Doctoral (PhD) dissertation

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

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1 Introduction

1.1 Personal introduction

As a student, the role of psychology on somatic medicine interested me the most. This is how I joined Éva Bányai and her research group and got in touch with psycho-oncology research. According to Riskó (2015), psycho-oncology focuses on the burden, specificities and overall care of patients coping with cancer, of their caregivers, and the healing medical team. It deals with the role of psychological and behavioural factors in the emergence and survival of the diseases. Psycho-oncology extends its activities to targeted research, the introduction of onco-psychological interventions, and psychosocial prevention. Psychiatrists and psychologists are working in the field of oncology in Hungary since the 1960s. The first Hungarian psycho-oncology department was organized by Sándor Eckhardt in 1988 at the National Institute of Oncology. Since then, onco-psychology has become more widespread in the country and more and more psychological help is available for patients and their caregivers.

In my MA thesis, we interviewed cancer patients and tried to explore how certain areas of their lives were affected by the disease. This research was a prelude to the present study.

As a clinician, I worked at different fields of oncology: in hospice home care, in paediatric oncology and with young adults preparing for limb amputation due to cancer. I have experienced the need for flexibility in this area, how much skills and knowledge of different types of intervention techniques are required to tailor individual needs. According to the level of my trainings I acquired different relaxation and imagery techniques both in hospice care, in paediatric oncology and for cancer patients preparing for amputation. In many cases, I have encountered the beneficial effects of these methods and the positive personal experience for the patients. They experienced greater control and Self-Efficacy, the way how they cope with the disease, changed. They became more committed in their own healing. The positive experiences gained during the occasions deepened the therapeutic relationship. The experiences of relaxation and imagery have often become the starting point for a change in the patient's life and personal growth. In many cases, such as post-operative pain or procedural pain, it was the only solution. These personal experiences have inspired my research interests.

Following my personal interest, my thesis topic became two-fold. Firstly, I became interested in integrated personal competencies, so-called psychological immunity (Oláh, 2005a, 2005b) which can underlie the processes of coping and successful adjustment to the experience of cancer. Secondly, I was interested in the nature and characteristics of cancer patients' personal experience of psychological interventions that take advantage of altered state of consciousness (such as hypnosis). I wanted to explore the different contents and their impact on the process of intervention. Furthermore, I wanted to explore how these subjective experiences are related to coping efforts

1.2 Introduction to the dissertation

Following my research interest, I joined a still ongoing randomized, controlled, longitudinal, prospective study, entitled PSYCHOLOGICAL RESOURCES AND HEALING led by my consultant Éva Bányai. The research is aimed 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. As a PhD student I took part in the development of research design from 2009 and in the actual research project that started in 2011. In this study, three groups of patients were examined: the first group received pre-recorded series of hypnotic suggestions, the second group listened to series of classical music, and for ethical consideration a control group got no special intervetions but received the same amount of special attention above standard medical care, as the two intervention groups. Interventions took place during 24 weeks of standardised (AC+PAC) chemotherapy sessions and while waiting for blood test results. After each session, patients were inquired about their subjective experience of the received intervention. Treatment and follow up period consisted of three years in total, while several physiological and psychological measures were administered. The scope of the present study is the psychological immune competence measured six times (before, during and after chemotherapy treatment and one, two and three years after diagnosis) by Psychological Immune Competence Inventory (PICI) (Oláh, 2005a, 2005b). Other relevant measures were WHOQOL100 testing patients' quality of life (at the same times when PICI was administered) and Post Traumatic Growth Inventory was administered at the end of the study period, three years after diagnosis.

My task in the research team was initially to accompany patients in all three three groups (hypnosis, music, special attention) in the National Institute of Oncology during chemotherapy treatments and blood controls. This task in practice meant administering the emotional and physical visual well-being scales to patients, and to register an explanation for their choice in more detail before each chemotherapy treatment or blood test, and to record subjective experiences afterwards. Furthermore, my task was to process and analyse the data of the Psychological Immune Competence Inventory (PICI) collected in the study and to perform content analysis on patients' subjective experiences of the received intervention.

The present study can be divided to three interrelated sub-themes. The first part of my thesis deals with the nature of the psychological immune competence of breast cancer patients: how do they relate to the psychological immune competence of healthy women, how psychological immune competence changes in the study period according to intervention groups, how it is affected by intervention and how it changes over time. In the second part, as an exploratory analysis, I examine the emerging themes in patients' subjective experience of psychological interventions (hypnosis/music/special attention) they received during chemotherapy treatment. These experiences reflect a degree of involvement in the received interventions. In the final part of my thesis, I explore how involvement relates to psychological outcomes such as psychological immunity, quality of life and posttraumatic growth. The main findings of my thesis are summarised in the following articles and prepared maniscript: Vargay (2012); Vargay et al., (2018); Vargay, Józsa, Pájer, & Bányai (2019); Vargay, Józsa, Lékó, Zsigmond, & Bányai (prepared manuscript).

2 Theoretical Background

2.1 Breast cancer

Cancer is the second leading cause of mortality and the main cause of long-term morbidity worldwide. Breast cancer is by far the most frequently diagnosed oncological disease among women. 25% of all female cancer cases were diagnosed as breast cancer. (Ferlay et al., 2015). It is also one of the most commonly examined cancer types in psychosocial oncology research (Rowland & Massie, 2010). Breast cancer diagnosis, besides causing

considerable distress resulting in fear as well as emotional work, can further challenge a woman's identity, self-esteem, body image and relationships (Campbell-Enns & Woodgate, 2015). Since different cancer types have their specific features, the following sections will focus on oncopsychological issues connected to breast cancer.

2.1.1 Prevalence and medical aspects of breast cancer

According to the WHO (2018) breast cancer impacts 2.1 million women each year and caused the death of an estimated 627,000 women in 2018, which represents approximately 15% of overall cancer death in women. It is also considered the primary overall cause of death of women between the age of 40-79 (WHO, 2018). In Hungary breast cancer is likewise the most common neoplasm among women, with 5000-6000 new cases each year and 2000 resultant deaths, which accounts for 14 percent of overall cancer death in women according to the WHO cancer mortality profile in Hungary. The average risk of breast cancer in Hungarian women is 8-10 percent. The incidence rate increased by 20% from 2007 to 2016, but mortality rates show a slight downward tendency in the same period due to early detection and improvements in treatment (Kásler, Ottó, & Kenessey, 2017). Breast cancer is a particularly serious public health problem and places major burdens on the health system and on society.

The treatment of breast cancer in Hungary is presently guided by the latest ESMO (Senkus et al., 2015), NCCN (NCCN, 2015), ABC2 (Cardoso et al., 2014), St. Gallen's Consensus Guideline. Breast cancer therapy in general consists of combined local (surgery or radiotherapy) and systemic therapy (endocrine or chemotherapy) In the local treatment of breast cancer one option is conservation surgery (where the neoplasm and the surrounding tissues are removed) which is usually accompanied by radiation therapy, or another and more radical option, is mastectomy (the complete removal of breast) which can take place with or without reconstruction. Adjuvant (post-surgery) and neo-adjuvant (pre surgery) treatment consists of chemotherapy, endocrine therapy and targeted therapy depending on hormonal status with the common acute and long term side-effects including nausea and vomiting, neuropathy, fatigue, alopecia, changes in cognitive function, sleep alteration, sexual disorders, and premature menopause (Horváth et al., 2016; Knobf, 2015).

2.2 Psychological distress, anxiety and depression in cancer

2.2.1 Psychosocial aspects of breast cancer

Alongside the increased survival rates there are worldwide improvements in meeting patient's psychosocial needs: new advances have been made in understanding the biology behind cancer, diagnosis has become more precise, involving less painful procedures, magnetic resonance imaging (MRI) is used more frequently, and patients have become more informed and involved in treatment decision-making. Improvements have also been made in primary and adjuvant therapies, which affect quality of life during the treatment period and survivorship: progress have been made in reconstructive surgery, targeted therapies for specific genetic alterations have become available, and neo-adjuvant therapies have been given a greater role among treatment options (Knobf, 2015). Patient experience has become an important indicator of person-centred quality care. Patient-Reported Outcomes (PRO) such as perceived pain level, quality of life, mood, distress, and symptom burden give a direct measurement of patients experience without any interpretation or amendment by clinicians. PRO has become a secondary – sometimes even primary – outcome of clinical trials over recent decades, with a growing effort to implement it in everyday clinical practice influencing the acceptance of certain treatments (LeBlanc & Abernethy, 2017). Psychosocial interventions have become part of general care, with early screening for psychological morbidity and vulnerability, implementing evidence-based interventions as a result. All these improvements influence the complexity of the experience that affects breast cancer patients' psychosocial adjustment to cancer diagnosis and treatment.

Although the majority of patients adapt relatively well over time (Carlson, Waller, Groff, Giese-Davis, & Bultz, 2013), breast cancer continues to be distressing, impacting on patients' quality of life, social relations, financial resources, and on their physical, emotional and social wellbeing. Patients demonstrate a varying ability to cope with the upcoming stressors. According to Knobf (2011, 2015) risk factors that influence coping and in turn psychological outcomes and quality of life in newly diagnosed breast cancer patients are: younger age, pre-existing psychological morbidity, comorbid illness, poorly controlled physical symptoms, past history of mood disorders, greater level of pre-existing distress, communication skills, low levels of social and emotional and family support, lower level of education.

2.3 Psychological distress, anxiety and depression in cancer

2.3.1 Correlates of distress, anxiety and depression in cancer

Besides the social, financial, and functional burdens and negative consequences of cancer, patients most often have to deal with great emotional distress caused by the disease. The National Comprehensive Cancer Network defines this distress as "a multifactorial, unpleasant emotional experience of a psychological (cognitive, behavioural, emotional) social, and/or spiritual nature that may interfere with the ability to cope effectively with cancer, its physical symptoms and its treatment. Distress extends along a continuum, ranging from common normal feelings of vulnerability, sadness, and fear, to problems that can become disabling, such as depression, anxiety, panic, social isolation, and existential and spiritual crisis" (National Comprehensive Cancer Network, 2011, available online). Psychological distress has been added as the 6th vital sign that should be monitored in patients (Bultz & Johansen, 2011) Studies indicate a prevalence of distress symptoms to be above 30% in cancer patients (Jacobsen, 2007). Emotional distress is associated with reduced quality of life, limited daily functioning and decreased adjuvant treatment compliance (Temple, Salmon, Tudur-Smith, Huntley, & Fisher, 2018) It affects social relations especially with the primary caregiver (Schmid-Buchi, van den Borne, Dassen, & Halfens, 2011).

Moderate to high levels of distress and anxiety seem to be evident following the cancer diagnosis. The negative impact of breast cancer on distress levels is strongest at the initial phase of the disease. The same is true for anxiety: more than half of women show clinical levels of anxiety during their hospital stay (Schwarz et al., 2008). Subsequent to the diagnosis, anxiety levels generally fall from almost 50% of women with clinical levels of anxiety to 20% (Silva, Crespo, & Canavarro, 2012) reflecting a process of adaptation, however it still remains higher than in the general population (Schwarz et al., 2008). This pattern might not be true for all patients. It seems that anxiety and distress level in the cancer trajectory may vary personally. Transitional periods such as the completion of the medical treatment and readjustment to life (re-entry period) are also characterised by elevated distress compared to healthy population (Beauregard, 2014; Miller, Merry, & Miller, 2008; Saboonchi, Petersson, Wennman-Larsen, Alexanderson & Vaez, 2015; Schwarz et al., 2008). Mental health disorders requiring treatment are also more prevalent (31%) among acute cancer patients (Singer, Das-Munshi & Brahler, 2010) The prevalence of depression in adults with cancer according to the meta-analysis of J. Walker

et al. (2013) is again high, ranging from 5% to 16% among outpatients, from 4% to 14% among inpatients, and 7% to 49% of those in palliative care. In a recent study, one Hungarian sample discovered medium or high levels of anxiety in 45.8% of cases, 18.4% of medium level- and 13.3% of high level depression (Rohánszky, Katonai & Konkoly Thege, 2014).

2.3.2 Distress trajectory in cancer

How well a woman can deal with the effects of the cancer trajectory depends both on her level of psychological distress and on her ability to adjust to it. Patients show different patterns of distress and adjustment over time. On the basis of Bonanno's model of psychological response to traumatic events (Bonanno, 2004) the trajectory of psychological distress in women with breast cancer was sought and identified by several authors (Deshields, Tibbs, Fan & Taylor, 2006; Helgeson, Snyder & Seltman, 2004; Millar, Purushotham, McLatchie, George & Murray, 2005). Henselmans, Helgeson, et al. (2010) identified and tested four types of trajectories over time, in this study assessment was linked to key elements of the cancer trajectory, not only to time from diagnosis. According to their findings (1) approximately one third of patients, despite stressful events, show resilience or no distress at all, (2) another third of patients show an initial high-level distress that gradually falls, and patients recover shortly thereafter, (3) 15% show a delayed response of distress (most usually at re-entry period after the active treatment ends). In this group a moderate level of initial distress seems to be present as well. (4) 15% shows a chronic state of distress. Optimism, mastery and neuroticism seem to be predictors of these trajectories. Patients in the chronic distress trajectory had lower optimism and mastery, but high neuroticism. Moreover, mastery seems to predict trajectory membership. Distress trajectories can predict long term outcomes such as longer-term psychological distress, cancer-related distress, and social adjustment (Lam, Shing, Bonanno, Mancini & Fielding, 2012). It should be noted that studies are inconsistent in the number of distress trajectories. More recently five (Bidstrup et al., 2015) and two trajectories (low level of distress that decreased over time (80%), and consistently high distress (20%) and several other predictors such as age, level of depression and level of pain were found. Several different trajectories can also be measured separately for anxiety and depression, but that is beyond the scope of this study (Bidstrup et al., 2015). However, all of them agree that there is a small percentage of patients who experience constant, chronic distress.

2.4 Phases of cancer treatment and survivorship and their psychosocial impacts

The most burdensome period of the cancer continuum is the period of active treatment, that is, diagnosis and subsequent therapies: surgery, chemotherapy, radiotherapy. It is characterised by an existential crisis: fear of death, fear of pain, uncertainty in financial questions, changed daily routine, increased level of distress, changes in body image, female identity, changes in meaningful activity and social networks, as well as by a focused energy for survival (Landmark & Wahl 2002). Emotional reaction to diagnosis can be divided into three phases: the first phase includes doubt, denial, despair, and often a narrowed focus of attention. In the second phase, mood disturbance begins to appear alongside with anxiety, sleep disturbance and eating disorders, often accompanied by anger and with the question "why me?". In the third phase, diagnosis becomes accepted, and personality resources are gathered to fight the disease. Certain mechanisms like avoidance, denial, regression, rationalization seems to be effective in this period to adapt to a trauma that seems unbearable (Rohánszky, 2014).

The beginning of the actual cancer therapy can be characterised by high anxiety and fear from the side effects and suffering. A common attitude towards chemotherapy is that it is a "poison". Major changes in body image occur in this period. The social network becomes overloaded. Providing adequate information according to patients' needs seems to be indispensable in this period (Rohánszky, 2014).

The so-called re-entry period starts when the major cancer treatment ends, and it can last for several month, even more than a year depending on the long-term severity of treatment and other contextual factors. It is the psychosocial transition from "cancer patient" to a "person with history of cancer". Contrary to an expectation of fast recovery, patients often face the loss of the safety net provided by the health care system, an alteration of daily routine and former roles, and a decline in social support. This can cause considerable distress. Re-entry period can be more challenging if the cancer experience influence core beliefs activities and social relationships. Being young also represents a risk factor (eg.: starting a family and building a career can be at risk, while changes to fertility can be a long-term side-effect of the treatment). This period is also characterised by finding benefits and new goals (Stanton, Rowland, & Ganz 2015).

Early survivorship is several months to approximately five years after diagnosis. By this time treatment-related physical morbidities and the cancer experience have mostly been

resolved psychologically. Physical and psychological problems may arise periodically, however, and routine surveillance and medical check-ups can evoke fear of recurrence (Stanton, Rowland, & Ganz 2015).

Long-term survivorship starts approximately five years after the diagnosis, when standard health-related quality of life returns. Although medically five years post diagnosis indicate the end of period when relapse can most probably occur, it means neither psychologically nor physically that the recovery is complete. For example, treatment toxicities can have a long-term effect. By this time, according to studies, 84% return to work. In the long run, symptoms such as anxiety, fear of cancer recurrence, depressive symptoms, fatigue and cognitive impairment as a side effect of treatment, pain and sexual dysfunction can subsist (Stanton, Rowland, & Ganz 2015).

According to Braybrooke et al. (2014) in the first five years of their survivorship, breast cancer patients reported a sufficient support from their family members and close friends, with half of them reporting a closer relationship then before the treatment. Although patients reported positive attitude from colleagues, returning to work is hindered by disease related health problems. more than half of patients choose part-time jobs.

2.5 Positive functioning in cancer

Positive psychology is a new approach which, in the case of patients with chronic disease, focuses on patients' positive resources, seeking to help patients overcome and transform negative life events, and continue optimal functioning while maintaining personal wellbeing through the development of personal strengths, principles and virtues (Duckworth, Steen & Seligman, 2005). There is a growing interest in recent psychosocial cancer care towards identifying protective factors that empower individuals to deal with distress, anxiety, depression and other difficulties caused by diagnoses and treatments. Recent literature has turned towards conditions and processes that contribute to patients' positive psychological functioning, i.e. focusing on assessing positive resources, strengths, personal meanings and optimal functioning. A wide range of constructs are associated with positive psychological functioning and cancer related health outcomes. Optimal functioning in breast cancer is associated with dispositional characteristics like hope, optimism or resilience, and with positive subjective states like wellbeing and happiness, and with positive life changes like post-traumatic growth, and the discovery

of meaning and benefit (Casellas-Grau, Vives, Font & Ochoa, 2016). Although positive functioning in cancer comprises a wide range of personal capacities, the present study focuses on the coping strategies, coping styles and correlates of successful coping with cancer.

2.5.1 Adjustment to cancer

With increases in long-term survivorship, with people living longer with the consequences of cancer and with the conceptualization of cancer as a chronic rather than a terminal disease, it has become important to address and identify factors that can facilitate successful adjustment to cancer. The historically addressed areas to measure the level of adjustment are anxiety, depression and psychological distress. More recent research includes various other domains of functionality like quality of life, cognitive, emotional, behavioural and psychological factors of wellbeing (Dekker & de Groot, 2018). These factors are usually the outcome measured when examining adjustment to cancer. Adjustment is referred to as a dynamic process of change, rather than an endpoint. This means that adaptation is influenced by personal characteristics, by the problems requiring adaptation over the course of the disease, and also by contextual factors (Brennan, 2001). There is wide range of factors behind the individual differences in adjustment, usually grouped according to sociodemographic, disease-related or medical, as well as psychosocial factors (Brandão, Schulz & Matos, 2017; Shapiro, McCue, Heyman, Dey & Haller, 2010). Psychosocial variables incorporate psychological functioning (anxiety, depression, psychological well-being), different personality traits (optimism, trait-anxiety, neuroticism, pessimism, hope, etc.), level of social support (overall support, support from a close relationship), cognitive or perceptual factors (perceived control, Self-Efficacy, intrusion, Sense of Coherence, helplessness/hopelessness, appraisal, illness perception etc.), and body image (perceived body image, appearance satisfaction, self-consciousness, attractiveness) and coping strategies. Coping strategies are traditionally dichotomised as being either effective (such as positive reappraisal, problem-solving, humour, etc.) or less effective (such as behavioural disengagement, self-blame, avoidance, repression, passive coping, resignation, and cancer-related rumination or anxious preoccupation). Effective coping strategies are generally associated with better psychosocial outcomes such as improved quality of life and fewer psychological problems, whereas less effective coping strategies can predict negative psychosocial outcomes such as higher levels of psychological

distress and more depressive symptoms (Brandão et al., 2017; Shapiro et al., 2010). However, whether a coping strategy eventually becomes effective depends on several factors, including the characteristics of the stressor (e.g. duration and predictability) and the characteristics of the person undergoing the stressor (e.g. personality traits, level of personal control, perceived competence, level of social support etc) (Lazarus & Folkman, 1984).

