

## CORRELATES OF QUALITY OF LIFE IN PEDIATRIC CANCER SURVIVORS

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received: 3.12.2019;

revised: 20.4.2020;

accepted: 7.7.2020

### SUMMARY

**Background:** Pediatric survivors of childhood cancer are at increased risk of poor quality of life and social-emotional outcomes following treatment. Aim of the research was to examine the possible predictors of quality of life, that is, to examine the impact and relative contribution of post-traumatic stress symptoms, post-traumatic growth, the effects of treatment and social functioning on quality of life.

**Subjects and methods:** Participants were 83 pediatric cancer survivors at age 16 to 29 who were off-therapy for more than one year. They filled out the Impact of Event Scale-Revised Questionnaire (IES-R), Quality of life scale (QOLS) and Social Adjustment Scale (SAS-SR). Demographic data including child health status information were also collected.

**Results:** Findings indicate a significant association between quality of life and social adjustment, posttraumatic growth, health consequences and posttraumatic stress disorder. Regression analysis showed that posttraumatic growth, social functioning and treatment consequences are significant predictors of quality of life in pediatric cancer survivors.

**Conclusion:** The findings highlight the importance of key factors associated with quality of life in pediatric cancer survivors. Interventions aimed at strengthening social support and highlighting positive changes following trauma of cancer treatment could improve quality of life of pediatric cancer survivors.

**Key words:** pediatric cancer survivors - adolescents - quality of life

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### INTRODUCTION

Advanced treatment and modern therapies have significantly increased the survival rate of children and adolescents treated for malignancies. Research indicate that today the probability of five-year survival in pediatric oncology exceeds 80% (Koutná & Blatný 2017). This also emphasize psychological consequences of treatment that have a long-term impact on the quality of life. Patenaude and Kupst (2005) highlighted in their review of studies addressing psychosocial functioning of pediatric cancer population that there is no child who has not been changed by the disease. Most studies have found that children are generally well socially adjusted (Eiser et al. 2000). Although the results of the existing studies are inconsistent, they show that children and adolescents cured of malignancies generally have no more severely elevated levels of psychopathology. At the same time they found symptoms of post-traumatic stress disorder (PTSD) and anxiety associated with treatment outcomes. Although adverse psychological sequelae can be observed in children and adolescents that can be directly linked to the experience of illness and treatment, there are also positive effects in the form of post-traumatic growth (Elkin et al. 1997). This means that children experience the positive impact of cancer treatment on their worldview and life, but on the other hand, they remain concerned about the physical, psychological and social quality of their lives.

### Distress and adverse effects of cancer treatment in children and adolescents

Cancer is considered to be an extremely stressful experience for the ill child but also for his or her family. Most studies have found consistent results that children and adolescents who reported the health consequences of treatment for malignancy also had less positive psychological outcomes (Zebrack & Chesler 2001). In addition, variability of moderate to high prevalence of post-traumatic stress symptoms in childhood cancer patients has been reported in the literature, ranging from 4.7-35% (Bruce 2006). Potential socio-demographic risk factors for the development of symptoms of post-traumatic stress disorder, which are associated with malignancy are: older age (Hobbie et al. 2000), female gender, single status, lower income, and unemployment (Stubber et al. 2010). Treatment-related factors associated with post-traumatic stress disorder include: multiple health outcomes of treatment, comorbidity and relapse, neurocognitive deficits and learning disabilities (Chen et al. 1998) The experience of malignancy includes symptoms of disease, family stress after finding out the diagnoses, side effects of chemotherapy, and treatment-related psychological distress, all of which can contribute to significant disruptions in day-to-day functioning.

Interpersonal connections with family members and peers have been identified as key predictors of good health and better quality of life. Lower family support,

increased levels of social withdrawal, difficulties in social competences, and less involvement in social situations are associated with poorer psychosocial functioning (Blatný et al. 2011).

### **The concept of post-traumatic growth**

The first and most influential model of post-traumatic growth (PTG) was introduced in 1996 by Tedeschi and Calhoun. They define post-traumatic growth as the experience of positive change that occurs as a result of coping with a very stressful life event. They emphasize that post-traumatic growth is not a consequence of trauma, but the result of an individual's internal struggle to overcome a traumatic experience (Tedeschi & Calhoun 2004). The concept of post-traumatic growth thus provides a new way of understanding trauma that, in addition to the obviously negative impact on an individual's life, can sometimes result in psychological well-being. Post-traumatic growth as defined by Tedeschi and Calhoun has five domains: a person appreciates his or her own life and there has been a change in priorities, a warmer, more intimate relationship with others, a more pronounced sense of personal strength, recognition of new opportunities in life, and spiritual development. Although it presupposes positive changes in an individual's life, post-traumatic growth does not imply that person experiencing these changes do not simultaneously show signs of stress and psychological distress due to trauma.

