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Theses of the Doctoral (PhD) Dissertation

Posttraumatic growth of childhood and adult survivors of cancer

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INTRODUCTION

One of the biggest health problems in the developing world is that with increasing age, the incidence of chronic diseases increases (Tompa, 2011). Cancer has become the second leading cause of death globally (WHO, 2018) and also in Hungary (Juhos, 2006). Although mortality statistics are improving, the diagnosis and treatment affect the patients emotionally, physically, socially and contribute to greater risk of psychological vulnerability (Rowland & Massie, 2010). Cancer diagnosis is still associated with death, even if the statistics are getting better and most of the breast and childhood cancer patients survive (later discussed). Several studies have been exploring the negative psychological consequences of the cancer diagnosis and treatment – for example: posttraumatic stress, anxiety, depression, body image problems, declining quality of life (Cordova et al. 2007; Fors, Bertheussen, & Thune, 2011; Helms, Ohea, & Corso, 2008). Although cancer may have many negative psychological consequences, it can also be considered as an existential challenge that can result in personal growth (Brix et al, 2013), which has been most often referred to as posttraumatic growth (Tedeschi & Calhoun, 1996). A significant proportion of patients who survived cancer (above 80%), including young adults who had recovered from childhood cancer, reported that their life changed in a positive direction as a result of the disease (Sears, Stanton, & Danoff-Burg, 2003). Although international researchers have been studying the phenomenon widely in the cancer population in the last 25 years, in Hungary it is still under-represented, especially in patients with pediatric cancer. Thus, my doctoral dissertation is aimed to analyze posttraumatic growth from three perspectives: firstly, the experience of women who underwent breast cancer as adults, secondly, young adults who were treated with cancer in their childhood and lastly, parents of childhood cancer patients.

THEORETICAL BACKGROUND

In this dissertation I am characterizing the two-sidedness of the cancer trajectory - I am framing cancer as a specific traumatic event and process and in the meantime as a potential to grow personally and experience posttraumatic growth. Cancer diagnosis and treatment cause a series of physical, emotional, practical, and social stressors, which are demanding on the individual and their support network and which are potentially traumatic (Cordova, Riba, & Spiegel, 2017). Also, learning that one's child has a life threatening illness is a qualifying event for trauma (APA, 1994) so it's potentially traumatic and has been considered as one of the most severe stressors experienced by a parent (Kazak, 1998). Cancer as a stressor, that can precipitate PTSD diagnosis is distinct from other stressors in many aspects (French-Rosas, Moye, & Naik, 2011), which are summarized elsewhere (Rigó & Zsigmond, 2015; Sumalla, Ochoa, & Blanco, 2009).

With the emergence of positive psychology, it has been recognized that the impact of critical life situations may not only be negative, but may also result in positive psychological changes and examining their interaction has a great importance (Kállay, 2007). The present dissertation focuses on the most widely studied phenomenon, posttraumatic growth (PTG) (Tedeschi & Calhoun, 1995, 1996), which refers to a positive psychological change after struggling with highly challenging life events. During the process of PTG, the personality development of individuals exceeds pre-traumatic levels: the ability to adapt is improved and the personality integration goes beyond the trauma level. So the person is not only the survivor of the trauma, but the changes override the pre-trauma condition. In the original functional descriptive model, PTG is a multidimensional phenomenon (Tedeschi & Calhoun, 2004): 1) increased Appreciation of Life and change in everyday priorities 2) Closer, more meaningful Relationships with greater intimacy 3) Increased sense of Personal Strengths, coupled with an increased sense of vulnerability, 4) Discovering New Possibilities in life, 5) Spiritual Change.

Based on the functional model of Calhoun and Tedeschi (2004, 2006), posttraumatic growth occurs due to the distress caused by the trauma, the collapse of the previous schema and belief system and the cognitive processing of the trauma. Their functional model also describes how the traumatic psychological distress triggers automatic and deliberate rumination processes of the serious event and the reactions associated with it. Rumination is therefore fundamentally important in the process leading from the broken world view to the development of PTG (Lindstrom, Cann, Calhoun, & Tedeschi, 2013). It is important to note that recent research shows, that not only emotional regulation and rumination processes related to negative effects, but also responses to positive emotions may be important in the development of PTG or depressive symptoms (Feldman, Joormann, & Johnson, 2008; Bijttebier, Raes, Vasej, & Feldman, 2012) .

The results, regarding the appearance of PTG in many groups of cancer patients, suggest so far, that people with cancer can experience change in all areas of PTG, but it seems that specific areas of PTG are more pronounced in this group: increased appreciation of life, more meaningful relationships and the increased sense of personal power (Brix et al, 2013; Cordova et al., 2007; Mols, Vingerhoets, Coebergh, & van de Pollen, 2009; Widows, Jacobsen, Booth-Jones, & Fields, 2005).

Research in different patient groups and knowledge gained through qualitative techniques have shown that posttraumatic growth could occur due to the interaction of many factors (Garnefski, Kraaij, Schroevers, & Somsen, 2008; Leung et al., 2012). In terms of cancer, individual (gender, age, marital status, education, health-related quality of life, degree of threat perception, coping skills, other serious life events experienced), social (quality of relationships, social support system, environmental factors) and cancer specific characteristics (type of tumor, stage, time since diagnosis, subjective severity of the disease and types of treatments, cancer-related posttraumatic stress) could affect the ability of the person to develop (Kulcsár, 2005; Sawyer, Ayers, & Field, 2010; Tanyi, 2015; Zsigmond, Rigó, Bányai, 2017).

Specifically, PTG in breast cancer is influenced by many individual and social factors, such as age (Boyle, Stanton, Ganz, & Bauer, 2017), educational level (Urucojo et al, 2005), marital status (Mystakidou, Tsilika, Parpa, Kyriakopoulos, Malamos, & Damigos, 2008), quality of life (Lerolain et al, 2010), social support (Lelorain, Tessier, Florin, & Bonnaud-Antignac, 2012), coping (Cordova et al, 2007) and occurrence of additional serious life threatening events. In terms of individual and social factors, the results have been inconsistent, which may be due to the fact that studies have used different methodologies and study groups. Nevertheless, research has proven consistently that core predictors of PTG are the level of social support and the various coping strategies (Bussell & Naus, 2010) - mostly positive coping - that are also interacting with each other (Cordova, Cunningham, Carlson, & Andrykowski, 2001). PTG in breast cancer is influenced by many cancer-related factors, such as time since diagnosis (Sears et al, 2003), perceived severity of the disease (Cordova et al, 2007), treatment types (Lerolain, 2012, Yanez et al, 2009) and cancer related posttraumatic stress (Koutrouli, Anagnostopoulos, & Potamianos, 2012). PTG may also be associated with various indicators of quality of life (Sawyer et al., 2010; Zoellner & Maercker, 2006), but the question is whether it can improve quality of life (Tomich & Helgeson, 2012). A number of studies suggest that PTG is related to better quality of life and more optimal functioning in women with breast cancer (Brix et al, 2013, Danhauer et el, 2013), therefore it may have an adaptive function. However, the results regarding the relationship between PTG and quality of life are not consistent. This may be due to the characteristics of different disease groups, methodology and personality factors (Coyne & Tennen, 2010; Zoellner & Maercker, 2006).

Despite the fact that the survival rate of childhood cancer has increased significantly, few studies address the possible positive psychological changes and PTG, instead largely focusing on the negative psychological factors experienced during the traumatic process.

