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Life After Facing Cancer: Posttraumatic Growth, Meaning in Life and Life Satisfaction

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Abstract
Although it is known that facing cancer may be accompanied by a range of chronic and acute stress reactions, it can also contribute to positive psychological changes and influence one's life perception. The aim of this cross-sectional study was to investigate relationship between posttraumatic growth (PTG), meaning in life and life satisfaction to determine whether the presence of meaning or the search for meaning mediated the relationship between PTG and life satisfaction. The study was conducted with 149 cancer survivors who were at least one-month post-completion of all medical cancer therapy. The results indicate positive associations between PTG, the presence of meaning in life, the search for meaning and life satisfaction. Moreover, the relationship between PTG and life satisfaction could be explained by the mediating effect of the presence of meaning in life. Thus, it is important for clinicians to systematically facilitate PTG, meaning in life and life satisfaction as protective factors to one's daily functioning.

Keywords Cancer · Posttraumatic growth · The presence of meaning in life · The search for meaning · Life satisfaction

Ever since the DSM-IV listed life-threatening illnesses as directly experienced traumatic events (American Psychiatric Association [APA], 1994), a large number of studies showed the prevalence of posttraumatic stress disorder (PTSD) in cancer patients and survivors (Abbey et al., 2015; Kangas et al., 2002). The fact that the DSM-5 defines medical conditions as traumatic only when they are sudden and catastrophic (APA, 2013) has reinvigorated the discussion about the validity of previous research and the possibility of viewing cancer as a traumatic experience. In light of recent research based on the DSM-5 criteria (Andrykowski et al., 2015) and a review of cancer-related PTSD literature, today it can be said that cancer might be traumatic for some patients, but not for all (Cordova et al., 2017). Although negative effects of cancer, such as PTSD, can occur, traumatic experiences may also result in positive life changes (Calhoun & Tedeschi, 2014). Moreover, Markman et al. (2019) deem that cancer more often contributes to positive life changes rather than to the development of traumatic stress, with the experience resulting in the patient's personal growth.

Posttraumatic growth (PTG) refers to positive psychological changes following the struggle with a traumatic event (Calhoun & Tedeschi, 1999). It is observed through five domains: personal strength, new possibilities, relating to others, appreciation of life, and spiritual change (Calhoun & Tedeschi, 2013). Sears et al. (2003) and Šimunović (2014) found that 83% to 87.6% of women diagnosed with breast cancer experienced positive changes and that the intensity of such changes was generally moderate (Cordova et al., 2007; Morris & Shakespeare-Finch, 2011; Park, Chmielewski, et al., 2010; Park, Park, et al., 2010). To date, many contributions from PTG to positive outcomes of psychological functioning are known, but sometimes these relationships remain unclear. Some researchers have found a positive association of PTG with better adjustment (Carver & Antoni, 2004), decreased psychological distress and somatization (Ruini et al., 2013), better mental health and better subjective physical health (Sawyer et al., 2010). On the other hand, PTG was unrelated to well-being (Cordova et al., 2001), and benefit finding was related to greater negative affect and worse

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mental health (Tomich & Helgeson, 2004) among women diagnosed with breast cancer.

While research until now has studied the relationship between PTG and the constructs important for an individual's daily functioning, the current PTG model expands the general components involved in the process of PTG. In the model, PTG is observed as a multidimensional construct of changes in beliefs, behavior and identity, resulting from a person's pre-trauma characteristics (personality traits, self-disclosure, fundamental schemas and goals, and assumptive world beliefs), as well as social support variables and enduring distress. Since the process of PTG involve cognitive restructuring and adaptation of existing cognitive schemas to new event, it may also have an effect on life satisfaction (Calhoun & Tedeschi, 2014). According to the model, this relationship could be due to acceptance of a "changed" world or increased wisdom, meaning a person has gained something from the experience, which in turn influences their overall perspective. Furthermore, if a positive relation between PTG and life satisfaction exists, such knowledge may be important in therapeutic work with cancer patients or survivors. More precisely, facilitating PTG through therapeutic interventions could lead to individuals seeing their lives in a new way.