2.5.2 Coping in the context of chronic illness

The most frequently used theoretical framework in connection to coping with chronic conditions is the 'Transactional Model of Stress and Coping' where coping is defined as an emotional, cognitive behavioural effort to manage, reduce and tolerate internal or external stressors and their potential impact, and to handle demands that go beyond a person's perceived resources (Lazarus, 1993; Lazarus & Folkman, 1984). According to Lazarus (1993 p.8.) "coping is process – a person's ongoing efforts in thought and action to manage specific demands appraised as taxing or overwhelming. Although stable coping styles do exist and are important, coping is highly contextual, since to be effective it must change over time and across different stressful conditions". Coping is considered a (mostly) conscious process determined by (a) the appraisal of the demands of the specific situation and (b) a person's perceived resources. In this model, coping is traditionally divided into two broad categories: (1) problem-focused coping that combines direct action to resolve the problem with planning to alter the source of stress. It includes actions such as active coping, planning and suppression of competing activities. In contrast (2) emotionally focused coping regulates, reduces or manages emotional responses to stressors, and includes actions like wishful thinking, positive reinterpretation, acceptance and turning to religion, (Carver, Scheier & Weintraub, 1989). More recent literature includes a third coping method: avoidance-orientated coping, which is an effort to disengage from the stressful situation (Endler & Parker, 1990a). In line with Lazarus (1993), people use most of the basic coping strategies in all stressful situations, however there are specific coping solutions for specific stressors. For example, Emotional Control is more frequent in loss or mourning, and in situations interpreted as more of a challenge, problem- focused coping and confrontation are more frequent (Oláh, 2005 a).

Another model used in the context of chronic illness is the Cognitive Activation Theory of Stress, which proposes that perceived stressors are evaluated in line with former experiences of ability to handle stress. Positive experiences of perceived stress reduction result in positive coping expectations, which in turn are more likely to result in dealing with the stressor with a positive coping strategy that allows one to modify stress, and to adopt to the situation. This results in positive outcomes such as greater wellbeing and personal development. In contrast, former negative experience of handling stress, and the belief in having limited resources, can lead to the discontinuation of positive coping and less successful reactions will be performed, confirming stress, hopelessness and helplessness (Ursin & Eriksen, 2004).

The Social-Cognitive Transition model (Brennan, 2001) is based on adjustment to cancer, and considers the process of adjustment an ongoing process of learning, where the success of adjustment depends on the interaction of coping responses, social support, and cognitive appraisal of the stressors of the disease.

Research on coping with chronic conditions such as cancer investigates the interactive relationship between the different strategies and the underlying personality traits and situational determinants that influence the success of coping. Coping can accordingly be regarded as a hierarchical construct. On the macroanalytic level, coping is considered a dispositional personality tendency (i.e. monitoring-blunting, engagement-disengagement). In the intermediate level coping is evaluated according to discrete strategies and unified classes of coping behaviour (e.g. seeking social support, problem solving, direct action). In the lowest microanalytic level, coping is evaluated according to the actual observable behaviour (e.g. focusing on work to divert attention on stressful emotions, talking to someone about feelings) (Livneh, 2000; Livneh, Wilson, Duchesneau & Antonak, 2001).

Livneh (2000) summarises the findings of the research on coping with chronic illness and disabilities in the following statements: (1) a great variety of coping efforts are employed to manage the distress which accompanies their condition, (2) various demands in a course of a disease require different coping strategies, (3) neither form of the dichotomised strategies (i.e. problem-solving and emotional-focused coping, engagement- disengagement coping) are adaptive or maladaptive, successful coping depends rather on the flexibility to change strategies over time and across different

distressing situations (4)) coping efforts can have a direct as well as a mediating role, or can be an outcome variable.

2.5.3 The hierarchic model of coping with breast cancer

Research on coping with breast cancer is rather extensive and includes different ways to conceptualise and measure it. Kvillemo & Bränström (2014) in their meta-analysis – in order to specify the characteristics of coping with breast cancer and to resolve the difficulties in the classification of coping in this field – proposed a comprehensive coping hierarchy model that summarise coping skills and strategies examined in the case of breast cancer patients. They used higher and lower order classification. lower-Order Coping classification was based on the scales of Ways of Coping and COPE questionnaires. This procedure was previously introduced in the Moskowitz, Hult, Bussolari, & Acree (2009) meta-analysis of coping with serious illness. The list of lower-order coping categories are presented in Table 1 higher-order coping classification was based on factors described by Compas et al. (2006) and Connor-Smith & Flachsbart (2007) and consisted of engagement coping (primary and secondary control copings) and disengagement coping. A third category, miscellaneous coping, was added to classify strategies that could not be easily categorized into engagement/disengagement coping. Engagement coping strategies refer to an active orientation towards stress and either to reduce its impact by actively changing the situation or adjusting emotional responses to adapt to the stressors. In engagement coping, a primary control coping includes strategies – like direct action, planning, seeking social support – that help to change the stressor or related emotions, whereas secondary control coping – acceptance, positive reappraisal, fighting spirit – facilitates strategies that helps to adapt to stress. Disengagement strategies, by contrast, are draw attention away from the stressor and include efforts that helps distance oneself from the stressor and feelings related to it. Engagement forms of coping are generally associated with a better psychological and physical state, and secondary control coping in particular was associated with a more positive psychological state (Table 1). Whereas disengagement coping is related to lower positive affect and higher negative affect, it has been proven to be more or less effective depending on the given situation (Kvillemo & Branstrom, 2014; Yu & Sherman, 2015).

Table 1.: Classification of coping with breast cancer based on Kvillemo & Bränström (2014) meta-analysis: coping hierarchy and coping scales

higher-order	**engagement coping**	
	primary control coping	**secondary control coping**
lower-order	direct action, planning, seeking social support	acceptance, positive reappraisal, fighting spirit
higher-order	**disengagement coping:**	
lower-order	alcohol/drug disengagement, behavioural disengagement, distancing/escape/avoidance, hopelessness, social isolation	
higher-order	**miscellaneous coping strategies**	
lower-order	rumination, self-blame, self-controlling, spirituality, venting	

2.5.4 Measuring coping in breast cancer

Most common self-reported measures to evaluate coping of cancer patients are (1) COPE (Carver et al., 1989) and the shortened version of it, the (2) Brief COPE (Carver, 1997), the (3) Ways of Coping Questionnaire (WCQ) (Folkman & Lazarus, 1988) it measures the general coping repertoire in response to stressors. These (and other similar scales) differ in the number and definition of subscales that list coping repertoire. Frequently used cancer specific questionnaires are (4) Mental Adjustment of Cancer (MAC) (Watson et al., 1988)and its shortened version the (5) mini MAC (Hulbert-Williams, Hulbert-Williams, Morrison, Neal, & Wilkinson, 2012). COPE and Brief COPE assess habitual (general reaction) and dispositional (reacting to a specific situation) coping. WCQ summarises cognitive and behavioural strategies in specific stressful situations. MAC and mini MAC asses the five traditional styles of adapting to breast cancer: fighting spirit, anxious preoccupation, cognitive avoidance, helplessness/hopelessness and fatalism

Further most important inventories are listed:

- Cancer Behaviour Inventory (Merluzzi et al., 2018) which aims to measure specific coping strategies that relate to achieving personal goals and positive outcomes in the adjustment process, particularly in cancer. It was developed on the basis of the Self-Regulation-, Social Cognitive-, Self-Efficacy Theories
- Coping Inventory for Stressful Situations: a four-factor model reflecting coping with stressful situations. Three types of coping are measured: task oriented,

emotion-oriented, and avoidant (distraction type and social diversion type) (Endler & Parker, 1990b)

- The Freiburg Questionnaire of Coping with Illness: measures successful coping in five subscales: Depressive symptoms, Active coping, Distracting and encouraging oneself, Consoling with religion and searching for meaning, Denying, dissimulating, and wishful thinking. Available in Hungarian (Muthny, 1989; Tiringer et al., 2011).
- The Jalowiec Coping Scale (Jalowiec, Murphy & Powers, 1984) is designed to measure how a person usually deals with stressful situations. It lists eight coping styles: confrontative, evasive, optimistic, fatalistic, emotive, palliative, supportive, and self-reliant.
- Coping Strategies Inventory: measures coping thoughts and behaviours in response to a specific stressor. It is based on the Lazarus "Ways of Coping" questionnaire. Initially, respondents describe the events and circumstances of a stressful event. It contains four higher-order subscales (Problem Focused Engagement/Disengagement and Emotion Focused Engagement/Disengagement Coping), and seven primary scales (Problem Solving, Cognitive Restructuring, Social Support, Express Emotions, Problem Avoidance, Wishful Thinking, Social Withdrawal) (Tobin, Holroyd, Reynolds & Wigal, 1989)
- Medical Coping Modes Questionnaire: measures illness-related coping strategies in the following factors (Confrontation (later divided into Social Support Seeking and Information Seeking), Avoidance, and Acceptance/resignation) (Feifel, Strack & Nagy, 1987).

Problems with these questionnaires is that they are based upon dichotomised theoretical approaches or assume strategies that are either more effective or not effective and/or lack an integrative approach where several personality resources, trait-like characteristics and the resilience of the affected individual are incorporated as variables in response to stress.

2.5.5 Coping effectiveness and its determinants

Cancer diagnosis and treatment result in life changes that may represent a wide variety of potential sources of stress. Diagnosis and treatment require so many personal life changes that it can be overwhelming. For a successful adaptation process, the development of effective coping strategies therefore seems to be indispensable. In line with the definition

of Lazarus and Folkman (1984) coping effectiveness can be defined in terms of the "goodness of fit" between the patients' actual coping behaviours and environmental demands. To determine how effective a coping attempt is, it is indispensable to evaluate the success in dealing with the stressful situation and eliminating negative emotions, and to evaluate the level of adjustment to the specific problem. On the one hand, coping effectiveness depends on the adequate use of certain strategies, and on the other hand on characteristics of the personality and of the resources available for the patients. These resources, found within the person and also in his or her environment, were defined by Antonovsky as general resistance resource (GRR). Antonovsky emphasizes not only the availability of the resource but rather its adequate use for the intended purpose. GRR consists of genetic, constitutional and psychosocial resources such as intelligence, personality traits, coping strategy, social support, religious belief, personal philosophy, preventive health orientation etc. (Lindström & Eriksson, 2005) The following sections describe the most important psychological factors and personality strengths that influence coping strategies of breast cancer patients, factors that determine the effectiveness of coping (such as illness representation, social support, personality traits), and important indicators of successful adaptation determined by effective coping (such as quality of life, positive life changes), keeping in mind its interrelated transactional nature.

2.5.5.1 Illness representation:

Illness perceptions refer to patients' mental representations and personal perceptions of their illness. In line with the Common Sense Model of self-regulation, cognitive representation of the illness is based on prototypes or memory structures of patients' former experiences of illnesses and treatment (Diefenbach & Leventhal, 1996; Leventhal, Phillips & Burns, 2016). Cognitive representations of illness perception fall into the following dimensions: identity (illness, and associated symptoms), beliefs about the cause, timeline of the disease, (being acute or chronic), perceived control over the disease, consequences for the patient's life, coherence in understanding the information about the illness, and emotional representations (depression, anxiety) (Broadbent et al., 2015; Hopman & Rijken, 2015). Illness perceptions and representations can be considered as a framework or basis on which coping strategies are selected to deal with the consequences of a disease. Patients develop coping procedures based on former illness perceptions, which evaluate their success in a feedback loop. According to this evaluation, changes in coping style or perception of the disease may occur (Dempster, Howell & McCorry,

2015). In the case of breast cancer patients, the perception of longer illness duration (chemotherapy vs radiotherapy) and the perception of more serious consequences, resulted in more frequent use of coping strategies like suppressing competing activities, mental disengagement, and restraint (Buick, 1997). More chronicity timeline perception is particularly related to more passive strategies such as avoidance, anxious preoccupation, helplessness or hopelessness (Fischer et al., 2013; Hopman & Rijken, 2015; Rozema, Vollink & Lechner, 2009).

2.5.5.2 Social support

Social support includes social network as well as a conductive climate resulting in improved well-being. As a multidimensional concept it can be divided into reciprocal emotional, instrumental and informational components. The last is particularly important in coping with health-related problems. An adequate social support can influence successful adjustment to breast cancer. The need for social support may vary across the different phases of the cancer continuum, with the highest need during diagnosis and the initial phase of the treatment period. The primary source of social support is the family, spouse, children, close relatives and friends. Less dominantly, however, health care professionals, peer and psychosocial group can provide important support as well (Drageset, Lindstrøm, Giske & Underlid 2016). According to McGonigal (2016) in stressful situations alongside cortisol as a hormonal stress response, oxytocin is released by the pituitary gland**.** The role of oxytocin in stressful situations is to drive the patient to seek social support: to talk about emotions, to search for the support and closeness of significant others. Perceived social support seems to influence the patients' choice of specific coping strategies, which can in turn lead to positive psychological outcomes such as emotional wellbeing. The level and quality of social support in case of breast cancer patients influenced their choice of active (e.g. positive reframing) or passive (e.g. self-blame) coping strategies, which in turn resulted in increased or decreased emotional wellbeing (Kim, Han, Shaw, McTavish & Gustafson, 2010).

2.5.5.3 Personality traits (optimism, mastery, hope, Self-Efficacy)

Optimism, mastery, hope, Self-Efficacy are cognitive traits that grant positive future expectancies, contributing to coping success and resilience. *Optimism* is a dispositional tendency to expect generally more positive than negative outcomes (Scheier & Carver, 1992), whereas *mastery* is considered as a perceived control over outcome (Pearlin &

Schooler, 1978). Both seems to relate to a choice of coping in case of cancer patients. Studies found that optimism and mastery can predict a greater level of problem-focused coping and active coping strategies, whereas higher level of optimism is negatively associated with emotional focused coping (Applebaum et al., 2014; Gallagher, Long, Richardson & D'Souza, 2019). Mastery has a protective effect on psychological distress through the mediating effect of threat appraisal and coping Self-Efficacy, and also on anxiety through the mediating effect of active engagement coping (Henselmans, Fleer et al., 2010). In that sense those patients who feel a sense of mastery over actual difficulties are more confident in their ability to deal with cancer, than those who perceive themselves as having less control.

Hope represents a positive motivational state that derives from goal-directed energy and pathways to meet those goals (Snyder, 2002). High levels of hope help to identify and use effective coping styles (Felder, 2004). In the case of breast cancer patients, cancer-dispositional hope interacted with coping strategies to influence adjustment to cancer in the first year after diagnosis and the choice of coping strategies (Stanton et al., 2000; Stanton, Danoff-Burg & Huggins, 2002).

Self-Efficacy represents confidence in the ability to execute actions that help with coping and with attaining goals desired by the patient such as a certain aspect of quality of life (e.g. work capacity). More efficacious cancer patients feel more confident about their coping strategies, and can therefore adjust better to the disease (Merluzzi et al., 2018). Self-Efficacy for coping with cancer refers to specific constructs which cover behaviours that occur in the course of the cancer continuum. It describes six areas of coping with the disease (a) maintenance of activity and independence (b) coping with treatment-related side effects (c) accepting cancer/maintaining a positive attitude (d) seeking and understanding medical information (e) affective regulation (f) seeking support. High Self-Efficacy for coping with cancer has a positive correlation with reduced distress and quality of life. Patients with high efficacy show less anxiety and better adjustment in response to the stress of cancer (Chirico et al., 2017; Merluzzi et al., 2018).

2.5.5.4 Coping and Quality of Life

Patients' quality of life is greatly influenced by the disease all along in the cancer continuum. Past research has shown that quality of life (QOL) and coping strategies are closely connected to each other, and according to Avis, Crawford, & Manuel (2005)

coping strategies were even more closely associated to QOL than medical determinants of the disease. Earlier cross-sectional and longitudinal studies examined the connection between QOL and coping strategies, in line with positive and negative coping strategies. It was generally found that strategies belonging to engagement coping are connected to physical wellbeing, in contrast to disengagement coping strategies which were connected to poorer psychosocial adjustment (Avis et al., 2005; Kershaw, Northouse, Kritpracha, Schafenacker & Mood, 2004; Manuel et al., 2007; Ransom, Jacobsen, Schmidt & Andrykowski, 2005). Interest then turned towards the examination of the reciprocal nature of coping strategies and QOL. The rationale behind this is the idea that according to the transactional model of Lazarus and Folkman (1984) coping is dynamic and reciprocal. So as coping strategies are adjusted to the source of stress, QOL could accordingly affect the use of coping strategy (Danhauer, Crawford, Farmer & Avis, 2009). When reciprocal relations between coping strategies and distress were examined in the case of cancer patients it was found that higher level of certain strategies like acceptance predicted a higher postsurgical distress which in turn resulted in passive coping strategies like denial, disengagement and self-distraction (Carver et al., 1993). Similarly, higher levels of postsurgical distress can be connected later to more disengagement coping that results in even more distress, and subsequent venting (Culver, Arena, Antoni & Carver, 2002). Similarly to distress, the effect of QOL on the choice of coping and their reciprocal relationship was measured by Danhauer et al., (2009); Paek, Ip, Levine & Avis, (2016). Both studies found that poorer QOL was a better predictor of subsequent coping strategies and negative coping strategies predicted poorer QOL and subsequent coping. Danhauer et al., (2009) found that the greater use of coping strategies such as seeking social support, keeping feelings to oneself and wishful thinking can be predicted by poorer QOL. Similarly, Paek et al. (2016) found that the use of negative coping strategies at the diagnosis stage was connected to lower QOL subsequently, and with further use of negative coping. The fact that poorer QOL has a better predictive value on coping strategies can be explained by the transactional nature of stress and coping, namely that the choice of coping strategies is adapted to arising problems. The authors suggest an implication for clinical practice, namely that intervention should target negative coping to improve QOL, and screening for poor QOL at the survival stage, to break the negative coping cycle.

