Investigation of post-traumatic growth with traumatic and psychological effects in children and adolescents diagnosed with cancer

Kanser tanılı çocuk ve ergenlerde travma sonrası büyüme ile travmatik ve ruhsal etkilenmenin incelenmesi

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Abstract

Purpose: The aim of this study was to evaluate and compare traumatic and mental effects and PTG by comparing a patient group in hematological-oncological cancer remission with a healthy control group.

Materials and methods: Children and adolescents aged 8-18 years, who were in remission with a diagnosis of childhood cancer, and presented at the Paediatric Hematology Department of Pamukkale Unıversity between 1 September 2021 and 30 April 2022 were included as the study group and a control group was formed of healthy children and adolescents with no history of cancer diagnosis. The Post-Traumatic Growth Inventory (PTGI), the Child Revised Impact of Events Scale (CRIES-13) and the Revised Child Anxiety and Depression Scale-Child Version (RCADS-CV) were applied to all the children in both groups. A sociodemographic information form prepared by the researchers, and the Revised Child Anxiety and Depression Scale- Parent Version (RCADS-PV) were applied to parents.

Results: Evaluation was made of 27 patients aged 8-18 years with a diagnosis of childhood cancer who were in remission, and a control group of 25 healthy children. No statistically significant difference was determined between the groups in respect of parental ages, family structure, parental educational levels, and mean monthly family income ($p>0.05$). In the comparisons of the raw scores of the RCADS-PV between the two groups, RCADS-PV Panic Disorder, Obsessive Compulsive Disorder, and Depression subscale scores were found to be statistically significantly higher in the control group than in the remission group ($p=0.048$; $p=0.045$; $p=0.047$). When the CRIES-13 scores of the two groups were compared, no statistically significant difference was found ($p=0.659$).When the PTGI scales and subscales of the two groups were compared; while no statistically significant difference was found in the total PTGI score ($p=0.066$), the change in life philosophy subscale and the change in relationships with others subscale was found to be statistically significantly higher in the remission group than in the control group ($p=0.038$; $p=0.05$).Considering the relationship between CRIES-13 and PTGI scale scores, no statistically significant relationship was found in the remission group.

Conclusion: Cancer survivors grow from this negative experience, become stronger and survive with positive gains; they can adjust their expectations from themselves, the world and their future. Considering the current prevalence of cancer and increasing survival rates with treatments, new multicenter studies with larger samples are needed on this subject.

Key words: Post-traumatic growth, trauma, cancer, child, adolescent.

Öz

Amaç: Hematoloji-onkoloji kanser remisyonunda olan hasta grubu ve sağlıklı kontrol grubunun karşılaştırarak travmatik ve ruhsal etkilenmelerini ve post travmatik büyümelerini değerlendirmek ve karşılaştırmak amaçlanmıştır.

Gereç ve yöntem: 01 Eylül 2021-30 Nisan 2022 tarihleri arasında Pamukkale Üniversitesi Çocuk Hematolojisi Anabilim Dalı'na başvuran ve çalışmaya katılmayı kabul eden çocukluk çağı kanser tanısı remisyonda olan 8-18 yaş arası çocuk ve ergenler ile daha önce çocukluk çağı kanser tanısı almamış sağlıklı kontrol grubu çocuk ve ergenler ile çalışma tamamlanmıştır. Çocuk ve ergenlere Travma Sonrası Büyüme Envanteri (PTGI), Revize Edilmiş Çocuk Olayın Etkisi Ölçeği -13 (CRIES-13), Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş-Çocuk Formu (ÇADÖ-Y-ÇF) ölçekleri uygulanmıştır. Ebeveynlere de Sosyodemografik form ve Çocuklarda Anksiyete ve Depresyon Ölçeği-Yenilenmiş-Ebeveyn Formu (ÇADÖ-Y-EF) uygulanmıştır.

Bulgular: Çalışmaya 8-18 yaş arası, 27 çocukluk çağı kanser tanısı remisyonda olan hasta ve 25 sağlıklı kontrol katılmıştır. İki grup arasında anne baba yaşı, aile yapısı, anne ve babanın öğrenim durumu ve ortalama aylık

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gelir dağılımında istatistiksel olarak anlamlı düzeyde bir farklılık saptanmamıştır (*p*>0,05). ÇADÖ-Y-EF Panik Bozukluk, Obsesif Kompulsif Bozukluk, Depresyon alt ölçek skorları kontrol grubunda remisyon grubuna göre istatistiksel olarak anlamlı düzeyde yüksek saptanmıştır (*p*=0,048; *p*=0,045; *p*=0,047). İki grubun CRIES-13 puanları karşılaştırıldığında istatistiksel olarak anlamlı farklılık bulunmamıştır (*p*=0,659). İki grubun PTGI ölçek ve alt ölçekleri karşılaştırıldığında; total PTGI puanında istatistiksel olarak anlamlı farklılık saptanmazken (*p*=0,066), PTGI ölçeğinin Yaşam Felsefesinde Değişim ve Başkalarıyla İlişkilerde Değişim alt ölçek ortalaması hasta grubunda kontrol grubuna göre istatistiksel olarak anlamlı düzeyde yüksek saptanmıştır (*p*=0,038; *p*=0,05). CRIES-13 ve PTGI ölçek puanları arasındaki ilişkiye bakıldığında, remisyon grubunda istatistiksel olarak anlamlı ilişki bulunmamıştır.

