EÖTVÖS LORÁND UNIVERSITY
FACULTY OF EDUCATION AND PSYCHOLOGY

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Coping with Breast Cancer and Patients' Experience of Psychological Interventions:

A Longitudinal Study

Theses of the Doctoral Dissertation

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Introduction

In the complex treatment of cancer patients, the mapping of psychosocial aspects that accompany the disease, and providing evidence-based psychological interventions for improving adjustment to cancer, play an increasingly important role. Some cancer patients are successfully fighting physical and psychological problems during treatment, either independently or with the help of their relatives and medical staff. However, at least one quarter of patients report that they need psychological support. A minimum of 30% – some studies show 60% – of patients have psychological symptoms that need professional psychological or psychiatric help. (Riskó, 2006, Gregurek, Bras, Dordević, Ratković & Brajković, 2010, Mitchell & et al., 2011, McFarland & Holland, 2016). Patients' coping styles have a significant impact on their physical and psychological adjustment to cancer. Onco-psychology uses a number of psychotherapeutic methods to enhance adjustment: to effectively improve the quality of life, strengthen coping potential, improve physical and mental condition, adapted to the problems of cancer patients (Watson & Kissane, 2011). Hypnotherapy is one of these effective, evidence-based psychosocial interventions.

The present thesis is part of an ongoing randomized, controlled, longitudinal, prospective study, entitled PSYCHOLOGICAL RESOURCES AND HEALING led by Éva Bányai. The research aims to measure the effect of hypnosis in case of intermediate- and high- risk breast cancer patients on psychological immunity, quality of life, posttraumatic growth, side effects of chemotherapy, immune functions and disease-free survival.

The thesis covers three major interrelated themes. (1) in the first part the characteristics of the psychological immune competence of breast cancer patients is examined: how do they relate to the psychological immune competence of healthy women, how does psychological immune competence change in the study period according to intervention groups, how is it affected by intervention and how does it change over time. (2) patients' subjective experience of psychological interventions (hypnosis/music/special attention only) that they received during chemotherapy treatment are being content analysed. These experiences reflect a degree of involvement in the received interventions. (3) In the final part, patients' level of involvement is related to psychological outcomes such as psychological immunity, quality of life and posttraumatic growth.

Theoretical background

Worldwide, the second most frequent type of tumour, with an estimated 1.67 million new cases per year is breast cancer, and it is by far the most common cancer among women (Ferlay et al., 2014). With increased survival rates and a shift towards regarding cancer as a chronic rather than a terminal disease, focus is moving towards survivors' quality of life and psychosocial needs. Furthermore, patients' experiences have become an important indicator of person-centred quality care.

Although the majority adapt relatively well over time to the challenges (Carlson, Waller, Groff, Giese-Davis, & Bultz, 2013), breast cancer patients demonstrate a varying ability to cope with the stressors generated by the disease. Traditionally, adjustment to breast cancer is measured by the level of patients' anxiety, depression and psychological distress. Recent research focuses on several other areas of functionality, such as quality of life, cognitive, emotional, behavioural and psychological factors of wellbeing (Dekker & de Groot, 2018). Adjustment can be considered a dynamic process of change, rather than an endpoint, and is influenced mainly by the arising problems over the course of the disease, by patients' personal characteristics and apperception, and also by contextual factors (Brennan, 2001). There is a wide range of psychological factors behind the individual differences in adjustment, and one of them is patients' coping style.

The different phases of breast cancer treatment – such as anticipation before diagnosis, diagnosis itself, treatment options such as surgery, chemotherapy, hormone or radiotherapy, and its side effects, end of treatment and early survivorship – may vary in the type and the degree of the stressors which affect the coping response as well. Patients' coping has individual-specific elements (coping resources, trait-like characteristics), while the actual coping behaviour is influenced by situational characteristics of the treatment (Geyer, Koch-Giesselmann, & Noeres, 2015; Regier & Parmelee, 2015; Scheenen, Horn, Koning, Naalt, & Spikman, 2017). Changes in coping style in the first place take place as part of the dynamic process of adaptation (Hervatin, Sperlich, Koch-Giesselmann, & Geyer 2012; Roussi, Krikeli, Hatzidimitriou, & Koutri, 2007); however, effective coping techniques can be achieved by psychological interventions. Psychological intervention that incorporates coping skills training seems to provide better adjustment to the disease, reduces symptoms, and increases positive coping (Groarke, Curtis, & Kerin, 2013; Stagl et al., 2015). Coping strategies are closely and reciprocally connected to quality of life (Danhauer, Crawford, Farmer & Avis, 2009; Paek, Ip, Levine & Avis, 2016) and posttraumatic growth (Hamama-Raz, Pat-Horenczyk, Roziner, Perry & Stemmer, 2019)

In order to integrate the different coping strategies, protective personality resources and dimensions of resilience behind successful adaptation, Oláh (2005a) introduced the multidimensional system of personal capacities called the Psychological Immune System (PIS). PIS plays an important role in maintaining and improving well-being by enabling the person to endure prolonged stress and cope efficiently with upcoming threats in such a way that personal integrity and developmental potential remains intact. It entails both individual protective attributes and those factors that mediate the person's orientation towards the protective resources of the environment (Oláh, 2005b). Strong psychological immunity is connected to greater life-satisfaction and aspects of wellbeing, such as environmental mastery, purpose in life, personal growth, self-acceptance, positive relations, and autonomy (Oláh, 2009). Certain resources of psychological immunity – such as positive thinking, sense of control, sense of coherence, and sense of self-growth – play a mediating role in psychological adjustment to chronic and psychiatric diseases (Mirnics et al., 2013). In a Hungarian oncological study, patients' sample results reflected significantly lower psychological immunity (on 12 out of 16 scales of the Psychological Immune Competence Inventory) than the standard, healthy

Hungarian population (Oláh, 2005b). Besides this study there is little knowledge on cancer patients' psychological immunity, how it reacts to the challenges of the different phases on the cancer continuum, and whether it can be imroved with psychotherapeutic intervention. Research in this field can therefore fill a scientific gap.