However, there are examples of recent PTG studies in survivors of childhood cancer (for example: Arpawong, Oland, Milam, Ruccione, & Meeske, 2013; Barakat, Alderfer, & Kazak, 2006; Gianinazzi et al., 2016; Kamibeppu et al., 2010; McDonell, Pope, Schuler, & Ford, 2018; Yi, Zebrack, Kim, & Cousino, 2015; Zebrack et al., 2015). 84-88% of young adults who have experienced cancer in their childhood experience PTG to some level, at least in one area of growth (Barakat et al., 2006, Yi et al., 2015), experiencing the cancer-specific areas of PTG more (Gianiazzi et al., 2016). No consensus has been reached on the factors that influence the development of PTG. In the case of young adults who have experienced childhood cancer disease, gender (Arpawong et al., 2013; Gianiazzi et al., 2016; Yi et al., 2015) and the age at diagnosis (Barakat et al., 2006; Devine, Reed- Knight, Loiselle, Fenton, & Blount, 2010; Yi et al., 2015), various cancer-specific variables (Arpawong et al., 2013; Devine et al., 2010; Turner-Sack, Menna, & Setchell, 2012), the perceived severity (Devine et al., 2010) and the objective severity of the treatment (Barakat et al., 2006), well-being (Kamibeppu et al., 2010; Zebrack & Chesler, 2002) and posttraumatic stress symptoms (PTSS) (Arpawong et al., 2013; Barakat et al., 2006; Gunst, Kaatsch, & Goldbeck, 2016) may also be related to PTG. However, the results regarding these variables show a mixed picture, for each predictor there could be found examples of positive relationships, but also the lack of connection with PTG. Nonetheless, it seems consistent to see a higher rate of general social support associated with higher levels of PTG (Ekim & Ocakci, 2015; Gunst et al., 2016; Yi et al., 2015). In addition, positive coping strategies are also positively associated with PTG (Turner Sack et al., 2012, Bussel & Naus, 2010). A recent study also showed a positive relationship between PTG and rumination (Kilmer & Gil-Rivas, 2010). In summary, the examination of young adult survivors of childhood cancer is still underrepresented regarding PTG, and study results to date provide an inconsistent picture and the modeling of the explanatory variables of PTG is also expected.

Previous research regarding parents of children living with cancer has been focusing on pathology, such as PTSS (Kazak et al, 2012). However, a recent study found, that current and lifetime PTSD for parents of children with cancer were low and there has been no difference from comparison parents, but PTG was higher for parents of children with cancer (Phipps et al, 2015). In the case of parents of children with cancer, the examination of the predicting variables of PTG is underrepresented (Picoraro et al., 2014), so future exploration of this group is essential. The few published studies link the PTG of parents to anxiety during treatment (Best, Streisand, Catania, & Kazak, 2001), the functioning of the family and to distress experienced and the severity of the child's diagnosis (Hungerbuehler, Vollrath, & Landolt, 2011). 80-90% of parents of children with childhood cancer experience PTG to some level, at least in one area of growth (Barakat et al., 2006). In another study, 62% of parents reported moderate growth, with the strongest explanatory variables being the perceived severity of the diagnosis and the degree of distress (Hungerbuehler et al, 2011). No comprehensive study has been conducted on a Hungarian sample in this patient population so far regarding the factors contributing to PTG.

AIMS OF THE STUDIES

The studies described in the doctoral dissertation are aimed to analyze posttraumatic growth from three perspectives: 1, the experience of women who underwent breast cancer as adults and who were treated with standard chemotherapy protocol and received psychological interventions. 2, the experience of young adults who were treated with cancer in their childhood and 3, the experience of parents of childhood cancer patients.

EMPIRICAL STUDIES

1. study: randomized, controlled, longitudinal trial with breast cancer patients (PSYCHOLOGICAL RESOURCES AND HEALING) containing psychological interventions

The purpose of this clinical, longitudinal trial was to explore the factors that influence posttraumatic growth 3 years after diagnosis in intermediate and high-risk breast cancer patients who underwent the same chemotherapy protocol and different psychosocial interventions. A number of studies have reported PTG in women diagnosed with breast cancer in the period of five years after diagnosis (Belizzi & Blank, 2006; Coroiu et al, 2016; Danhauer et al, 2013, Tanyi, 2015), but few studies explored the phenomenon in relation to psychological interventions (for example: Pat-Horenczyk et al, 2015). However, one Hungarian study group conducted an integrated lifestyle and psychosocial intervention program tying in with a conventional tumor therapy, examining PTG and social support regarding intervention and control group (Kovács, Rigó, Sebestyén, Kökönyei, & Szabó, 2015).

An important shortcoming of the research so far is that in most studies only quantitative methods were used to explore PTG, proven by a recent review (Casellas-Grau, Vives, Font, & Ochoa, 2016). Qualitative research can also provide a deeper understanding of the dimensions of PTG, which would be of great help in designing goal-oriented interventions in clinical work (Stefanic, Caputi, Lane, & Iverson, 2015). Another advantage of qualitative methods is that participants are not primed with specific items, so the growth reported could be particularly relevant (McMillen, 2004). The parallel usage of quantitative and qualitative methods would provide a complex understanding of PTG in breast cancer. There has been no combined study of PTG of this group in a Hungarian sample yet - this study attempts to fill this gap and to provide a descriptive picture of how PTG appears in this group and how underlying factors are associated with it.

1.1. Study hypotheses

Some of the possible explanatory variables of PTG have been controlled in our study: disease-related factors such as the characteristics of breast cancer (see below), the treatment protocol (see below); gender (only women participated in the study); time since diagnosis (was the same for all of the participants). Therefore, these factors would not appear in the hypotheses.

1. **Hypothesis**: The present dissertation supposes, that most of the women underwent breast cancer were able to experience posttraumatic growth at least at a minimal level at least in one dimension of growth. This hypothesis is supported by several studies (for example: (Brix et al, 2013; Riskó, 2006; Sears et al, 2003; Wang, Liu, Wang, Chen, & Li, 2014).

2. **Hypothesis:** In line with previous research abroad we suggest that breast cancer patients can experience change in all areas of PTG. However, we suppose that the most significant domains of change experienced will be Appreciation of life, Relationships and Personal Strength (Cordova et al., 2007; Manne, 2004; Mols et al, 2009; Svetina, Nastran, 2012).

3. **Hypothesis:** We suggest, that from demographic characteristics (age, marital status, educational level) age will affect PTG. In line with previous research we suggest, that younger age can influence the perceived threat of the cancer diagnosis with higher rates of psychological distress and younger patients could be more engaged in the re-evaluation of their schema system than older patients who have already experienced

serious life events (Boyle et al, 2017; Mystakidou et al, 2010). Regarding marital status (Belizzi & Blank, 2006; Casellas-Grau et al, 2016; Danhauer et al, 2015; Mystakidou et al, 2010) and educational level (Danhauer et al, 2013; Mystakidou et al, 2010) the results are mixed, so our study would be exploratory regarding these factors.

4. **Hypothesis:** We hypothesize, that positive coping will be one of the key factors influencing PTG, as supported by several studies (Bussel & Naus, 2010; Cordova et al, 2007) and also a longitudinal study (Hamama-Raz, Pat-Horenczyk, Roziner, Perry, & Stemmer, 2019).

5. **Hypothesis:** We hypothesize, that posttraumatic stress symptoms (PTSS) would be in a positive relationship with PTG (Shakespeare-Finch & Beck, 2014), but the nature of the relationship is questioned, therefore our study is exploratory.

6. **Hypothesis:** We hypothesize, that PTG is related to better quality of life and more optimal functioning in women with breast cancer (Brix et al, 2013; Sawyer et al, 2010), therefore it may have an adaptive function.

7. **Hypothesis:** We suggest that because of the traumatic nature of cancer, the patients become more susceptible to suggestions and suggestive techniques like hypnosis which maybe especially effective in mediating social support (Bányai, 2015), which has a crucial effect on PTG (Danhauer et al, 2013; Tedeschi & Calhoun, 2006; Scrignaro, Barni, & Magrin, 2011). In our study music was designed to have similar suggestive affect as hypnosis, so we suppose, that PTG would be higher in the intervention groups (hypnosis or music), than in the control (SA) (receiving special attention only) group.