Sonuç: Kanseri yenenler bu olumsuz deneyimden büyüyerek, güçlenerek ve olumlu kazanımlarla sağ çıkarak; kendilerinden, dünyadan ve geleceklerinden beklentilerini ayarlayabilmektedir. Günümüzdeki kanser prevalansı ve tedavilerle artan sağkalım oranları göz önüne alındığında bu konuda yapılacak çok merkezli ve daha büyük örneklemli yeni çalışmalara ihtiyaç vardır.

Anahtar kelimeler: Travma sonrası büyüme, travma, kanser, çocuk, ergen.

Introduction

With developments and new treatments for cancers in childhood, they are mostly no longer fatal and survival rates have increased. Together with the increase in survival, there has been an increase in the number of children and adolescents coping with chronic disease and the psychological difficulties brought about by cancer. In the long-term follow-up of children and young people diagnosed with cancer, some emotional and cognitive symptoms may be seen [1, 2].

Cancer treatment, especially the treatments for childhood cancers can be extremely difficult psychologically [3]. There are several stressful situations such as the psychosocial stressor factors experienced in the treatment process by children diagnosed with cancer and their families, changes in physical appearance, a worsening of the prognosis, and uncertainty about the future [4]. Developments in cancer treatment have increased survival rates, so the focus of researchers has shifted to adaptation and coping mechanisms [5]. Previous studies have shown that as a result of trauma experienced, the resilience of these young people has increased and they can adapt better to the process [6].

Does cancer count as a trauma? This remains a matter of debate. The diagnosis of a life-threatening disease corresponds to the DSM-IV definition of a traumatic event. However, this definition changed in DSM-V, in which it was stated that when the cancer diagnosis was not related to a sudden and catastrophic event, it is not accepted as a traumatic event requiring post-traumatic stress disorder (PTSD) testing. Research has shown that there are both negative and positive outcomes of cancer. Many individuals who have undergone cancer treatments have been reported to have expressed positive feelings about being diagnosed with cancer [5]. Post-traumatic growth (PTG) can be defined as the cognitive process gone through to find meaning in a traumatic event by re-interpreting the traumatic event encountered in a positive way [5, 7].

It has been reported that being able to take a stronger approach to changes in the individual's outlook of a difficult experience such as cancer by making positive psychosocial changes in life priorities and interpersonal relationships can lead to positive results [5, 7]. Post-traumatic growth results in an increase in self-confidence, decreased vulnerability to the event experienced, and gives new meaning to the positive aspects of life. Development of the process in this way can be a protective psychological factor against the trauma experienced [7]. From a review of literature, it can be seen that 58-83% of trauma survivors retrospectively reported PTG following problems [8].

Although studies related to PTG have aimed to reduce the psychosocial stressors and improve quality of life of cancer survivors, it is not possible to completely eliminate all the problems experienced [9]. The process of the negative event experienced by the individual can cause PTSD, depression, and anxiety symptoms [10]. Following a negative event,

results may emerge parallel to the findings of both PTG and PTSD [11]. These results show that both negative and positive effects of a traumatic event may be seen at the same time, and sometimes negative outcomes may pass to a stage of positive outcomes. Previous studies have shown that children diagnosed with cancer can demonstrate different behaviours from healthy children to events after having experienced this trauma [12, 13].

There is an increasing number of paediatric hematology and oncology patients referred for consultation in paediatric psychiatry practice. This has made paediatric psychiatrists feel that they need more information about this patient group. Recognising that patients diagnosed with cancer and in remission have stronger coping skills and strategies was of guidance for this research on the subject of PTG.

From the starting point of this information and our clinical experience, the hypothesis of this study was that PTG would be seen in a patient group diagnosed with cancer and in remission, and there would be fewer mental effects due to the coping skills and mechanisms developed with trauma.

The aim of this study was to evaluate and compare traumatic and mental effects and PTG by comparing a patient group in hematological-oncological cancer remission with a healthy control group.

Material and method

Children and adolescents aged 8-18 years, who were in remission with a diagnosis of childhood cancer, and presented at the Paediatric Hematology Department of Pamukkale University between 1 September 2021 and 30 April 2022 were included as the study group and a control group was formed of healthy children and adolescents with no history of cancer diagnosis. Power analysis was applied to determine the sample size.

The effect size was seen to be obtained at a strong level (d=0.96) in the reference study [14]. Considering that a lower level of effect size (d=0.9) could be obtained, it was calculated from the results of the power analysis that it was necessary to include 42 subjects (21 in each group) to be able to obtain 80% power in a 95% confidence interval.

The study included a group of 27 children and adolescents previously diagnosed with childhood cancer and currently in remission, and a control group of 25 healthy children and adolescents with no history of cancer diagnosis. Although a detailed psychiatric examination was not performed, it was questioned whether the individuals in the healthy group had a diagnosis of any mental disorder and whether they were treated for mental disorders. Those who did not have any mental or physical complaints, diagnosis or treatment were included in the group.