In order to strengthen successful coping skills to promote well-being and health related QoL, psychosocial interventions are regarded as indispensable components in oncological care (Holland, Breitbart, Butow, Jacobsen, Loscalzo, McCorckle, 2016). Hypnosis, as a mind–body intervention, has a place all along the cancer care continuum from prevention to palliation. Besides the major beneficial effect in treating the physiological side-effects of cancer (Wortzel, & Spiegel, 2017) it seems to be effective in reducing negative emotions, depression, and anxiety about cancer; across a patients' lifespan (from paediatric to geriatric oncology), at all stages of the disease (diagnosis, treatment, survivor period) with both immediate and a long-term effect (Chen, Liu & Chen, 2017). Hypnosis as an intervention can increase health-related quality of life, improve coping strategies and enhance resilience (Walker et al., 1999; Bragard et al., 2017; Schoen & Nowack, 2013). Just as hypnosis, music has been used effectively as well in the cancer continuum in order to ease anxiety in perioperative periods, during chemotherapy or radiation therapy, to ameliorate the side-effects of treatment, to improve wellbeing, quality of life and immune functioning (Bradt, Dileo, Magill & Teague 2016).

Examining the subjective experiences of healthy volunteers in hypnosis, it has been proved that its intensity and pattern is related to physiological and biological markers such as changes in the oxytocin level and the genotype of the participants (Kasos et al., 2018; Katonai et al., 2017). However, relatively few studies explore the nature of experiences of cancer patients undergoing adjunctive therapies involving techniques such as guided imagery, hypnosis or music. These studies point out the relationship between the quality of patients' experience and the perceived or measured benefits of these interventions, and they equally prove that intrapsychic involvement, such as the vividness of the visualization in guided imagery, has a positive effect on clinical outcome. Walker et al. (1999) report marked difference in clinical response in breast cancer patients, showing correlation with the vividness ratings for the visualisation exercises whereas the control and treatment groups showed no difference in primary response to the chemotherapy. Similarly, Eremin et al. (2009) reported significant correlation between the vividness of imagery, as rated by the patient, and NK (Natural Killer) and LAK cell (lymphokine-activated killer cell) activity during chemotherapy treatment period, and further significant correlation between imagery ratings and change from baseline NK cell activity, as well as IL1b (interleukin 1 beta) levels after radiotherapy. Kwekkeboom, Kneip & Pearson (2003) and Kwekkeboom, Wanta & Bumpus (2008) found that improvement in pain reduction was associated with greater imaging ability. Furthermore Kwekkeboom, Hau, Wanta & Bumpus (2008) found that the effectiveness of these techniques depended upon – among other factors – patients' active, motivated involvement in the treatment and individual imaging abilities. In connection to musical interventions, Potvin, Bradt, Kesslick (2015) discussed with oncology patients that symptom management should not be regarded as a linear process (i.e. receiving an intervention that helps to relieve symptoms), but that it is influenced by the intrapsychic involvement of the patients to achieve the desired state.

Generally, clinical trials to describe the effects of techniques such as hypnosis and music in oncology settings, tend to overlook how individuals respond to the interventions and usually report group data (e. g. means) only. However, based on the above-mentioned findings, it is important to identify patient-related factors that influence the effectiveness of psychosocial intervention in oncology settings. Therefore, patients' subjective experience should be better understood and analysed.

Aims and Hypotheses

The primary aim of the thesis is to describe the psychological immunity of breast cancer patients: how it changes during the different phases of cancer treatment and early survivorship, and how it can be modified by psychological interventions such as hypnosis, music or special attention only. A further aim is to analyse patients' subjective experiences of these psychological interventions, and to examine the relationship between these experiences and patients' psychological immune competence, quality of life and posttraumatic growth.

Based on theoretical considerations and previous empirical findings stated above, the following research hypotheses (H) and questions (Q) were formulated

1. H1: Breast cancer patients have a different psychological immune competence to healthy control women. Due to the activation of the psychological immune response to distress, it can be assumed that breast cancer patients show higher immune competence than healthy control women.
2. H2: The most prominent and the lowest elements of immune competence in certain phases of cancer treatment can be identified, and since psychotherapy affects coping, it is assumed that this may vary across intervention groups.
3. H3: Psychological interventions (hypnosis/music/special attention only, without further intervention) are assumed to have different effects on Psychological Immune Competence. It is hypothesized that hypnosis may be a more effective tool for increasing Psychological Immune Competence than music or special attention.
4. H4: As coping changes in time and under the influence of therapy, it can be assumed that psychological immune competence as an integrated system changes over time in the course of treatment and early survival period. Psychological intervention also influences this change in time.
5. Q1: It can be assumed that subjective experiences of the received intervention differ among patients. How can these experiences be described and to what extent do they reflect personal involvement in the received psychological intervention?
6. Q2: Is the degree of involvement connected to the psychological immune competence, quality of life and post-traumatic growth of patients? Can it be assumed that greater involvement is related to higher immune competence, better quality of life and higher post-traumatic growth?