2.5.5.5 Coping and positive life changes

Positive psychological changes beyond the previous level of functioning can occur in the aftermath of a trauma, which is referred to as Posttraumatic Growth (PTG) (Tedeschi & Calhoun, 2004). Adverse life events such as cancer can challenge and modify a person's cognitive schemas, which may in turn result in a better apperception of life, enhanced spirituality, more meaningful relationship with significant others, perceived changes in the self like personal strength, and better use of opportunities and new possibilities that they may have previously overlooked (Tedeschi & Calhoun, 2004; Hamama-Raz, Pat-Horenczyk, Roziner, Perry & Stemmer, 2019; Rajandram, Jenewein, McGrath & Zwahlen, 2011; Silva et al., 2012). Mobilising hidden resources at the onset of breast cancer appears also in the literature of PTG. As coping with the illness begins, it seems that women start to transform their experience of the trauma of the disease and realise that they have become stronger and have more skills to overcome difficulties, providing a better sense of self-reliance and competence (Silva et al., 2012). This initial level of change remains stable or increases over the course of treatment, when women are directly facing the effect of the illness, and afterwards when returning to other areas of life in the initial survivor period (Scrignaro, Barni & Magrin, 2011; Silva et al., 2012). PTG is mainly conceptualised as an outcome represented in positive functional changes, but also as a process of dealing with traumatic events and as coping strategy to counterbalance emotional distress (Hamama-Raz et al., 2019; Rajandram et al., 2011). Tedeschi & Calhoun (2004) proposed that the early success of coping and cognitive processing can later determine an adaptive PTG or a maladaptive trajectory. Therefore, personal coping skills and strategies are considered as key components of PTG. Coping strategies that are considered to foster cognitive processing information related to the traumatic event are cognitive reconstructing, active relational coping, problem-focused coping, and positive attentional bias. Specific personality traits like optimism, hope and humour that can enhance positive coping methods are associated with increased PTG, (Rajandram et al., 2011; Silva et al., 2012). Deliberate rumination of the benefits of cancer as a coping strategy and social support were associated with greater PTG later while life purpose rumination and intrusive rumination were connected to distress (Morris & Shakespeare-Finch, 2011). According to the meta-analysis of Prati & Pietrantoni (2009) coping responses like positive reappraisal and religious coping are stronger predictors of PTG, whereas optimism, social support, spirituality, acceptance coping and seeking for social

support were moderately associated. A more recent review on PTG found that only positive coping strategies were connected with PTG (Kolokotroni, Anagnostopoulos & Tsikkinis, 2014). However, not only do coping processes contribute to PTG, but PTG through its multiple forms, such as feeling a greater personal strength, new possibilities, or a stronger sense of meaning, can mobilise more effective coping strategies to handle future stress. Hamama-Raz et al. (2019) recently published a seven-year-long longitudinal study of breast cancer patients and found that higher reports of PTG after the treatment period were linked to increased use of positive cognitive emotional regulation coping strategies such as acceptance, planning, positive refocusing, positive reappraisal, and putting into perspective.

2.5.6 Changes in coping in the cancer trajectory

Changes in coping come in the first place from different reactions to different stressors that patients face with different level of perceived control and expected outcome, so variability of coping over time can be expected in the cancer continuum as well. However, individual-specific elements of coping, the specific characteristic of a stressful situation and a feedback loop on coping efficacy can determine a patient's adaptive or maladaptive trajectory. Evidence proves that coping strategies can be modified by psychological interventions as well. In the following section these two forms of change will be described.

2.5.6.1 Variability of coping in the course of the disease

Over the course of the disease, cancer patients face different challenges. Different problems arise at the time of the diagnosis, or later at the post-operative phase when facing the side-effects of cancer treatment, or at the reintegration period when facing again the challenges of work and daily routine. Besides individual-specific dispositional elements of coping patterns like mastery or hope (Stanton et al., 2002), coping is mainly determined by situational factors. Variability over time in coping strategies can be observed. Therefore it is essential to asses coping in multiple phases of measurement, especially at the so-called transitional periods such as the beginning or end of treatment, returning to normal life or long-term survival (Geyer, Koch-Giesselmann & Noeres, 2015). Flexibility of coping is the ability of a person to identify the different challenging aspects of a situation and to employ a coping strategy that best fits this demand. The use of coping strategies in a flexible way is a key element of successful adaptation (Roussi,

Krikeli, Hatzidimitriou & Koutri, 2007). According to Cheng, Lau & Chan (2014) flexibility of coping is conceptualised and measured in five different ways: broad coping repertoire, well-balanced coping profile, cross-situational variability, strategy-situation fit coping, and perceived ability. Strategy-situation fit flexible coping is associated with greatest effect size in psychological adjustment (Cheng, Lau & Chan, 2014). Increases in time could be found in the case of coping strategies that are negatively related to distress at time of diagnosis, such as acceptance, positive reinterpretation and self-distraction. Strategies that positively correlated to distress at time of diagnosis, such as denial, decreased (Roussi et al., 2007). This could be explained by the fact that, in the case of the majority of patients, levels of distress drop as cancer treatment proceeds. A good example of the changing adaptivity of a coping strategy was explained also by Roussi et al. (2007). They found, for example, that early use of emotional expression and social support is related to low level of distress, while the same coping strategy was found to be related to higher levels of distress three months later. This is explained by the fact that the early use of this strategy made it possible to process the event, while three months later this strategy may signal that patients have become involved in a rumination process. A greater variability of cognitive coping strategies was found by Hervatin, Sperlich, Koch-Giesselmann & Geyer (2012) and was therefore judged to be more influenced by environmental factors, whereas emotional coping strategies seemed to be remain more stable, in this aspect more closely connected to personality traits. Similarly, positive coping, planning and denial were found to be used more frequently at the time of diagnosis and dropped as treatment proceeded, while social support, self-distraction and the suppression of competing activities remained more constant (Carver et al., 1993; Culver et al., 2002). In the case of cancer patients, low prevalence of strategies associated with higher distress like denial or self-blame could also be found (Hervatin, Sperlich, Koch-Giesselmann & Geyer, 2012). Young breast cancer patients' coping strategy such as seeking social support, spirituality, wishful thinking and making changes diminished in time, while the level of detachment increased. The most commonly used coping strategy was in their case positive cognitive restructuring, which remained constant over time (Manuel et al., 2007). The same tendency was found by Danhauer et al. (2009) seeking social support, spirituality, wishful thinking, and making changes appeared to decrease over time while active coping strategies remained to be frequently used by breast cancer patients. It must be noted that the above-mentioned changes occur in these studies without psychological interventions.

2.5.6.2 Changes in coping due to psychological interventions

Changes in coping style can occur by applying psychological intervention, as effective coping techniques are skills that can be modified and acquired. Those studies that explore how psychological interventions modify patients' coping skills usually report that improved coping skills seem to provide long-term beneficial effects, better adjustment to the disease, reduce symptoms, and increase positive coping (Groarke, Curtis & Kerin, 2013; Stagl et al., 2015) Coping skill training and other interventions designed to improve stress management and the effective coping repertoire usually incorporate elements such as cognitive reconstructing, interpersonal problem resolution, communication skills training, education in pain management, and also techniques working with altered states of consciousness such as relaxation techniques, guided imagery, autogenic training. These therapies, as measured by outcome, usually reduce emotional distress, depression and anxiety, improve quality of life and social support, and result in positive outcomes such as benefit finding (Manne, 2007). A wide range of therapies are used to improve coping skills. At these sections, those therapies are introduced which have been systematically studied only for changing coping strategies. A more detailed description of psychological interventions in cancer care will be provided later. Below are provided the most important interventions targeting changes in coping style, and the effect of this change on psychosocial outcomes.

Cognitive-behavioural stress management (CBSM) is one of the most examined interventions for improving coping skills. The intervention focuses on dealing with daily stressors and treatment-related problems, increasing social support and emotional expression, and uses cognitive reconstructing of doubt appraisal. CBSM encourages the improvement of both problem-focused (e.g. active coping, planning) and emotion-focused (e.g. relaxation, use of emotional support) coping skills (Antoni et al., 2001). The changes that occur in coping style due to intervention are also reflected in positive changes in psychological outcome measures: CBSM results in better quality of life, immune function, perceived ability to relax, enhanced benefit finding, increased emotional well-being, positive affect and decreased depression, social disruption and emotional distress (Antoni, Lechner et al., 2006; Antoni et al., 2001; Antoni, Wimberly et al., 2006; Groarke et al., 2013; McGregor & Antoni, 2009; Phillips et al., 2008). Interventions attempting to achieve changes in coping style seem to have long term effects: early implementation (after surgery) of CBSM has beneficial effect, even after

fifteen years, in terms of better QOL and lower depressive symptoms (Stagl et al., 2015). A more recent psychological intervention to improve, besides many other factors, the coping skills of breast cancer patients is Mindfulness Based Stress Reduction (MBSR). (Castanhel & Liberali, 2018; Witek-Janusek et al., 2008). A Hungarian study using MBSR, as a result of intervention, reported a long-term change in three negative coping styles, namely: depressive, distraction and minimizing importance coping styles (Rohánszky, Berényi, Fridrik & Pusztafalvi, 2017). The Comprehensive Coping Strategy Program changes coping strategies through implementation of educational information, cognitive restructuring, coping skills enhancement, and relaxation with guided imagery. As a result it is reported to be an effective coping enhancement intervention that resulted in improved quality of life in the case of breast cancer patients (Gaston-Johansson et al., 2013).

2.5.7 Integrating personality factors of successful coping and adaptation

As it was formerly introduced, coping with cancer is discussed in diverse theoretical frameworks. Several coping styles, personality characteristics and resources of stress tolerant patient and successful adaptation have been identified and studied separately with the evolution of positive psychological movement. As a Hungarian theoretical concept Oláh (2005a, 2005b) succeeded in integrating the empirically related resources of the personality types that help maintaining psychological health when dealing with stressful events. This one comprehensive model is the so called Psychological Immune System (PIS). The model is based upon positive psychological approaches which seek to emphasize human strengths and potential. The different protective personality factors fostering successful adaptation function in the same mode of action and have a high correlation. Therefore, it be considered as an integrated multidimensional system of personal capacities.

2.5.7.1 Psychological immunity

PIS involves coping strategies, protective personality resources and dimensions of resilience such as control capacity, learned resourcefulness, constructive thinking, hardiness, dispositional optimism, ego resiliency and emotional intelligence. Psychological immunity plays an important role in maintaining and improving wellbeing – it grants a certain “immunity” during a stressful or traumatic event that provides immediate protection in situations that hinder development and the achievement of a personal goal. PIS integrates resources that enable 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 focuses on individual protective attributes and attributes that mediate the person's orientation towards the protective resources of the environment (Oláh, 2005b).

2.5.7.2 Functioning of Psychological Immune System

PIS integrates, as a superordinate system, three mutually interactive subsystems. The first subsystem directs the person towards the exploration, understanding, and control of the physical and social environment, helps to monitor the possible positive outcomes, and to appraise the environment in a meaningful way. These so-called accommodative competencies like Positive Thinking, Sense of Control, Sense of Coherence, or Sense of Self Growth constitute the Approach-Belief Subsystem (ABS). The second subsystem helps to modify the difficult accommodation situation to guide the person towards the decided goal by changing the self or changing the environment. Utilising the necessary personal or environmental resources to generate new or alternative possibilities, these assimilative components of the Monitoring-Creating-Executing Subsystem (MCES) consist of creative self-concept, Change and Challenge Orientation, Social Monitoring Capacity, Problem Solving Capacity, creative self-concept, Self-Efficacy, Social Mobilizing Capacity, Social Creating Capacity and Goal-Orientation. The third subsystem, the Self-Regulating Subsystem (SRS), helps to stabilize the inner emotional state, especially negative emotions that interfere with planned actions, to help the person focus on the original goal by controlling the attentional focus and conscious operation. It provides for the stable operation of the first two subsystem through Impulse Control, Emotional Control, Irritability Control and Synchronicity (Oláh, 2005a) (Figure 1).

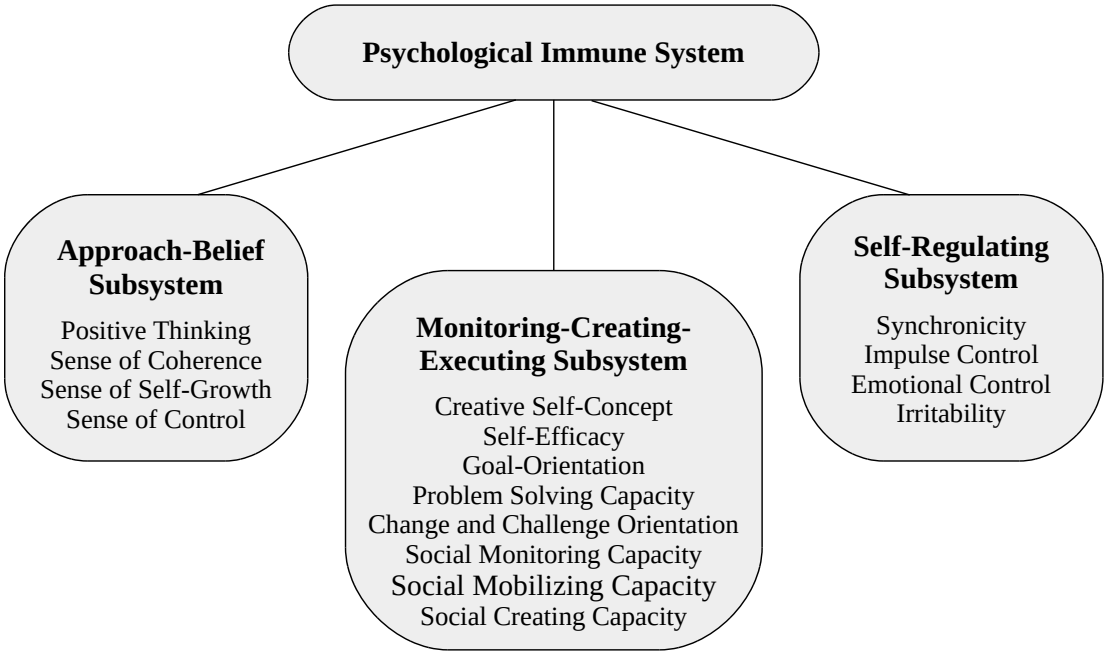


Figure 1.: The components of Psychological Immune System according to Oláh (2005a, 2005b)

PIS as part of the individual protective apparatus functions both in the primary and secondary cognitive appraisal process of coping, and therefore allows for effective coping with stress. All three subsystems take part in the appraisal process, but with a time delay. Immune traits of ABS have the most influence on the primary appraisal process, while MCES and SRS direct secondary appraisal. MCES functions mainly in problem-focused, task-oriented coping processes. Scales of MCES like Problem Solving Capacity, Social Creating Capacity, and Self- Efficacy correlate significantly with problem-focused ways of coping, while Social Monitoring and Social Mobilizing Capacity correlates with the Seeking Social Support preference. SRS, by regulating mainly the emotional aspects of personality, operates in emotion-focused behaviour. The three subsystems function in dynamic interaction with each other and with the environment. Biological, psychological and social components facilitate or inhibit the adaptative processes of the subsystems. Giving an example for the functioning of PIS, in case of a stressor ABS initiates the exploration of the environment, while MCES handles and assimilates the result of the exploration. If ABS and MCES tendencies are balanced the person is capable of assimilating the approaching result and feels competence and other positive emotions. If

MCES is weak there is no competence to handle AB, the person feels anxiety and helplessness. If SRS is constantly low, a prolonged negative emotional state can be expected. At the same time, if AB has strong tendencies and SRS is weak it can describe sensational seekers or the maniac state. Optimal functioning requires on the one hand a great variety of elements of PIS within one system, and on the other hand a dynamic interactions of the inter-system units in synchrony with personal and environmental demands, so an optimal balance between the components can be achieved.(Oláh, 2005a).

2.5.7.3 Important correlates of psychological immunity

Psychological immunity seems to correlate with life-satisfaction and with factors of psychological wellbeing, such as environmental mastery, purpose in life, personal growth, self-acceptance, positive relations, and autonomy (Oláh, 2009). Mental and physical health is associated with higher Sense of Coherence, Sense of Self-Growth, Synchronicity, and Impulse, Emotion and Irritability Control, and almost all aspects of psychological immunity correlates negatively with burnout (Oláh, 2009). Furthermore, psychological immunity plays a role as the most important factor protecting against burnout among health care workers (Gombor, 2010). The personality resources of PIS, such as Positive Thinking, Sense of Control, Sense of Coherence, and Sense of Self-Growth have a mediating role in mental health and psychological adjustment to acute psychopathology (Mirnics et al., 2013). To our knowledge there is one published study examining the Psychological Immunity in cancer context. According to its findings, Hungarian oncology patients showed significantly lower scores on 12 out of 16 scales of the Psychological Immune Competence Inventory than the standard, healthy Hungarian population (Oláh, 2005b). Although PIS has been examined across different cultures, populations, and life situations (Gupta & Pandey, 2014; Magyaródi, Nagy, Soltész, Mózes & Oláh, 2014; Mirnics et al., 2013; H. Nagy & Oláh, 2014; Oláh, Nagy & Tóth, 2010; Szicsek, 2004; Voitkane, 2004), ***there is a need for more research on the psychological immune system of cancer patients***. It is yet unknown whether it changes along the cancer continuum, or whether it can be improved by psychotherapeutic intervention. ***Research in this field can fill a scientific gap and integrate the knowledge of isolated models.***

In summary, successful adjustment to cancer is a dynamic, interrelated process where coping plays an important role. Coping seems to change over time in the different phases

of cancer treatment and survivorship as the stressors patients have to face also change. Psychological immunity as a comprehensive model integrates resources that enable the person to endure prolonged stress and cope efficiently while personal developmental potential remains intact. Psychosocial interventions aim to improve adaptation processes to the illness. They have long term effects on coping processes. It remains a question, however, how psychological immunity as an integrated system changes over time and due to psychological interventions. Although there are methods that target especially the improvement of problem-solving and the coping repertoire, in general, it can be said that psychological interventions influence patients coping through the Sense of Control and personal growth, through Self-Efficacy and by effectively solving problems and the deeper understanding of the self and the underlying intrapsychic processes. In the next session the different psychosocial interventions used in oncological settings will be presented, with special focus on hypnosis and music.

2.6 Psychological intervention in cancer care

2.6.1 Need for psychosocial intervention in cancer care

The comprehensive (physical, psychological and social) rehabilitation of cancer patients is both heterogeneous and wide in scope, from screening to a life-long, complex physical and psychological intervention based on multidisciplinary team work. However, its literature exceeds the aims of the current study so focus will be restricted to psycho-oncological aspects only. Psycho-oncological rehabilitation, integrated into oncological care, targets through interventions in the prevention, diagnosis, therapy and post treatment period. It aims to help adjustment and reintegration, based on patients' available resources and personal power, with the evaluation of psychosocial status, risks and protective factors (Kovács et al., 2017; Riskó, 2017).

As already outlined, patients react to a cancer diagnosis with varying degrees of success in coping with the attendant stressors, and most of the arising psychological problems are reactive disorders to the given stressors arising from the diseases. Clinical research and therapeutic experience show that approximately one third of the overall cancer patient population can successfully cope, able to face all the negative emotional stress accompanying the examinations and treatments, whether alone or with close relatives and medical personnel. However, it appears that at least one third of patients require more psychological support from their environment, and another 30%—and according to some

studies, up to 60%—experience a level of distress requiring professional, psychological or psychiatric help (Gregurek, Bras, Dordevic, Ratkovic & Brajkovic, 2010; McFarland & Holland, 2016; Mitchell et al., 2011; Riskó, 2006). According to a study based on the results of a heterogenous group of 1070 Hungarian cancer patients, more than 60% took part in some kind of psychosocial intervention, although the authors admit that this overrepresents national and worldwide tendencies, though it mirrors the needs and motivation on the patients' side (Rohánszky et al., 2014).