The Post-Traumatic Growth Inventory (PTGI), the Child Revised Impact of Events Scale (CRIES-13) and the Revised Child Anxiety and Depression Scale-Child Version (RCADS-CV) were applied to all the children in both groups. A sociodemographic information form prepared by the researchers, and the Revised Child Anxiety and Depression Scale-Parent Version (RCADS-PV) were applied to parents. Both parents and participants were informed verbally and in writing, verbal consent was obtained from the participants and written consent was obtained from their parents. A "voluntary consent form" was signed for both the remission and healthy control groups. Exclusion criteria was determined as the decision not to participate or continue the study.

Data collection tools

Post-Traumatic Growth Inventory (PTGI):

The PTGI was developed to measure psychological growth after traumatic experiences. This scale consists of 21 items with 6-point Likert-type responses [7]. High points indicate positive psychological changes because of negative life events. In the original form of the scale there were 5 subscales. The internal consistency of the 21 items was determined as α=0.90.

In a study which classified the potential changes which could occur after traumatic experiences or crises, a trend form of the measurement tool was used. The Turkish adaptation of the scale was done by Kagan et al. [15]. The Turkish form of the scale comprises 3 subscales of change in self-perception, change in life philosophy, and change in relationships with others. Different studies in literature have shown that the scale is suitable for use with children and adolescents [16-22].

The Revised Child Anxiety and Depression Scales- Child and Parent Version (RCADS)

The RCADS was developed to measure symptoms of anxiety disorders and depression in children and adolescents [23]. The scale contains 47 items and has a 4-point Likert type scoring. It can be applied to children between the ages of 8-18. It consists of major depressive disorder, social phobia, panic disorder, separation anxiety disorder, generalized anxiety and obsessive-compulsive disorder subscales. There is a parent version of the scale, which consists of 47 items with 4-point Likert-type responses regarding the child's symptoms. Validity and reliability studies of the Turkish version of the scale were conducted by Gormez et al. [24].

Child Revised Impact of Events Scale-13 (CRIES-13):

This scale, for which the Turkish validity and reliability study was conducted by Çeri, consists of 13 questions. Suitable for 8-18 age range. The scale is adapted from the Impacts of Events Scale (IES). The highest 65 points can be obtained in the scoring of the Likert type scale. A score of 30 and above indicates the risk for PTSD [25-27].

Sociodemographic data form:

This form was created by the researchers to record age, education status, medical history and diagnosis of the child, and the age, education level, income level, medical history and diagnosis of the parents.

Statistical analysis

Data obtained in the study were analysed statistically using SPSS vn. 25.0 software (IBM, Armonk, NY, USA). Continuous variables were stated as mean ± standard deviation values and categorical variables as number (n) and percentage (%). In the comparisons of two independent groups of data, the significance of the difference between two means test was used when parametric assumptions were met, and the Mann Whitney U-test if not. Correlations between variables were examined with the Spearman correlation test. Statistical significance in all the tests was evaluated in a 95% confidence interval at a value of $p<0.05$.

Results

Evaluation was made of 27 children aged 8-18 years with a diagnosis of childhood cancer who were in remission, and a control group of 25 healthy children aged 8-18 years. The mean age of the children was 13.48±3.64 years (range, 8-18 years) in the remission group and 14.48±2.1 years (range, 10-18 years) in the control group. The mean duration of remission was 36.78±28.29 months (range, 2-99 months). There was no statistically significant difference between the groups in terms of parental age, family structure, parental education level and average family income ($p>0.05$). The family structure, educational levels, and family income levels are shown in Table 1. All scale scores were evaluated according to the age at which they were diagnosed and the duration of remission. No statistically significant difference was found.

In the remission group, remission was obtained in the follow-up of a diagnosis of Pre-B-cell ALL in 40.7% of the patients, Hodgkin's lymphoma in 18.5%, AML in 14.8%, Burkitt lymphoma in 7.4%, T-ALL in 7.4%, Non-Hodgkin's lymphoma in 7.4%, and Mixed Hodgkin's lymphoma in 3.7%. Due to the limitation in the sample group, statistically significant results could not be obtained when the diagnoses and scale scores of the individuals were evaluated.

In the comparisons of the raw scores of the RCADS parent scale (RCADS-PV) between the two groups, the mean raw score of the panic disorder subscale was determined to be 2.52±3.15 in the patient group and 3.56±2.83 in the control group, with a statistically significant difference determined between the groups (p=0.048). The mean raw score of the OCD subscale was 3.07±3.17 in the patient group and 4.84±3.36 in the control group, and the difference was determined to be statistically significant (p=0.045). The mean raw score of the depression subscale was 4.81±4.74 in the patient group and 7.12±4.97 in the control group, and the difference was determined to be statistically significant (p=0.047). When the RCADS child scale (RCARDS-CV) points were compared between the two groups, no statistically significant difference was determined (Table 2). The raw scores of the child and parent RCADS of both groups are shown in Table 2.