### **Positive consequences of treatment of malignancy in childhood and adolescence**

In support of the previously mentioned concept of post-traumatic growth, research suggests that a traumatic experience in the treatment of malignancy can result in positive outcomes. Specifically, a significant proportion of children and young people who are cured of cancer talk about shifting life priorities, experiencing greater value of life, more closeness in interpersonal relationships, or generally – more positive growth. This represents their personal way of dealing with the disease, but at the same time, it also represents the way in which their family copes with the illness and treatment of their child (Eiser & Havermans 1994). Most adolescents treated for childhood malignancy show positive changes in evaluating themselves, relationships, and life goals after successfully treating cancer. Studies assessing post-traumatic growth (Duran 2013) highlight some specific dimensions of inner growth such as: a deeper meaning in life, understanding of oneself, family, peers and other people. A higher degree of perceived family closeness is associated with a greater attachment and respect: children are extremely grateful for the support they received during their cancer treatment.

### **Cancer Survivorship and Quality of Life**

Cancer survivorship represents process of living following a diagnosis of cancer, regardless of how long a person lives. It is a concept used by many health care professionals and cancer patients to understand physical, social, psychological, and spiritual impact of cancer on quality of life. Many research (Zebrack & Chesler 2002). had been conducted to assess survivors' quality of life regarding health status, emotional distress, sexuality and fertility, school achievement, social and family relations, spirituality and other psychosocial elements. This study reports on quality of life in survivors of childhood cancer as measured by psychometric instruments of post-traumatic stress symptoms, post-traumatic growth, social adjustment and Quality of life scale questionnaire (QOLS, Flagan 1970, Burckhardt & Andreson 2003). Some medical data related to quality of life (ie. treatment outcomes) were also assessed.

### **Study Aim**

The aim of the study was to examine the possible predictors of quality of life, that is, to examine the impact and relative contribution of post-traumatic stress symptoms, post-traumatic growth, the effects of treatment and social functioning on quality of life.

## **SUBJECTS AND METHODS**

### **Participants**

This study included 83 adolescents and young adults between the ages of 15 and 30 who were treated in childhood and adolescence at the Department of Hematology and Oncology, Pediatric Department at the University Hospital Center - Zagreb, or at the Department of Oncology and Hematology „Dr. Mladen Čepulić“ in Pediatric Diseases Clinic Zagreb.

The inclusion criteria for participants was finishing of active treatment for malignant disease, or remission achieved at least one year ago. Participants were survivors recruited from the database of the association „Firefly“ which provides assistance to children and adolescents with malignancies. A link to an online questionnaire, was sent to them, and they filled it out electronically. The exclusion criteria from the study was patients' health condition, which included relapse of the disease.

### **Ethical considerations**

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration (2013). Informed consent/permission was obtained from all patients and parents of minors who participated in the study.

## Psychometric instruments and procedures

Sociodemographic questionnaire was constructed for the purpose of this research, and the data included: participants' age and gender, education, employment and partner status, place of residence and income. Anamnestic data included information on the type of illness, length of hospital stay, duration of treatment, as well as current health status information (remission or relapse of the disease).

Quality of life was examined by the Quality of life scale questionnaire (QOLS, Flagan 1970, Burckhardt & Andreson 2003), which has 16 items and was adapted for use in various chronic diseases groups. It generally examines perceived quality of life in three areas of functioning: close relationships and material well-being, health functioning, and personal and social engagement. The original questionnaire consisted of 15 items, but the European version consists of 16. The minimum total score is 16 and the maximum is 112 points; for the population of healthy subjects the average total score is 90 points. Internal consistency is  $\alpha=0.78$  to 0.84.

The level of traumatization was assessed by the Revised Event Impact Scale (Impact of Event Scale-Revised - IES-R; Weiss & Marmar 1997). The IES-R is a measure of subjective stress related to a specific life event. It contains 22 items that examine the presence of difficulties in three groups of traumatizing symptoms: reliving events, avoiding trauma-related stimuli, and increased arousal. The IES-R score range is divided into 3 categories, where a score of 24 or more is reported as clinically significant because it indicates the presence of PTSD symptoms, while a score of 33 or more is recommended as a cut-off score for diagnosing PTSD (Creamer et al. 2003). The questionnaire has a high internal good internal consistency with Cronbach's alpha range from 0.79 to 0.92.