The Hungarian National Anti-Cancer Program (Nemzeti Rákellenes Program) declared in 2006 that all institutes treating cancer should make psychological services available, however according to a recent study only a third of departments and 50% of the centres employ specialists in this field. (Mailáth, Laczkóné Majer, Horváth & Szabó, 2017). Evidence suggests that the early detection of psychosocial symptoms and early implementation of intervention can influence aspects of long term survival outcomes, especially quality of life (McFarland & Holland, 2016).

2.6.2 Possibilities for psychosocial intervention in the cancer trajectory

Educational, supportive, and therapeutic interventions in cancer care have proven to be effective as alternative solutions to problems that can be cured with medication (anxiolysis, analgesia). Furthermore, it provides distress reduction, enhances effective coping strategies, facilitates a better interaction with the social network (family, friends, health care professionals) and improves adherence to treatment (Spiegel, 2014). The following table (Table 2) contains the phases of illness, possible psychological and psychiatric symptoms and possibilities of intervention (Kahán et al., 2016).

Table 2.: Problems associated with the different phases of cancer treatment and possible psychological interventions based on Kahán et al. (2016)

phase of cancer	**possible symptoms**	**possible interventions**
oncological screening	anxiety, communication and compliance difficulties, positive familiar anamnesis, denial, postponing behaviour	psycho-education, problem-focused stress reduction
medical procedures preceding diagnosis	fear of pain, fear of lost autonomy, fear of losing physical integrity, sense of being	psychoeducation, counselling, suggestive

	depersonalised, body image problems	communication techniques, pain reduction
diagnosis, preparing for surgery and treatment	diagnosis as crisis, fear of pain, fear of lost autonomy, PTSD, cognitive functional disorders (narrowed focus) body image problems, relational and sexual problems	psychosocial screening, psychodiagnosis, crisis intervention, counselling, psychotherapy
oncology treatment period: chemo-hormone-radiotherapy	Communication problems, frustration, adjustment problems, fear of death, depression, anxiety, PTSD, psychogenic side-effects, long term cognitive deficits such as: concentration problems, memory problems, learning disabilities, sleeping problems, fatigue, problems in the family and relationships, sexual problems, increase in premorbid psychiatric disorders due to constant stress, anticipated mourning	psychoeducation, verbal and nonverbal techniques reducing distress, supportive techniques, individual and group therapies, couple therapy, family intervention consulting
sustained period of symptom relief	adjustment problems, conditioning, psychogenic side-effects, cognitive problems, chronic fatigue, fear of recurrence, PTSD, maladaptive substance use as a coping strategy, emotional disorders, depression, anxiety disorders (panic, carcinophobia) danger of suicide	consulting and verbal and non-verbal psychotherapy, couple therapy, family intervention, crisis intervention, self-help groups of survivors
recurrence	emotional crisis, anger, anxiety, depression, fear of death, adjustment problems and coping difficulties	crisis intervention, supportive techniques, support for family members, preventive psychotherapeutic interventions
palliation	denial, anxiety, depression, fear of death, acceptance,	mainly non-verbal psychotherapy, support for family and caregivers, dealing with anticipated mourning

2.6.3 Levels of psychosocial intervention in cancer care

Psychological interventions in the context of oncology are considered to be a continuum, on the basis of which treatments are described according to structure, frequency, and depth. One end of the continuum is supportive psychoeducation. It focuses on the 'here and now' rather than past experiences and provides patients with useful skills to handle normal levels of psychosocial problems associated with cancer (such as a normal-level grief reaction). It can consist of health education, stress management, coping skills and communication skill improvement, and can focus on enhancement of overall quality of life. Counselling as the next level of the continuum represents a short-term approach, focusing on the present and dealing with a well-defined problem of the patient, e.g. by improving their problem-solving ability and coping skills. Psychotherapy as the highest level of the continuum is based on a specific theoretical framework and structure. Psychotherapy focuses on exploring and understanding the patient's intrapsychic functioning and dealing with problems of psychopathology if it is present. It works within a broader framework examining the patient's past, present and future (Strada & Sourkes, 2010). Psychological interventions in cancer care can be individual, group based, couple based, family centred, and therapies differentiate across life cycles, such as children and adolescent therapy, parental therapy, elderly cancer patients' therapy.

2.6.4 Evidence based interventions in onco-psychology

A wide range of evidence-based interventions exist within onco-psychology. The most important interventions that are proven to be effective in the cancer continuum are listed below:

2.6.4.1 Supportive psychotherapy

Although it is hard to give a simple definition of supportive psychotherapy, it can be "utilized intermittently or continuously to help patients deal with distressing emotions, reinforce pre-existing strengths, and promote adaptive coping with the illness serves" (Akechi, 2012 p.1114.) Supportive therapy serves as the basis for all therapies in cancer care. It resembles a constant connection with the patient in need, and helps to deal with distressing emotions, unfold existing resources and promote successful coping. It requires great flexibility on the part of the therapist, being familiar with a wide range of methods including crisis intervention, cognitive therapy and deep dynamic pattern operating. The therapist needs to be able to work with the medical team just as much as with caregivers

and family members. Due to its flexible nature it is hard to test its effectiveness in randomised control trials (RCT), but it is accepted as a valid intervention and its implementation is suggested in routine care. A detailed description on this method is provided by Lederberg & Holland (2011) in J. S: Holland's reference handbook entitled Onco-Psychology. Supportive psychotherapy is especially important in advanced cancer and palliative care. In these cases, in addition to providing general support, interventions aimed to deal with the consequences of life-threatening disease, covering fears about 'death' and issues of 'existence'. It has been proven to ameliorate anxiety and depression and it can help to achieve a 'good death' (Akechi, 2012).

2.6.4.2 Cognitive-Behavioural Therapy

Cognitive-behavioural therapy (CBT) "focuses on recognizing and changing maladaptive thoughts and behaviours to reduce negative emotions and facilitate psychological adjustment" (Akechi, 2012 p.1115.). A wide range of cognitive-behavioural therapies in cancer care aim to understand cognitive distortions and subsequent irrational thinking that negatively affect further coping and adjustment efforts. It is useful to treat procedural and treatment-related anxiety, PTSD (Horne & Watson 2011) and physical symptoms such as fatigue (Montgomery et al., 2009) and insomnia (Johnson et al., 2016), and is especially effective in treating clinical levels of depression. Recent studies seem to support the evidence that CBT is comparable to antidepressant medication for at least mild-to-moderate depression in cancer (Akechi, 2012). It usually targets early-stage cancer patients, but success with advanced and terminally ill patients have also been noted (Horne & Watson 2011). CBT seems to be more effective in treating distress than e.g.: group therapies (Tatrow & Montgomery, 2006).

2.6.4.3 Positive Psychology Interventions

Positive psychology interventions such as positive psychology therapy, hope therapy, meaning making therapy, wellbeing therapy and mindfulness-based interventions aim to develop personal strengths, enhance positive emotions, flow, life-satisfaction, personal growth and change. The most studied intervention among this group is mindfulness-based intervention. It uses a technique that involves paying attention to the present moment without judgement, which allows a greater awareness of ongoing mental events and creates openness and acceptance of experiences in the moment. It targets a wide range of psychological problems, among which the most outstanding is stress reduction (Payne,

2011). Another widely used therapy is meaning-centred psychotherapy, which is a brief intervention to enhance meaning and purpose in advanced cancer patients in palliative care. It aims to treat patients with advanced cancer and palliative conditions to reduce psychological and existential/spiritual distress (Breitbart et al., 2018).

2.6.4.4 Relaxation and Image-based Therapies

Relaxation and image-based therapies are based on various forms of changed focus and consciousness that cause changes in the central nervous system. As a basis, relaxation techniques help patients to change the body's stress response to a 'relaxation response', characterised by both a physically and emotionally relaxed state. The most frequently used method is progressive muscle relaxation. Autogenic training or cue-controlled relaxation teaches learning to relax muscles associated with certain verbal suggestions. These techniques are widely used in oncological contexts, either by themselves or, often, incorporated into other interventions such as CTB. Guided imagery is an often-used technique by itself or along other types of interventions. It uses mental representations of objects, places and situations, most commonly through visual images but also with sound, smell and taste and affective feelings. Imagination is guided through the experience to achieve emotional, spiritual and physical changes. Most usually a therapist leads the session, but recorded spoken scripts, with or without accompanying background music, are also common (Roffe, Boehm & Ernst, 2010). Relaxation and imagery-based techniques are frequently used to reduce pain and anxiety, to promote emotional functioning, successful coping and a better quality of life. There is evidence that it can facilitate healthy bodily functions, reduce side effects and enhance immunity (Eremin et al., 2009) and is used in the management of cluster symptoms in chemotherapy (Charalambous et al., 2016). Hypnosis as a distinct intervention will be discussed later in more detail as a focus of this paper.

2.6.4.5 Creative Interventions

Creative interventions use expressive forms of the creative arts as a therapeutic technique. They consist of art, drama, dance and music therapies, and aim for a better understanding of self, as well as increased emotional, social and physical wellbeing. They do not require a special skill, but rather therapists facilitate the process of expressing the self through these channels. Creative interventions can benefit patients with cancer in order to reduce anxiety and depression, and improve mood, quality of life, and coping skills (Archer,

Buxton & Sheffield, 2015). Music therapy as a focus of the dissertation will be discussed in more detail below.

For those who do not desire to engage with professionals for face-to-face support, self-directed interventions offer patients an opportunity to make use of interventions according to their desire. According to the review of Ugalde et al. (2017) self-guided interventions represent a potentially efficient means of support for cancer patients.

2.7 Hypnosis in cancer care

According to the APA definition, hypnosis is currently understood as "A state of consciousness involving focused attention and reduced peripheral awareness, characterized by an enhanced capacity for response to suggestion (Elkins, Barabasz, Council & Spiegel, 2015 p. 6.)". This state allows patients to be guided to evolve therapeutic metaphors and mental images, helps dissociation from disturbing somatic and psychological experience (such as pain or anxiety) and helps to reframe former personal paradigms to function psychologically in a more adaptive way (Wortzel & Spiegel, 2017). In the integrative therapy of cancer care, hypnosis has a growing role. In somatic medicine the British Medical Association approved the use of hypnosis in 1955, based mainly on case reports and expert consensus, while the American Medical Association followed in 1958 (Häuser, Hagl, Schmierer & Hansen, 2016). Modern studies investigating the role of hypnosis in a cancer setting date back to 1970s, and since than was continually present in cancer care, the body of literature exploring its benefits has grown considerably larger over the past 10-15 years. In medical situations that require highly affective involvement on the side of the patient, such as being in emergencies, receiving of a serious diagnosis, undergoing a painful procedure, altered states of consciousness may occur spontaneously. Patients' attentional focus spontaneously narrows due to the emotional strain and psychological distress caused by the diagnosis and the difficulties of the treatment, with information processing becoming dominated by emotional impacts. This spontaneously developed altered state of consciousness is an uncontrolled negative trance, which theoretically can be transferred to a positive one through techniques involving controlled altered states of consciousness such as hypnosis (Spiegel & Cardeña, 1991; Varga, 1998; Barabasz, 2005; Jakubovits, 2011; Bányai, 2015).

2.7.1 Levels of hypnotic interventions in medical settings

Table 3 summarises, based on Häuser et al. (2016), the different levels of hypnosis that can be used in medical settings depending on goals. Although, it is a continuum rather than a series of distinct categories, the gradations from hypnotic communication to hypnotherapy represent deeper and more involved interventions (Table 3).

Table 3.: levels of hypnosis in medical settings based on Häuser et al., (2016)

Hypnotic/suggestive communication	**Medical hypnosis**	**Hypnotherapy**
• waking suggestions (no trance induction)	• reduction of somatic symptoms	• Improvement of problem management by unfolding hidden resources
• suggestions under general anaesthesia • effective doctor–patient communication	• reduction of procedural distress • Facilitating physiological/biochemical healing • improve disordered physiological/biochemical parameters	• changes in behaviour • cognitive-affective reconstructing • reintegration of dissociated feelings • reinterpretation of stressful situations/sensations

While respecting the fact that mind and body can only be interpreted as a unity, medical hypnosis still mainly targets physical symtoms and its associated stress factors, as well as quality of life aspects, whereas hypnotherapy deals with deeper psychological correlates of the disease. Both are interreleated. Most studies deal with the beneficial effects of medical hypnosis, due to the fact that it can more easily be standardised and the outcome consequences can more easily be measured. There is a lack in exisisting literature in terms of controlled studies that measure the deeper psychological correlates of hypnosis. For this reason, in the following section the beneficial effects of medical hypnosis will be discussed with a particular attention on the application (ways as it is implemented) and, when there is, on psychoterapeutic aspects.

2.7.2 Hypnosis across the different phases of cancer

Hypnosis has a place all along the cancer care continuum from prevention to palliation. In terms of prevention, cancer risk can be reduced by changing health-related habits such as avoiding smoking, healthy dietary habits and taking part in cancer screening. Studies demonstrate that hypnosis is effective in changing health-related habits that can be connected to cancer such as smoking (D Spiegel, Frischholz, Fleiss & Spiegel, 1993). Therapeutic practice also supports changes in maladaptive health beliefs to more adaptive ones in order to foster healthier behaviour (Alden & Owens, 2012). Hypnosis is also beneficial in reducing screening associated with pain and anxiety (Elkins et al., 2006). In terms of cancer diagnosis, the use of hypnosis has shown beneficial effects in diagnosis procedures such as breast biopsy: it can cause reduced anxiety and pain levels with equal procedure time, and at a significantly lower cost (Lang et al., 2006). A large body of literature deals with the beneficial effects of hypnosis during the treatment period. It was found to be useful in connection with presurgical distress, recovery from surgery, body image problems and procedural distress. During chemotherapy it has a beneficial effect in reducing gastrointestinal side effects and fatigue. It has its benefits during radiotherapy in decreasing fatigue and procedure-related distress, and increasing positive emotions and wellbeing (Carlson et al., 2018; Guy H Montgomery, Schnur & Kravits, 2013; Owens & Walker, 2012). In long term survivorship, hypnosis can reduce long lasting side effects and other common survivorship problems such as hot flashes and sleep disturbance (Elkins et al., 2008). Hypnosis can also address the problems of advanced and metastatic breast cancer such as pain and mood disorders and quality of life (Spiegel et al., 2007). Table 4 gives an overview of the most important beneficial effects of hypnosis along the cancer continuum as found by RCT studies.

Table 4.: The beneficial effects of hypnosis along the cancer continuum as found by RCT studies

prevention	treatment period				survivorship	advanced care / palliative care
	diagnosis procedures	surgical and invasive procedures	chemo-therapy	radio-therapy		
· smoking cessation · change heathy habits	· reduced pain · reduced anxiety · reduced MRI related distress / claustrophobia · saving costs · relaxed state · emotional support	· reducing perisurgery distress · decreased pain · decreased nausea · enhance recovery from surgery · reduced negative affect · reduced recovery time · reduce procedure related distress	· reducing gastro-intestinal side-effects · reducing anticipatory nausea · reducing fatigue · enhancing immune activity · emotional consequences of alopecia	· reduced fatigue · reduced procedural distress · increasing positive affect · well-being	· reduced long term side-effects (hot flash) · reduced sleep disturbance	· less pain · improved mood · better quality of life · reducing distress

2.7.3 Hypnosis and pain reduction in cancer care

The most deeply and frequently studied aspect of hypnosis in cancer care is pain management. A detailed description of this area of hypnosis intervention was chosen to give a better insight into how hypnosis interventions in general and other related areas of symptom management can function. Research has shown that hypnosis not only alters the subjective sensation of pain, but also causes physiological changes in the brain as processing sensational information. As earlier and most recent studies were summarised by Wortzel & Spiegel (2017), when proprioception is altered by hypnosis, changes can be detected in brain function. In the case of pain, when patients are guided in hypnosis to change the ‘intensity’ of perceived stimulus (lower the severity of pain), metabolic activity and blood flow changes the affected sensory cortices. At the same time, when they are guided to ‘alter’ their perception (and detect pain as a more acceptable sensation such as warmth) the anterior cingulate cortex shows decreased activity. The most recent

studies (Jiang, White, Greicius, Waelde & Spiegel, 2017; Wortzel & Spiegel, 2017). indicate that entering into a hypnotic state reduces activity in the anterior cingulate gyrus, which by itself can lead to pain reduction. Furthermore, in hypnosis the connection between the dorsolateral prefrontal cortex (executive control network) and the insula (salience network) demonstrate an increased connectivity that allows for control over somatic functioning such as pain. Hypnosis can be used for acute and procedural pain, as well as for chronic conditions. Hypnosis-induced analgesia has its practical advantages besides the psychological benefits. Research has proven that invasive procedures can last significantly shorter (i.e.: 18 minutes on average in case of a liver chemoembolization (Lang et al., 2000), which relieves some of the burden from an overwhelmed healthcare system. Due to reduced procedure time and less pain medication needed, hypnosis can reduce institutional costs (e.g. in case of breast cancer patients who underwent excisional breast biopsy or lumpectomy the cost reduction was on average $772.71 per patient (Montgomery et al., 2007). Hypnosis sedation, in contrast to general anaesthesia for patients who underwent breast surgery, resulted in hospital stays which were on average 1.1 days shorter. The literature outlines three techniques for achieving hypnotic analgesia: sensory transformation, sensory accommodation and dissociation. In sensory transformation, patients are asked to accept rather than fight against pain and transform it by focusing on more pleasant stimuli in the body. This allows pain to be in the periphery of conscious awareness. In sensory accommodation patients, are taught to make a distinction between neuronal signals and the discomfort caused by the signal. It is mainly based on appraisal processes, and how pain is interpreted (i.e. a threatening or a more benign sensation). In dissociation, patients are guided to detach themselves from the actual experience (e.g. imagining themselves at a beloved place) (Wortzel & Spiegel, 2017)

2.7.4 Use of hypnosis for psychosocial aspects of cancer-related problems

Hypnosis research in the context of cancer measures psychological wellbeing as a primary or a secondary outcome by measuring the reduction in physical symptoms such as pain, nausea fatigue. In the flowing sections those aspects of hypnosis that are in connection with successful adaptation to cancer such as distress, anxiety and quality of life.