Life satisfaction is defined as the cognitive evaluation of an individual's life through subjectively shaped standards about appropriate circumstances (Diener et al., 1985). If the assessment of subjectively perceived life circumstances matches a unique set of criteria, the individual's assessment of satisfaction is high (Pavot & Diener, 1993). Although life satisfaction assessments are temporally stable, some life events can be associated with permanent change (Heady, 2006). There is evidence that life satisfaction of cancer survivors is significantly higher compared to the normative population (Mols et al., 2009) and that women with breast cancer believe that most people have lower life satisfaction than they did (Kessler, 2002). Therefore, it is possible that the experience of cancer changes a set of judging criteria. While a positive association between positive changes and life satisfaction among cancer survivors was empirically supported (e.g., Mols et al., 2009; Seitz et al., 2011), other studies did not present such findings (e.g., Park, Chmielewski, et al., 2010; Park, Park, et al., 2010; Stanton et al., 2006). As there have been discrepancies in findings related to the connection between PTG and life satisfaction, even among different populations faced with trauma, Triplett et al. (2012) tried to find a proper explanation for the unclear results. Their findings suggest that this relationship is mediated by the presence of meaning in life among students faced with a certain traumatic event. To our knowledge, it is still unknown whether the presence of meaning in life or the search for meaning mediate the relationship between PTG and life satisfaction among cancer survivors. Hence, it is valuable to explore if facing cancer not only contributes to positive life changes (and potentially to the revision of life satisfaction), but whether it could also be linked to reevaluation of individual interpretations and deeper understanding of life events.

Theory and previous research suggest that negative consequences of trauma often precede one's reconstruction of meaning systems (Janoff-Bulman, 1992). Meaning in life seems to be a superordinate term that implies comprehension and purpose (Steger, 2009, as cited, Steger, 2012). While comprehension is perceived as an individual's ability to make sense and understand life, purpose refers to a long-term life aspiration. Research into meaning in life indicates two important components: the presence of meaning in life and the search for meaning (Steger et al., 2006). The presence of meaning represents the subjective sense that one's life is meaningful (Steger et al., 2006) and refers to the aforementioned terms of comprehension and purpose (Martela & Steger, 2016). On the other hand, the search for meaning is defined as the strength, intensity and activity of individual desires and efforts to establish or enhance a personal understanding of life meaning, significance and purpose (Steger et al., 2008). Distinguishing between the presence of meaning in life and the search for meaning is important to understand their relationship with vital aspects pertaining to an individual's daily life. More precisely, the search for meaning is associated with less psychological well-being (Steger et al., 2008), depression, anxiety and some unpleasant emotions, such as fear and sadness (Steger et al., 2006). On the other hand, the presence of meaning is positively correlated with life satisfaction, positive emotions, intrinsic religiosity, agreeableness, and negatively associated with depression, unpleasant emotions and neuroticism (Steger et al., 2006). Therefore, if the presence of meaning in life and search for meaning differ in a way that individuals who continuously search for meaning cannot find it, the presence and the search of meaning could have opposite roles in perceived outcome of illness and thus life satisfaction.

Prior research has established the role of meaning in life in the perception of positive changes and life satisfaction. A positive relationship was found between the presence of meaning in life and PTG (Kashdan & Kane, 2011; Linley & Joseph, 2011; Triplett et al., 2012). Moreover, even if the search for meaning was not related to positive changes following adversity, it is believed to be vital for the development of positive outcomes (Linley & Joseph, 2011). Efforts to find meaning, viewed as positive reframing, are related to personal growth following cancer (Park et al., 2008). On the other hand, while the presence of life meaning seems to be positively associated with life satisfaction, the relationship between the search for meaning and life satisfaction has the opposite features (Dezutter et al., 2013; Park, Chmielewski, et al., 2010; Park, Park, et al., 2010; Steger & Kashdan,

2007; Steger et al., 2006). Breast cancer patients who found an objective that orients their life, representing their new-found meaning in life, had higher life satisfaction (Fonseca et al., 2014). Moreover, Visser et al. (2010) in their review suggested that meaning in life (seen in different terms, but primary as the meaning a person had already found) seems to be positively associated with well-being and quality of life, constructs significant for life satisfaction.