Regarding the qualitative analysis our study is exploratory, so further hypotheses could not have been made.

1.2. Study framework

We examined a group of breast cancer patients in a randomized, controlled, longitudinal, prospective trial – PSYCHOLOGICAL RESOURCES AND HEALING (Research ethical approval:15530-0/2010-1018EKU (670/PI/10.) and 39447-/2013/EKU (465/2013.), supported by the Hungarian Scientific Research Fund – OTKA K109187), with principal investigator Éva Bányai - containing psychological interventions. The research project started in 2011 and aimed to analyze the effect of adjuvant hypnosis on survival, quality of life, immune functions and coping. Patients were randomized into two intervention groups before the chemotherapy started (hypnosis=H or music=M). For ethical reasons, the idea for a randomized control group receiving only standard medical care as opposed to the intervention groups was rejected, because we did not want the patients – randomized to this group – feel socially rejected. Thus, a third, special attention group (SA) was formed, which consisted of patients who either refused to receive intervention, or were recruited in distinct oncology centres (Szombathely, Debrecen) where the patients originally applied to participate in a research studying the relationship between psychological and physical states. Patients received psychological interventions during all chemotherapy sessions and also during blood count controls. Patients received a standard hypnotherapeutic advocacy line for chemotherapy or a musical composition of the same length and dynamics. Patients in the SA group had nothing to listen to, but received extra social support above standard medical care, and were asked about their emotional and physical well-being. During treatment and follow-up, beyond asking the participants about their emotional and physical well-being, psychological questionnaires were registered 6 times (psychological

immune competence, quality of life) and questionnaires regarding posttraumatic stress symptoms, posttraumatic growth, and serious life events were assessed at the end of the trial. Psychological interviews were conducted at the end of the treatment period and end of the study.

1.3. Methods

1.3.1. Participants

The study involved non-metastatic, axillary lymph-node-positive or high-risk lymph-node-negative, medium-high risk HER2-negative breast cancer patients receiving standard chemotherapy protocol. The inclusion criteria for the characteristics of breast cancer were really strict and precise and determined medium or high risk breast cancer.
71 women completed the 3-year-long study until now. This dissertation analyzes their outcomes. From the 71 women, 30 patients received hypnosis, 26 received music therapy and 15 received no extra therapy, only special attention during the treatment.

1.3.2. Measures

1.3.2.1. Posttraumatic Growth Inventory (PTGI)

PTG was measured by the original and most often used form of the Posttraumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 1996, 2004). The 21 item self-report measure assessed the five separate dimensions of PTG (Relationships, New Possibilities, Personal Strengths, Spiritual Change and Appreciation of Life) according to Tedeschi and Calhoun (1996) on a 0-5 Likert scale, indicating the degree to which the individuals experienced changes in their life after crisis (in this case, the cancer diagnosis).

1.3.2.2. WHO Quality of Life-100 (QOL)

Quality of life was measured by WHOQOL-100 questionnaire (WHO QOL Group, 1998). The 100 questions covering 24 facets, hierarchically organized within six domains: Physical Health, Level of Independence, Psychological, Social Relations, Environment, Spirituality/Religion/Personal Beliefs. The 25th facet, Overall QoL and General Health, is not part of the domains covering general items.

1.3.2.3. Psychological Immune Competence Inventory (PICI)

Coping capacity was measured by the Psychological Immune Competence Inventory (PICI) (Oláh, 2005) which is an 80-item inventory, containing 16 scales and 3 subordinate systems, the items of PICI should be answered on a 4 point Likert scale. General immune competence can be described by the cumulative PICI score by adding up the scores of all the scales (Perczel Forintos, Kiss, & Ajtay, 2007).

1.3.2.4. Posttraumatic Stress Diagnostic Scale (PSDS)

The self-report measure was developed by Foa (1996) and validated by Foa, Cashman, Jaycox, & Perry (1997) using the DSM-IV criteria for posttraumatic stress disorder (PTSD). In the shortened, Hungarian version (Perczel-Forintos, Ajtay, Barna, Kiss, & Komlósi, 2012; Perczel-Forintos, 2002), the patient was required to indicate the frequency (A) and the emotional severity (B) of the possible symptoms of PTSD on a 0-3 scale. The total score indicates the frequency (PSDS FR) and the emotional severity (PSDS ES) of the symptoms of PTSD. The 3 symptom groups of PTSD (intrusive thoughts, hyperarousal and avoidance) is also measurable with the scale.

1.3.2.5. Life Event List by Holmes and Rahe

Major life events and their emotional affectivity were measured by the 27 Life Event List from the Hungarian adaptation (Rózsa et al, 2005) of The Brief Stress and Coping Inventory (Rahe & Tolles, 2002). The list of 27 items covers a wide range of positive and negative life events: accessing health, work, home and family functioning, changes in personal life and social relationships, and economic changes. Patients must report whether they have experienced the particular life event and how they were emotionally influenced (severity) by it on a scale of 1 to 10 (0 = not serious - 10 = the most serious trauma).

1.3.2.6. Qualitative analysis

The present dissertation demonstrates the content analysis of the psychological interview at the end of the chemotherapy treatment (0,5 years after diagnosis). In this study, we explored the 5 dimensions of PTG defined by Tedeschi and Calhoun. We used a predefined, theory-based coding system developed by the author of this dissertation to encode the texts. Subcategories were also determined within the 5 dimensions of PTG based on the literature

1.4. Main results

1.4.1. Group differences

There were no significant differences between the groups regarding any of the study variables, except educational level ($\chi^2(4) = 12.748$, $p = 0.013$) and Spiritual Change [F (2.68) =4.702, p=0.012, ω2=0.1)].

Table 1. Descriptive statistics of the study variables in the three groups and group differences in the breast cancer sample

	Hypnosis		Music		Special Attention		F	p	ω^2
	M	SD	M	SD	M	SD			
PICI cum T1	233.96	31.71	226.00	39.19	236.64	35.43	0.468	0.628	-.02
PICI cum T3	244.16	29.41	231.22	39.30	239.92	39.49	0.778	0.464	-.01
PICI cum T6	245.38	32.24	240.22	46.07	235.83	45.83	0.247	0.782	-.03
PSDS FR T6	10.63	8.70	8.19	11.34	11.20	9.26	0.602	0.550	-.01
PSDS ES T6	11.83	10.67	8.04	11.94	11.27	9.14	0.919	0.404	-.02
QOL SOC T1	16.13	2.14	15.41	2.39	16.11	1.75	0.906	0.409	.00
QOL SPI T1	14.08	3.31	14.92	3.44	15.47	2.61	0.205	0.815	-.02
QOL PHY T1	14.75	2.41	14.51	2.59	14.06	1.98	0.412	0.664	.00
QOL PSY T1	14.10	2.28	13.86	2.96	13.88	2.03	0.075	0.928	-.03
QOL ENV T1	15.70	1.59	15.01	1.97	15.14	1.69	1.175	0.315	.00
QOL LOI T1	15.49	2.78	15.21	3.32	14.06	2.03	0.485	0.618	-.02
QOL SPI T3	16.27	3.32	16.08	2.71	16.64	3.08	0.156	0.856	-.02
QOL SOC T3	15.54	2.45	14.92	2.30	16.53	2.69	1.793	0.175	.02
QOL PHY T3	14.40	2.59	14.26	2.67	13.83	2.34	0.239	0.788	-.02
QOL PSY T3	14.62	2.41	14.65	2.42	14.47	2.56	0.038	0.963	-.01
QOL ENV T3	15.99	1.73	15.50	1.91	15.35	2.09	0.737	0.482	-.01
QOL LOI T3	15.70	2.55	15.07	2.85	14.82	2.50	0.666	0.517	-.01
QOL SPI T6	16.04	2.90	15.42	3.43	16.00	2.56	0.298	0.743	-.02
QOL SOC T6	15.31	2.32	14.97	2.41	14.97	2.28	0.163	0.850	-.03