2.7.4.1 Cancer related distress, anxiety and hypnosis

As described beforehand, anxiety has been considered the most frequent type of psychological distress among cancer patients in the diagnosis, treatment and also survival phase (Gregurek et al., 2010; Maass, Roorda, Berendsen, Verhaak & de Bock, 2015). Generalised anxiety, as well as specific fears of symptoms or recurrence, affect at least 30-50% of cancer patients. As a nonpharmacological complementary intervention for anxiety reduction, hypnosis is acknowledged as a viable solution (Genuis, 1995; Hammond, 2010). Hypnosis is effective in treating anxiety across a person's lifespan (from paediatric to geriatric oncology patients), at all stages of the diseases (diagnosis, treatment, survivor period) and has both an immediate and a long term effect (Chen, Liu & Chen, 2017). Hypnosis is acquired in order to relieve either overall or disease-related anxiety or procedural distress (Carlson et al., 2018). The anxiolytic effect on the one hand is embedded in hypnosis, since to achieve and maintain a hypnotic state, subjects are often guided to be relaxed, focused, calm, asked to recall pleasant states and safe places, and on the other hand it equips patients with control over certain bodily sensations or side-effects such as pain, fatigue and nausea that are often the origins of anxiety. Several meta-analyses reported on the efficacy of hypnosis in reducing both procedural and general distress and anxiety (Chen et al., 2017; Schnur, Kafer, Marcus & Montgomery, 2008; Tefikow et al., 2013). A decrease in symptoms of anxiety can be captured not only by perceived subjective experience but also in biological markers such as systolic and diastolic blood pressure and heart rate (Hammond, 2010; Saadat et al., 2006) and can be even more effective than medication such as alprazolam and midazolam (Calipel, Lucas-Polomeni, Wodey & Ecoffey, 2005; Nishith, Barabasz, Barabasz & Warner, 1999). Useful hypnotic imagery for reducing anxiety can be: a feeling of floating (in a bath, lake, hot tub, or in space), lightness or buoyancy, or images of a safe place etc. (Alden & Owens, 2012).

2.7.4.2 The effect of hypnosis on mood coping and quality of life

Although it is considered a key patient-reported outcome, most studies do not directly asses mood, coping or quality of life, but rather measure factors (pain, fatigue, distress) that adversely impact it. Collingwood & Elliott (2010) found, alongside other outcome measures, changes in perceived quality of life due to six hypnotherapy session and home practice CD. Walker et al. (1999) found that patients receiving relaxation combined with

guided imagery were more relaxed and easier going than patients in the control group during chemotherapy (Mood Rating Scale). Intervention increased quality of life as well (Global Self-assessment and Rotterdam Symptom Checklist). Emotional suppression as a coping strategy was reduced by the intervention (Courtauld Emotional Control Scale). Bragard et al. (2017) reported increased quality of life and mental adjustment due to self-hypnosis intervention in the case of cancer patients. Furthermore, self-hypnosis in the same study had a long time effect in emotional well-being, by decreasing depression and fatigue nine month after the intervention (Charlotte Gregoire et al., 2017). Furthermore, Gregoire et al. (2018) found that although self-hypnosis was effective for reducing anxiety, depression, fatigue, sleep difficulties, and the increased global health status in quality of life in case of breast cancer patients, the same result was not achieved with prostate cancer. The authors explained this through baseline differences, such as that women were experiencing more anxiety, more fatigue, and more severe sleep difficulties, most probably due to more severe treatment. Stalpers et al. (2005) found that although hypnosis did not have a direct effect on anxiety and quality of life, it did affect patients mental and overall wellbeing. In end of life care with far advanced cancer, (Liossi & White, 2001) found that patients receiving hypnosis had demonstrated better overall quality of life and lower levels of anxiety and depression. In terms of therapeutic intervention, hypnosis in the form of suggestions can directly address and reconstruct cognitive beliefs, and through this achieve better coping and improved mood and quality of life, e.g. “as you practice finding this deeply relaxed state, you will find that your confidence in your ability to cope in any situations can strengthen and grow… These affirmations repeated . . . aloud, daily . . . engender hope, optimism, and the courage to follow that path which is right for you . . . a path that leads you in the direction of joy and fulfilment” (Alden & Owens, 2015 pp. 354.)

2.8 Music in cancer care

Music as a low cost, easily accessible, and high accepted intervention is becoming more and more popular in medical settings (Corbijn van Willenswaard et al., 2017). Music-based interventions can be classified as passive (such as listening to pre-recorded music, often referred to as ‘music medicine’) or active (personally tailored music experiences with the presence of a therapist) (Bradt, Dileo, Magill & Teague, 2016). Just as hypnosis music also has an effect on specific brain functions that are involved in memory, learning

and multiple motivational and emotional states. As summarised by Koelsch, (2014) 'music-evoked pleasure' is connected with activity of the dopaminergic mesolimbic reward pathway (the right nucleus accumbens and the left dorsal striatum) and is also associated with the activity of the following structures: (a) ventromedial orbitofrontal cortex, (b) pre-genual anterior cingulate cortex, (c) amygdala, (d) anterior insula and (e) mediodorsal thalamus. The importance of these brain activities is that music is in contact with a phylogenetically old reward network with evolutionary significance. As Bradt et al., (2016) summarises, music has been used in various contexts in the cancer continuum for paediatric as well as adult patients, in order to decrease anxiety in perioperative periods and during chemotherapy or radiation therapy, to ease the side-effects of treatment, to improve wellbeing, quality of life and immune functioning. Music has its significance in stress reduction through the biological stress pathways by the modulation of stress response. Stress-reductive effects in response to music were recorded in biomarkers such as changes in cortisol level and blood glucose, heart rate and blood pressure. Stress reduction is observed irrespective of the type and duration of the music, although most studies apply classical music (Finn & Fancourt, 2018). Music can reduce anxiety and pain in perioperative settings, therefore reducing the use of sedatives and analgesics. The pain, anxiety, and stress-reducing effects of music are commonly viewed as a result of attentional distraction from a negative stimulus. Music further encourages the patient to withdraw into his or her "own world" with an additional relaxing effect (Nilsson, 2008).

2.8.1 The combined use of imagery and music in clinical settings

The Bonny Method of Guided Imagery and Music (BMGIM), is a music-centred approach that has been often acquired for several health-related problems in clinical settings. It uses recorded music from the Western classical tradition, and client generated images with the guidance of a therapist (Ventre & McKinney, 2015). BMGIM was found to reduce several mood related variables like anxiety, depression and total mood disturbance in the case of the clinical population (McKinney & Honig, 2017). BMGIM in cancer care was effective in reducing depression, anxiety, and increasing quality of life according to the review of (Roffe et al., 2010) in reducing chemotherapy-induced side effects, but results should be viewed with caution because of the small sample size and questionable design (Gimeno, 2010).

2.8.2 The comparison of use of hypnosis and music in cancer

Several studies demonstrate similar effect of hypnosis and music in treating symptoms of cancer patients. Nilsson, Rawal, Uneståhl, Zetterberg, & Unosson (2001) examined 90 patients who were undergoing hysterectomy under general anaesthesia. Patients were intra-operatively exposed to music (M), music + therapeutic suggestion (M+H) or the general sounds of the operating theatre. Patients in M group experienced more effective analgesia and were able to mobilise themselves earlier after the operation. Patients in M+H group needed less rescue analgesic. Nilsson, Rawal, Enqvist, & Unosson (2003) in another study with 182 patients used the same study design except for the control: in this case they used a blank tape in the immediate postoperative period. Pain intensity was significantly lower and oxygen saturation was significantly higher in M and M+H group. They again found no difference between the two type of intervention. Tellez, Sanchez-Jauregui, Juarez-Garcia & Garcia-Solis (2016) used pre-recorded hypnosis + music (H+M) or music only (M) and compared their results with a control group (C) in case of 75 breast cancer patients undergoing breast biopsy. They used a 17-minute pre-recorded hypnosis that induced relaxation, stress reduction, and pain relief through dissociation and healing suggestions with background music. M condition patients listened to music without hypnosis. The music consisted of 'new age music'. Stress, depression, pain, anxiety, fatigue, optimism, and general wellbeing were all measured on the Visual Analog Scale. According to their results *before* breast biopsy, the M group presented less stress and anxiety, whereas the H+M group presented reduced stress, anxiety and depression, as well as increased optimism and general wellbeing. Interestingly, a*fter* breast biopsy, the M group showed less anxiety and pain, and the H group reported less anxiety and increased optimism (Tellez et al., 2016). Most recently, Sanchez-Jauregui, Tellez, Juarez-Garcia, Garcia & Garcia, (2019) randomly assigned 170 patients to music (M) hypnosis (H) or control group in breast biopsy. Results indicated decreased stress, anxiety, depression and pain in the H and M groups compared to the control. Before biopsy H decreased pain and depression more efficiently than M, but after the biopsy no differences between the two groups were found. In line with these studies and other studies that examined the effect of music and imagery and found only small or no differences between the examined outcomes of these interventions (Gimeno, 2010; Roffe et al., 2010), hypnosis and music are both effective in clinical settings. However, in the first place they are different in mode of operation and effect, and in the second place the above-mentioned

studies, did not used detailed assessments (Shenefelt, 2011), did not explore in depth the longer-term effects and psychological outcomes.

It is also characteristic of the Hungarian research tradition that it uses positive suggestion, relaxation, imagery and /or music in somatic medicine (Varga, 1998; Varga, 2005) These studies usually unfold the effectiveness of both techniques. As an example, Jakubovits, Janecskó, Varga, Diószeghy & Pénzes (2005) found that patients listening to positive suggestion or music compared to control condition had fewer complaints, used less pain medication, and in their own judgement had better healing. In this study positive suggestion was only slightly ahead of music.

2.9 Subjective experience in hypnosis and music

2.9.1 Subjective experience in hypnosis

The attempt to understand the private experience of a hypnotised person in experimental circumstances resulted in the development of several distinctive methods and instruments for measuring the so-called subjective depth of hypnosis. Varga (2013) summarised the most important findings and evolution on this topic. One of the earliest attempts was made by LeCron (1953), who measured hypnotic depth by instructing his subject during hypnosis to estimate their hypnotic depth on a 100-point scale. His categories ranged between full wakefulness through a light, medium, deep plenary to stuporous hypnosis. LeCron's report inspired a number of other researchers to investigate the depth of hypnosis by developing various one-dimensional models based on self-reports during hypnosis. These models were similar to LeCron’s, essentially only differing in the labels used (Tart, 1970). The methods of signalling the participant's experience at the time of the suggestion became increasingly sophisticated, with technical improvements such as subjects being able to turn a dial connected to a computer to indicate changes in their experience of the suggested effect during that experience. This provided real-time insight into the changes of hypnotic depth (McConkey, Wende & Barnier, 1999); however, only a single aspect of hypnotic depth was measured.

Opposed to such single-dimensional scales, Shor introduced a three-factor theory, postulating that hypnosis is a complex of three separate but complementary psychological processes, and that therefore the measured hypnotic depth should also be three-dimensional. These dimensions are central to the hypnotic experience: trance (the true state of reality is not represented in the subject’s consciousness), unconscious

involvement (hypnotic experiences and behaviours performed by the subject without conscious intent), and archaic involvement (expressing attitudes, and modes of relating to the hypnotist as a child toward his parents) (Shor, 1962, 1970). These main factors are supplemented by the following sub-factors, which are considered to be non-hypnotic variants: (1) sleepiness, (2) relaxation, (3) vividness of imagery, (4) absorption (immersion in the state, giving up one's self), and (5) accessibility to unconscious material. Hypnotic depth is registered by the hypnotist on a six-point scale, based on the self-disclosure of the subject after hypnosis.

Based on phenomenological studies and theories similar to Shor's (1962), Kelly and Matterson constructed a paper-and-pencil questionnaire to be filled in by the subject retrospectively. The Hypnotic Experience Questionnaire is a 47-item scale which investigates five factors of hypnotic experience: (1) Dissociation/Altered State, (2) Relaxation, (3) Rapport, (4) Visual Imagery, (5) Cognitive rumination: a negatively correlated factor measuring the extent of anxious, self-reflective, and interfering thought. A composite scale, "General Depth," provides a summary measure of the subjective quality of the hypnotic experience(Matheson, Shue & Bart, 1989).

Pekala's questionnaire, the "Phenomenology of Consciousness Inventory" (PCI) was developed to map consciousness in general. It is a self-report questionnaire to be filled in retrospectively regarding any preceding stimulus condition, so it is not hypnosis-specific, but the PCI is an adequate tool to be used for the detailed quantification of the subjective experiences regarding the trance state in hypnosis. The PCI includes pattern parameters as well as intensity parameters. It is a 53-item questionnaire consisting of two opposing statements separated by a seven-point Likert scale (e.g. 'I felt very tranquil' 0 1 2 3 4 5 6 'I felt very anxious'), creating 12 dimensions and 14 subdimensions. The dimensions and subdimensions are as follows: I. Altered Experience: 1. Body Image, 2. Time Sense, 3. Perception, 4. Unusual Meaning; II. Positive Affect: 5. Joy, 6. Sexual Excitement, 7. Love; III. Negative Affect: 8. Anger, 9. Sadness, 10. Fear; IV. Attention: 11. Direction, 12. Absorption; V. Visual Imagery: 13. Amount, 14. Vividness; VI. Self-Awareness; VII. State of Awareness; VIII. Arousal; IX. Rationality; X. Volitional Control; XI. Memory, and XII. Internal Dialogue. Five pairs of reliability items are also included in the PCI (Pekala, 1991). Kumar, Pekala & Cummings, (1996) used the PCI after standardized group hypnosis sessions (Harvard Group Scale of Hypnotic Susceptibility: Form A, (Shor & Orne, 1962) and factor analysed the PCI dimensions listed above. This factor analysis

revealed five state factors: 1. dissociated control state, 2. positive affect, 3. negative affect, 4. attention to internal processes, and 5. visual imagery.

Sheehan & McConkey (1982) involve in their assessment the subjects' own retrospective observations and reports about their subjective experiences of hypnosis. Through videotape playback or imagery-induced recalls, subjects can revisit their hypnotic experience, their subjective feelings and thoughts. The theoretical foundation of this so-called Experiential Analysis Technique (EAT) is that hypnosis is an active cognitive process that involves interaction by the subject. This means that patients take an active role in recalling their experience, which mirrors their narratives and cognitive style. With this method, patients are free to recall the elements of hypnosis that had a personal significance for them.

In vivo measurement of hypnotic depth was introduced by McConkey, Wende & Barnier (1999). Subjects turned a dial to indicate changes in their experience. The depth ratings depended on the nature of the suggestion, while the difference in subjective depth could also be detected according to whether the behavioural criteria of suggested effect was 'passed' or not.

Oakley, Deeley & Halligan (2007) examined hypnotic depth in an fMRI-scanning environment. The aim of the study was to establish whether a typical fMRI-scanning environment has a potential hindering effect on the subjective depth of hypnosis. This evaluation of subjective depth of hypnosis used verbal self-reporting similar to Le Cron's hypnotic-depth scale (1953) and to the Long Stanford Scale (Tart, 1970). The small but significant increases in hypnotic depth were reported at the introduction of special-place imagery and at hypnotic paralysis. The most significant effect on hypnotic depth was eye closure, relaxation and counting procedures. In another fMRI study of McGeown, Mazzoni, Vannucci, & Venneri (2015) subjective hypnotic depth ratings – which were measured on a Likert-scale from 0-10 retrospectively by the subjects – were positively correlated with grey matter volume in the frontal cortex and the anterior cingulate cortex (ACC) . The authors further suggest that greater development of ACC helps the subject reach more intense depths of hypnosis. Hypnosis research on healthy volunteers proved that the intensity and the pattern of subjective experiences during hypnosis are 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). Despite these important findings, studies exploring the effectiveness of hypnosis in oncological settings

usually do not include the possible moderating effect of subjective experiences on the clinical outcome.

2.9.2 Hypnotic susceptibility and subjective experience

Scales measuring hypnotic susceptibility are usually administered prior to clinical hypnosis or hypnotherapy, in order to estimate a dispositional ability to become engaged in a hypnotic state and to plan treatment accordingly (e.g. Weitzenhoffer & Hilgard, 1962). It should be distinguished from hypnotic response or subjective depth, which is calculated from session to session and designed to track individual impact and subjective experience of suggestions (Kronenberger, LaClave & Morrow, 2002). The subjective experience of hypnosis measured with PCI in experimental settings was found to be related to hypnotic susceptibility (Józsa, Költő, Bányai & Varga, 2019; Pekala & Kumar, 2007). It should be noted, however, that if low and moderately susceptible people have a chance to speak about their subjective experiences freely, they report as many experiences that indicate the alteration of their usual awareness as those who are highly susceptible (Bányai, 1991). Beyond this, according to Shor (1962) the three dimensions of hypnotic depth (trance, unconscious involvement and archaic involvement) can be regarded as three separate but interrelated dimensions. On a group level, these dimensions can reflect a correlation that accounts for the relation with hypnotic susceptibility. However, this correlation is usually not high and therefore on an individual level this association between the dimensions and therefore with hypnotic susceptibility can disappear.

2.9.3 Subjective experience in listening to music

Music as a 'peak experience' has been analysed as well for differences in subjective experience and involvement. In connection with strongest musical experience, Gabrielsson & Wik (2003) created a three-level descriptive system that comprises seven fundamental categories. (1) General characteristics (unique and hard-to-describe experiences) (2) Physical reactions and behaviours (physiological reactions such as goose flesh, shivers, thrill, responses such as breathlessness, quasi-physical reactions as though being penetrated by music) (3) Perception (auditory, visual, tactile, kinaesthetic (such as being relaxed in the whole body) synaesthesia (intensified perception), (4) Cognition (altered states of consciousness like changed attitude, changed experience of body and mind, time and space, loss of control, imagery, association of memories and thoughts,) (5) Feelings/Emotions, (intense, positive, negative) (6) Existential and transcendental

aspects, (existence, transcendence, religion) (7) Personal and social aspects (new possibilities and insights, confirmation of identity, self-actualisation). Each of these contains sub-categories of specific reactions described non-exhaustively above. Their results were based on content analysis and questionnaires filled in by healthy volunteers based retrospectively on their most profound musical experience.

Nagy & Szabó (2002) developed the *Musical Involvement Scale,* which is a 29-item Likert type self-report scale that measures the capacity for being involved in musical experience. It distinguishes between high and low musical involvers retrospectively and helps to predict the musical experiences of healthy subjects in a laboratory situation. A more recently-developed scale to assess individuals' absorption in music is the AIMS (Sandstrom & Russo, 2013). It is a 34-item questionnaire that measure individuals' ability and willingness to immerse themselves in an emotional experience such as listening to music and is able to predict the strength of their emotional responses to music. AIMS is associated with general absorption, musical involvement and empathy, but it is not related to musical training.

There are broad individual differences in terms of musical experiences and involvement. Hejja-Nagy & Szabó (2006) assume that this type of involvement in music is a personal characteristic like hypnotic susceptibility, or everyday absorption. Snodgrass & Lynn (1989) compared hypnotisability with involvement in classical music in terms of self-reported absorption and imagery elaboration in the case of imaginative and non-imaginative music. Subjects were divided according to low- and high-level involvement in music based on open ended essays. High hypnotic susceptibility was connected to more absorption than low hypnotic susceptibility. More imagery elaboration was reported in the imaginative than non-imaginative music.

2.9.4 Subjective experience of hypnosis/music interventions of cancer patients: the role of patients' intrapsychic involvement:

Relatively few studies explore the nature of experiences of cancer patients undergoing adjunctive therapies involving altered states of consciousness. In these studies, it has become clear that the quality of patients' experience affects the perceived or measured benefits of the interventions. Walker et al. (1999) asked cancer patients in a relaxation combined with guided imagery study to keep a journal of their experiences, keeping track of their exercises, any difficulties experienced in the performance, as well as rating how

vivid the imagery was (with ratings of 0–10 on a Likert scale). In line with their findings, while the control and treatment groups showed no difference in primary response to the chemotherapy, there proved to be a marked difference in clinical response, showing correlation with the vividness ratings for the visualisation exercises. Eremin et al. (2009) used a similar methodology to investigate the immuno-modulatory effects of relaxation training and guided imagery exercises for patients suffering from breast cancer. Their results showed significant correlation between the vividness of imagery, as rated by the patient, and NK (Natural Killer) and LAK cell (lymphokine-activated killer cell) activity change from base line to end of chemotherapy/pre-surgery. Furthermore, significant correlation between imagery ratings and change from baseline NK cell activity, as well as IL1b (interleukin 1 beta) levels were detected eight weeks after radiotherapy.