In general, it seems that past research has only rarely focused on all these factors, namely PTG, meaning in life and life satisfaction. The aim of this study was to investigate the relation of PTG to the presence and search for meaning and life satisfaction among people cured of cancer, as well as to determine whether the presence of meaning and the search for meaning mediated the relationship between PTG and life satisfaction. Based on related literature we hypothesized that high PTG and its domains (personal strength, new possibilities, relating to others, appreciation of life and spiritual change) would be associated with a higher presence of meaning in life, higher life satisfaction and lower search for meaning. We postulated that high levels of life satisfaction would be positively correlated with the presence of meaning in life and negatively correlated with the search for meaning. Finally, we assumed that the relationship between PTG and life satisfaction would be explained through the presence of meaning in life and the search for meaning.

Method

Participants and Procedures

This cross-sectional study utilized a convenience sample of individuals, aged 18 and older, who were treated for cancer and were at least one-month post-completion of all medical cancer therapies. Since we consider that both finding out about the diagnosis and the time of treatment contribute to the potentially traumatic experience of cancer, the eligibility criterion for the completion of all medical treatment was determined. Participants were recruited via Croatian civil society cancer organizations between April and November of 2019. Data collection was approached in different ways. Organizations were asked to share an online survey on their websites or social networking sites and to encourage their members to complete paper-and-pencil questionnaires during monthly meetings. Participants' written informed consent was obtained, and the study was approved by the Ethics Committee of Faculty of Croatian Studies in Zagreb prior to implementation. We collected 63 (37.7%) responses in-person, and 104 (62.3%) by way of online survey. Participants could not finish the online survey without answering every question, but the paper-and-pencil method resulted in missing data. Eighteen participants did not answer most of the questions, be it entire sections on PTG, meaning in life, life satisfaction measures or enter their sociodemographic and medical data. For that reason, their results were not included in further data analyses. On the other hand, 26 participants left some sociodemographic and medical questions unanswered, but their results were taken into consideration.

The final sample included 149 participants (105 women and 44 men; $M_{age} = 49.18$, age range: 21–85 years) who completed medical treatments on average 5.89 (SD = 6.67; range: 0.8–29 years) years ago. Most of them were in a romantic relationship (65%), had a secondary school education (41.7%) and were employed (54.4%). The most common cancer sites were breasts (38.2), the lymphatic system (22.1%), mouth, pharynx and larynx (17.4%).

Measures

Two sets of questions were asked in order to gather both sociodemographic and medical data. Participants answered questions regarding their gender, age, relationship status, education level and work status. Concerning medical information, participants reported their sites of cancer and the potential presence of metastasis as the secondary malignant growths spread from the primary site of a tumor in time of diagnosis and treatment and as the potential indicator of advanced cancer. Moreover, to establish that potential PTG occurs as a result of facing cancer, participants reported about potential comorbidity of other physical illnesses which they considered as life-threatening. Participant also gave information on psychological/psychiatric support.

Posttraumatic growth was assessed using Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), a self-report questionnaire of 21 items measuring positive changes as a result of traumatic experience. The procedure of back-translation (provided by professional translators) was used to develop the Croatian questionnaire from the original English-language version. The participants were instructed to estimate the incidence of particular change on a 6-point Likert scale ranged from 0 ("*I did not experience this change as a result of my crisis*") to 5 ("*I experienced this change to a very great degree as a result of my crisis*"). Scale and subfactors that assess specific area of changes (relating to others, new possibilities, personal strength, spiritual changes and appreciation of life) are scored by averaging responses—higher scores represent a greater degree of perceived changes. Internal reliability of the scale was $\alpha = 0.96$.

The Meaning in Life Questionnaire (MLQ; Steger et al., 2006) was used to assess the presence of meaning in life and search for meaning. The official Croatian translation of this self-report questionnaire was used (Čavrag, Gazivoda and Sedinić, unpublished). The MLQ consist of 10 items, scored from 1 ("*Absolutely Untrue*") to 7 ("*Absolutely True"*). Scores for each factor (the presence of meaning in life and

the search for meaning) are computed as a sum score, where a higher result indicates a greater presence of meaning in life or perceived search for meaning. The internal reliabilities of the MLQ subscales were α = 0.77 for the presence of meaning in life, and α = 0.88 for the search for meaning.

The Satisfaction with Life Scale (SWLS; Diener et al., 1985) measures participant's life satisfaction. Croatian translation of this questionnaire was used (Komšo & Burić, 2016). It is a five-item self-report questionnaire with a scale ranging from 1 ("*Completely Untrue*") to 7 ("*Completely True"*). The total score refers to the sum of all responses, with higher values signify higher life satisfaction. The alpha coefficient of reliability for this scale was α = 0.88.