The level of posttraumatic growth was examined by the Posttraumatic Growth Inventory (PTGI, Tedeschi & Calhoun 1996), which measures the extent to which people with traumatic experience of any kind perceive positive psychological changes resulting from their attempts to cope with trauma and its consequences. It consists of 21 items that assess positive change in five areas: relationships with others, new opportunities, personal strength, spiritual change, and respect for the value of life. Participants on a scale from 0 (I did not experience) to 5 (to a very large extent) should evaluate the degree to which they experienced the changes mentioned as a result of coping with a particular life crisis. The total score is

determined as the sum of all estimates and ranges from 0 to 105, and it is possible to use scores on individual factors. A higher score indicates a higher level of growth. Cronbach's  $\alpha$  coefficient is 0.90 for the scale.

The level of social adjustment was assessed by the Social Adjustment Scale (SAS SR; Weissman 1999), which is a measure of social functioning and is used in research and clinical practice. There is a length of 54 particles and a shorter one with 24 items which is used here. The questionnaire assesses behavioral and emotional adjustment in the areas of work, social, family and partner functioning. The total score is determined as the sum of all estimates and ranges from 14 to 70, and it is possible to use the results in individual areas of adjustment. A higher score indicates a higher level of adjustment. SAS-SR has high internal consistency and validity of  $\alpha=0.88$ .

## RESULTS

All statistical analyzes were done using IBM SPSS 12.0. Descriptive data, arithmetic means, and percentages of individual anamnestic sample data were calculated. The correlation matrix was used to show the association between quality of life and symptoms of post-traumatic stress disorder, posttraumatic growth, social adjustment, and treatment outcomes. To determine the possible contribution of individual factors (post-traumatic stress disorder, posttraumatic growth, social adjustment, and treatment consequences) to quality of life, multiple regression analysis was used, with a significance level of  $p<0.05$  (Table 1).

Table 2 emphasizes demographic and medical history of participants and their treatment. It is obvious that slightly more women (63%) participated in the study, while the average age of adolescents and adults who participated in the study was 21 years. Most graduated from high school (56.6%). The majority are students (47%), while 22.9% of participants are employed. Considering marital status, majority of participants are single (60.2%), while 36.1% are in a relationship. The average age of cancer diagnosis was 12 years, with average duration of the treatment about 15 months, and hospital stay of about 9 months. 1 to 25 months had passed since the active cancer treatment (on average about 8 months). Participants diagnosed with leukemia/lymphoma (47%) slightly dominated, followed by those with solid tumors (39%), and the least are participants with brain tumors (14%). 86.5% of the respondents are in remission of the disease.

**Table 1.** Descriptive statistics regarding variables

Questionnaire	M (SD)	Score range (min-max)	Scale range (min-max)
PTSD	21.26 (14.52)	0-57	0-88
PTG	67.15 (10.17)	37-84	0-105
Quality of life	90.06 (12.07)	58-112	16-112
Social adjustment	54.31 (7.68)	40-67	14-70

Note: M = mean; SD = standard deviation; PTSD = posttraumatic stress disorder; PTG = posttraumatic growth

**Table 2.** Demographic and medical history of participants and treatment

Number of participants	83 pediatric cancer survivors
Sex	
Male	37%
Female	63%
Age	16-28 years (M=21)
Level of education	
Primary school	9.6%
High school degree	56.6%
Bachelor degree	14.5%
Graduate degree	19.3 %
Employment situation	
Going to school	14.5%
Student	47.0%
Working	22.9%
Unemployed	15.7%
Marital status	
Single	60.2%
In a relationship	36.1%
In marriage	3.6%
Age at diagnosis	1-18 years (M=12 years)
Duration of treatment	2-48 months (M=15months )
Duration of hospital stay	0.5-36 months (M=9 months)
Time off-treatment	1-25 months (M=8 months)
Diagnosis	
Leukemia/lymphoma	47%
Brain tumor	14%
Other solid tumor	39%
Recurrence	
Yes	13.5%
No	86.5%

Note: M = mean

Insights into the correlation matrix (Table 3) revealed a high and significant positive association between quality of life and social adjustment for pediatric cancer survivors ( $r=0.703$ ,  $p<0.01$ ), and a moderate positive association between quality of life and post-traumatic growth ( $r=0.478$ ,  $p<0.01$ ). The consequences of treatment ( $r=-0.628$ ,  $p<0.01$ ) were negatively associated with quality of life, as were the symptoms of traumatization of childhood cancer survivors ( $r=-0.326$ ,  $p<0.01$ ).