Method

Study framework

The presented data of the thesis is part of a prospective, randomized, single-blind, controlled study entitled "PSYHOLOGICAL 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, Principal investigator Prof. Éva Bányai). The study is designed to evaluate the beneficial effect of hypnotherapy administered during chemotherapy on intermediate and high-risk breast cancer patients in terms of disease-free survival, cell-mediated immunity, adverse events (nausea, vomiting, hospitalization), general mood and physical-state, quality of life, psychological immune competence as a coping resource, and post-traumatic growth. All patients – as part of their standard medical treatment – undergo a standardised taxane-antacycline chemotherapy protocol: four cycles of Adriamicin and Cyclophosphamide (AC) and 12 cycles of Paclitaxel (PAC) in 24 weeks. Besides standard medical care and special attention that was given to each participant, patients either received a pre-recorded series of positive suggestions in hypnosis or music selections or received special attention only without further intervention. Interventions took place while receiving cytostatic infusion or waiting for blood test results (Bányai, 2013; Bányai, 2015; Bányai et al., 2017). The

research was conducted in three different institutes in Hungary, with the collaboration of a multidisciplinary team, in the following locations: (1) The National Institute of Oncology (NIO) (Budapest), (2) The Oncology Ward of the Markusovszky Lajos Hospital (Szombathely), (3) Institute of Oncology of Debrecen University (Debrecen). The study was coordinated by the ELTE (Eötvös Loránd University) Institute of Psychology, Department of Affective Psychology.

Subjects

Breast cancer patients

The study involves histologically confirmed, HER2-negative, axillary lymph-node-positive or high-risk lymph-node-negative breast cancer patients without distant metastases, who are candidates for adjuvant chemotherapy based on the St. Gallen's Consensus guidelines of 2011 (Goldhirsch et al., 2011).Patients were recruited by their oncologists in the above-mentioned three distinct oncology centres on their first visits, and at the NIO they were invited to participate in a study to compare the effectiveness of different psychological interventions. Patients who agreed were randomly assigned to the *hypnosis* or *music* groups. For ethical reasons, in order to avoid the harmful psychological and physiological effects of social exclusion (Eisenberger, Lieberman & Williams, 2003; Twenge, Catanese & Baumeister; 2002, 2003) patients were not randomised to a non-intervention control group. Those patients who refused to participate in psychological interventions were invited to participate in a study that examines the relationship between psychological and physical states. They represented the special attention only group. Since it can be supposed that the psychological characteristics of those who refuse differ from those who accept interventions, to control for this, two other special attention groups were gathered in two distant cities: in Szombathely and in Debrecen. Participation was voluntary, with a signed, informed consent form. Altogether the data of 149 breast-cancer patients (aged between 25–75 years (M = 53.30, SD = 10.83)) were analysed.

Healthy control group

To compare the psychological immunity of the study population to the average healthy woman, the psychological immunity of Hungarian women was measured via the internet, and via convenience sampling, gathered by psychology students. Altogether the data of 516 healthy women aged between 18 – 82 was analysed (M = 33.42, SD = 14.33).

Interventions

Special attention above standard medical care was provided to all subjects of the study. In line with this, three types of study groups were formed: (1) *hypnosis group,* receiving special personal attention and hypnosis, (2) *music group,* receiving special personal attention and a music selection, (3) *special attention only group (later special attention group)*, receiving special personal attention without further intervention. Interventions took place 21 times throughout the 24-week AC/PAC cytostatic treatment period.

Hypnosis

Patients listened to pre-recorded hypnosis through MP3 players in the presence of a hypnotherapist while receiving chemotherapy or waiting for blood test results. The hypnosis started with standardised relaxational hypnotic induction in a permissive style, followed by therapeutic suggestions focusing on decreasing anxiety, dealing with the side-effects of chemotherapy (e.g., nausea, hair loss), ego-strengthening, activating inner healing resources and facilitating immune functions. All sessions ended with a formal process of dehypnosis. The suggestions used were developed by the research team, based on the current literature on hypnotic suggestions used in case of adult (Jakubovits, 2011) and paediatric cancer patients (Vargay, 2012) as well as on the clinical experience of the hypnotherapists on this topic.

