), η<sub>p</sub><sup>2</sup>: Partial eta-square, IG: Intervention Group, CG: Control Group PPUS: Parents Perceptions of Uncertainty Scale= Mishel's Uncertainty in Illness Scale-Parent/Child Form BHS: Beck Hopelessness Scale , CAPS: Coping and Adaptation Process Scale



**Fig. 2.** Time-dependent change in perception of uncertainty, hopelessness, coping and adaptation according to groups (group\*time interaction).

## Discussion

Uncertainty is a cognitive condition that can appear at any time. Antecedents of uncertainty, appraisal of uncertainty, perception of uncertainty as a danger or opportunity, and coping and adaptation behaviours affect the cognitive processes of the individual (3). Caregivers who perceive uncertainty experience repeated cycles of pessimistic and optimistic moods, and face dilemmas between being perceived as parents who over-push/harm their children even after knowing the debilitating effects of treatment or parents who try to protect the lives of their children (30, 31). In one study conducted with the parents of children diagnosed with cancer, parents reported that they wanted to make the right decision, but because of the intense uncertainty experienced by them, making decisions became complicated, difficult, and debilitating (32). There is a relationship between the perceptions of uncertainty and hope experienced by the child diagnosed with cancer as well as patient's family during disease. In one study on the perceptions of the hope of parents whose child was diagnosed with cancer, it was reported that parents felt they were on a roller coaster ride and that hope was the most basic condition that gave them strength to endure. Further, the same study emphasized that not to experience hopelessness was not important for parents because hopelessness meant giving up on their children and their future for the parents (33). The relevant literature

emphasizes the importance of health professionals, including nurses, in the monitoring and evaluation of the perception of uncertainty, and studies report that theory-based, individual-centred interventions and protocols are needed to effectively handle this process. Health professionals use different methods related to uncertainty, coping and adaptation processes, and it has been emphasized that encouraging the caregiver and addressing the family unit is essential over the course of the disease (3, 8, 11, 16).

Caregivers who experience uncertainty can feel pain, anguish, loneliness, and hopelessness; if they are unable to receive effective and ongoing counselling from health professionals (2, 30). In the literature, it is reported that "trust, control, and effective communication" are at the heart of coping and adaptation processes, and positive results can be obtained by effectively supporting the caregiver. Over the course of the disease, counselling should be provided on basic issues, such as meeting the need for information about the disease and treatment, providing information about the possible risks of symptom management and treatment, and addressing the perception of uncertainty (22, 28, 32, 34).

In our study, perception of uncertainty in IG was lower than CG in the post-test and follow-up measurements, and perceptions of uncertainty in IG significantly decreased during the time. In the present research, it was found that theory-based nursing interventions positively affected the perceptions of hope of caregivers in IG, which was consistent with the concepts and assumptions of the theory and the relevant literature. If we consider the combined effect of decreased perception of uncertainty and increased perception of hope in the IG, we can conclude that the caregivers in the IG are prepared for a cognitive scheme that will allow them to choose a more positive approach to the history of uncertainty, evaluation-perception, and coping and adaptation processes. In addition, since hope is a positive internal force with respect to uncertainty and adaptation, the level of hope of the caregiver has a protective effect against the negative impact of future uncertainties. This protective effect affects the caregiver personally and affects the child and the family in general (30). The findings obtained in the present research are consistent with the relevant literature and reduced perception of uncertainty and hopelessness and increased coping and adaptation scores of caregivers in the IG are in line with the conceptual framework of the theory.

## Conclusion

Uncertainty, which is an indispensable part of life, is an important concept that affects the coping with and adaptation of caregivers. The implementation of theory-based nursing interventions has a positive effect on perception of uncertainty and adaptation of caregivers whose child has been diagnosed with cancer.

## Limitations of the study

Study data cannot be generalized to larger groups. There is no data about how the child and her family are affected by the nursing intervention based on MUIT.

## Clinical implication

Nursing intervention based on MUIT can be used in a program to alleviate uncertainty and related the psychological distress of caregivers of child with cancer. Caregivers' coping and adaptation ability to live with cancer depend on the perception of uncertainty. For example, uncertainty processed with negative, destructive, and harmful cognitive connotations is perceived as a threat, which ultimately makes the caregiver feel psychological distress. When caregivers perceive uncertainty with positive associations and a natural part of life with nursing intervention based on MUIT, the caregivers can identify the areas that support them in the with coping and adaptation processes. Also, they provide strength and energy, it helps them develop a new personality through coping and harmony, and makes them gain a new perspective on life. As a result of these, nursing intervention based on MUIT can promote quality of care, decrease psychological distress.

## Acknowledgments

- This study was registered Clinical Trial with the number of NCT03431155.
- The results of this study were oral presented at the 11th Excellence in Pediatrics (EIP) Congress 5-7 December 2019, in Copenhagen, Denmark (ID: 255/Pediatrics GP-3:15).
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## Conflict of Interests

No conflict of interest has been declared by the authors.

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