Table 4. shows a significant and moderately high correlation between the quality of life of pediatric cancer survivors and their working role ( $r=0.578^{**}$ ;  $p<0.01$ ), followed by quality of life and social functioning ( $r=0.574^{**}$ ;  $p<0.01$ ) as well as family functioning ( $r=0.530^{**}$ ;  $p<0.01$ ). Partner functioning is not significantly associated with the quality of life of pediatric cancer survivors. Quality of life is significantly and negatively associated with cognitive impairment ( $r=-0.523$ ;  $p<0.01$ ), physical disability ( $r=-0.509$ ;  $p<0.01$ ), as well as general health problems ( $p=-0.327$ ;  $p<0.05$ ).

In order to determine the possible contribution of individual factors to the quality of life of pediatric cancer survivors, a regression analysis was done. Table 5. shows that social adjustment ( $\beta=0.592$ ;  $p<0.01$ ), post-traumatic growth ( $\beta=0.245$ ;  $p<0.05$ ) and the consequences of treatment ( $\beta=-0.266$ ;  $p<0.05$ ) contribute to quality of life (explaining 60.4% variance criteria), whereas traumatization symptoms did not prove to be a significant predictor of the quality of life of pediatric cancer survivors ( $\beta=0.154$ ;  $p>0.05$ ).

**Table 3.** Relationship of quality of life and posttraumatic stress disorder, posttraumatic growth, treatment consequences, and social adjustment of pediatric cancer survivors

r	QOL	PTSD	PTG	Treatment consequences	Social adjustment
QOL	1.000	-0.326**	0.478**	-0.628**	0.703**
PTSD	-0.326**	1.000	0.067	0.492**	-0.594**
PTG	0.478**	0.067	1.000	-0.323**	0.235
Treatment consequences	-0.628**	0.492**	-0.323**	1.000	-0.621**
Social adjustment	0.703**	-0.594**	0.235	-0.621**	1.000

Note: QOL = quality of life; PTSD = posttraumatic stress disorder; PTG = posttraumatic growth;  
<sup>\*</sup> $p<0.05$ ; <sup>\*\*</sup> $p<0.01$ ; N = 83 for all analyses

**Table 4.** Correlations between quality of life, social adjustment subscales, and treatment outcomes

	Subscales of social adjustment				Treatment outcomes		
	Working role	Social functioning	Partner functioning	Family functioning	General health problems	Disability	Learning difficulties
QOL	0.578**	0.574**	0.197	0.530**	-0.327*	-0.509**	-0.523**

Note: QOL = quality of life; <sup>\*</sup> $p<0.05$ ; <sup>\*\*</sup> $p<0.01$ ; N = 83 for all analyses

## DISCUSSION

In this research we wanted to examine the possible predictors of quality of life, that is, to examine the impact and relative contribution of traumatization symptoms, post-traumatic growth, the effects of treatment

and social functioning on quality of life. It can be concluded that adolescents cured of malignancies report generally good quality of life. The average score on the quality of life questionnaire in our participants is 90.06, while the average score for healthy population of the same age group is 90 (Burckhardt & Andreson 2003).

**Table 5.** Predictors of quality of life in pediatric cancer survivors

Predictors	R	R <sup>2</sup>	β
PTSD			0.154
PTG	0.800	0.604	0.245*
Treatment outcomes			-0.266*
Social adjustment			0.592**

Note: PTSD = posttraumatic stress disorder; PTG = posttraumatic growth; Quality of life was criteria for all predictors; beta (β) indicates the standardized regression weights; R<sup>2</sup> = coefficient of determination; \*p≤0.05; \*\*p≤0.01; N = 83 for all analyses

Adolescents and young adults treated for malignancies in their childhood generally report a good quality of life, which is most influenced by variables of social adjustment, post-traumatic growth, and treatment consequences. Symptoms of traumatization did not prove to be a significant predictor of quality of life in our sample. It is possible that this result would change with a larger sample, but on the other hand, it could be partly explained by the high intercorrelations with other variables, especially with the consequences of treatment. Namely, the significant negative correlation between traumatization symptoms and treatment outcomes implies, as a result, a lower quality of life in young people and adults treated for malignancies. Among the aforementioned consequences of treatment, the most significant ones related to the quality of life in our sample are: current health problems (such as chronic fatigue, nausea and frequent pain), disability and cognitive difficulties, ie. learning difficulties. A number of other studies have yielded similar results (Zeltzer 1993, Elkin et al. 1997), showing that young people with more late treatment effects, other comorbidities, primary disease relapses, and learning disabilities (most commonly attention deficits, concentrations, and memory difficulties), report lower levels of psychological well-being in the post-treatment period after malignancy treatment.