QOL PHY T6	15.08	2.06	14.26	3.82	13.28	1.43	1.841	0.167	.03
QOL PSY T6	14.81	2.28	14.82	2.99	13.82	2.46	0.712	0.495	-.01
QOL ENV T6	16.02	1.84	15.34	2.13	15.04	2.11	1.277	0.286	.01
QOL LOI T6	16.44	2.25	16.23	3.11	14.46	2.31	2.561	0.086	.05
PTGI total score	3.81	0.98	3.33	1.14	3.74	0.81	1.704	0.190	.02
PTGI Appreciation of life	4,3	0.85	4.02	1.16	4.42	0.77	0.956	0.390	-.00
PTGI Relationships	3.85	1.04	3.47	1.24	3.86	0.68	1.062	0.352	.00
PTGI Personal Strengths	4	1.02	3.55	1.28	3.76	1.12	1.080	0.345	.00
PTGI New Possibilities	3.69	1.32	3.06	1.45	3.29	1.21	1.521	0.226	.01
PTGI Spiritual Change	2.85	1.64	1.98	1.44	3.36	1.12	4.702	0.012	.10

Due to small group sizes and minimal group differences and the fact, that the patients all received social support in addition to medical care during treatment (from the research team and from each other), the groups were merged.

1.4.2. Correlational studies of the variables related to posttraumatic growth

In the bivariate correlations, the Psychological domain of QOL (QOL PSY), the Spiritual domain of QOL (QOL SPI), the Environmental domain of QOL (QOL ENV), the cumulative PICI at T3 and T6 were moderately, significantly, positively correlated with PTG. PTG was in a significant, positive, weak association with the other domains of QOL at T6 and with cumulative PICI at T1. The association with the Level of Independence domain of QOL was not significant via the Bonferroni adjusted value. There were no significant associations between age at diagnosis and PTGI.

Table 2. Bivariate correlation analyzes of the variables related to posttraumatic growth

	PTGI total score	
	r	*p*
Age at diagnosis	-.010	.936
PSDS ES	-.034	.658
PSDS FR	-.054	.778
QOL SPI T6	.433	.000
QOL PHY T6	.393	.001
QOL PSY T6	.514	.000
QOL ENV T6	.476	.000
QOL SOC T6	.368	.003
QOL LOI T6	.255	.042
PICI cumulative T1	.390	.001
PICI cumulative T3	.518	.000
PICI cumulative T6	.546	.000
Life events severity	.007	.953

1.4.3. Linear regression model for the variables underlying PTG

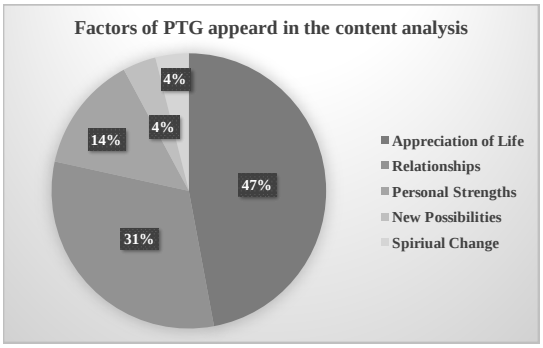
In the model (see *Table 3*.) cumulative PICI (T3), the social support scale of QOL at T6 and PSDS ES were all significant predictors, the model explained 33,9% of the variance of PTGI (R^2 = 0.339, R^2_{adj}=*0.299*, F (3) = 8.547, p < 0.001). Thus, we can state that the increased presence of emotional severity of PTSS, the social support experienced and the higher scores on cumulative PICI explain a part of the increased level of posttraumatic growth.

Table 3. Regression model for the underlying factors of PTGI in the breast cancer sample

	Unstandardized coefficients		Standardized coefficients	t	p
	B	Standard error	β		
PICI cumulative T3	.299	.088	.520	3.398	.001
PSDS ES	.641	.285	.355	2.252	.029
QOL social support scale T6	.599	1.197	.333	2.171	.035

1.4.4. Results from the qualitative analysis of the psychological interview at the end of the chemotherapy treatment

From our sample 65 patient's psychological interview have been analyzed so far. The three independent raters identified a total of 212 cases, of which 153 were matching, resulting in 72 % agreement between the coders. The experience of PTG appeared at least in one dimension of growth in 83% of our patients (54 out of 65 subjects) 0.5 years after diagnosis.



To differentiate by participants, it can be observed, that Appreciation of Life and Relationships appeared in more than half of the participant's interviews. In line with previous quantitative studies also this qualitative study showed that the most pronounced domains of PTG are Appreciation of Life, Relationships and Personal Strengths even just 0.5 years after diagnosis.

1.5. Discussion

The aim of this study was to test the prevalence of PTG, to explore factors contributing to PTG controlling for demographic and disease variables, and to test the hypothesis of positive relation between PTG and QOL in a breast cancer sample after receiving psychological interventions and special attention during chemotherapy treatment. The study is unique from a methodological point of view, because the diagnosis, the time since diagnosis, the treatment protocol and the risk of the diagnosis were controlled, and the sample is homogenous by disease variables. All of these variables could have an effect on PTG, thus controlling them is an opportunity to reach the core predictors of PTG. In addition, an important strength of the dissertation is, that we also used qualitative analysis parallel with the quantitative methods.

The averaged total score of PTG of breast cancer patients was moderate and the total mean score was higher than in other studies including breast cancer patients (Lerolain, 2010, Silva, Crespo, & Cannavaro, 2012) and containing psychological interventions (Pat-Horenczyk et al, 2015). It can be explained with two inferences: firstly, in the current study psychological interventions and special attention were included, which could have increased the rate of PTG even more (Garland et al, 2007). The social support of the research team and also which was experienced by the patients towards each other could have been an important factor in posttraumatic growth. It is important to mention, that most of our patients have been in touch with each other, organizing events to meet and to support every one of them.

Our results (quantitative and also qualitative studies) supported the fact, that specific areas of PTG (Appreciation of Life, Relationships, Personal Strengths) are more pronounced in a cancer sample, which differentiates the experience of cancer from other traumatic events. Also, it seems, that even in the subjective perception of the disease and without PTG specific primed questionnaire items patients report growth similarly.

The results supported the fact, that positive coping strategies (psychological immune competence) measured after treatment (T3) could predict PTG 3 years after diagnosis. The results showed, that the PICI scores increased significantly between T1 and T3 which could occur due to the mobilization of inner resources with the help of psychological interventions and special attention which could result in increased PTG. The results showed that the cumulative PICI score at T3 together with the emotional severity of PTSS and the social support scale from QOL at T6 explained one third of PTG variance. The model confirms the original belief that the presence of distress is necessary to develop PTG (Calhoun & Tedeschi, 2006). Also, the co-occurrence of PTG and PTSS creates questions about the adaptive function of PTG (Pat-Horenczyk et al, 2015). How could PTG be adaptive, if the emergence of PTG is accompanied by PTSS? Consistently with previous findings, the constant cognitive involvement in processing the trauma could be a key factor in the development of PTG. For this process stress is needed (Silva et al, 2012). In my opinion, posttraumatic stress is the factor which reminds patients of the vulnerability of people and life, which in the meantime helps to appreciate ourselves and life more. On the other hand, results of the current study showed, that PTG and QOL domains have moderate, significant associations (except Level of Independence with which the association was weak). This result could confirm the theory about the adaptive function of PTG, but also raises many questions. Is PTG leading to better well-being (Sawyer et al, 2010) or reciprocal relationships can be cited, as in a state of stable well-being, people may be more inclined to see more positive changes that are reflected in their well-being notion. The question also arises as could PTG really be differentiated from quality of life as they both are positive psychological constructs?