Table 1. The family structure, educational levels, and family income levels

	Remission		Control		*p*
	n	%	n	%	
Family Structure					
Core family	19	70.4	19	76	
Extended Family	6	22.2	3	12	0.733
Divorced	1	3.7	2	8	
Deceased	1	3.7	1	4	
Mother's education status					
Primary education	15	55.6	14	56	
High school	8	29.2	5	20	0.589
University	4	14.8	6	24	
Father's education status					
Primary education	13	48.1	13	52	
High school	10	37	7	28	0.753
University	4	14.8	5	20	
Family income					
< Single Minimum Wage	11	40.7	12	48	
Single Minimum Wage – Double Minimum Wage	10	37	9	36	0.810
> Double Minimum Wage	6	22.2	4	16	

Chi-square test

Table 2. The raw scores of RCADS-PV

RCADS	Remission Mean±SD	Control Mean±SD	*p*
PV AD	19.81±14.98	25.2±14.59	0.133 (z=-1.503)
PV SAD	3.15±3.22	2.76±2.92	0.802 (z=-0.251)
PV GAD	4.33±3.79	5.76±3.72	0.099 (z=-1.65)
PV PD	2.52±3.15	3.56±2.83	0.048* (z=-1.977)
PV SP	6.74±5.59	8.28±5.22	0.27 (z=-1.103)
PV OCD	3.07±3.17	4.84±3.36	0.045* (z=-2.009)
PV DD	4.81±4.74	7.12±4.97	0.047* (z=-1.985)
CV AD	21.3±17.59	25.12±16.88	0.284 (z=-1.072)
CV SAD	2.52±2.68	2.24±2.42	0.816 (z=-0.233)
CV GAD	5.15±5.13	6.2±3.81	0.105 (z=-1.623)
CV PD	2.85±3.66	4.2±3.71	0.083 (z=-1.734)
CV SP	7.81±6.93	8±5.95	0.804 (z=-0.248)
CV OCD	2.93±3.28	4.48±3.45	0.069 (z=-1.821)
CV DD	5.19±4.53	7.24±5.94	0.177 (z=-1.351)

* *p*<0.05 statistically significant, z: Mann Whitney U test, SD: standard deviation
RCADS: Revised Child Anxiety and Depression Scales
RCADS-PV: Revised Child Anxiety and Depression Scales-Parent Version
RCADS-CV: Revised Child Anxiety and Depression Scales-Child Version
AD: Anxiety Disorder, SAD: Separation Anxiety Disorder, GAD: Generalized Anxiety Disorder
PD: Panic Disorder, SP: Social Phobia, OCD: Obsessive Compulsive Disorder
DD: Depressive Disorder

In the study, the CRIES-13 score of 30 and above was found to be 22.2% in the remission group and 16% in the control group. When the CRIES points of both groups were compared, no statistically significant difference was determined (*p*=0.659). In the comparisons of the PTGI and subscales of both groups, no statistically significant difference was determined in respect of the total scale points (*p*=0.066). In the change in life philosophy subscale, the mean points were 15.59±7.31 in the remission group and 11.36±7.00 in the control group, with the difference determined at a statistically significant level (*p*=0.038). The subscale points of the change in relationships with others were 10.59±6.32 in the remission group and 7.24±5.68 in the control group, and the difference between the two groups was determined to be statistically significant (*p*=0.05). The CRIES and PTGI scale points of the groups are shown in Table 3.

Table 3. The CRIES-13 and PTGI scale and subscale points

	Remission Mean±SD	Control Mean±SD	*p*
CRIES- 13	17.19±15.46	17.8±13.15	0.659 (z=-0.441)
PTGI	54.78±23.03	43.24±20.99	0.066 (t=1.883)
Change in self-perception	28.59±12.08	24.64±11.41	0.232 (t=1.211)
Change in life philosophy	15.59±7.31	11.36±7	**0.038* (t=2.129)**
Change in relationships with others	10.59±6.32	7.24±5.68	**0.05* (t=2.006)**

CRIES-13: Child Revised Impact of Events Scale; PTGI: Post-Traumatic Growth Inventory
* *p*<0.05 statistically significant, t: In independent groups t test; z: Mann Whitney U test
SD: standard deviation

Correlation analysis of the clinical scale points (RCADS-PV, RCADS-CV, CRIES-13, PTGI) was performed separately in the remission and control groups.

The correlations between the raw scores of all the subscales of the RCADS-PV/ RCADS-CV and the CRIES-13 scale points were examined in both remission and control group. The correlations between the remission group scales are shown in Table 4. The correlations between the scales in the control group are shown in Table 5.

The correlation between the raw score of the generalised anxiety subscale of the RCADS-PV and the PTGI subscale of change in life philosophy was examined. In the remission group, a moderate level positive correlation was observed (*p*=0.036, r=0.405). The correlations between the remission group scales are shown in Table 4.

When the relationships were examined between the CRIES-13 and PTGI scale points in the remission group, no statistically significant relationship was determined. When the relationships were examined between the CRIES-13 and PTGI scale points in the control group, a moderate level positive correlation was determined between the PTGI total score

(*p*=0.022, r=0.455), and the subscale points of change in self perception (*p*=0.010, r=0.507) and change in life philosophy (*p*=0.032, r=0.429). The relationships between the CRIES-13 and PTGI scale points are shown in Table 6.

Discussion

The aim of this study was to evaluate the levels of traumatic and mental effects and post-traumatic growth by comparing a group of patients in cancer remission and a control group. The study results showed that the anxiety, depression, and OCD raw scores of the RCADS-PS were statistically significantly higher in the control group than in the remission group who had been diagnosed with cancer and were in remission. In addition, the PTGI subscale points of the change in life philosophy and change in relationships with others were found to be statistically significantly higher in the remission group than in the control group. In the comparisons of the CRIES points, no statistically significant difference was determined between the two groups.