In a pilot study of 62 hospitalized cancer patients currently experiencing pain, Kwekkeboom, Kneip & Pearson (2003) found that as imaging ability scores increased, mean pain intensity decreased, and patients reported more positive affect and perceived control over pain. However, imaging ability could not predict pain-related distress as a more emotional component of pain. In this study, the preferred way of coping with pain as a predictor of outcome expectancy was included, but no significant association was found.

In a study by Kwekkeboom, Wanta & Bumpus (2008) on the reduction in pain level among 40 cancer patients using guided imagery, they discovered that a meaningful improvement in pain reduction was associated with greater imaging ability, more positive outcome expectancy, and fewer concurrent symptoms.

Kwekkeboom, Hau, Wanta & Bumpus (2008) performed a retrospective study on how the efficacy of relaxation and visualisation treatment techniques could be affected by the perceptions and expectations of patients. According to their findings, among other factors, patients' active, motivated involvement in the treatment and individual abilities showed correlation with its ultimate effectiveness.

Regarding musical interventions with oncology patients, in line with the findings of Potvin, Bradt, Kesslick (2015) symptom management is not a linear process (i.e. receiving an intervention that helps to relieve symptoms), but rather requires intrapsychic involvement on the part of the patients to achieve a more holistic wellbeing. The authors

also recommend for future research the incorporation of intrapsychic content when examining interventions for symptom management.

These findings demonstrate that there is an important relationship between the subjective experience of patients, their active involvement, the vividness of imagery, and the efficiency of the method used. However clinical trials to describe the effects of a supportive techniques (like hypnosis, music) in oncology settings, and to determine statistical significance, usually report group data (e. g. means) only. These studies tend to overlook how individuals respond to the psychological intervention technique in question. Patients' subjective experience and level of involvement in the given technique and, as a result, their perception on how well the intervention worked for them, are often not reflected in the conclusion drawn from the group data. So, it is important to identify patient-related factors that influence the effectiveness of a supportive intervention in cancer care. Therefore, patients' subjective experience should be better understood and analysed.

In summary, in order to help patients to adjust to breast cancer it is extremely important to understand the personality resources which help patients to become stress-tolerant and to cope effectively. Since psychological immune competence involves coping strategies, protective personality resources and dimensions of resilience, it seems to provide a comprehensive insight into coping processes. It is important to gain more knowledge on the psychological immune competence that characterises breast cancer patients, and on how it changes over time, during cancer treatment and the survivor period, and how it can be affected by well-proven methods in oncological settings, by psychological interventions such as hypnosis or music medicine. Patients' subjective experience of guided imagery interventions such as imagery ratings, involvement and vividness seems to have an impact on the clinical outcomes of cancer patients, therefore it seems essential to explore in depth what patients experience when undergoing adjuvant hypnosis or music medicine as psychosocial interventions during their cancer treatment, and how these experiences are related to coping, personal resources, how they reflected in adaptational outcomes such as patients' quality of life and personal growth.

3 Aims and hypothesis

The main aim of our study is to discover the patterns of psychological immune competence of breast cancer patients: changes during treatment and in early years of survivorship, changes that occur due to psychological interventions. Furthermore, our aim is to analyse the subjective experience of psychological interventions (hypnosis/music/special attention only without further intervetion), and compare patients' psychological immune competence, quality of life and posttraumatic growth according to it.

To study the above aims, we compared our breast cancer patient sample to a group of healthy women in order to determine how the patients' psychological immune competence develops during the study compared to a healthy sample. We found it important to determine the most dominant elements of psychological immune competence that are used by patients receiving different interventions.

Based on theoretical considerations and previous empirical findings, 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?

4 Method

4.1 Study framework

The presented data 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), which aims to prove that hypnotherapy administered during chemotherapy has beneficial effects on intermediate and high-risk breast cancer patients in terms of disease-free survival, cell-mediated immunity, on adverse events (nausea, vomiting, hospitalization), general mood and physical-state, quality of life, psychological immune competence as a coping resource, and post-traumatic growth. The effectiveness of hypnosis is compared with music selections and special attention only, which are provided throughout the course of chemotherapy. Patients follow a standardised taxane-antacycline chemotherapy protocol: 4 cycles of Adriamicin and Cyclophosphamide (AC) and 12 cycles of Paclitaxel (PAC) in 24 weeks. While receiving cytostatic infusion or waiting for blood test results, patients listened to either pre-recorded positive suggestions in hypnosis, or a classical music selection with the same dynamism and duration, or received special attention above standard medical care without any further intervention (Bányai, 2013; Bányai, 2015a; Bányai et al., 2017). The research took place in three different institutes in Hungary, with the collaboration of a multidisciplinary team, in the following locations: (1) The National Institute of Oncology (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.

4.2 The phases of pilot work preceding the study

The above-mentioned, multistage onco-psychological research project started with a qualitative pilot investigation mapping psychosocial correlates of high-risk Hungarian breast cancer patients and matched a healthy control group in order to explore and ground further research. The result of this first phase has been published in the following journal articles (Mersdorf, Vargay, Horváth & Bányai, 2013, 2014a b).

The second phase was the preparation and pre-testing of the previously-mentioned study, PSYHOLOGICAL RESOURCES AND HEALING. Besides preparing the protocol and testing material for the study, an important task was to prepare the text of hypnotic suggestions. For a professionally grounded hypnosis intervention, a literature review of existing methods was conducted. Besides several other theoretical and clinical considerations, the knowledge and consequences gathered in the field of hypnosis in paediatric cancer settings was used in order to create hypnotic suggestions which were summarised in a review article (Vargay, 2012). A selection of classical music as a second type of intervention was prepared to compare its effect to hypnosis. This music was intended to follow the themes, dynamism, and duration of the hypnotic suggestions. and was tested before use on oncology patients and healthy volunteers (Bányai & Vargay, 2013).

In order to compare certain psychological features of the breast cancer sample with the healthy Hungarian population, testing of a healthy control group was also incorporated. Therefore, data on psychological immunity of healthy Hungarian women was gathered on community sites and a convenient sample was arranged.

The previously-mentioned, ongoing study of PSYHOLOGICAL RESOURCES AND HEALING began in 2011, and a follow-up period is currently in progress.

4.3 Subjects

4.3.1 Healthy control group

In order to compare the psychological immunity of the study population to the average healthy woman, the psychological immunity of 668 Hungarian women was measured. The healthy control group was reached in two waves. First, via internet, through popular websites and community sites, the PICI profiles of women above the age of 35 who consider themselves healthy were gathered (n=249). The second wave was a convenience sampling, gathered by psychology students (n=419). 152 women were excluded because they indicated at least one chronic state or temporary disease. In the final sample, the data of 516 healthy women aged between 18 – 82 was analysed (M = 33.42, SD = 14.33).

4.3.2 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). These intermediate- and high-risk patients spoke Hungarian, were above 18 years of age, and without known psychopathology. All patients underwent complete surgical resection. For inclusion criteria to the study the following algorithm was used:

The breast cancer is:

- hormone-receptor negative (i.e. "triple-negative") OR
- hormone-receptor positive, AND patients who have
- more than 3 positive axillary lymph nodes (i.e., pN2 or pN3) OR
- less than 4 positive axillary lymph nodes (pN1) AND pT≥2 AND (MAI>20 or Ki67>30%) AND/OR histological grade: II-III; OR
- two of the above variables AND age younger than 40; OR
- the probability of 10 years progression determined by Adjuvant!Online® (choosing third generation chemotherapy protocol and best-available endocrine therapy) is greater, than 30%.

Patients were recruited in three distinct oncology centres and were elected by the local onco-team. Patients' oncologists in the National Institute of Oncology described the nature of the study on their first visits, and invited them to participate in a study to

compare the effectiveness of different psychological interventions. Patients who agreed were randomly assigned to the hypnosis or the music group. 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 this, other two special attention group was gathered in two remote cities: in the Oncology Ward of the Markusovszky Lajos Hospital (Szombathely) and in the Institute of Oncology of Debrecen University (Debrecen) (see in more details below).

Participation was voluntary, with a signed, informed consent form. Randomisation of hypnosis and music groups according to menopausal and hormonal status and hypnotic susceptibility took place during the first meeting with the research team A total of 161 patients were selected for the study. By the time my data was finalised, twelve patients had been excluded. Exclusion of patients (n=5) was either due to the fact that after their inclusion it was discovered that they were suffering from an illness that was a negative circumstance in the study (i.e.: psychosis or severe spleen disease requiring spleen removal). Or because paclitaxel (PAC) in the second phase of treatment induced a severe allergic reaction and their treatment therefore continued with different chemotherapy. Exits from the study (n=7) usually occurred prior to the start of PAC treatment: patients either stopped taking chemotherapy on a weekly basis, or completely stopped taking chemotherapy (for example, they were threatened with dismissal due to frequent absences at their workplace). Or they wanted to continue their treatment at a facility closer to their place of residence. Altogether the data of 149 breast-cancer patients (aged between 25–75 years (M = 53.30, SD = 10.83)) were analysed, but since it is an ongoing study, at the different test phases variant sample sizes were available. For the analyses presented below, the exact number of elements relevant to the given analysis will be described.

4.4 Interventions

Special attention above standard medical care was provided to all subjects of the study. Extra attention was given in a form as being accompanied throughout the treatment by

the research team, who enquired about their physical and emotional well-being on each occasion and providing more attention than to patients receiving regular treatment at the same medical institute. 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 music assembly, (3) *special attention only group (later special attention group)*, receiving special personal attention without further intervention. Patients in this group received special attention only, besides standard medical treatment.

4.4.1 The process of hypnosis / music intervention

Hypnosis and music were administered 21 times throughout the 24-week AC/PAC cytostatic treatment. Patients listened to pre-recorded hypnosis or music sessions through MP3 players while receiving chemotherapy or waiting for blood test results. Every patient in the study received this same treatment. A treatment session consisted infusion of premedication (approximately 15-30 minutes) and chemotherapy received in infusion which took approximately 1 hour 15 minutes. During premedication patients were asked about their physical and emotional states using visual analogue scales designed to measure these aspects. Hypnosis or music began when cytostatic infusion started. Hypnosis and music were designed to match the duration of the treatment, so they ended when the infusion dripped, there was no need to restart them. Since the procedure took place in the chemotherapy treatment rooms while receiving the prescribed treatment or waiting for blood test results, the intervention did not require any extra effort or time on the part of the patients. The study embedded in the everyday routine of the clinic, while several other patients and members of the medical team were present, resulting in a less intimate atmosphere. A hypnotherapist was present during all sessions to provide help if needed. During the study period no interference from the side of the hypnotherapist was needed due to problems arising from hypnosis. The significance of this setting is that the described method can be part of a regular cancer treatment without any further room or device requirements. Intervention happened in the following cycle during the 12 weeks of AC treatment: Week 1: intervention during chemotherapy. Week 2: intervention while waiting for blood test results. Week 3: no meeting with the patient. During the following 12 weeks, PAC treatment involved weekly interventions during chemotherapy. AC represented demanding and burdensome treatment for patients with severe, mainly emetogenic, side-effects, while PAC treatment, due to its premedication, made patients

sleepy and tired during the actual chemotherapy. It also entailed a greater incidence of allergic reactions, and long-term neuropathic side-effects.

4.4.1.1 Hypnosis

The hypnosis started with a standardised relaxational hypnotic induction in permissive style, with occasional indirect instances (Bányai, 2015b, 2008) , followed by regular relaxational therapeutic suggestions with additional immaginative active-alert suggestions for enhancing immune functions of the patients. (Banyai, 2018). Therapeutic and posthypnotic suggestions focused on how to decrease stress-induced anxiety, and how to deal with the side-effects of chemotherapy (e.g., nausea, hair loss). Suggestions concentrated on activating inner healing resources in a symbolic way, and on facilitating immune functions, as well as on metaphors for ego-strengthening and increasing motivation for recovery. All sessions ended with a formal process of dehypnosis. Hypnosis consisted of three slightly different phases:

- During the course of AC treatment (8 sessions) acceptance of chemotherapy, cooperation with the healing team, exploring psychological resources, immune enhancements, and replenishing psychological resources were the focus of the hypnotic suggestions.
- In the second series (the first six sessions of PAC treatment) the metaphor of healing after a natural disaster (forest fire) was employed, followed by suggestions facilitating the understanding of the personal meaning of the illness and 'communication' with the body.
- In the third series (last 7 weeks of PAC treatment) resocialization, future orientation, outline of a positive image of the future were the focus of the hypnotic suggestions. According to the content, suggestions could be divided into three different groups: (1) general ego-strengthening, (2) focusing on cancer specific symptom reduction, (3) focusing on the theme of the breast.

The used suggestions were developed by the research team, led by Prof. Éva Bányai, the principal investigator, based on the current literature on hypnotic suggestions used in case of adult (for review see Jakubovits (2011) and paediatric cancer patients (for review see Vargay, 2012) as well as on the clinical experience of the hypnotherapist members of the research team and other professionals of the International Hypnosis Society who were consulted on this topic. The procedure was embedded in the approach frame of the social-

psychobiological model of hypnosis (Bányai, 1991; Bányai, 2008; Bányai, 2019) and is in line with the latest APA definition of hypnosis: “A state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion.” (Elkins, Barabasz, Council, & Spiegel, 2015, p. 6.)

For list of suggestions see Appendix 1.

4.4.1.2 Music

Music was chosen as the control condition for hypnosis since it has been shown to cause similar attentional dissociation. Although its beneficial effect was assumed, the primary aspect in selecting the music was not the therapeutic effect, but rather the ability to fill the control function as much as possible for hypnosis and at the same time to be enjoyable for the patients. Therefore, music was arranged to match the dynamism and duration of the hypnotic suggestions. It was a selection of classical music that was intended to follow the different themes of the hypnosis, 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. Choosing music was a multi-step process. First it was listened through and filtered by the research team. The music was tested afterwards on a voluntary basis by the patients of the National Institute of Oncology, currently undergoing chemotherapy. (Surprisingly many people asked to listen to the music). They commented on the music: how much they liked it, what impact it had on them, what kind of feelings it awakened. At the same time, the Liszt Ferenc Academy of Music tested the music on healthy students. This was followed by the finalization of the musical material (Bányai & Vargay, 2013). The musical selection is listed in Appendix 2.

4.4.2 Special Attention Only

As was mentioned before, for ethical reasons a control group receiving standard medical care only was not included. For the same ethical reasons, all patients who agreed to take part in the study to compare the effectiveness of different interventions received either hypnosis or music. Therefore, only those patients who in NIO refused to receive hypnosis or music intervention, or who were recruited in distinct oncology centres (Szombathely, Debrecen) for studying the relationship between psychological and physical states, became part of the special attention only study group.

Since it was hypothetised that there might be differences in psychological characterisics between those who accepted interventions and those who refused them, in Szombathely and Debrecen the members of the special attention group was tested on whether they would participate or refuse such interventions. However, since differences either in psychological measures (baseline PICI, QoL and follow up PTN) or baseline physiological measures (NK activity, blood count) between those who would accept or refuse hypnosis/music as an intervention was 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. This meant a greater than average level of attention during oncological treatment in the same institute. In practise, patients were welcomed on arrival, then a research assistant inquired into their physical and emotional state. When the chemotherapy started the assistant stopped talking, just as in the case of hypnosis and music, and sat silently in the room, taking notes, or started attending to another patient. After the treatment the patients were questioned about their subjective experience simirarly to the members of the hypnosis and music groups.

The following figure summarises the intervention groups at the three different locations (Figure 2.)

Overview of research

<table>
<tr><td colspan="4">National Institute of Oncology</td><td colspan="3" rowspan="3">Department of Oncoradiology in Szombathely, Institute of Oncology of Debrecen University</td></tr>
<tr><td colspan="4">Recruiting for studying psychological effects of interventions: hypnosis / music</td></tr>
<tr><td colspan="2">Agreed</td><td colspan="2">Rejected</td></tr>
<tr><td colspan="2" rowspan="3">Random assignment</td><td colspan="2">Recruiting for studying relationship between psychological and physical states</td><td colspan="3">Recruiting for studying relationship between psychological and physical states</td></tr>
<tr><td rowspan="2">Agreed</td><td rowspan="2">Rejected</td><td colspan="2">Agreed</td><td rowspan="2">Rejected</td></tr>
<tr><td colspan="2">Questionnaire[2]: Would you accept hypnosis / music ?</td></tr>
<tr><td>Gets attention + HYPNOSIS (n=47)</td><td>Gets attention + MUSIC (n=47)</td><td>Gets attention (n=6)</td><td rowspan="2">No data</td><td>Gets attention (n=21)</td><td>Gets attention (n=28)</td><td rowspan="2">No data</td></tr>
<tr><td>Assessment QOL, PICI, PTGI, subjective experience, hypnotizability[1]</td><td>Assessment QOL, PICI, PTGI, subjective experience, hypnotizability[1]</td><td>Assessment QOL, PICI, PTGI, subjective experience[1]</td><td>Assessment QOL, PICI, PTGI, subjective experience[1]</td><td>Assessment QOL, PICI, PTGI, subjective experience[1]</td></tr>
</table>

Figure 2.: Overview of study sample. Detailed descriptives of the study sample will be given in the 'Results' section

NOTE: 1: physiological and psychological measures not included in the present dissertation (blood count, NK cell number and activity, nausea/vomiting, emotional and physical well-being scales, PSDS and Life Event List, Structured Psychological Interviews),

2: the questionnaire was asking hypothetical questions about the willingness of patients of participating in a study that involves alternative adjuvant interventions eg.: hypnosis and music among 8 other possibilities.

4.5 Measures and data collection (relevant to the dissertation)

4.5.1 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 which results in elevated levels of distress.

The measuring points were the following:

- T1: after diagnosis and surgery, before starting chemotherapy treatment and psychological interventions. This point served as a baseline,
- T2: after 12 weeks of AC treatment, on the first PAC treatment,
- T3: after 12 week of PAC treatment, at the end of chemotherapy treatment and psychological intervention period,
- T4: 12 months after diagnosis, early survivorship, in the past few months most probably re-entering previous life, field of work and duty,
- T5: 24 months after diagnosis, medium-term survivorship,
- T6:36 month after diagnosis medium-term survivorship.