There were no significant differences between the intervention groups regarding total PTG score and the factors of PTG, except Spiritual Change between M and SA group. Both in the H and M group the spiritual change detected was small, but in the SA group it was above moderate. First, as far as spirituality is concerned, it is important to point out that, there have been no previous studies exploring the relationship between the baseline spirituality/religiousness level of the patients and the spiritual change (Shaw, Joseph, & Linley, 2005). For those with a higher initial level, the change could be less visible. Second, from a methodological point of view, it is also important to emphasize that the Spirituality Scale contains very few items and its reliability is below other scales. Third, spirituality could be culturally affected, so Tedeschi and colleagues (2017) suggested a revision and expansion of PTGI. The new spirituality items reflect on the diversity of perspectives on spiritual and

existential thinking represented in different cultures and also solves the problem of few items in the Spirituality Scale. And fourthly, because of the small group sizes the difference could be just a result of statistical analyzes.
There were also no significant differences between the groups regarding the study variables affecting PTG (PICI scales at T1, T3 and T6 and QOL domains, and PSDS scales and Severity of Life Events at T6). Regarding T1, the similar PICI scores can be explained citing two factors: the groups were quite homogenous or, the group size was relatively small. For T3 and T6 the explanation could be more complex than at baseline, because the treatment and the interventions also could have had an effect. First, the patients were receiving the same treatment protocol, but we did not measure the perceived stress regarding treatment, which could have been individually different. Second, the received social support from the research team and from the other patients could have been more effective than the interventions. The support experienced among our patients towards each other could have had a serious effect which we could not predict early on and therefore have not measured. According to the theoretical and also to the research literature, social support at the time of diagnosis and during treatment is one of the key factors for mobilizing inner resources and even PTG in the long run (Scrignaro et al, 2010; Silva et al 2012; Tedeschi & Calhoun, 2006). In line with this thought, the results from the regression model could indicate the important nature of social support. Although using one subscale from the QOL questionnaire raises methodological questions.

1.6. Limitations and future directions

The results should be interpreted with caution, as the variables examined were measured by self-report questionnaires, and the sample size was relatively small, although small sample size in a clinical study with cancer patients is a frequent problem, because of the sensitive nature of the patient's experience. It is also important that participation was voluntary, so the sample is not representative. On the other hand, our research team reached rural Oncology Centers too. It would also be important to assess the perceived severity of the diagnosis and treatment, which would provide useful information on the extent of the threat experienced by the patients. The question also arises as to whether each person in the study considered the disease as a trauma, this topic could be also measured, providing a more detailed picture about the traumatic nature of the cancer disease. Also, regarding the time-sensible nature of PTG it would be useful to measure changes in PTG over time – in the present study we were not able to do that, because the PTGI questionnaire was added after the clinical trial started. For future considerations the content analysis of the psychological interviews at the end of the trial would help to detect changes in PTG over time. This work is having been already started.
Methodologically it could have been interesting to compare the results from the content analysis with the results from the PTGI questionnaire. In the present dissertation the data captured was not enough to execute this comparison.

It is an important question of the present study as to whether the interventions experienced really do not have an effect on PTG or the size of the intervention groups were to small to detect any difference. Another possible explanation and also an important limitation in relation to this topic could be the fact, that actually the study had no control group receiving only the standard medical treatment, so the real differentiation between intervention and no intervention was not possible.

Further research is needed to explore the different processes that can lead to the different dimensions of PTG, therefore the separate analysis of the predicting variables of the dimensions of PTG would be important. Also, several theorists discuss the different processes leading to the different dimensions of growth (for example: Janoff-Bulman, 2004), therefore the process-

focused, longitudinal studies would aid in the more accurate understanding of the forming of PTG dimensions.

Not measuring social support is also a limitation of the current study. For future considerations it is also important, that different forms of social support could be measured: emotional, informational and instrumental social support (Schroevers, Helgeson, Sanderman, & Ranchor, 2010). Also for future considerations, it would be useful to measure PTG (and PTG dimensions separately) and PTSS during and after treatment, longitudinally, to examine the process of the reintegration of the trauma. Also the content analysis of the psychological interviews could be assessing not just the manifestations of PTG, but parallel the symptoms of posttraumatic stress.

2. Study: Retrospective study of young adult survivors of childhood cancer and parents of childhood cancer survivors

The purpose of the **retrospective study** was to explore the factors that influence posttraumatic growth in both young adult survivors of childhood cancer and parents of childhood cancer survivors. Despite the fact that international research has been more focused on PTG in recent years regarding the experience of young adult survivors of childhood cancer (Arpawong et al, 2013; Gianiazzi et al, 2016; Yi et al, 2015), in the case of parents of childhood cancer survivors, the examination of the predicting variables of PTG is underrepresented, as just few studies have explored this topic (for example: Hungerbuehler et al, 2011; Picoraro et al, 2014). It is important to recognize that parents of children diagnosed with cancer - especially mothers – are sharing the experience of the cancer trajectory with the child and have a great influence on how the child cope with it, therefore parental examination is also of paramount importance. To date, there has not been a comprehensive study of this groups in a Hungarian sample yet - this study attempts to fill this gap and provide a descriptive picture of how PTG appears in these groups and how underlying factors are associated with it. The few Hungarian studies regarding childhood cancer have focused on other aspects of the childhood cancer trajectory (for example: Szentesi, 2018: illness representation of childhood cancer patients; Molnár et al, 2013: cognitive schemas and the development of relationships of childhood cancer survivors). This direction of research is very important for the planning of psychological interventions, especially in the field of post-disease rehabilitation - both in terms of the person undergoing the disease and the functioning of the family.

2.1. Study hypotheses

Despite the fact that the present study is exploratory and the results regarding the factors influencing PTG in these study groups are contradictory in the current literature and using different methodologies, research hypotheses were formulated.

1. **Hypothesis**: The present dissertation outlines that most of the young adult survivors of childhood cancer and the parents of childhood cancer survivors are able to experience posttraumatic growth at a minimal level at least in one dimension of growth. This hypothesis is supported by previous studies (for example: Arpawong et al, 2013; Gianiazzi et al, 2016; Picoraro et al, 2014).

2. **Hypothesis:** In line with previous research abroad we argue that young adult survivors of childhood cancer can experience change in all areas of PTG. However, we suppose, that the most significant dimensions of change experienced will be greater appreciation of life and the need for more meaningful relationships (Gianiazzi et al., 2016; Yi et al., 2015). Regarding the parents, the study is exploratory, but we suggest, that the most

significant domains of change experienced will also be greater appreciation of life and the need for more meaningful relationships, because the nature of the experience.

3. **Hypothesis:** We suggest, that gender and the age at diagnosis will affect PTG in the group of young adult survivors of childhood cancer. The results of previous studies suggest that women (Arpawong et al., 2013; Gianiazzi et al., 2016; Yi et al., 2015) and patients who are older at the time of diagnosis (Barakat et al., 2006; Devine, Reed-Knight, Loiselle, Fenton, & Blount, 2010; Yi et al., 2015) can experience higher levels of PTG. Regarding parents, we mostly examined mothers, so statistical differentiation is not possible, but some studies suggest that mothers experience greater growth than fathers (Hungerbuehler et al, 2011).

4. **Hypothesis:** We suppose, that time since diagnosis plays an important role in PTG in both groups, but the results regarding the association are contradictory in the current literature. We suggest, that a longer time duration since diagnosis will be in a negative relationship with PTG, as proven by some studies (Barakat et al, 2006; Yi & Kim, 2014), because as posttraumatic stress fades PTG could also decrease.