One of the hypotheses of this study was that the children and adolescents who had been diagnosed with cancer would develop coping skills and coping mechanisms and the mental effects would be lower in this group.

Table 4. Remission group scale correlations

RCADS		CRİES-13	PTGI	Change in self-perception	Change in life philosophy	Change in relationships with others
RCADS-PV AD	r	**0.853****	0.045	-0.016	0.130	0.161
	p	<0.001	0.823	0.938	0.517	0.422
RCADS-PV SAD	r	**0.670****	-0.160	-0.186	-0.203	0.125
	p	<0.001	0.426	0.352	0.309	0.533
RCADS-PV GAD	r	**0.654****	0.273	0.206	**0.405***	0.207
	p	<0.001	0.168	0.303	0.036	0.301
RCADS-PV PD	r	**0.729****	-0.116	-0.138	0.046	-0.142
	p	<0.001	0.564	0.493	0.820	0.479
RCADS-PV SP	r	**0.607****	0.251	0.180	0.329	0.273
	p	0.001	0.206	0.369	0.094	0.168
RCADS-PV OCD	r	**0.765****	-0.003	-0.047	0.088	0.104
	p	<0.001	0.987	0.814	0.664	0.606
RCADS-PV DD	r	**0.795****	-0.103	-0.197	0.041	-0.029
	p	<0.001	0.610	0.326	0.839	0.887
RCADS-CV AD	r	**0.733****	0.065	<0.001	0.128	0.143
	p	<0.001	0.746	0.999	0.524	0.477
RCADS-CV SAD	r	**0.564****	-0.105	-0.181	-0.137	0.201
	p	0.002	0.604	0.365	0.496	0.316
RCADS-CV GAD	r	**0.633****	0.195	0.121	0.314	0.146
	p	<0.001	0.331	0.548	0.111	0.468
RCADS-CV PD	r	**0.804****	0.010	0.009	0.098	-0.030
	p	<0.001	0.962	0.963	0.625	0.884
RCADS-CV SP	r	**0.585****	0.118	0.077	0.125	0.185
	p	0.001	0.558	0.701	0.535	0.356
RCADS-CV OCD	r	**0.484****	0.014	-0.068	0.122	0.140
	p	0.10	0.946	0.737	0.545	0.485
RCADS-CV DD	r	**0.686****	-0.085	-0.121	0.024	-0.117
	p	<0.001	0.675	0.548	0.905	0.560

RCADS: Revised Child Anxiety and Depression Scales
RCADS-PV: Revised Child Anxiety and Depression Scales-Parent Version
RCADS-CV: Revised Child Anxiety and Depression Scales-Child Version
AD: Anxiety Disorder, SAD: Separation Anxiety Disorder, GAD: Generalized Anxiety Disorder
PD: Panic Disorder, SP: Social Phobia, OCD: Obsessive Compulsive Disorder
DD: Depressive Disorder; CRIES-13: Child Revised Impact of Events Scale
PTGI: Post-Traumatic Growth Inventory, * $p < 0.05$ statistically significant
r: Spearman correlation coefficient

Table 5. Control group scale correlations

RCADS		CRİES-13	PTGI	Change in self-perception	Change in life philosophy	Change in relationships with others
RCADS-PV AD	**r**	**0.549****	0.363	**0.410***	**0.443***	-0.003
	p	0.004	0.075	0.042	0.027	0.990
RCADS-PV SAD	**r**	0.341	-0.018	0.023	0.047	-0.104
	p	0.095	0.931	0.911	0.823	0.620
RCADS-PV GAD	**r**	**0.421***	**0.475***	**0.521****	**0.541****	0.092
	p	0.036	0.017	0.008	0.005	0.660
RCADS-PV PD	**r**	0.354	0.146	0.239	0.219	-0.135
	p	0.082	0.486	0.250	0.293	0.519
RCADS-PV SP	**r**	**0.481***	0.305	0.370	0.372	-0.097
	p	0.015	0.138	0.069	0.067	0.646
RCADS-PV OCD	**r**	**0.402***	**0.486***	**0.441***	**0.613****	0.105
	p	0.046	0.014	0.027	0.001	0.618
RCADS-PV DD	**r**	**0.408***	0.057	0.224	0.207	-0.255
	p	0.043	0.787	0.282	0.321	0.220
RCADS-CV AD	**r**	**0.646****	0.274	0.369	0.308	-0.003
	p	<0.001	0.186	0.069	0.135	0.987
RCADS-CV SAD	**r**	**0.490***	-0.052	0.014	0.015	-0.027
	p	0.013	0.805	0.947	0.943	0.898
RCADS-CV GAD	**r**	**0.607****	0.268	0.334	0.325	0.049
	p	0.001	0.196	0.103	0.112	0.818
RCADS-CV PD	**r**	**0.600****	0.173	0.281	0.212	-0.004
	p	0.002	0.410	0.173	0.309	0.987
RCADS-CV SP	**r**	**0.498***	0.348	**0.437***	0.322	0.028
	p	0.011	0.088	0.029	0.117	0.894
RCADS-CV OCD	**r**	**0.541****	0.227	0.287	0.380	-0.021
	p	0.005	0.275	0.164	0.061	0.921
RCADS-CV DD	**r**	**0.528****	0.022	0.154	0.086	-0.151
	p	0.007	0.918	0.462	0.681	0.470