4.5.2 Quantitative measures

4.5.2.1 PICI

Psychological immune competence was measured by the Psychological Immune Competence Inventory (PICI), which is an 80-item inventory containing 16 scales and 3 subordinate systems. PICI was conceptualised and operationalized to evaluate individual mental resistance and coping capacity. The test explores those personality resources that grant effective coping strategies to endure stressful events in a way that the integrity, effective functioning, and developmental potential of the personality remain uninjured. The validity of PICI was tested with the Big Five dimensions, with the Three Giants (Neuroticism, Psychoticism, Extroversion), and with prominent indicators of healthy personality (learned resourcefulness, dispositional optimism, constructive thinking, hardiness, psychological well-being and ego-resiliency, and with effective functioning in life (mental/somatic healthy, flow, burnout) (Oláh, 2005a). The 16 scales are: (1) Positive Thinking, (2) Sense of Control, (3) Sense of Coherence, (4) Creative Self-Concept, (5) Sense of Self-Growth, (6) Change and Challenge Orientation, (7) Social Monitoring Capacity, (8) Problem Solving Capacity, (9) Self-Efficacy, (10) Social Mobilizing Capacity, (11) Social Creation Capacity, (12) Synchronicity, (13) Goal-Orientation, (14) Impulse Control, (15) Emotional Control, and (16) Irritability Control. The three subordinate systems are: Approach-Belief Subsystem, Monitoring-Creating-Executing Subsystem, Self-Regulating Subsystem. 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; T1: after the diagnosis and surgical resection, before the chemotherapeutic treatment as baseline, T2: after 12 weeks of AC treatment, T3: at the end of the 24 weeks of chemotherapeutic treatment, T4–T5–T6: follow-up period, 1–2–3 years after diagnosis.

4.5.2.2 WHOQOL-100

Quality of life was assessed by the WHOQOL-100 questionnaire that measures "individuals' perceptions of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns" (The WHOQOL Group, 1998 p. 1405). WHOQOL-100 proved to be reliable and valid on a sample of breast cancer patients and survivors (Den Oudsten, Van Heck, Van der Steeg, Roukema, & De Vries, 2009). 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, as was PICI.

4.5.2.3 Post-traumatic Growth Inventory

The post-traumatic growth of patients was measured by the Post-Traumatic Growth Inventory (PTGI) (Tedeschi & Calhoun, 2004), an instrument developed to assess positive changes and outcomes after a traumatic event. It is a 21-item questionnaire with five sub-scales: Relating to Others, New Possibilities, Personal Strength, Spiritual Change and Appreciation of Life. The five-factor structure of the questionnaire was proved to be valid on a sample of physically active breast cancer survivors.(Brunet, McDonough, Hadd, Crocker, & Sabiston, 2010). The PTGI is registered once in the follow-up period, three years after the diagnosis (T6).

All questionnaires were filled out on occasions when the patient visited the institution for examination or treatment, i.e. it did not represent an extra trip. They were filled out in the research room, ensuring calm conditions or occasionally patients could fill it in the waiting area adjusted to their needs. A member of the research team who was present at that time presented the questionnaire to the patient in paper form. No one refused to fill

in the questionnaires, but since the participants on the study were seriously ill, errors could have occurred.

4.5.2.4 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 music and hypnosis group. The standard hypnosis was carried out by the hypnotists participating in the study (mainly by the principal investigator of the study), in the room reserved for the research, under undisturbed conditions at the National Institute of Oncology.

4.5.3 Qualitative data

4.5.3.1 Patients' subjective experience of interventions

Besides quantitative data, qualitative information was also gathered from patients. Relevant to this work was the subjective experience of patients while either receiving hypnosis/music or being accompanied throughout an actual chemotherapy infusion treatment. Patients' subjective experience was registered by research assistants via face-to-face interviews following each session. Assistants asked patients to report on their thoughts and feelings after each hypnosis or music session, or in the case of the special attention group, after receiving the chemotherapy infusion, or while waiting for their blood test results. The first standardised question asked of the hypnosis/music group was: "Please tell us, in your own words, everything you have felt and experienced since listening to the hypnosis/music" and for the group with special attention: "Please tell us, in your own words, everything you have felt and experienced since receiving the chemotherapy." However, assistants were allowed to raise further questions to clarify patients' statements, to facilitate more detailed explanations, or to reflect on their emotions in a non-directive way. All assistants were trained in the above-described process. The patients' answers were recorded on an mp3 player and later transcribed verbatim for further analysis. The verbatim texts serve as the basis for content analysis. The lengths of the answers given varied from 5 to 2279 words, with the mean 203.

Figure 3 below gives an overview of the study protocol, frequency of interventions, measuring times and data collection.

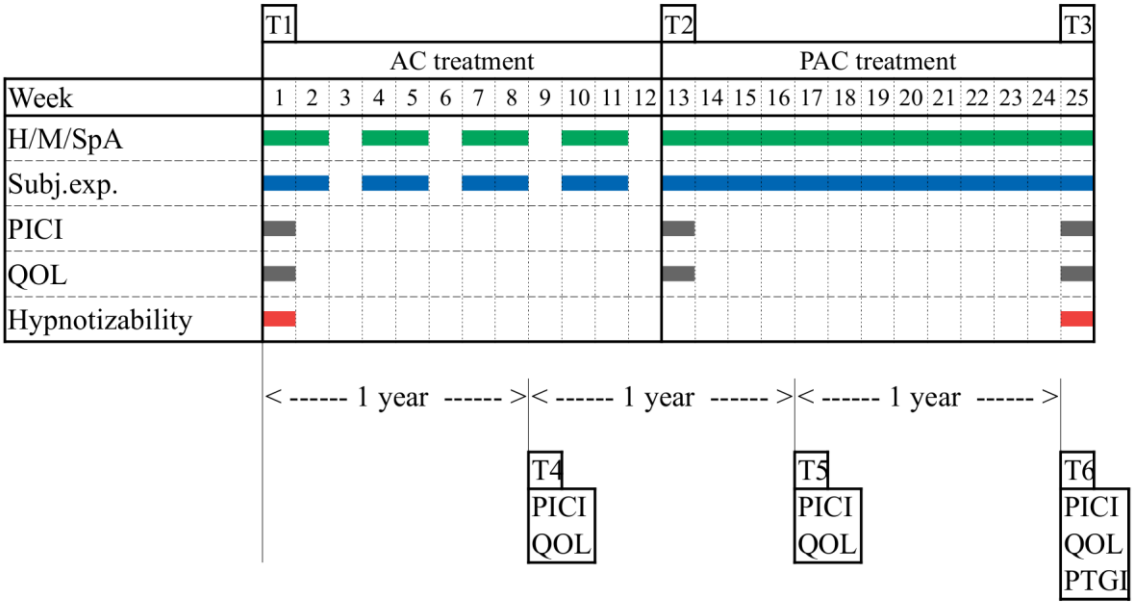


Figure 3.: Study protocol: frequency of interventions, measuring times and data collection.

T1-T6: measuring points,

H/M/SpA: Hypnosis, Music, Special Attention,

PICI: Psychological Immune Competence Inventory,

QOL: WHOQOL quality of life questionnaire,

PTGI: Post-Traumatic Growth Inventory,

Other physiological and psychological indicies not included in the present dissertation were measured, details see below.

4.5.4 Data measured in the study but not used in the dissertation

The study measured a number of other variables that are beyond the scope of this dissertation. At the same time, it is important to mention these outcome measurements for a full insight.

Several physiological indicators were measured in the study:

- Full blood count was measured before the initiation of treatment, during each chemotherapy treatment, (in case of AC treatment also one week after chemotherapy as a check-up), and at the end of the chemotherapy phase, altogether 21 times.

- Natural Killer (NK) cell activity was measured six times as PICI and WHOQOL100 was measured: at the beginning of chemotherapy treatment before the first AC, 12 weeks later before the first PAC treatments, and at the end of the chemotherapy protocol, then every 12 months for three years follow-up.
- Nausea/ vomiting as side-effects were registered at each chemotherapy treatment, 17 times altogether.

Psychosocial measures which were not included:

- Analogous emotional and physical wellbeing scales were registered each time when meeting with the patients, during chemotherapy and also in the follow up period, 25 times altogether. Patients were asked to choose a face or a body image closest to their actual emotional and physical feelings, and afterwards to explain their choice.
- Structured interviews (the first psychological interviews and the interviews after the termination of the chemotherapy treatment, and at the end of a three-year follow-up period) were conducted to gain a better insight into patients' attitudes toward the chemotherapy treatment and to our interventions before and after.
- PSDS and Life Event List were registered at T6, three years after the diagnosis

4.6 Data analysis

Data analysis can be divided into six different sections:

1. Comparison of PICI results of breast cancer patients with 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, PTN) in the three groups to patients' subjective experience.

4.6.1 Statistical analysis for quantitative measures.

Descriptive statistics, including mean, standard deviation, frequencies and percentages, were used for describing the sample and the data.

One sample t-test was used to examine the difference between the sample's mean and the hypothetical mean. Cohen's d was calculated as effect size.

Paired sample t-test was calculated to determine if the mean differs between two sets of cases.

To compare means between two groups of independent samples a t-test was conducted, and to compare means between three groups, a one-way ANOVA was used. Due to significant difference in groups' sample size, the robust Welch test was used. In case of independent samples t-test, Hedges' g was used to measure effect size with a correction for small sample size (under 50). In case of one-way ANOVA omega-squared was calculated as effect size.

Tukey or Games-Howell post-hoc test was used (considering homogeneity of variance assumption) for pairwise comparisons. For interpretation of effect size measurements, the Cohen's criteria were used (Ellis, 2010).

Binary logistic regression was conducted to ascertain the effect of a predictor on the likelihood that participants would be classified as high involvement. Due to the relatively small sample size, binary logistical regression was used with the bootstrap method.

Factorial repeated measured ANOVA was used to examine the Time main effect and Time x Factor interaction in a within-subject method. The partial eta-squared was calculated as effect size indicators.

To compare group differences, Bonferroni correction was used: for the 3 PICI subsystems: .05/3= .017, for the 16 PICI scales: .05/16=.003; for the 6 domains of WHOQOL100: .05/6=.008; and for the factors of PTGI: .05/5=.010 .

When evaluating the results, both statistical and practical significance were used. A statistically significant result means that the p-value (with Bonferroni adjusted value) was under a fixed P limit. For explorative purposes beyond statistically significant differences using Bonferroni corections, practical significances were also calculated. A practically significant result means that the calculated magnitude of effect revealed at least small effect.

4.6.2 Method of the qualitative data analysis

Qualitative data analysis was implemented on patients' subjective experience of hypnosis, music and special attention. In its methodology phenomenological approach (similar to (Smith & Osborn, 2008) interpretative phenomenological analysis (IPA method) and content analysis methods (Downe-Wamboldt, 1992) were combined. The

aim was to examine breast cancer patients'personal perception on the received intervetions, and to create a categories system about the experience itself.

The data analysis was divided to two phases. In the first phase, a phenomenology-oriented and inductive method was used, in the second phase systematic content analysis for codifying the system was aquired.

In the first phase alltogether 351 sessions (hypnosis/music/special attention) were analysed. Two independent researchers from the research team (female psychologists familiar with hypnosis, having practice in the field of oncology) read the subjective experinece narratives of hypnosis, music and special attention sessions (Smith, 2004). The transcripts were studied and reread several times to assure the knowledge of the text indepth. The researchers searched for emerging themes in the patients' self-disclosure (Downe-Wamboldt 1992), and then defined categories. The emerging themes reflected involvement in the psychological intervention. One researcher created a list of basic themes and subcategories which was then given to the other researcher. She was asked to create subcategories for the basic themes as well. Her categories after were compared with the original list. The two lists were repeatedly compared with the interview data, until the two researchers were in agreement regarding the basic themes and sub-categories. The two researchers then named these categories. After this, two other independent raters (male psychology students, undergoing BA, later MA training in clinical psychology) were tasked with measuring the reliability of the coding system, through encoding a total of 1568 hypnosis / music / special attention sessions. The analysed text comprises a total of 318786 words. The raters were blind to the hypothesis of the study, had only basic knowledge of hypnosis, did not meet with the patients, did not participate in other phases of the research, and only a minimum of research details were known to them. They worked completely independently of each other. In theory, they were blind to the affiliation of patient groups, but total blindness was impossible due to the nature of the texts (Vargay et al., 2018).

5 Results

Results can be divided into seven main sections. After the (1) descriptive statistics of study sample, the (2) PICI results of healthy Hungarian women and breast cancer patients are compared. It is followed by (3) the psychological immunity of breast cancer patients (irrespective to group affiliation) at certain phases of cancer treatment is described. Then

(4) the PICI results of hypnosis/music/special attention groups are compared at the 6 measuring points during the intervention and follow up period. As a following step (5) the effect of time on PICI results depending on groups is introduced. Afterwards (6) the analysis of patients' subjective experience of received psychological intervention (hypnosis/music/special attention) is introduced. Then (7) the relation between subjective experience and psychological measures (PICI, QOL, PTGI) is analysed.

5.1 Descriptive statistics of study sample

The study sample consisted of 149 breast cancer patients aged between 25–75 years (M = 53.30, SD = 10.83). In terms of education level: 17 patients (11.4%) had primary education, 80 patients (53.7%) had secondary education, 43 patients (28.9%) had higher education. In terms of marital status: 11 patients (7.4%) were single, 86 patients (57.7%) were married, 11 patients (7.4%) were in relationship, 15 patients (10.1%) were divorced, and 18 patients (12.1%) were widows.

The Hungarian healthy control group consisted of 516 women; aged between 18 – 82 years (M = 33.42, SD = 14.33). In terms of education level: 7 women (1.4%) had only primary-level education, 301 women (58.3%) had secondary education, 208 women (40.3%) had higher education. In terms of marital status: 145 (28.1%) were single, 133 (25.8%) were married, 196 (38%) were in relationship, 32 (6.2%) were divorced, and 10 (1.9%) were widows.

5.2 Comparison of the Psychological Immune Competence Inventory (PICI) characteristics of breast cancer patients and healthy Hungarian women

In order to examine the differences between the psychological immunity of breast cancer patients as a special subgroup and healthy Hungarian women, the baseline PICI results of breast cancer patients (n= 149) were compared to a healthy Hungarian control group (n=516). First the internal consistency of PICI results in case of breast cancer patients and healthy women are introduced, then the cumulative PICI results and PICI scales are compared between the two groups.

5.2.1 Internal consistency of PICI in case of breast cancer patients

In order to describe internal consistency of PICI of breast cancer patients, the Cronbach α of cumulative PICI and PICI scales was counted. Cronbach α for cumulative PICI was

.950 which is an excellent level of internal consistency. Table 5 demonstrates the Cronbach α of PICI scales. Cronbach α of Sense of Control (.549) showed a poor internal consistency and the Cronbach α of Sense of Coherence (.678), Impulse Control (.679) reflected a questionable internal consistency. When analysing the results, these values should be taken into consideration. The rest of the scales fall between .702 and .885 an acceptable to good level of internal consistency.

5.2.2 Internal consistency of PICI among healthy Hungarian women

The Cronbach α of cumulative PICI and PICI scales was counted to describe the internal consistency of PICI of healthy women. Cronbach α for cumulative PICI was .958, which is an excellent level of internal consistency. For Sense of Control the Cronbach α was .597, representing poor internal consistency, and in case of Impulse Control the Cronbach α was .656 representing questionable internal consistency. When analysing the results, these values should be taken into consideration. The rest of the scales fall between .749 and .881, meaning acceptable to good internal consistency. Table 5 below shows the Cronbach α in the case of PICI scales.

Table 5.: The Cronbach α of PICI scales

PICI scales	**Breast cancer patients**	**Healthy women**
	Cronbach α	**Cronbach α**
Positive Thinking	.885	.851
Sense of Control	.549	.597
Sense of Coherence	.678	.749
Creative Self Concept	.855	.881
Sense of Self Growth	.763	.759
Change and Challenge Orientation	.702	.846
Social Monitoring Capacity	.859	.872
Problem Solving Capacity	.845	.862
Self-Efficacy	.715	.753
Social Mobilizing Capacity	.760	.789
Social Creating Capacity	.860	.847
Synchronicity	.798	.798
Goal-Orientation	.717	.764
Impulse Control	.679	.656
Emotional Control	.772	.804
Irritability Control	.712	.809

5.2.3 Comparing PICI profile of healthy women with the breast cancer patients

The mean of cumulative PICI and scales of the healthy Hungarian woman (n=516) were used as standard scores. One sample t-test was calculated to examine the differences between the breast cancer patients (n = 149) at T1 and standard scores in cumulative PICI and scales.

5.2.3.1 Comparison of cumulative PICI of healthy women and breast cancer patients

When cumulative PICI results of healthy women (M=224.72, SD=34.74) and breast cancer (M=233.27, SD=32.64) patients were compared, it revealed that breast cancer patients had significantly higher cumulative PICI scores (t(663)=3.144 p=.002, Cohen's d=.26). Cohen's d reflected a small effect size.

5.2.3.2 Comparison of PICI scales of healthy women and breast cancer patients

At baseline (T1) there was no significant difference in 5 scales of PICI between healthy women and breast cancer patients. 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 2 scales – Sense of Self-Growth and Social Monitoring Capacity – breast cancer patients scored significantly lower than healthy women (Table 6.)