Music

Selection of classical music as a control condition was chosen so that it matched the dynamism and the duration of the hypnosis sessions: e.g., stress reduction was matched with soft and calm music, enhancing active coping with the disease was matched with march-like, energizing themes, while bodily rebirth via natural symbols was matched with 'program music' implying themes of natural rebirth. The music was tested on a voluntary basis by the patients of the National Institute of Oncology, currently undergoing chemotherapy and by the healthy students of the Liszt Ferenc Academy of Music (Bányai & Vargay, 2013)

Special attention

For ethical reasons, a control group receiving standard medical care only was not included. In NIO the only patients who were part of the special attention only study group were those who refused to receive hypnosis or music intervention but agreed to take part in a study examining the relationship between psychological and physical states. Since it was hypothesised that there might be differences in psychological characterisics between those who accepted interventions and those who refused them, two further special attention groups were gathered in Szombathely and Debrecen, and were tested on whether they would participate or refuse such interventions. A questionnaire asked hypothetical questions about the willingness of patients to participate in a study that involves alternative adjuvant interventions eg.: hypnosis and music among eight other possibilities. However, differences either in psychological measures (baseline PICI, QoL and follow up PTN) or baseline physiological measures (NK activity, blood count) between those who accepted or refused hypnosis/music as an intervention were not found (Bányai et al., 2017). For further analysis, their results were merged. The patients in the special attention group, apart from being accompanied throughout the treatment by the research team and being asked about the physical and emotional wellbeing on each occasion, did not receive any further psychological intervention.

Measures

Measuring points

Measuring points were determined at such phases of the cancer treatment where we assumed that changes would occur in patients' treatment-related life with elevated distress. Measuring points were the following: T1: serving as a baseline, after diagnosis and surgery, before starting chemotherapy treatment and psychological interventions; T2: after 12 weeks of AC treatment; T3: at the end of 24-week chemotherapy treatment and psychological intervention period; T4: 12 months after diagnosis; T5: 24 months after diagnosis; T6: 36 months after diagnosis

PICI

Psychological immune competence was measured by the Psychological Immune Competence Inventory (PICI), which is an 80-item inventory containing 16 scales and three subordinate systems (Oláh, 2005a).. The items of PICI consist of a Likert scale, ranging from 1 to 4, where 1 means "does not describe me at all" and 4 means "describes me completely". (Oláh, 2005b, 2005a) General immune competence can be described by the cumulative PICI score (i.e., by adding up the scores of all the scales) (Perczel Forintos, Kiss, & Ajtay, 2007). PICI was registered six times, at all six measuring points

WHOQOL-100

Quality of life was assessed by the WHOQOL-100 questionnaire (The WHOQOL Group, 1998): the 100 questions cover 24 facets, creating six domains: physical health, psychological domain, level of independence, social relations, environment and spirituality/religion/personal beliefs. Each facet consists of four questions (4–20 points). The 25th facet, overall QOL and

general health, is not among the domains. WHOQOL-100 was registered six times, at all measuring points.

Post-traumatic Growth Inventory

The post-traumatic growth of patients was measured by the Post-Traumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 2004), a 21-item questionnaire with five sub-scales (Relating to Others, New Possibilities, Personal Strength, Spiritual Change and Appreciation of Life). The PTGI was registered once, three years after the diagnosis (T6).

Hypnotic susceptibility

Hypnotic susceptibility was measured by the Stanford Hypnotic Clinical Scale for Adults (Morgan & Hilgard, 1978) before and after chemotherapy treatment only in the case of the music and hypnosis groups.

Patients' subjective experience of interventions

Patients' subjective experience (their thoughts and feelings after each hypnosis or music session, or in the case of the special attention group, after receiving the chemotherapy infusion) was registered by research assistants via face-to-face interviews following each session (hypnosis/music/special attention). Patients were asked first a standardised question "Please tell us, in your own words, everything you have felt and experienced since listening to the hypnosis/music after receiving the chemotherapy. However, further questions to clarify patients' statements, to facilitate more detailed explanations, or to reflect on their emotions in a non-directive way was allowed. Answers were recorded and transcribed verbatim for content analysis. The lengths of the answers given varied from 5 to 2279 words, with a mean of 203.

Data analysis

Data analysis can be divided into six different sections:

1. Comparison of PICI results of breast cancer patients with a healthy control group
2. Descriptions of psychological immunity at certain phases of cancer treatment
3. Comparison of PICI results of breast cancer patients in the three groups (hypnosis/music/special attention) at each measuring point (T1-T6)
4. Effect of time in the PICI results according to the three groups (hypnosis/music/special attention)
5. Qualitative data analysis of patients' subjective experience of intervention
6. Comparing quantitative data (PICI, QOL, PTG) in the three groups to patients' subjective experience

Results

Below the most important findings of the thesis will be summarised

Comparison of PICI results of breast cancer patients with healthy control group

It seems that breast cancer patients have significantly higher psychological immunity than healthy control women, at base line as well as during the treatment period.

At baseline in 9 scales breast cancer patients scored significantly higher than healthy women: Positive thinking, sense of control, creative self-concept, change and challenge orientation, self-efficacy, social mobilizing capacity, social creating capacity, goal-orientation, irritability control. In two scales – sense of self-growth and social monitoring capacity – breast cancer patients scored significantly lower than healthy women. Psychological immune competence of breast cancer patients was more pronounced at the further measuring points. The difference was the greatest at T1, T3 and T4 between the two groups.

Sense of control, self-efficacy, social mobilizing capacity and goal-orientation remain higher in the breast cancer group throughout the study period

Descriptions of psychological immunity at certain phases of cancer treatment
In each group, as a least dominant scale, emotional control showed the lowest mean at all six measuring points. In the hypnosis group, Goal Orientation showed the highest mean throughout the study period**.** In the music group, Social Mobilizing Capacity was the highest at T1, T2, T5, T6; Creative Self-Concept at T3; and Positive Thinking at T4. In the case of the special attention group, Positive Thinking was the highest at T1, T3, T4; Creative Self-Concept at T5 and Social Mobilizing Capacity at T6.