RCADS: Revised Child Anxiety and Depression Scales
RCADS-PV: Revised Child Anxiety and Depression Scales-Parent Version
RCADS-CV: Revised Child Anxiety and Depression Scales-Child Version
AD: Anxiety Disorder, SAD: Separation Anxiety Disorder, GAD: Generalized Anxiety Disorder
PD: Panic Disorder, SP: Social Phobia, OCD: Obsessive Compulsive Disorder
DD: Depressive Disorder, CRIES-13: Child Revised Impact of Events Scale
PTGI: Post-Traumatic Growth Inventory, * *p*<0.05 statistically significant
r: Spearman correlation coefficient

Table 6. Correlation between CRIES-13 AND PTGI scale scores in remission and control groups

CRIES-13		PTGI	Change in self-perception	Change in life philosophy	Change in relationships with others
Remission	r	-0.017	-0.067	0.089	0.066
	p	0.934	0.740	0.660	0.745
Control	r	**0.455***	**0.507****	**0.429***	0.275
	p	0.022	0.010	0.032	0.183

CRIES-13: Child Revised Impact of Events Scale; PTGI: Post-Traumatic Growth Inventory
* *p*<0.05 statistically significant; r: Spearman correlation coefficient

The study results were consistent with this hypothesis. Previous studies in literature have also shown results that children and adolescent cancer patients in remission have fewer mental complaints and exhibit higher self concepts [5, 28-30]. It has been reported that adolescents who have been saved from cancer show lower psychological distress and use avoidance coping strategies less. In the results of another study, it was reported that surviving children and adolescent cancer patients have a lower probability of being anxious and depressive [31].

Another hypothesis was that PTG would be observed in the remission group who had been diagnosed with cancer and were in remission. The study results confirmed the hypothesis. Growing up from a difficult cancer experience, children's interpretations of themselves and their environment change and their focus on the positive aspects of life increases [5, 9]. In studies on childhood cancers; many survivors report more positive changes in their behavior towards others, and these positive changes have been suggested to result from experiences with childhood cancer and its treatment [9, 32]. It has been reported that post-traumatic growth can also be seen in young children, it is not age-related, and post-traumatic growth may occur independently of age and cognitive maturity level [5]. Although consistent with the developmental functions and difficulties of children and adolescents, these findings show the importance of understanding how this experience is processed by children and adolescents in remission [9].

When the CRIES-13 scores of the two groups were compared, there was no statistically significant difference, but CRIES-13 scores of 30 and above were found in more participants in the remission group than in the control group. This may have been due to the limited number of the sample or to differences in individual coping mechanisms, and could be a sign of post-traumatic growth. PTSB has worked with young adult cancer survivors in the literature [33-39]. the frequency of PTSD has been reported to vary between 6.2% and 21.6% [36, 37]. In a study in Japan, although no difference was seen between a remission group and a control group in respect of IES-R points ≥25, the median total IES-R points were found to be higher in the remission group [14]. Similarly, although no statistical difference was observed between the groups in our study, CRIES-13 scores were found to be 30 and above in numerically more participants in the remission group.

In this study, when the relationship was examined between the raw scores of all the RCADS parent and child subscales and the CRIES -13 scale points, strong and moderate level positive correlations were determined with mental disorders in both the remission and control groups. This showed that trauma increased the predisposition to mental diseases. The lifetime risk of a predisposition to mental disease is higher as a result of an individual having experienced cancer or another challenging life event and having processed this as trauma. Events that are seen as ordinary or that are not seen as a disaster by most people may cause a post-traumatic psychopathology as the event has special meaning for the individual [40, 41].

When the relationships between the CRIES-13 and PTGI points were examined in this study, a moderate level positive correlation was determined between the PGTI total score and the subscale points of change in self-perception and change in life philosophy in the control group. In the literature, growth indicators, such as positive changes in relationships with oneself and others, have been shown to be independent of PTSD and treatment of children [9]. Post-traumatic reactions can be multifaceted. In pediatric cancers, posttraumatic growth is thought to be a measure of coping mechanisms rather than an outcome [9, 42].

Limitations/Strengths

The number of participants is the most important limitation of the study. There could also have been bias in the sample as it was formed of those who volunteered to participate in the research. Therefore, the results cannot be generalised to all children and adolescents, and there is a need for further multicentre studies with larger samples. Nevertheless, that the findings contribute to an area which has not been sufficiently studied can be considered a strength of this study.

As a result; the resulting data contribute to an understudied field and provide a better understanding of children and adolescents who

are cancer survivors. Cancer survivors grow from this negative experience, become stronger and survive with positive gains. Considering the current prevalence of cancer and increasing survival rates with treatments, new multicenter studies with larger samples are needed on this subject.

Conflicts of interest: No conflict of interest was declared by the authors.

References

1. Marziliano A, Tuman M, Moyer A. The relationship between post-traumatic stress and post-traumatic growth in cancer patients and survivors: a systematic review and meta-analysis. Psycho-Oncology 2020;29:604-616. https://doi.org/10.1002/pon.5314

2. Özbaran B, Erermiş S. Kanser tedavisi gören çocuk ve gençlerde uzun süreli izlem sürecinde psikososyal özelliklerin tanımlanması ve genel yaklaşım ilkeleri. Klinik Psikiyatri 2006;9:185-190.