Statistical Approach

All statistical analyses were performed using IBM SPSS. Descriptive analysis was conducted to determine the prevalence of PTG and its domains, as well as the degree of presence of meaning in life, search for meaning and life satisfaction. Moreover, to determine whether PTG and life satisfaction differ based on type of cancer site, a one-way analysis of variance (ANOVA) was performed. Additionally, we performed a series of t-tests to establish if the main study variables differ due to the method of data collection. Pearson's correlations were calculated in order to establish bivariate correlations among PTG, the presence of meaning in life, search for meaning and life satisfaction. Testing the mediation effect of the presence of meaning and the search for meaning on relationship between PTG and life satisfaction was performed using the bootstrapped mediations procedures in Process for SPSS (Hayes, 2013). Confidence intervals excluding zero indicate significant bootstrapped mediation effects.

Missing values were generated for less than 5% of responses. They were subsequently substituted with the average response value for the item at hand.

Results

Prevalence of PTG, Meaning in Life and Life Satisfaction

Table 1 shows the descriptive statistics for all major study variables. Results indicate a mild incidence of posttraumatic growth among people treated for cancer. More precisely, participants experienced positive changes to a moderate degree (M = 3.33, SD = 1.15), with a total PTG score, indicating a sum of all responses, of 62.68 (SD = 22.68). Following the recommendations for cutoff points of PTG inventory (Jansen et al., 2011; Tang, 2006), to determine the percentage of people who experienced significant posttraumatic growth, the number of participants with total PTG scores higher than 3 was calculated. As such, 72.5% of participants experienced moderate positive changes. Regarding specific areas of positive change, spiritual changes were the least reported. On the other hand, the most reported area relates to the personal strength subfactor. Additional items analysis indicates that the top five most frequently reported changes refer to the following items: "I can better appreciate each day" (86%), "I have a greater appreciation for the value of my own life" (85%), "I have a greater feeling of self-reliance" (85%), "I know better that I can handle difficulties" (84%) and "I discovered that I am stronger than I thought I was" (83%). Moderate to high levels of life satisfaction were reported, as well as high levels of the presence of meaning in life and search for meaning. Potential difference in total score of the main variables (PTG, the presence of meaning in life, the search for meaning and life satisfaction) based on the method of data collection was not established (PTG: t (147) = -0.74, p = 0.46 / MLQ-P: t (147) = -0.46, p = 0.66 / MLQ-S: t (147) = .-0.33, p = 0.74 / SWLS: t (147) = 0.16, p = 0.87).

Table 1 Descriptive statistics of major study variables

Measure	M	SD	Range	
			Potential	Actual
PTG	3.33	1.15	0–5	0–5
PTG RO	3.20	1.26	0–5	0–5
PTG NP	3.21	1.33	0–5	0–5
PTG PS	3.67	1.24	0–5	0–5
PTG SC	2.83	1.71	0–5	0–5
PTG AL	3.71	1.30	0–5	0–5
MLQ—P	26.59	6.28	5–35	11–35
MLQ—S	23.20	7.70	5–35	5–35
SWL	23.10	7.00	5–35	5–35

N = 149. *PTG* Posttraumatic growth, *PTG RO* PTG Relating to others, *PTG NP* PTG New possibilities, *PTG PS* PTG Personal strength, *PTG SC* PTG Spiritual Change, *PTG AL* PTG Appreciation of life, *MLQ – P* The presence of meaning in life, *MLQ – S* The search for meaning in life, *SWL* Satisfaction with life

Correlation Between Study Variables and the Prediction of Life Satisfaction

The association between gender and PTG (r = 0.201, p = 0.01) indicates that women, as well as younger people (r = -0.205, p = 0.02), reported more positive changes. Being in a romantic relationship (r = -0.043, p = 0.61) and time since medical treatment completion (r = 0.122, p = 0.17) were not linked to PTG. The presence of metastases at the time of diagnosis and treatment were not associated with higher PTG (r = 0.07, p = 0.41), as well as psychological or