Moreover, young people with more pronounced treatment consequences (health and psychological as well as cognitive ones) report significantly lower social adjustment as well as lower post-traumatic growth, suggesting a negative effect of the cancer treatment on many aspects of life functioning. This finding highlights the importance of health status and the treatment outcomes, as well as their relationship with the physical, social, and psychological aspects of quality of life. Adolescents who were able to perceive the positive psychological consequences resulting from the cancer treatment also reported higher levels of quality of life. Posttraumatic growth refers to a more intense sense of closeness to others, an increase in perceived personal strength, usefulness, and the experience of new opportunities, despite the uncertain future as a consequence of the cancer treatment. The above speaks in favor of

strengthening the psychological resistance in a situation of dealing with a life-threatening events.

In the domain of social functioning, young people treated for malignancies report family and peer relationships as those having the greatest positive impact on quality of life. Work role (study or employment) has also proven to be significantly related to quality of life, which is not the case with relationship functioning. As more than half of our participants are single, it is possible that because of their cancer treatment, they have not yet had the opportunity to have social interactions aimed at creating the first intimate relationships. Family support and peer relationships, as well as the need for involvement in career development and employment, at this age, may be more important than a relationship. It seems that love and support that adolescents received from family and peers during active treatment (or after it) have a huge positive impact on psychological adjustment, quality of life, psychological growth and personal development of young people and adults treated for cancer in their childhood.

### Limitations and Future Implications

The first limitation relates to the fact that, without a control group, we should be cautious in conclusions about good quality of life and its correlates in the pediatric cancer survivors. There is also the possibility of giving the socially desirable answers by the participants (in the form of overestimated levels of psychological well-being, social functioning, and quality of life). At the same time, a sampling error is possible; we can assume that young people treated for malignancies, which have more pronounced treatment consequences and generally lower quality of life, were not even motivated to participate in the study. Adolescents who rarely come to the doctor's control, those who live in places distant from the clinical hospital centers in which they are treated, which live in potentially dysfunctional family environments, who socially more isolated and who have not reached the expected developmental milestones (for example, the successful completion of high school, enrollment in college or employment) may have more pronounced negative psychological consequences of treatment for malignancy, which again raises the question of the representativeness of the sample.

Future research should include a larger number of subjects, including variables of emotional functioning (such as indicators of anxiety, depression, behavioral abnormalities, etc.) and compare the results with the control group of healthy subjects. It would also be interesting to explore the determinants of the quality of life of parents of pediatric cancer survivors. A longitudinal study would certainly provide insight into changes in the degree of traumatization, post-traumatic growth, and other determinants of the quality of life of adolescents who were cured from malignancy during childhood.

## CONCLUSIONS

Pediatric cancer survivors are at increased risk of developing symptoms of posttraumatic stress disorder and require continuous psychological assessment and follow-up during and after cancer treatment. At the same time, young people treated for malignancy report relatively good quality of life. They can learn positive coping strategies and reframe cancer treatment experience to perceive psychological well-being. Adolescents who are better socially adjusted (i.e., those with adequate family and peer support), who have fewer treatment outcomes (primarily health and cognitive impairment) and who have been able to perceive positive psychological changes as a consequence of treatment, experience higher level of quality of life.

In order to improve their quality of life in the long term and to develop age-appropriate behaviors aimed at strengthening psychological resilience, it is important to provide psychological support and interventions for pediatric cancer survivors and their families, aimed at improving their social functioning, alleviating the effects of stress, and finding meaning of cancer treatment experience.

### Acknowledgements:

The authors appreciate the important work of association „Firefly“ which provided their database of pediatric cancer survivors in Croatia. In addition, we want to thank children and adolescents who participated in the research and were open about sharing informations and experiences surrounding their cancer treatment.

**Conflict of interest:** None to declare.

### Contribution of individual authors:

Maja Sedmak: conceptualization; methodology; data curation; writing; reviewing and editing.

Ana Bogdanić: methodology; format analysis; investigation; data curation; reviewing.

Marina Grubić: conceptualization; validation; resources; supervision.

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