3. Smith MY, Redd WH, Peyser C, Vogl D. Post-traumatic stress disorder in cancer: a review. Psychooncology 1999;8:521-537. https://doi.org/10.1002/(sici)1099-1611(199911/12)8:6<521::aid-pon423>3.0.co;2-x

4. Kazak AE, Rourke MT, Alderfer MA, Pai A, Reilly AF, Meadows AT. Evidence-based assessment, intervention and psychosocial care in pediatric oncology: a blueprint for comprehensive services across treatment. J Pediatr Psychol 2007;32:1099-1110. https://doi.org/10.1093/jpepsy/jsm031

5. Turner Sack AM, Menna R, Setchell SR, Maan C, Cataudella D. Posttraumatic growth, coping strategies, and psychological distress in adolescent survivors of cancer. J Pediatr Oncol Nurs 2012;29:70-79. http://dx.doi.org/10.1177/1043454212439472

6. Phipps S. Adaptive style in children with cancer: implications for a positive psychology approach. J Pediatr Psychol 2007;32:1055-1066. https://doi.org/10.1093/jpepsy/jsm060

7. Tedeschi RG, Calhoun LG. The posttraumatic growth ınventory: measuring the positive legacy of trauma. J Traumatic Stress 1996;9;455-471. https://doi.org/10.1007/BF02103658

8. Joseph S, Linley PA. Trauma, recovery, and growth: positive psychological perspectives on posttraumatic stress. John Wiley and Sons 2008. https://doi.org/10.1002/9781118269718

9. Barakat LP, Alderfer MA, Kazak AE. Posttraumatic growth in adolescent survivors of cancer and their mothers and fathers. J Pediatr Psychol 2006;31:413-419. https://doi.org/10.1093/jpepsy/jsj058

10. Berntsen D, Rubin DC. The centrality of event scale: a measure of integrating a trauma into one's identity and its relation to post-traumatic stress disorder symptoms. Behav Res Ther 2006;44:219-231. https://doi.org/10.1016/j.brat.2005.01.009

11. Boals A, Steward JM, Schuettler D. Advancing our understanding of posttraumatic growth by considering event centrality. J Loss Trauma 2010;15:518-533. https://doi.org/10.1080/15325024.2010.519271

12. Linley PA, Joseph S. Positive change following trauma and adversity: a review. J Trauma Stress 2004;17:11-21. https://doi.org/10.1023/B:JOTS.0000014671.27856.7e

13. Phipps S, Klosky JL, Long A, et al. Posttraumatic stress and psychological growth in children with cancer: has the traumatic ımpact of cancer been overestimated? J Clin Oncol 2014;32:641-646. https://doi.org/10.1200/JCO.2013.49.8212

14. Kamibeppu K, Sato I, Honda M, et al. Mental health among young adult survivors of childhood cancer and their siblings including posttraumatic growth. J Cancer Surviv 2010;4:303-312. https://doi.org/10.1007/s11764-010-0124-z

15. Kağan M, Güleç M, Boysan M, Çavuş H. Travma sonrası büyüme envanteri'nin türkçe versiyonunun normal toplumda hiyerarşik faktör yapısı. TAF Prev Med Bull 2012;11:617-624. https://doi.org/10.5455/pmb.1323620200

16. Altınışık E. Suriyeli ergenlerde travma sonrası büyüme ve psikolojik problemler ile ilişkili faktörler. Yüksek Lisans Tezi. İbn Haldun Üniversitesi, Lisansüstü Eğitim Enstitüsü, Psikoloji Anabilim Dalı, İstanbul, 2020.

17. Zebrack B, Kwak M, Salsman J, et al. The relationship between posttraumatic stress and posttraumatic growth among adolescent and young adult (AYA) cancer patients. Psychooncology 2015;24:162-168. https://doi.org/10.1002/pon.3585

18. Ying L, Wang Y, Lin C, Chen C. Trait resilience moderated the relationships between PTG and adolescent academic burnout in a post-disaster context. Pers Individ Dif 2016;90:108-112. https://doi.org/10.1016/j.paid.2015.10.048

19. Laufer A, Raz Hamama Y, Levine SZ, Solomon Z. Posttraumatic growth in adolescence: the role of religiosity, distress, and forgiveness. J Soc Clin Psychol 2009;28:862-880. https://doi.org/10.1521/jscp.2009.28.7.862

20. Levine SZ, Laufer A, Hamama Raz Y, Stein E, Solomon Z. Posttraumatic growth in adolescence: examining its components and relationship with PTSD. J Trauma Stress 2008;21:492-496. https://doi.org/10.1002/jts.20361

21. Milam JE, Ritt Olson A, Unger JB. Posttraumatic growth among adolescents. J Adolesc Res 2016;19:192-204. https://doi.org/10.1177/0743558403258273

22. Cryder CH, Kilmer RP, Tedeschi RG, Calhoun LG. An exploratory study of posttraumatic growth in children following a natural disaster. Am J Orthopsychiatry 2006;76:65-69. https://doi.org/10.1037/0002-9432.76.1.65

23. Chorpita BF, Yim L, Moffitt C, Umemoto LA, Francis SE. Assessment of symptoms of DSM-IV anxiety and depression in children: a revised child anxiety and depression scale. Behav Res Therapy 2000;38:835-855 https://doi.org/10.1016/S0005-7967(99)00130-8