5. **Hypothesis:** We strongly suppose, that general social support is one of the key factors influencing PTG. We hypothesize, that social support is in a positive relationship with PTG in both groups, which is also supported by previous studies (Ekim & Ocakci, 2015; Gunst et al., 2016; Yi et al., 2015).

6. **Hypothesis:** We hypothesize that the perceived objective severity of the diagnosis and posttraumatic stress symptoms are in a positive relationship with PTG as discussed above and supported by several studies in both groups (Arpawong et al., 2013; Barakat et al., 2006; Gunst et al, 2016; Hungebuehler et al, 2011).

7. **Hypothesis:** We hypothesize, that well-being and posttraumatic growth will be in a positive relationship, as supported by previous studies (Kamibeppu et al., 2010; Zebrack & Chesler, 2002) in the group of young adult survivors of childhood cancer, but as discussed before, the direction of the association is not clear.

Regarding emotion regulation in both groups and well-being in the group of parents we could not make a hypothesis, because there are no studies exploring the first association and regarding well-being the results are contradictory and are influenced by posttraumatic stress. Generally, we think that the factors influencing posttraumatic growth should be explored together, because most of the factors are in relationship with each other. Taking this into account, multiple regression modelling is crucial.

2.2. Methods

2.2.1 Study framework

We asked young adults (aged 18-35) who underwent childhood cancer and have been in remission to take part in the retrospective study. In addition, we examined parents of childhood cancer survivors without age restriction. We asked participants to take part in the study not through health organizations, but through supporting organizations and foundations in relation to children and their parents who had undergone cancer (Bátor Tábor Foundation/Serious Fun camp; Érintettek Egyesület/Association of patients affected by childhood cancer). We have provided access to our study questionnaires to organizations that are involved with young adult survivors of cancer and parents of childhood cancer survivors. Our online questionnaire was

available on LimeSurvey online platform. The young adult survivors of childhood cancer and parents of childhood cancer survivors who participated in the study could not have been matched, because of the anonymity, and also because of the fact that more parents filled out the questionnaires than young adults. The study was conducted with the permission of ELTE-PPK Research Ethics Committee. License code: ELTE PPK Research Research Request_201410. (Principal investigator: Adrien Rigó, PhD).

2.3.1. Participants

A total of 53 young adults with a history of childhood cancer were enrolled in our sample, with an average age of 27.5 (SD = 5.4), 17 men and 36 women.
A total of 112 parents were enrolled in our sample, with an average age of 44.9 years (SD = 6.7), 9 men and 103 women. Demographic data included gender, age, educational level, marital status, employment status and income of the study subjects. Disease variables included diagnosis, perceived objective severity of diagnosis (size of the tumor, presence of metastasis), date of diagnosis, time since diagnosis, age of the person at the time of diagnosis, type and characteristics of the treatment, the history of surgery or transplantation, relapse and the long-term consequences of the disease and treatment.

2.3.2. Measures

2.3.2.1. Posttraumatic Growth Inventory (PTGI)

2.3.2.2. Social Support Questionnaire (SSQ)

Social support was measured with a shortened, Hungarian version of Support Dimension Scale (Tandari-Kovács, 2010) developed by Caldwell Pearson and Chin (1987), which measures the perceived degree of social support (Kopp & Skrabski, 1992) on a 4 point Likert scale. The participants had to decide how much they could count on the help of the people in their social environment during the illness, or generally.

2.3.2.3. Impact of Events Scale Revised (IES-R)

To measure posttraumatic stress symptoms, the Hungarian and revised version (Perczel-Forintos, Ajtay, Barna, Kiss, & Komlósi 2012), of the Impact of Events Scale (developed by Horowitz Wilner and Alvarez, 1979) was used. The 22 item self-reported questionnaire measures the level of subjective distress symptoms regarding a traumatic event on a 5-point Likert-scale. Three subscales are included: avoidance, intrusive thoughts and hyperarousal.

2.3.2.4. Responses to Positive Affect Questionnaire (RPQA)

To measure emotion regulation, the Responses to Positive Affect Questionnaire developed by Feldman, Joormann and Johnson (2008) was used. Since the validation of the questionnaire is still ongoing in Hungary (by the research team of Gyöngyi Kökönyei at the Department of Clinical Psychology and Addictology of ELTE), we used the original three-factor structure. The questionnaire measures three cognitive, response-focused emotion regulation strategies (intensity and length of emotion) to positive affects, on a 4-points Likert scale. Two positive strategies (emotional-focused and self-focused rumination) and a negative (dampening of positive emotions) can be measured with the 17-item questionnaire.

2.3.2.5. WHO well-being Questionnaire

For measuring the current (regarding the past two weeks) psychological well-being, the WHO Well-being Questionnaire was used. The shortened 5 items version, by Bech, Gudech and Johansen (1996) was validated in 2006 (Susánszky, Konkoly Thege, Stauder, & Kopp, 2006). The participants have to decide on a 4-point Likert scale between the endpoints *Not at all (0) and Completely (3*) regarding the 5 questions.

2.4. Main results

2.4.1. Characteristics of PTGI

The large majority of young adult survivors (97.9%) and parents (93%) experienced some degree of positive change as reflected by a mean PTGI total score above 1 point (higher than very little influence of childhood cancer on growth) on the 6 points scale. The averaged total score of PTG of young adults was moderate (M = 3.18; SD = 0.97; CI (0.95) = 2.9-3.45) and was also moderate (M = 3.15; SD = 0.98; CI (0.95) = 2.94-3.33) for the parents. There were no significant gender differences in any of the groups regarding PTGI, except for the Appreciation of Life dimension of PTGI in the group of parents ([F (1.97) =98, p=0.011)]: women had significantly higher values.

Table 4. Mean PTGI total and PTGI factor scores in the group of young adult survivors of childhood cancer and parents of childhood cancer survivors.

	Young adult survivors of childhood cancer				**Parents of childhood cancer survivors**			
			95% Confidence interval				95% Confidence interval	
	M	SD	Lower	Upper	M	SD	Lower	Upper
PTGI total score	3.18	0.97	2.88	3.44	3.15	0.98	2.94	3.33
PTGI Appreciation of Life	3.7	1.17	3.32	4.02	4.03	0.95	3.85	4.21
PTGI Relationships	3.3	1.15	2.94	3.6	3.22	1.09	2.99	3.42
PTGI Personal Strengths	3.29	1.16	2.93	3.62	3.28	1.19	3.04	3.49
PTGI New Possibilities	3.19	1.08	2.85	3.45	2.83	1.19	2.56	3.07
PTGI Spiritual Change	1.79	1.59	1.32	2.25	2.13	1.49	1.85	2.42

2.4.2. Correlation studies of the variables related to PTG in both groups

For the results of the correlation studies see *Table 5.*

Table 5. Bivariate correlations of the variables related to the total score of posttraumatic growth (PTGI) in both of the groups

	Young adult survivors		Parents of survivors	
	r	*p*	*r*	*p*
SSQ: illness	**.360**	**.013**	.037	.713
SSQ: in general	**.392**	**.006**	.183	.069
(Child's) age at diagnosis	.234	.118	-.082	.420
Time since diagnosis	**-.323**	**.027**	.024	.846
Perceived, objective severity of the diagnosis	-.027	.857	-.095	.433
IES-R: intrusive thoughts	.295	.044	**.275**	**.006**
IES-R: hyperarousal	.214	.149	**.322**	**.001**
IES-R: avoidance	-.118	.431	.191	.057
IES-R: total score	.156	.296	**.334**	**.001**

RPQA: self-focused rumination	**.398**	**.006**	**.421**	**.000**
RPQA: emotion-focused rumination	**.570**	**.000**	**.339**	**.000**
RPQA: dampening of positive emotions	.160	.287	.215	.034
WHO: well-being	**.512**	**.000**	**.311**	**.004**

Notice, that significant correlations are written with bold numbers

2.4.3. Linear regression models for the variables underlying PTG in both groups

In the group of young adults, after the stepwise regression (backward elimination), in the final model well-being, dampening of positive emotions, and intrusive thoughts remained significant explanatory variables. In the case of general social support, the significance was on a tendency level ($p = 0.055$), but we determined, that it was approaching an acceptable level of significance and on the other hand, the exploratory power of the model would have been greatly reduced by excluding it. The final model explained 50.7% of PTG variance ($R^2 = 0.507$; $R^2_{adj} = 0.459$; $F(4) = 10.562$; $p = 0.001$).