psychiatric support (r = -0.012, p = 0.89). All participants considered that cancer was the only life-threatening illness they suffered from. We aimed to include a heterogeneous group of cancer survivors, but since data collection resulted in the higher frequency of some subsamples (Table 2) we additionally performed a one-way ANOVA analysis to explore the potential differences in PTG and life satisfaction based on cancer site. To ensure the assumption of ANOVA regarding the homogeneity of variance of subsamples (Howell, 2013), only three groups of most common cancer sites in our sample (breast, the lymphatic system and mouth, pharynx and larynx) were entered into the analysis. Results revealed that PTG significantly differed between groups of survivors due to cancer site (F (2,113) = 3.724, p = 0.02, $\eta_p^2 = 0.06$). The intensity of positive changes increased from the group who suffered from mouth, pharynx or larynx cancer (M = 2.72, SD = 1.38) to the lymphatic system cancer survivors (M = 3.18. SD = 1.15) and breast cancer survivors (M = 3.45, SD = 1.09). Tukey post-hoc test indicates that the only significant mean difference was reported between breast cancer survivors and those who suffered from mouth, pharynx or larynx cancer (p = 0.02). Differences in life satisfaction judgments among groups of most common cancer sites of our sample were not significant (F (2,113) = 0.35, p = 0.70, $\eta_p^2 = 0.006$). Pearson's correlations between PTG, its domains, the presence of meaning in life, search for meaning and life satisfaction are shown in Table 3. PTG (overall score and domains) are positively correlated with the presence of meaning in life, the search for meaning and life satisfaction. Moreover, the presence of meaning in life and the search for meaning are positively intercorrelated and positively correlated with life satisfaction.

Table 2 Sociodemographic and medical characteristics of participants

Variable	N	n	%
Age	132		
18–39		30	22.7
40–59		68	51.5
60–85		34	25.8
Relationship status	146		
Not in a relationship		51	34.9
In a relationship		95	65.0
Education	147		
Elementary education		5	3.4
Secondary education		68	41.7
Higher level education		25	15.3
College/university or graduate degree		49	30.1
Employment	147		
Student		7	4.3
Unemployed		9	5.5
Employed		80	54.4
Retired		51	34.7
Metastasis	146		
Yes		47	32.2
No		99	67.8
Psychological or psychiatric support	146		
Yes		42	28.8
No		104	71.2
Site of cancer	147		
Breast		57	38.2
Leukemia and lymphoma		33	22.1
Mouth, pharynx and larynx		26	17.4
Trachea, bronchus and lungs		8	0.05
Ovary, fallopian tube and adnexa		8	0.05
Colon and terminal intestine		6	0.04
Thyroid		6	0.04
Brain		2	0.01
Prostate		1	0.01

N denotes the number of responses obtained for each variable

To determine the mediating role of the presence of meaning in life and the search for meaning the bootstrapping method was conducted on 5000 bootstrap samples. Two separate bootstrapped analyses were performed with PTG as the independent variable, life satisfaction as the dependent variable and the presence of meaning, as well as the search for meaning, as potential mediator variables. We conducted separate analyses because the presence of meaning and the search for meaning are usually considered as separate dimensions of the meaning in life in the literature (Steger et al., 2006). Moreover, to establish the effect size of indirect effect we reported the ratio of indirect effect to the total effect alongside unstandardized and standardized indirect effects (Wen & Fan, 2015).

The summaries of the mediation analyses performed are presented in Table 4. The results of the mediation analysis indicate that around 46% of the variance in life satisfaction, in both models, was explained by the PTG and specific mediator (mediator – MLQ-P: Adjusted $r^2 = 46.18$, F (2, 146) = 62.64, p < 0.001 / mediator – MLQ-S: Adjusted $r^2 = 45.80$, F (2, 146) = 19.38, p < 0.001). While the indirect effect of the PTG on life satisfaction through the presence of meaning was significant (b = 1.49, SE = 0.432, 95% CI [0.706, 2.387], β = 0.25, standardized SE = 0.07, standardized 95% CI = [0.12, 0.38]), the indirect effect of the search for meaning was not (b = 0.09, SE = 0.25, 95% CI [-0.36, 0.61], β = 0.01, standardized SE = 0.04, standardized 95% CI = [-0.06, 0.10]). Precisely, only the presence of meaning mediates the relationship between PTG and life satisfaction, indicating that the perception of positive changes favors the occurrence of the presence of meaning which in turn contributes to the assessment of life satisfaction. The indirect effect through the presence of meaning in life explained 53.5% of the total effect of the PTG on life satisfaction. In

Table 3 Bivariate correlations between PTG, the presence of meaning in life, the search for meaning and satisfaction with life