Comparison of PICI results of breast cancer patients in the three groups (hypnosis/music/special attention) at each measuring point (T1-T6)
In general, the difference between the three groups at the six measuring points was less than expected. In cases where difference between groups were present, beneficial effect of hypnosis was detected.

Cumulative PICI
Cumulative PICI showed statistically significant differences with small effect between the groups ($F(2,91) = 4.455$, $p = .016$, $\omega^2 = .06$) after 12 weeks of chemotherapy (T2): hypnosis scored higher than music, and special attention was in between the two groups. There was no statistical difference at the other measuring points

PICI scales and subsystems
There were no statistically significant differences between the three groups at baseline (T1), at the end of chemotherapeutic treatment (T3), or at one, two or three years after the diagnosis (T4 – T6).

After 12 weeks of chemotherapy (T2) there were statistically significant differences (using Bonferroni adjusted value) between the groups on one PICI scale and one subsystem: Impulse Control ($F(2,91) = 9.061$, $p<.001$, $\omega2 = .12$), Self-Regulating Subsystem ($F(2,91) = 6.298$, $p=.003$, $\omega2 = .08$) The highest scores were in the hypnosis group.

Effect size indicated notable effect at T2 in case of change and challenge orientation ($F(2,91) = 2.739$, $p=.073$, $\omega^2 = .04$) Social Monitoring Capacity ($F(2,91) = 5.229$, $p=.008$, $\omega^2 = .08$), Problem-Solving Capacity ($F(2,91) = 3.961$, $p=.024$, $\omega^2 = .06$), Emotional Control ($F(2,91) = 4.474$, $p=.012$, $\omega^2 = .07$), Irritability Control ($F(2,91) = 2.523$, $p=.054$, $\omega^2 = .04$), Monitoring-Creating-Executing Subsystem ($F(2,91) = 3.068$, $p=.089$, $\omega^2 = .03$). At T4 Goal-Orientation ($F(2,103) = 5.629$, $p=.006$, $\omega^2 = .07$) and Impulse Control ($F(2,103) = 3.448$, $p=.038$, $\omega^2 = .03$) and at T5 in Goal-Orientation ($F2,82) = 3.973$, $p=.025$, $\omega^2 = .06$) In all these cases the scores were the highest in the hypnosis group. In the case of Change and Challenge Orientation ($F(2,82) = 3.656$, $p=.033$, $\omega^2 = .06$), at T5 the special attention group shows a higher mean compared to music, and hypnosis was in between the two groups.

Effect of time on cumulative PICI and PICI scales and subsystems depending on groups
Due to the small sample size, statistical analysis to measure the effect of time was performed T1 – T4. Data was analysed in a descriptive way T4 – T6.

In the first year after diagnosis, treatment and follow up period, (T1 – T4) Time had a statistically significant main effect in cumulative PICI ($F(3,174) = 6.403$, $p< .001$; partial $\eta^2 = .10$). In PICI subsystems, the Approach-Belief subsystem had a statistically significant Time main effect ($F(3,174) =5.986$, $p = .001$, partial $\eta^2 = .09$). In terms of PICI scales, a statistically significant main effect of Time could be detected in the case of Emotional Control ($F(3,174)$

=6,027, p = .001, partial η^2 = .09). Effect size indicated practically significant changes in time in the case of three other PICI scales: Positive Thinking, Sense of Control and Impulse Control.

Time × Group interaction in the first year after diagnosis (T1-T4) was statistically non-significant. However, effect size indicated practical significance in the Approach - Belief subsystem, in Sense of Control, Sense of Coherence, Social Monitoring Capacity, Synchronicity, and Emotional control. In almost all of these cases the score of the hypnosis group increased from T1-T3, reaching its peak at the end of the chemotherapy treatment period and falling back after chemotherapy had ended. However, it still reflected a higher level than in initial functioning. In the case of the music or special attention groups, a small increase, relative stability or even a decrease could be observed from the beginning of chemotherapy (T1) to the end (T3), and afterwards showed an increase until one year after the diagnosis (T4)

In the follow-up period, when only explorative and descriptive data analysis was performed due to the small sample in T4-T6, there was no statistically significant Time main effect or Time x Group interaction. However there was a notable effect size in Time x Group interaction in Positive Thinking (F(2,44) = 1.650, p = .179, partial η^2 = .13), Sense of Self-Growth (F(2,44) =2.214, p = .083, partial η^2 = .17), Problem-Solving Capacity (F(2,44) =4.544, p = .004, partial η2 = .29), Synchronicity (F(2,44) = 2.525, p = .054, partial η^2 = .19) and Social Creating Capacity (F(2,44) =1.823, p = .141, partial η^2 = .14). The scores of hypnosis show a small increase, whereas the scores of the music and special attention groups decreased or remained at around the same value (Vargay, Józsa, Pájer & Bányai, 2019).

Analysis of patients' subjective experience of interventions

Patients' subjective experience of the received psychological intervention (hypnosis/music/special attention) was content analysed, two types of encoding systems were developed and their reliability according to raters' agreement was tested.

Codes for the Characteristics of Involvement (CI)

These categories reflect a certain intensity of involvement in the available support and patients' intrapsychic work (Table 1).