Table 6. The final stepwise regression model for the exploratory variables of PTG in the group of young adults.

	Unstandardized coefficients		Standardized coefficients	t	p
	B	Standard error	β		
SSQ: in general	.917	.465	.234	1.971	.055
RPAQ: dampening of positive emotions	1.097	.497	.253	2.205	.033
IES-R: intrusive thoughts	1.312	.404	.374	3.25	.002
WHO well-being	3.743.	.703	.622	5.324	.000

In the group of parents, self-focused rumination, hyperarousal from posttraumatic stress symptoms and well-being remained significant explanatory variables. The final model explained 26.5% of PTG variance ($R^2 = 0.265$; $F(3) = 6.799$; $p = 0.001$).

Table 7. The final stepwise regression model for the exploratory variables of PTG in the group of parents.

	Unstandardized coefficients		Standardized coefficients	t	p
	B	Standard error	β		
IES-R: hyperarousal	2.064	.636	.396	3.244	.002
RPQA: self-focused rumination	2.903	1.175	.31	2.27	.017
WHO well-being	1.699	.78	.275	2.139	.037

For the dimensions of PTG separate stepwise regression models were performed.

In the group of young adults, compared to the PTG total score model, the gender of the respondents was also an explanatory factor in the Appreciation of Life domain (PTG was higher for women), but social support did not have significant explanatory power. In terms of the Relationships domain, social support experienced during the time of illness took over the role

of general social support, and the dampening of positive emotions did not appear in the final model. In terms of Personal Strengths domain, only well-being had an explanatory role. In the domain of New Possibilities, avoidance (from posttraumatic stress symptoms) and time since diagnosis had also a role in addition to the variables explaining the total score of PTG, but the direction of the relationship was negative. In the case of Spiritual Change domain, dampening of positive emotions and well-being were excluded from the model.
In the group of parents, compared to the PTG total score model, the significant explanatory variables of the Appreciation of Life domain included dampening of positive emotions, but none of the posttraumatic stress symptoms played a significant role in the final model. Regarding the Relationship domain, well-being did not play a role compared to the original model. In terms of Personal Strengths domain, only self-focused rumination had a role. Regarding New Possibilities domain, however, self-focused rumination was eliminated, and only hyperarousal and well-being played a role. In terms of Spiritual Change domain, social support experienced during the child's illness had a negative effect, while general social support had a positive effect, and hyperarousal proved to have a lesser impact.

2. 5. Discussion

The aim of our study was to investigate variables affecting posttraumatic growth among young adult survivors of childhood cancer and parents of childhood cancer survivors in Hungarian samples. This was the first study to examine this groups regarding PTG in Hungary.

The averaged total score of PTG of young adult survivors of childhood cancer was moderate and was higher than in a similar American study (Yi et al., 2015) and was lower than in a study focusing on breast cancer patients (Brunet, McDonough, Hadd, Crocker, & Sabiston, 2010), but higher than in a study focusing on stomach cancer patients (Sim, Lee, Kim, & Kim, 2015). These kind of differences could be suggesting, that the degree of PTG could be different by cancer types. Another important factor is, that the subjects of the present study were recruited via organizations which are focusing on the therapeutic recreation of the pediatric cancer patients, so they received some kind of psychological and social support, which could lead to increased levels of PTG. The average total PTG score of parents was also moderate and was higher than what was observed in a similar American study (Turner-Sack, Menna, Setchell, Maan, & Cataudella, 2016), and was nearly the same as in another study where the PTG of the parents was measured in relation to their child's complex chronic health condition (Stephenson et al, 2017). It appears that the chronic nature of the disease could be an important factor regarding PTG.
In line with previous research abroad, young adult survivors of childhood cancer can experience change in all areas of PTG and the most significant dimensions of change experienced were greater Appreciation of Life and Relationships, similar to other studies (Gianiazzi et al., 2016; Yi et al., 2015). Lower scores were shown only by the Spirituality factor, which could be due to cultural differences; the religious context in which the child was brought up could be a determinant (Kilmer et al., 2009). In addition, the cognitive developmental level of the child at the time of illness may also be a significant factor (Hendricks-Ferguson, 2006) which was not explored during our study.

In the sample of young adults, the age at diagnosis and the gender were not in a significant relationship with PTG and there were no significant gender differences regarding PTG in this group. In the sample of parents, the child's age at diagnosis was not in a significant relationship with PTGI and there were also no gender differences regarding PTGI total score, but in the dimension of Appreciation of Life, women reached higher scores, than men. This results could have been occurred due to methodological reasons. The gender ratio was not balanced in either

of the groups, the retrospective analysis may deprive the age of diagnosis, and the sample size was small, which could weaken the statistical strength, but in many studies these variables and PTG were also unrelated. (Arpawong et al., 2013; Turner-Sack et al., 2012). Additionally, age was used as a continuous variable, thus age groups could not be determined, because the group sizes would be really small.

Of the cancer-related variables, only the time elapsed since diagnosis was in a negative, significant relationship with PTG in the group of young adult survivors, which is consistent with the results of several recent studies (for example: Barakat et al., 2006; Yi & Kim, 2014), although in a study where similarly longer time since diagnosis has elapsed (more than 10 years) no significant relationship with PTG has been found (Klosky et al., 2014). Also, a longitudinal examination did not reveal any significant change in PTG at 6, 12, 24 months after diagnosis on an adolescent sample (Husson et al., 2017). It can be suggested that longitudinal studies examining longer periods of time after the diagnosis could be more meaningful in relation to the process of PTG.

In the sample of young adults, general social support, dampening of positive emotions, intrusive thoughts and well-being remained significant explanatory variables of PTG, the model explained 50% of the variance of posttraumatic growth, which is a very high ratio compared to the similar literature (for example it was 9.5% in the study of Yi et al., 2015) and even compared to the field of psychology. As previously discussed, social support is fundamentally important for the main mechanisms of coping with the trauma, thus the role of general social support is unquestionable. It is also not surprising that general social support has an affect on PTG, rather than social support experienced during the illness, because the emergence of PTG is a process for which social support is longitudinally needed. It is also important that during the illness and hospital stay children are isolated from their everyday environment and can experience less social interaction and support than before – they could not meet their friends, their wider family and also their close family has been seen less often. Usually, during hospital stay, the social support experienced in appearance is limited for the presence of the mother. Therefore, it is not surprising that social support experienced in general (after treatments and hospital stay) would have had a greater importance in the process of PTG. The dampening of positive emotions can be associated with the process of cognitive restructuring (Calhoun & Tedeschi, 2006) related to the integration of trauma. The experience of a serious illness shatters a person's belief that only good things can happen and can result in a more realistic worldview, the person no longer naïvely thinks that only good things could happen and adopts a more balanced approach about positive life events. Feldman and his colleagues (2008) found in their original research that dampening of positive emotions could be used to maintain a sense of predictability and stability. At the same time, there is a risk of pathologies, and this type of emotional regulation can also be associated with a decrease in self-confidence (Feldman et al., 2008). It is important to note, however, that the regression studies on the factors of PTG have shown that dampening of positive emotions was only relevant to the factors Appreciation of Life and New Possibilities. It is possible that a person will be less in need of definitive positive emotions and events in order to appreciate life, and to be happy with small things. Perhaps by trying to dampen positive emotions, the person will spare themselves of further disappointments. In addition, the security of stability can help improve appreciation of life and more anxious testing of life's possibilities, as the person already possesses a cautious awareness of that negative events. Regarding intrusive thoughts, it is important to note that they are not only intrusive thoughts about cancer as a trauma, but may also include future fears of possible recurrence of the disease (Kangas et al., 2002). The presence of these symptoms can maintain the perceived threat of the trauma, which can affect posttraumatic growth through rumination processes and social support