	1	2	3	4	5	6	7	8	9
1. PTG	–	.92**	.93**	.89**	.63**	.84**	.44**	.46**	.46**
2. PTG RO		–	.79**	.73**	.53**	.65*	.38**	.45**	.44**
3. PTG NP			–	.82**	.46**	.80**	.43**	.44**	.42**
4. PTG PS				–	.47**	.77**	.45**	.42**	.42**
5. PTG SC					–	.41**	.24**	.27**	.24**
6. PTG AL						–	.34**	.34**	.37**
7. MLQ—P							–	.40**	.65**
8. MLQ—S								–	.24**
9. SWLS									–

N = 149. *PTG* Posttraumatic growth, *PTG RO* PTG Relating to others, *PTG NP* PTG New possibilities, *PTG PS* PTG Personal strength, *PTG SC* PTG Spiritual Change, *PTG AL* PTG Appreciation of life, *MLQ – P* The presence of meaning in life, *MLQ – S* The search for meaning in life, *SWL* Satisfaction with life

*p < .05, **p < .01

Table 4 Summary of the separate mediation analyses predicting life satisfaction from PTG via the presence of meaning in life and the search for meaning

	Parameter	Estimate (b)	SE	95% CI	Standardized estimate (β)
Mediator: MLQ-P	Individual parameters				
	PTG to MLQ-P	2.40**	.41	[1.59, 3.20]	.44
	MLQ_P to SWLS	.62**	.08	[.47, .77]	.56
	Direct effect				
	PTG	.13*	.41	[.48, 2.11]	.21
	Indirect effect				
	via MLQ-P	1.49*	.43	[.71, 2.39]	.25
	Total effect	2.79**	.45		.46
Mediator: MLQ-S	Individual parameters				
	PTG to MLQ-S	3.11**	.49	[2.14, 4.08]	.46
	MLQ-S to SWLS	.03	.08	[− .12 .17]	.03
	Direct effect				
	PTG	2.70**	.50	[1.70, 3.71]	.44
	Indirect effect				
	via MLQ-S	.09	.25	[− .36, .61]	.01
	Total effect	2.79**	.45	[1.91, 3.68]	.46

PTG Posttraumatic growth, *MLQ-P* The presence of meaning in life, *MLQ-S* The search for meaning, *SWLS* Satisfaction with life, *SE* standard error, *CI* confidence interval; *p < .05; **p < .01

addition, as seen in Table 4, the direct effect of the PTG on life satisfaction remained significant when the indirect effects (of the presence of meaning in life and the search for meaning) were included in the models.

Discussion

The purpose of this study was twofold—to examine the relationship between PTG, meaning in life and life satisfaction, and to determine whether the relationship between PTG and life satisfaction could be explained by the presence and the search for meaning in life. The results indicate that 72.5% of participants experienced at least medium levels of positive changes as a result of their cancer experience. The total PTG score indicates a generally moderate degree of changes, which is comparable to previous data on the prevalence of PTG among a heterogenous sample of cancer patients or survivors, whose intervals ranged from 47.87 to 73.12 (Bellizzi, 2004; Jaarsma et al., 2006; Lechner et al., 2003; Morris et al., 2012; Schroevers & Teo, 2008; Widows et al., 2005). Moreover, the subgroup of breast cancer survivors reported significantly higher PTG than oropharyngeal (cancer site: mouth, pharynx and larynx) cancer survivors. Based on our clinical experience, it can be said that breast cancer has a relatively good survival prognosis and that most common

long-lasting physical consequences, such as removing breast tissue, are most commonly minimized by plastic surgical breast reconstruction procedures. On the other hand, physical consequences of oropharyngeal cancer may last for the rest of the patient's life and often include problems with eating and speech, which are visible to others as well. These findings may suggest that severity of physical consequences and long-lasting symptoms could influence PTG levels in cancer survivors. The most frequently reported statements of all respondents were similar to those found in previous studies with a similar sample (Morris et al., 2012; Schroevers & Teo, 2008; Widows et al., 2005). The results show that the most salient domain of changes refers to personal strengths which is in line with some previous findings (Cordova et al., 2007), while some others emphasize the appreciation of life (Morris et al., 2012; Schroevers & Teo, 2008). Differences in the most salient domains of changes are hard to interpret due to the fact that all changes can be described as moderate to strong, indicating just low intervals of variation. Differing results may also stem from sample characteristics or contrasting cultures, which would require further research.