24. Gormez V, Kılınçaslan A, Cahid Orengul A, et al. Psychometric properties of the Turkish version of the revised child anxiety and depression scale-child version in a clinical sample. Psychiatry Clin Psychopharmacol 2017;27:84-92. https://doi.org/10.1080/24750573.2017.1297494

25. Perrin S, Meiser Stedman R, Smith P. The children's revised ımpact of event scale (CRIES): validity as a screening instrument for PTSD. Behav Cogn Psychother 2005;33:487-498. https://doi.org/10.1017/S1352465805002419

26. Horowitz M, Wilner N, Alvarez W. Impact of event scale: a measure of subjective stress. Psychosom Med 1979;41:209-218. https://doi.org/10.1097/00006842-197905000-00004

27. Çeri V, Hamidi F, Çakır B, et al. Child Revised Impact of Event Scale (CRIES): validity and reliability study of Turkish version. Neuropsychiatr Invest 2021;59:21-26. https://doi.org/10.5455/NYS.20201101115427

28. Dejong M, Fombonne E. Depression in paediatric cancer: an overview. Psychooncology 2006;15:553-566. https://doi.org/10.1002/pon.1002

29. Elkin TD, Phipps S, Mulhern RK, Fairclough D. Psychological functioning of adolescent and young adult survivors of pediatric malignancy. Med Pediatr Oncol 1997;29:582-588. https://doi.org/10.1002/(sici)1096-911x(199712)29:6<582::aid-mpo13>3.0.co;2-8

30. Phipps S, Srivastava DK. Repressive adaptation in children with cancer. Health Psychol 1997;16:521-528. https://doi.org/10.1037/0278-6133.16.6.521

31. Frank NC, Blount RL, Brown RT. Attributions, coping, and adjustment in children with cancer. J Pediatr Psychol 1997;22:563-576. https://doi.org/10.1093/jpepsy/22.4.563

32. Kazak AE, Stuber ML, Barakat LP, Meeske K. Assessing posttraumatic stress related to medical illness and treatment: the impact of traumatic stressors interview schedule (ITSIS). Fam Syst Heal 1996;14:365-380. https://doi.org/10.1037/h0089795

33. Erickson SJ, Steiner H. Trauma and personality correlates in long-term pediatric cancer survivors. Child Psychiatry Hum Dev 2001;31:195-213. https://doi.org/10.1023/A:1026477321319

34. Erickson SJ, Steiner H. Trauma spectrum adaptation: somatic symptoms in long-term pediatric cancer survivors. Psychosomatics 2000;41:339-346. https://doi.org/10.1176/appi.psy.41.4.339

35. Langeveld NE, Grootenhuis MA, Voûte PA, de Haan RJ. Posttraumatic stress symptoms in adult survivors of childhood cancer. Pediatr Blood Cancer 2004;42:604-610. https://doi.org/10.1002/pbc.20024

36. Kazak AE, Barakat LP, Alderfer M, et al. Posttraumatic stress in survivors of childhood cancer and mothers: development and validation of the ımpact of traumatic stressors ınterview schedule (ITSIS). J Clin Psychol Med Settings 2001;8:307-323. https://doi.org/10.1023/A:1011977031826

37. Meeske KA, Ruccione K, Globe DR, Stuber ML. Posttraumatic stress, quality of life, and psychological distress in young adult survivors of childhood cancer. Oncol Nurs Forum 2001;28:481-489.

38. Schwartz L, Drotar D. Posttraumatic stress and related ımpairment in survivors of childhood cancer in early adulthood compared to healthy peers. J Pediatr Psychol 2006;31:356-366. https://doi.org/10.1093/jpepsy/jsj018

39. Rourke MT, Hobbie WL, Schwartz L, Kazak AE. Posttraumatic stress disorder (PTSD) in young adult survivors of childhood cancer. Pediatr Blood Cancer 2007;49:177-182. https://doi.org/10.1002/pbc.20942

40. Yavuz MS, Akın U, Karabağ G, Ozan E, Aykir OF. Travma sonrası gelişen ruhsal bozuklukların adli-tıbbi açıdan değerlendirilmesi. Van Tıp Derg 2020;27:100-102. https://doi.org/10.5505/vtd.2020.47154

41. Özgen F, Aydın H. Travma sonrası stres bozukluğu. Klinik Psikiyatri 1999;1:34-41.

42. Cordova MJ, Cunningham LL, Carlson CR, Andrykowski MA. Posttraumatic growth following breast cancer: a controlled comparison study. Heal Psychol 2001;20:176-185. https://doi.org/10.1037/0278-6133.20.3.176

Authors' contributions to the article

M.A.T. constructed the main idea and hypothesis of the study. M.A.T., T.S.M., S.Y. and H.Ş. developed the theory and organized the material and method section. Data collection was done by M.A.T., T.S.M. and S.Y. and data analysis was done by H.Ş., M.A.T., T.S.M. and H.Ş. evaluated the data in the results section. The discussion section of the article was written

by M.A.T., T.S.M., S.Y. and H.Ş reviewed the article and made the necessary corrections and approved it. In addition, all authors discussed the entire study and approved the final version.

by M.A.T., T.S.M., S.Y. and H.Ş reviewed the article and made the necessary corrections and approved it.