(Meyerson, Grant, Carter, & Kilmer, 2011: a model explaining the development of post-traumatic growth regarding children underwent traumatic experiences).
The positive relationship between PTG and posttraumatic stress symptoms (in this case: intrusive thoughts) proves the assumption that for positive psychological change stress is needed (Silva et al, 2012), even if one could suppose that a positive construct, like PTG would be correlating with other positive constructs (Kovács et al, 2012). The memories of the trauma and the anticipatory nature of the cancer disease could be reminding the survivors repeatedly to appreciate life, relationships, themselves and the possibilities that life can offer. In this way suffering can have an adaptive function in the long term. This line of thought also contradicts the idea that strictly positive thinking is necessary to cope with traumatic events. The traumatic experience should be legitimized as shattering, therefore the reconstruction of one's world view could mean real change. PTG showed a clear and strong relationship with well-being in the case of young adult survivors of childhood cancer, also when examining the factors of PTG individually (only examining Spirituality had no role). However, the role of well-being in our explanatory model raises many questions. Does PTG lead to better well-being (for example, female breast cancer patients: Morill et al., 2008) or more positive family relationships have an impact on well-being (for example, in child cancer survivors: Orbuch, Parry, Chesler, Fritz, & Repetto, 2005)? Maybe it can be inferred that in reciprocal relationships, as in a state of stable well-being, people may be more inclined to see more positive changes that are reflected in their well-being vision. In the research area of young adult survivors of childhood cancer, this area is still very neglected, most of the studies explore the well-being and posttraumatic stress symptoms of childhood cancer patients and young adult survivors (for example: Quinn, Goncalves, Sehovic, Bowman, & Reed, 2015), but regarding the relationship of PTG and well-being little research has been conducted.

In the case of parents, posttraumatic stress symptoms and all forms of emotional regulation were in a significant, positive relationship with posttraumatic growth, but only the hyperarousal, self-focused rumination and well-being remained in the final explanatory regression model. According to a longitudinal study, the symptoms of stress experienced by parents (mainly due to their nature, intrusive thoughts and hyperarousal) may be more sustained over time (Pöder, Ljungman, & von Essen, 2008). This may explain that the posttraumatic stress symptoms are still pronounced in the present study after 8.1 years on average, when they have to recall the trauma. In addition, parents are more objectively able to judge the severity of the life-threatening nature of the disease because of their cognitive capacity (Kazak et al., 2004; Landolt Vollrath, Ribi, Gnehm, & Sennhauser, 2003) and are more likely to be afraid of the recurrence of the disease. While social support had a role for young adult survivors, for parents the belief in themselves and their own strength was an important factor. Regarding self-focused rumination, the recurring automatic thoughts are associated with a positive self-image, which can be beneficial in difficult situations. Also my personal experience is that parents of children undergoing cancer cannot focus on themselves (as in the need for social support), while concentrating on ways to support their child. A significant personal experience for me in the pediatric oncology setting was, that as psychologists we can only support parents if we are able to help their child first. Thus, perhaps social support is experienced by parents' trough their child, which indicates that dyadic analyses would be useful in future research. The role of well-being is also important in the case of parents regarding PTG, which can be due to the decrease of the perceived threat (healed child). Regarding parents, the question arises as why just 26% of PTG was explained by the study variables. It is possible that future studies would have to examine more factors related to the child in terms of posttraumatic growth while carrying out dyadic analyzes.

Our results indicate that certain domains of PTG require different predicting variables in both groups. This finding suggests that PTG is a multidimensional construct, as the different areas of PTG are forming through different processes, but in relation to each other. It would be interesting and useful to explore the paths of development of the different domains longitudinally.

2.6. Limitations and strengths

Our results should be interpreted with caution, as the variables examined were measured by self-reporting questionnaires, and the sample size was not too broad, which is a common phenomenon in this disease population. It is also important to note that the participation was voluntary, so the sample is not representative. At the same time, reaching the study subjects through different non-health organizations could result in greater heterogeneity. However, the question of group effects regarding high levels of PTG also arises. The question is whether study subjects who turn to non-health care organizations are more open to accepting outside support. An important limitation of our study is that the appearance of different disease groups was not balanced in the sample, and we were not able to study the disease-related variables because the group was too heterogeneous. It would also be important to assess the perceived severity of the diagnosis, which would provide useful information on the extent of the threat. The question also arises as to whether each person in the study considered the disease as a trauma.

An important strength of our study on the other hand is, that there has not been a comprehensive study of these target groups in a Hungarian sample yet. This study provided a descriptive picture of how PTG appears in these groups and how underlying factors are associated with it. Regarding the young adult survivors of childhood cancer, the study succeeded to identify 50% of the PTG variance, which is a high percentage given the fact that emotions and thoughts are hard to predict. It was proven, that PTG could be described through several underlying factors in a complex relationship.

GENERAL CONCLUSION

Generally, both of the studies of the present dissertation found, that most of the cancer patients can experience posttraumatic growth 0,5 years or 3 years after diagnosis or even retrospectively. Also, parents of childhood cancer survivors experienced a similar amount of PTG retrospectively.

Both of the studies supported the fact, that specific areas of PTG (Appreciation of Life, Relationships, Personal Strengths) are more pronounced in a cancer sample, which differentiates the experience of cancer from other traumatic events. Also, both of the studies found that cancer patients and survivors and also close relatives experience PTG generally at a moderate level. Both of the studies and also the qualitative analysis supported the fact, that Appreciation of Life is the most pronounced domain of PTG on a cancer sample.

Our results indicate that certain dimensions of PTG are related to different predicting variables in both groups. This finding suggests that PTG is a multidimensional construct, as the different areas of PTG are forming through different processes, but in relation to each other. It would be interesting and useful to explore the paths of development of the different dimensions longitudinally.

Regarding the factors underlying PTG both of the studies suggested, that different forms of posttraumatic stress symptoms, coping and emotion regulation strategies and social support are the core predictors of PTG controlled for disease-related variables or even when not controlled.

However, we did not have information about the subjective perception of the cancer trajectory (for example: perceived severity of the threat). Quality of life was also an important factor regarding PTG, but the direction and the nature of the association is still not clear. The more critical line of theorists are also considering the fact that, before the beneficial relationship between PTG and physical well-being (which is difficult to detect) is proven to be evident, it would be important to design studies that examine immune functions, and the progression of cancer and mortality in the context of PTG (Gorin, 2010). In our breast cancer longitudinal study we measured immune functions (white blood counts and NK activity), but the data processing is not in the stage which would allow me to discuss it here.

In addition to these, our research provides useful information for planning future interventions. It is clear from the results that it would be worthwhile to help people with cancer not only individually but also with regard to family functioning, to strengthen and facilitate their social support system during treatment and recovery, and facilitate coping strategies and to help integrate trauma with cognitive therapeutic techniques according to their age if the clinician thinks it is adequate. Meanwhile, of course the treatment of stress symptoms is crucial.
Both of the studies drew attention to the importance of the psychological rehabilitation of the cancer patients, as PTG was examined years after diagnosis. Based on my own experience, the psychological rehabilitation after treatments end could be as important as the coping with the disease-related psychological consequences during treatment.

Regarding our study with the breast cancer patients containing intervention, a last, rhetorical question arises as to the type of intervention or the social support received through intervention is more important?

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