The results support findings that the more positive changes persons who faced a particular life-threatening illness experience, the more satisfied they are with their life (Mols et al., 2009; Pakenham, 2005). Consistent with our hypothesis, the results indicate a positive association between PTG and the presence of meaning. Our results are in line with previous findings that established a positive correlation between general positive changes or its domains with the presence of meaning in life among student samples, tornado survivors, churchgoers, the general population and funeral directors (Kashdan & Kane, 2011; Lancaster & Carlson, 2014; Linley & Jospeh, 2011; Triplett et al., 2012; Weber et al., 2019). These results suggest that people who experienced more PTG might see their lives as more purposeful and meaningful, which can contribute to narratives about the lives of survivors in general. More precisely, Calhoun and Tedeschi (2013) suggest that facing trauma, when seen as a positive turning point in one's life, may lead to enhanced sense of purpose in life, which is determined as one of the two main components of meaning in life. We find that focusing on the positive aspects of adversity is a form of self-reflection and a deeper insight into one's own life that contributes to one's presence of meaning.

The presence of meaning in life was not only positively correlated with PTG, but also with life satisfaction. These findings are consistent with previous research that consistently demonstrates a positive relationship between measures of meaning and life satisfaction among not only the general population (Chamberlain & Zika, 1988; Pan et al. 2008; Park, Chmielewski, et al., 2010; Park, Park, et al., 2010; Steger & Frazier, 2005; Steger et al., 2006, 2011), but even those who experienced some kind of traumatic event (Jafari et al., 2010; Triplett et al., 2012). The previously found correlation coefficients ranged from 0.39 to 0.71, where the upper end of this range was sometimes seen as a threat to the discriminatory validity of these constructs (Steger & Kashdan, 2007). In our study, correlation coefficient was 0.65 indicating that 42.25% (r^2) of variability in life satisfaction is attributable to PTG. However, we believe that, considering the previously established independence of the used measures (Steger et al., 2006), the results suggest that a sense of purpose and fulfillment is essential to assessing life satisfaction and vice versa. We are of the opinion that life satisfaction and meaning in life can both be seen as components of the superior concept of well-being.

Although Frankl (1962) emphasized the importance of the search for meaning for one's well-being in the last century, scientific attention was just recently focused on the empirical study and development of the measures of the search for meaning. While empirical research on the presence of meaning in life reveals consistent relations to PTG and life satisfaction, their relation to the search for meaning seems to be more complex. Contrary to expectations, the search for meaning was positively correlated with PTG and explained about one-fifth of the variability of occurrence of positive changes. Whereas some previous findings demonstrate relation between the search for meaning and greater negative change (Linley & Joseph, 2011), mental health impairments (Steger et al., 2006) and the fact that the search for meaning is sometimes considered as unresolved coping with adversity (Steger & Park, 2012), our findings were not in line with the established hypothesis. Conversely, these results support findings stating that the search for meaning is positively correlated with student's perception of positive changes (Stockton et al., 2011) and that it has an adaptive role in the increased appreciation of one's life after a natural disaster (Dursun et al., 2016). Similar tendencies in correlation results are seen in the relationship between the search for meaning and life satisfaction. Although previous research had mostly shown negative correlations between the aforementioned constructs (Degges-White & Stoltz, 2015; Nell, 2014; Park, Chmielewski, et al., 2010; Park, Park, et al., 2010; Steger & Kashdan, 2007; Steger et al., , 2006, 2011), our findings revealed that the search for meaning positively contributes to life satisfaction judgments, supporting the results from Lin et al. (2020).

An explanation for the positive associations may be found in the sample's characteristics and the fact that previous research was not conducted on the population of patients treated for cancer. The conceptualization of cancer as a traumatic event can play an important role in understanding the nature of the given relationships. The forward-looking nature of cancer as an ongoing threat distinguishes cancer from acute trauma (Sumalla et al., 2009). Moreover, fears for the future and recurrent disease are also known as specific

features of oncology patients and survivors (Holland, 2003). Such population characteristics may encourage the individual to continually search for meaning, and that ruminative process may also be a daily reminder of the experienced positive changes. Those who search more may be inclined to notice more life domains wherein changes occurred due to past cancer experience. On the other hand, if the search for meaning is seen as a dimension of human motivation (Maddi, 1970, see Steger et al., 2011), it is plausible that it can contribute to assessments of life satisfaction. These findings complement the view that the search for meaning could be seen as a motivational force (e.g., Frankl, 1962) and a positive sign of mental health (Steger et al., 2008).