Table 1.: Characteristics of Involvement codes

Code	Example
Somatic complaints	"All in all, these two hours seemed extremely long. I have nothing good to say about it. Someone started to dry heave, which had a really bad effect on me, now I feel sick too."
Internal or external disturbances	"Noises from outside distracted me."
Pleasant somatic experiences	"It was a pleasant, gratifying, relaxing experience."
Non-verbal sensory experiences	"First, I felt the waves, the waves of the words, later I felt like I was levitating". "Like light phenomena. Vibrating star-like shapes, I cannot tell you exactly when… but when you talked about healing. So, it was interesting that I saw it as a shining star."
Positive personal memories	"I saw my goddaughter with her two little girls walking down the street like organ-pipes, and I thought it was not so long ago when I had her in my arms, and now she has two girls, and it was so good to see them walking down the hill."
Negative personal memories	"I lost this little farmhouse, I picture this very often (during hypnosis). This is a heartache for me that I can't make up for now, and it doesn't look like anything in my life would do it"
Visualization of symbols	"I heard the soft music, I imagined myself at the seaside, and it was a pleasant feeling." "I could imagine the balloons, I looked at the sky, and there I saw loads of them, flying colourfully, and I let them fly."

Elaboration of symbols	"I believe it started with a waltz, and then I felt that all my cells suddenly started to dance, and they [the cells] were happy for that thing [chemotherapy] that entered me, and that would help them" "And when I heard that they were killing the cancer cells, strangely I became one of the white blood cells, and I was running around in a vein, and the others came after me, like soldiers, to kill the cancer cells."

The two independent raters identified a total of 3408 codes, of which 2930 were matching, resulting in 96.2% agreement between the coders.

The most dominant code in all three groups was pleasant somatic experience, followed by visualization of symbols in the hypnosis group, and by somatic complaints both in the music group and in the special attention group (Table 2).

Table 2: The Distribution of CI codes

	Hypnosis		Music		Special Attention		Total
	codes (n)	%	codes (n)	%	codes (n)	%	codes (n)
1 Somatic complaints	243	18	294	25,1	158	38,5	695
2 Internal /external disturbances	164	12,2	204	17,4	41	10	409
3 Pleasant somatic experiences	369	27,4	453	38,6	191	46,6	1013
4 Non-verbal sensory experiences	51	3,8	37	3,2	0	0	88
5 a Positive personal memories	109	8,1	38	3,2	1	0,2	148
5 b Negative personal memories	5	0,4	4	0,3	1	0,2	10
6 Visualization of symbols	331	24,6	120	10,2	18	4,4	469
7 Elaboration of symbols	75	5,6	23	2	0	0	98
Total	1347	100	1173	100	410	100	2930

Codes for Intensity of Involvement (II)

After the first set of ratings was completed according to CI, a need for a more general category system became apparent. It was found that at times, behind more intense categories, there was a less intense involvement or vice versa. Therefore, two subcategories were created. Based on evaluating an experience, codes were assigned high or low levels of intensity**.**

> *Low intensity involvement:* The patient appears not to be involved in the process or shows signs of resistance. Does not report subjective experiences and demonstrates no sign of intrapsychic work.
>
> *High intensity involvement:* The patient achieves a relaxed state, with optimal signs of an altered state of consciousness (e.g., sensory hallucinations) or the patient is involved in the process, discovering content with personal significance or symbolic meaning. There is clear evidence of intrapsychic work.

Strong agreement was found between the raters. (Cohen's Kappa = .951 ($p < .001$)).

The special attention group reported low intensity (93.2%). In the hypnosis group, high-intensity involvement (61.9%) appeared more frequently, whereas in the music group low intensity was more dominant (69.3%). The association between the groups (hypnosis vs. music) and the involvement (low vs. high) was statistically significant ($\chi^2(2) = 299.763$, $p < .001$, Cramer's V = .44) (Vargay, Kaló, Zsigmond, Józsa, Thurzó, Kóber& Bányai 2018)

Comparison of PICI, WHOQOL-100, and PTGI in groups based on interventions (hypnosis/music) and intensity of involvement (high/low)

Patients' data was compared not only according to intervention (hypnosis/music) but to involvement (high/low). To avoid bias resulting from the special attention group's generally low involvement, their data was excluded from further analysis. Cumulative PICI T1 – T4 were statistically significantly higher in the high involvement group (Figure 1).