Above all, it should be noted that relations between the observed variables are complex. This view is supported by the findings of this research, which indicate the importance of the presence of meaning in life as a mediator in the relationship between PTG and life satisfaction. More positive changes were associated with a perception of more meaningful and purposeful life and this, in turn, contributed to higher life satisfaction. However, it needs to be said that this mediation is only partial, which implies that there is also a direct connection between PTG and life satisfaction. These findings are consistent with a previous study by Triplett et al. (2012).

Although this research is the first one in Croatia to study PTG, meaning in life and life satisfaction among patients treated for cancer, it does have several notable shortcomings. First, the study was conducted using a convenience sample, mostly recruited through civil society organizations. As a result, the generalization of the results should be taken with caution. In addition to that, the discrepancy between the sample characteristic and the national incidence of cancer sites contributed to this problem, as well as mostly female-skewed sample (70.5%). Furthermore, data collection was performed using two methods (*online* and paper-and-pencil), each of which carries its own limits (see Goodwin & Goodwin, 2017). For example, using a paper-and-pencil method resulted in missing values. Surprisingly, a large number of missing values was related to sociodemographic questions. Also, PTG, meaning in life and life satisfaction can be seen as an advantageous feature of one's life which can contribute to socially desirable responding. In this study, a socially desirable response was not controlled. This study is cross-sectional in nature, which prevents the establishment of causality and interpretation of obtained correlations. Considering that PTG is a process that requires time, starting from the moment of experiencing a traumatic event, the study required that the subject's post-completion of all medical cancer therapy be at least one-month before participating. Because the upper limit of the time passed since diagnosis was not set, it should be taken into consideration whether the obtained values are a reflection of the participant's cancer experience or it has been too long of a time since diagnosis and treatment for cancer to still strongly influence one's life.

The study results indicate that about half of the variance of life satisfaction, in both observed mediation models, is attributable in the variance of PTG and the certain component of meaning in life (the presence of meaning or the search for meaning). So, despite the shown shortcomings, the results might still be valuable for clinical purposes. Clinicians should be aware that most of the participants, mostly without professional PTG facilitation, reported at least some elements of growth, but also that life crises as facing cancer contributed to the reconstruction of survivor's overall life perspective. The facilitation of PTG in clinical practice is indeed possible, but one should exercise caution when employing such strategies, that is to allow the client to first experience the full range of emotions that naturally occur when facing life-threatening disease. We believe that facilitating changes can benefit the long-term integration of the traumatic experiences into the global picture of one's life. Moreover, if we see life satisfaction as a protective factor in psychological well-being, the results imply that, by using well-established meaning-making strategies (Breitbart et al., 2010; Henry et al., 2010; Vos et al., 2015) and PTG facilitation concepts (Calhoun & Tedeschi, 2013), therapists can contribute to patient's everyday functioning. In general, focusing on any of the studied constructs may provide greater life satisfaction due to the cyclical nature of their relationships.

For more precisely clinical guidelines further research is required. A longitudinal design would contribute to the clarification of causal relationships between PTG, meaning in life and life satisfaction. Studying these constructs across diverse cancer types, demographic populations, participation in supportive groups and medical treatments would increase the possibility of generalizing the results to the population of cancer patients and survivors. However, the true prevalence of PTG and its correlations with observed constructs would be known to researchers only by using random sampling methods. In order to determine whether the nature of the obtained correlations is characteristic only of patients treated for cancer or is also applicable to the general population, the findings should be compared to a control group.

To conclude, even though many questions still remain to be answered, the present study filled the gap in the literature regarding PTG, meaning in life and life satisfaction among patients who experienced life-threatening illnesses. The results indicate that positive changes occur following cancer and that those changes relate to one's meaning in life and life satisfaction. Both the presence of meaning and the search for meaning seem to be protective signs of mental health among cancer treated patients.

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Declarations

Conflict of Interest The authors have no relevant financial or non-financial interest to disclose.

Ethical Approval The study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of Faculty of Croatian Studies (University of Zagreb).

Consent to Participate Informed consent was obtained from all individual participants included in the study.

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