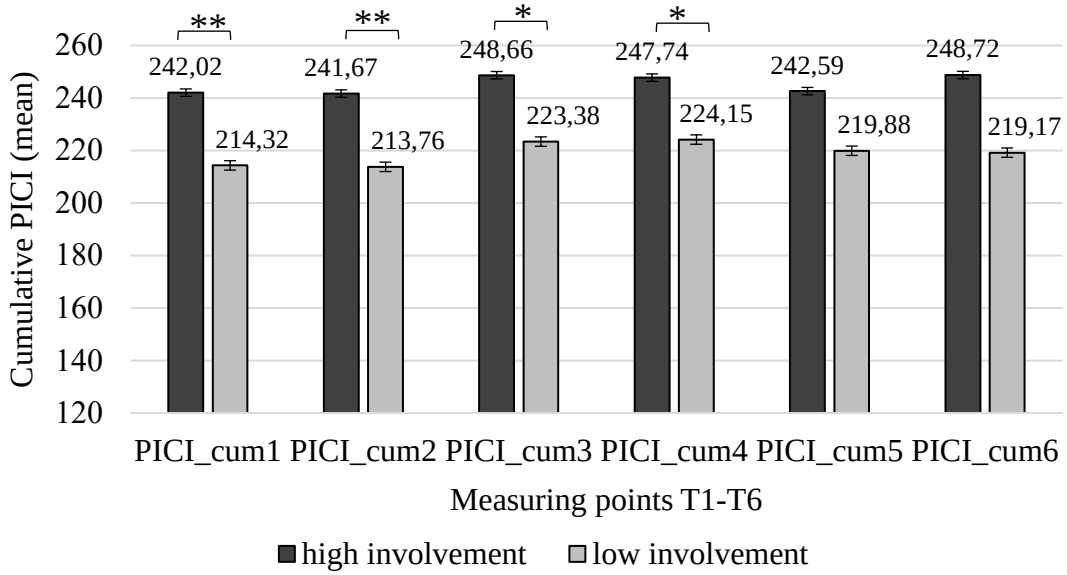

Figure 1.: Comparing cumulative PICIs in the high/low involvement groups (* p < .050, ** p < .010; error bar: standard error)

Furthermore, in PICI scales and subsystems: T1 – T6 several scales and subsystems were significantly higher (p<.003 Bonferroni adjusted value or Hedges'g ≥.5) in the high involvement group compared to low involvement.

The same tendency was observable in the case of WHOQOL-100: almost no difference between hypnosis/music group, but the high involvement group scored significantly higher (p<.008 or Hedges'g ≥.5) on several domains T1-T6; the greatest difference was in physical health, psychological domain, and level of independence.

PTGI reflected the same tendency as well: there was no significant difference between the music and hypnosis groups, but the high involvement group scored significantly higher in every factor.

Group membership was predicted in two models. Model 1 was significant ($\chi^2(1)$ = 9.243, p = .002): PICI at T1explained 18.6% (Nagelkerke R^2) of the variance in group membership. Model 2 was significant ($\chi^2(3)$ = 15.502, p = .001): WHOQOL-100 (physical health, psychological domain, level of independence at baseline) at (T1) explained 28.9% (Nagelkerke R^2) of the variance in group membership, but only the psychological domain was a significant predictor in this model (Vargay, Józsa, Lékó, Zsigmond, & Bányai, 2019).

Discussion

The thesis aimed to reveal the characteristics and changes in the integrated cognitive, motivational, and behavioural personality dimensions of psychological immune competence

throughout the treatment and early survivorship of breast cancer of patients who received psychological intervention (hypnosis/music/special attention). Patients' results were compared to healthy controls, and the effects of time and intervention was followed. Patients subjective experience of the received interventions and its relation to psychological immune competence, quality of life, and posttraumatic growth was analyzed. Patients were compared not only according to the type of interventions (hypnosis/music) that they received, but also according to their involvement in these interventions (low/high). In our understanding, the thesis is unique in investigating psychological immune competence in the case of a homogeneous group of breast cancer patients who received standardized chemotherapeutic treatment and psychological intervention with a longitudinal design. In addition, the strength of the dissertation is that it takes into account the subjective experiences of patients, regarding the intervention, when analyzing their psychological outcomes.

Since there are very few available published data on coping mechanisms, especially on the psychological immune competence of Hungarian cancer patients, the PICI results of breast cancer patients were first compared to healthy Hungarian women. In general, breast cancer patients reported higher psychological immune competence than healthy women. This contradicts previous findings (Oláh 2005b) where cancer patients were found to have significantly lower psychological immunity. One possible explanation is that between the two studies at least 15 years passed. There has been a great change in Hungary in the status of cancer and its treatment, with new and more effective or alternative treatments and also psychosocial help. These results might reflect a shift in patients' attitudes. Another explanation is that the patients in our sample, even in the special attention group, were open to receiving psychological help, even if it was just an extra attention. It is possible that their psychological immunity differs from those who refuse help entirely.

The lowest scale in all intervention groups throughout the treatment and follow up period was Emotional Control, which is consistent with healthy Hungarian women. In the hypnosis group, Goal Orientation was the strongest component of psychological immune competence throughout the study period. Goal-orientation allows the continuation of a task or decided behaviour even when facing difficulties or obstacles (Oláh, 2005a). It might be the inherent nature of this group or the effect of direct suggestions which maintain its strength. The highest scales in the music group (positive thinking, social mobilising capacity and creative self-concept) and in the special attention group (positive thinking, goal orientation, social mobilising capacity and creative self-concept) reflected a greater variability, which suggests a greater coping flexibility (Cheng et al., 2014).

The greatest difference between the three groups was during chemotherapy treatment (T2), after 12 weeks of AC treatment. AC is a highly emetogenic treatment and is hard to endure, due to its severe side-effects. The benefits of hypnosis seem to unfold during this period, and it is reflected most markedly in the *Cumulative PICI results*, in the *Self-Regulating Subsystem and in Irritability Control*. Hypnosis seems to regulate patients' emotional states to create an ideal emotional atmosphere for carrying out realistic and logical actions. These control functions help to stabilize an emotional environment for effective coping and optimal functioning. In this sense it has the same effect as the engagement of emotional regulation strategies, which can be connected to well-being and positive emotions, and to better quality of life for cancer patients (Conley, Bishop & Andersen, 2016).

Generally, psychological immunity tends to increase from the beginning of chemotherapy until one year after diagnosis, irrespective of the intervention. In the following two years this type of increase seems to reach a plateau and does not grow significantly further. It seems that during chemotherapy treatment, and also in the follow up period hypnosis might had further protective

functions. However, it has to be kept in mind that results from the last two years of the follow-up period are descriptive in nature, due to the small sample size. These results show very similar tendencies to posttraumatic growth (PTG): it could be evinced in the early onset of the breast cancer trajectory (4-6 month after diagnosis) (Manne et al., 2004; Silva et al., 2012), but personal growth reached a plateau around at end of treatment, and functioned accordingly in early survivorship, signalling that re-shaped self-concept remains stable even after stressors – arising from the disease – diminish (Scrignaro et al., 2011; Silva et al., 2012).

Patients' subjective experiences of the provided intervention (hypnosis, music, or special attention) were content analysed, and two types of category systems were developed. To our knowledge, this is the first study analysing in such detail spontaneous reports which are registered immediately following these types of interventions in case of a homogeneous group of breast cancer patients. The outstanding advantage of this method is that it unfolds unique experience of the patients due to intervention without predefined questions and guidance. Having a pleasant somatic experience (being relaxed, calm, free of stress) during chemotherapy was the most dominant response in all three types of interventions. The most important merits of this study was that all three types of interventions could outweigh the side effects of chemotherapy, and that treatment time could be referred to as a pleasant somatic experience. It seems that hypnosis triggered the most extended subjective experiences by evoking contents with personal significance and symbolic meaning, referred to as deeper intrapsychic involvement.

As patients became involved in the provided psychological interventions to different degrees, the question arose whether those who had deep immersion in the given suggestions and reported subjective experience according to it, would have better outcome on psychological measures than those who felt unaffected by it. Besides the received intervention (hypnosis/music) patients were therefore also compared according to their involvement in the received psychological interventions (low/high). In general, our results suggest that those patients who were characterised by high involvement show higher psychological immune competence, better quality of life and greater posttraumatic growth. It seems that they differ in baseline characteristics as well. Furthermore, based on psychological immune competence and quality of life before chemotherapy started, level of involvement could be predicted. Our study shows similar results to those studies that used patients' subjective experience (e. g.: imagery vividness) in interpreting interventional results and clinical outcomes measures with cancer patients (Eremin et al., 2009; Kwekkeboom, Hau, et al., 2008; Kwekkeboom et al., 2003, 2018; Kwekkeboom, Wanta, et al., 2008; Walker et al., 1999)

According to this, an association seems to be present between psychological immunity, quality of life, posttraumatic growth, type of intervention, and personal involvement throughout cancer treatment. Patients' baseline characteristics such as higher psychological immunity and higher quality of psychological aspects of life (QOL, psychological domain) at baseline predicted a greater involvement in psychological intervention, and thus a deeper intrapsychic work. This type of higher involvement seems to have a protective effect in preserving a higher psychological immunity, a better quality of life, and in the long run a greater sense of personal growth. Hypnosis as an intervention seems to generate higher involvement than music or special attention and, in this sense, might generate a protective effect for those who show lower psychological immunity and quality of life.

Limitations

In the followings the most important limitations of the thesis is identified.

Methodologically, the most serious limitation of the study is that we did not have a control group of patients who received only standard medical care. The reason for this is that the Hungarian oncology service still lacks a psychological screening protocol involving every patient who receives treatment. This means that the questionnaires we used in this research could not be administered to patients who were not invited to the study and received only the standard medical care. For ethical reasons, after inviting patients to a study comparing the effect of different interventions, we did not want a group who felt rejected by not receving any psychological help. That is why patients were not randomised to a standard medical care group.

Several important psychological factors could affect coping capacity and psychological immunity, the most important being perhaps perceived social support, dispositional coping resources like optimism, and perceived level of distress experienced during cancer treatment. In a further study, these factors could provide a better understanding of relationships, as well as mediating and moderating effects. Although we gathered indispensable information through content analysis of subjective experiences, it is nonetheless a laborious technique. Further research should find a simpler technique for analysing experiences.

A further problem is the relatively small sample size, especially in the follow up period, which hindered us in the application of certain statistical tests.

Clinical significance

The most important clinical significance of the dissertation is to draw attention to the beneficial effects of pre-recorded hypnosis or music medicine on the adaptation processes of breast cancer patients' in terms of psychological immunity, quality of life and personal growth. The advantage of these methods is that they can reach high number of patients with low human investment. It is easily applicable by the medical staff without requiring extra time. In general, it can be easily adopted in an average oncology service.

It also draws attention to the influence of initial psychological factors (psychological immune competence, quality of life) that play a role in making such standard interventions beneficial or not to an individual patient. It seems that for a group of breast cancer patients, baseline characteristics allow them to mobilize hidden resources and become involved in psychological interventions, that might protect them from stressors in the cancer trajectory, which generally result in better psychological outcomes. However, for a smaller group of patients where baseline resources seem to be weaker, such unified interventions would not achieve the same optimal outcome, and an additional intervention (e.g. coping skills training) or a personalized therapy would be indispensable. Consequently, screening for initial psychological immunity and quality of life can help in planning a suitable intervention.

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