Table 6.: Comparison of PICI scales of healthy women and breast cancer patients at the 6 measuring points

Bold = statistically significant difference between groups (Bonferroni adjusted value),
Italic = practically significant difference between groups with Cohen d > .2 (based on Bonferroni adjusted α-value statistically non-significant results)

	Healthy women (n=516)		**Breast cancer patients (n=144)**		**t**	**p**	**Cohens ' d**
T1	**M**	**SD**	**M**	**SD**			
Positive Thinking	14.87	3.49	16.02	3.43	4.023	**< .001**	.34
Sense of Control	13.85	2.57	15.04	2.31	6.196	**< .001**	.52
Sense of Coherence	15.31	3.27	15.24	2.91	-.276	.783	.02
Creative Self Concept	14.73	3.56	16.05	3.31	4.781	**< .001**	.40
Sense of Self Growth	15.28	3.37	14.61	3.17	-2.535	.012	*.21*
Change and Challenge Orientation	13.42	3.55	14.15	3.10	2.810	.006	*.23*

Social Monitoring Capacity	14.60	3.48	13.73	3.57	-2.924	.004	*.24*
Problem Solving Capacity	14.30	3.45	14.31	3.37	.045	.965	.00
Self-Efficacy	14.62	3.06	15.65	2.89	4.291	**< .001**	.36
Social Mobilizing Capacity	14.52	3.41	15.96	3.26	5.301	**< .001**	.44
Social Creating Capacity	13.16	3.45	14.01	3.56	2.857	.005	*.24*
Synchronicity	13.13	3.71	13.64	3.35	1.822	.071	.15
Goal-Orientation	14.94	3.11	16.28	2.59	6.199	**< .001**	.52
Impulse Control	14.00	3.04	13.69	3.26	-1.125	.262	.09
Emotional Control	11.60	3.65	11.35	3.20	-.923	.358	.08
Irritability Control	12.39	3.68	13.54	3.22	4.267	< **.001**	.36

	Healthy women (n=516)		**Breast cancer patients (n=94)**		**t**	**p**	**Cohens ' d**
T2	**M1**	**SD1**	**M2**	**SD2**			
Positive Thinking	14.87	3.49	15.52	3.38	1.866	.065	.19
Sense of Control	13.85	2.57	14.70	2.56	3.221	**.002**	.33
Sense of Coherence	15.31	3.27	15.04	2.94	-.882	.380	.08
Creative Self Concept	14.73	3.56	15.38	3.28	1.929	.057	.19
Sense of Self Growth	15.28	3.37	14.32	3.22	-2.896	.005	*.29*
Change and Challenge Orientation	13.42	3.55	13.50	2.88	.269	.789	.02
Social Monitoring Capacity	14.60	3.48	13.59	3.12	-3.158	**.002**	.30
Problem Solving Capacity	14.30	3.45	14.22	3.14	-.237	.813	.02
Self-Efficacy	14.62	3.06	15.27	2.75	2.276	.025	*.21*
Social Mobilizing Capacity	14.52	3.41	15.40	3.17	2.704	.008	*.26*
Social Creating Capacity	13.16	3.45	13.62	3.16	1.404	.164	.13
Synchronicity	13.13	3.71	13.46	3.57	.890	.376	.09
Goal-Orientation	14.94	3.11	15.79	2.71	3.029	**.003**	.28
Impulse Control	14.00	3.04	14.48	3.09	1.501	.137	.16
Emotional Control	11.60	3.65	11.71	3.36	.326	.745	.03
Irritability Control	12.39	3.68	13.16	2.72	2.746	.007	*.22*

	Healthy women (n=516)		**Breast cancer patients (n=115)**		**t**	**p**	**Cohens ' d**
T3	**M1**	**SD1**	**M2**	**SD2**			
Positive Thinking	14.87	3.49	16.30	3.15	4.885	**< .001**	.42
Sense of Control	13.85	2.57	15.17	2.57	5.533	**< .001**	.52
Sense of Coherence	15.31	3.27	15.93	3.08	2.162	.033	.19
Creative Self Concept	14.73	3.56	16.32	3.16	5.395	< **.001**	.46
Sense of Self Growth	15.28	3.37	14.97	3.25	-1.010	.314	.09

Change and Challenge Orientation	13.42	3.55	14.00	2.94	2.117	.036	.17
Social Monitoring Capacity	14.60	3.48	13.90	3.77	-2.006	.047	*.20*
Problem Solving Capacity	14.30	3.45	14.62	3.19	1.066	.288	.09
Self-Efficacy	14.62	3.06	15.90	2.67	5.154	**< .001**	.43
Social Mobilizing Capacity	14.52	3.41	16.02	3.06	5.246	**< .001**	.45
Social Creating Capacity	13.16	3.45	14.17	3.22	3.345	**.001**	.29
Synchronicity	13.13	3.71	14.35	3.73	3.503	**.001**	.33
Goal-Orientation	14.94	3.11	16.23	2.55	5.398	**< .001**	.43
Impulse Control	14.00	3.04	14.31	3.00	1.120	.265	.10
Emotional Control	11.60	3.65	12.42	3.51	2.500	.014	*.23*
Irritability Control	12.39	3.68	13.60	3.29	3.948	**< .001**	.34

	Healthy women (n=516)		**Breast cancer patients (n=106)**		**t**	**p**	**Cohens ' d**
T4	**M1**	**SD1**	**M2**	**SD2**			
Positive Thinking	14.87	3.49	16.20	3.57	3.826	**< .001**	.38
Sense of Control	13.85	2.57	15.26	2.53	5.708	**< .001**	.55
Sense of Coherence	15.31	3.27	16.01	3.05	2.361	*.020*	.22
Creative Self Concept	14.73	3.56	15.93	3.56	3.454	**.001**	.34
Sense of Self Growth	15.28	3.37	15.11	3.43	-.501	.617	.05
Change and Challenge Orientation	13.42	3.55	13.88	3.24	1.455	.149	.13
Social Monitoring Capacity	14.60	3.48	14.04	3.55	-1.633	.106	.16
Problem Solving Capacity	14.30	3.45	14.50	3.04	.677	.500	.06
Self-Efficacy	14.62	3.06	15.76	2.93	4.017	**< .001**	.38
Social Mobilizing Capacity	14.52	3.41	15.98	3.43	4.385	**< .001**	.43
Social Creating Capacity	13.16	3.45	14.26	3.22	3.527	**.001**	.32
Synchronicity	13.13	3.71	14.57	3.60	4.102	**< .001**	.39
Goal-Orientation	14.94	3.11	16.25	2.44	5.497	**< .001**	.43
Impulse Control	14.00	3.04	14.68	2.76	2.538	*.013*	.23
Emotional Control	11.60	3.65	12.70	3.18	3.558	**.001**	.31
Irritability Control	12.39	3.68	13.73	3.04	4.524	**< .001**	.37

	Healthy women (n=516)		**Breast cancer patients (n=85)**		**t**	**p**	**Cohens ' d**
T5	**M1**	**SD1**	**M2**	**SD2**			
Positive Thinking	14.87	3.49	15.86	3.56	2.561	.012	*.28*
Sense of Control	13.85	2.57	15.14	2.51	4.738	< **.001**	.50
Sense of Coherence	15.31	3.27	15.80	3.06	1.477	.143	.15
Creative Self Concept	14.73	3.56	15.82	3.61	2.793	.006	*.31*

Sense of Self Growth	15.28	3.37	15.05	3.19	-.673	.503	.07
Change and Challenge Orientation	13.42	3.55	13.89	3.38	1.294	.199	.13
Social Monitoring Capacity	14.60	3.48	14.21	3.69	-.971	.334	.11
Problem Solving Capacity	14.30	3.45	14.51	3.10	.612	.542	.06
Self-Efficacy	14.62	3.06	15.38	2.84	2.459	.016	*.25*
Social Mobilizing Capacity	14.52	3.41	15.72	3.63	3.041	**.003**	.35
Social Creating Capacity	13.16	3.45	14.09	3.52	2.444	.017	*.27*
Synchronicity	13.13	3.71	14.49	3.56	3.535	**.001**	.37
Goal-Orientation	14.94	3.11	16.32	2.80	4.530	**< .001**	.45
Impulse Control	14.00	3.04	14.53	3.16	1.544	.126	.17
Emotional Control	11.60	3.65	12.59	3.32	2.746	.007	*.27*
Irritability Control	12.39	3.68	13.34	3.46	2.533	.013	*.26*

	Healthy women (n=516)		**Breast cancer patients (n=64)**		**t**	**p**	**Cohens ' d**
T6	**M1**	**SD1**	**M2**	**SD2**			
Positive Thinking	14.87	3.49	16.08	3.71	2.606	.011	*.34*
Sense of Control	13.85	2.57	15.28	2.79	4.110	**< .001**	.55
Sense of Coherence	15.31	3.27	15.84	3.26	1.309	.195	.16
Creative Self Concept	14.73	3.56	15.91	3.93	2.394	.020	*.33*
Sense of Self Growth	15.28	3.37	15.36	3.54	.179	.858	.02
Change and Challenge Orientation	13.42	3.55	13.48	3.55	.145	.885	.02
Social Monitoring Capacity	14.60	3.48	14.61	3.72	.020	.984	.00
Problem Solving Capacity	14.30	3.45	14.52	3.73	.463	.645	.06
Self-Efficacy	14.62	3.06	15.67	3.04	2.768	.007	*.34*
Social Mobilizing Capacity	14.52	3.41	16.42	3.43	4.441	**< .001**	.56
Social Creating Capacity	13.16	3.45	14.38	3.66	2.654	.010	*.35*
Synchronicity	13.13	3.71	14.30	4.01	2.330	.023	*.31*
Goal-Orientation	14.94	3.11	16.39	2.60	4.456	**< .001**	.47
Impulse Control	14.00	3.04	14.55	3.17	1.381	.172	.18
Emotional Control	11.60	3.65	12.34	3.79	1.570	.121	*.20*
Irritability Control	12.39	3.68	13.61	3.65	2.676	.009	*.33*

In the following, for the sake of greater transparency, I will highlight only those scales that show a change in difference compared to the experienced difference between the healthy women and breast cancer patients at baseline (T1). Figure 4 summarises the comparison of PICI scales of healthy women and breast cancer patients at each measuring points in an overview.

- At T2 Positive Thinking, Creative Self Concept, Social Creating Capacity did not differ between healthy women and breast cancer patients. However, from T3-T6 breast cancer patients showed significantly higher scores in these scales than healthy women at baseline
- From T3 until the end of study period (T6) Sense of Self-Growth did not differ between healthy women and breast cancer patients, the difference was evident only at T1 and T2.
- From T3 Synchronicity and Emotional Control were significantly higher in the breast cancer patient group which were not detected at baseline and T2. This difference remained until the T5 in case of Emotional Control, and until the end of study period in case of Synchronicity.
- Impulse Control and Sense of Coherence revealed a significantly higher score in breast cancer patients than healthy women at T4. This difference was not detected at other measuring points.
- From T2 to T6, Change and Challenge Orientation were not significantly higher in the breast cancer patient group compared to healthy women, as it was experienced at baseline.
- From T4 to T6 Social Monitoring Capacity was not significantly lower in the breast cancer group compared to healthy women. This difference was detected from baseline until T3.

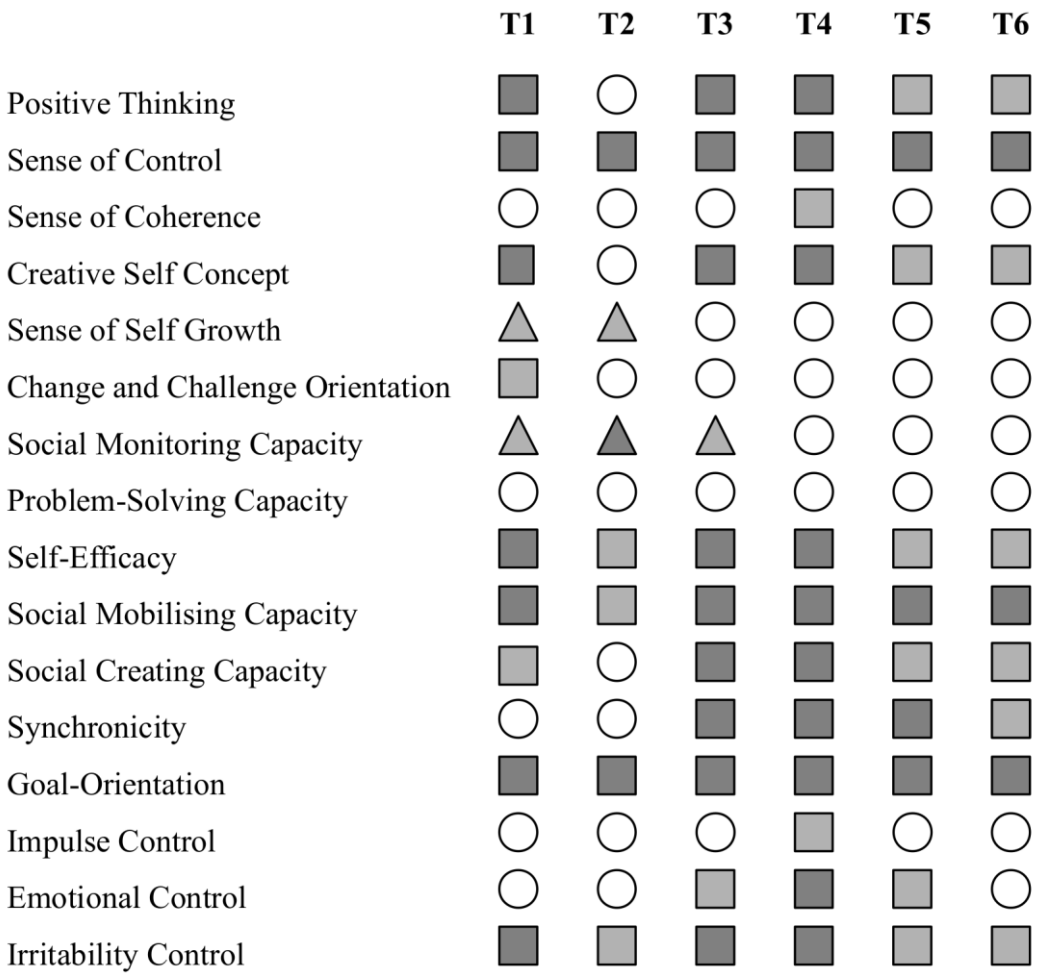


Figure 4.: Overview of comparison of PICI scales of healthy women and breast cancer patients at the six measuring points.

- breast cancer patients had statistically significant higher scores than healthy women
- breast cancer patients scored higher with practical significance Cohen d > .2
- non-significant difference between the two groups
- Breast cancer patients had statistically significant lower scores than healthy women
- breast cancer patients scored higher with practical significance Cohen d > .2

5.3 Descriptions of psychological immunity at certain phases of cancer treatment according to intervention groups

In this section, first the descriptive statistics (age, level of education, marital status) of the three different study groups (hypnosis, music, special attention) are introduced. Then

those PICI scales are described which have the lowest and highest scores throughout the treatment and follow up period based on intervention groups.

5.3.1 Descriptive statistics of study groups (hypnosis, music, special attention)

Participants were formed into three groups: hypnosis (n = 47), music (n = 47) and special attention (n = 55). There was no significant difference in age ($F(2,144) = .750$, $p = .474$) between the three groups. The mean age in the hypnosis group was 55.75 years (SD = 11.00 years), in the music group was 53.00 years (SD = 11.23 years), and in the special attention group was 54.17 years (SD = 10.40 years). There was no significant association between study groups and level of education ($\chi^2(4) = 8.013$, $p = .091$) (Figure 5).

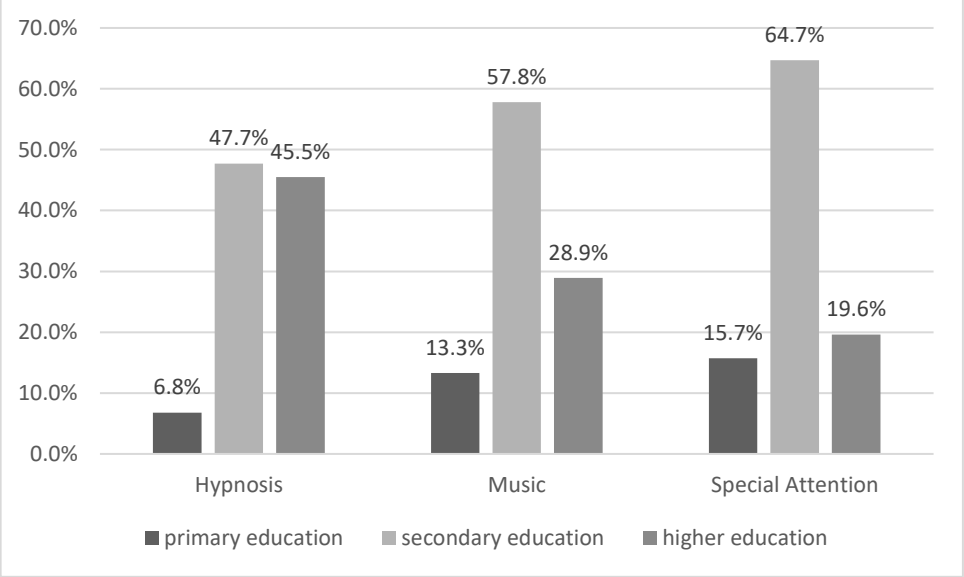


Figure 5.: Distribution of education level in the study groups (hypnosis, music, special attention)

Examining the study sample, the majority of the patients – 86 – were married (57.7%), and another 11 patients (7.4%) lived in a relationship. 11 patients (7.4%) were single, 15 patients (10.1%) were divorced, and 18 patients (12.1%) were widows. Due to the small sample size, in order to analyse the association between the study groups and marital status, patients were grouped as (1) living alone (single, divorced, widow) and (2) being married or living in relationship. There was no significant association between study groups and marital status ($\chi^2(2) = .732$, $p = .694$) (Figure 6).

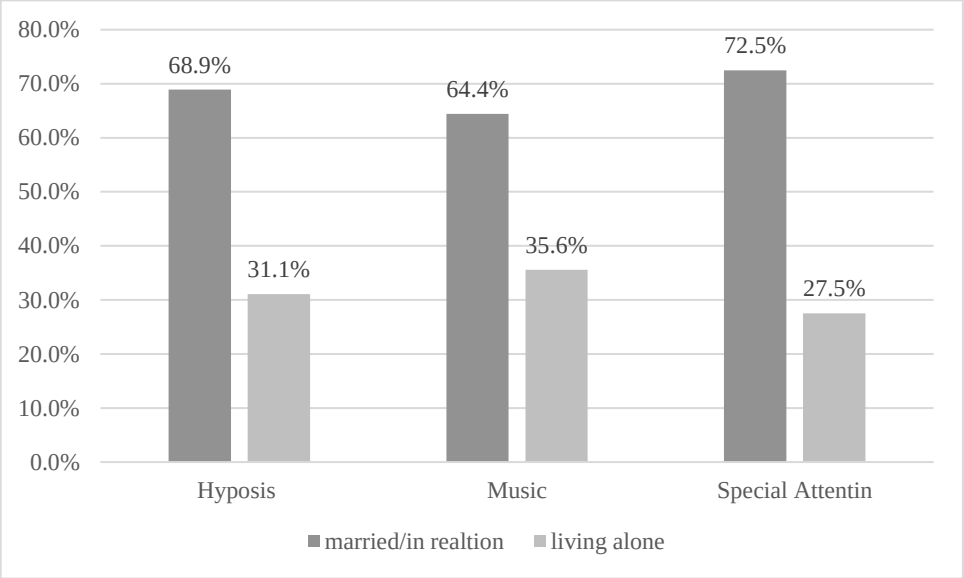


Figure 6.: Distribution of marital status in the study groups (hypnosis, music, special attention)

5.3.2 Highest and lowest PICI scales in the six measuring points according to intervention groups (hypnosis, music, special attention)

In order to give a description of the coping strategy that was most or least favourably used by the patients at particular stages of their disease and treatment, a highest mean and lowest mean of the PICI scales in each group at each measuring points are given and compared. In each group, Emotional Control showed the lowest mean at each measuring points. In the hypnosis group Goal-Orientation showed the highest mean at each measuring point. 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. In all cases the difference between the lowest and highest mean was statistically significant. (Table 7).

Table 7.: The highest and the lowest means of the PICI scales at each measuring points according to intervention groups

Hypnosis					**Music**					**Special Attention**				
T1	*M*	*SD*	*t*	*p*	T1	*M*	*SD*	*t*	*p*	T1	*M*	*SD*	*t*	*p*
Emotional Control	11.35	2.77	-11.142	.000	Emotional Control	11.13	3.63	-8.172	.000	Emotional Control	11.55	3.20	-9.436	.000
Goal-Orientation	16.72	2.30			Social Mobilizing	16.27	3.22			Positive Thinking	16.30	3.11		
T2	*M*	*SD*	*t*	*p*	T2	*M*	*SD*	*t*	*p*	T2	*M*	*SD*	*t*	*p*
Emotional Control	13.00	3.17	-5.467	.000	Emotional Control	10.52	3.09	-5.898	.000	Emotional Control	11.67	3.42	-7.288	.000
Goal-Orientation	16.53	2.15			Social Mobilizing	15.29	3.19			Goal-Orientation	15.76	3.06		
T3	*M*	*SD*	*t*	*p*	T3	*M*	*SD*	*t*	*p*	T3	*M*	*SD*	*t*	p
Emotional Control	12.95	3.22	-8.372	.000	Emotional Control	11.73	3.44	-9.124	.000	Emotional Control	12.56	3.79	-5.354	.000
Goal-Orientation	16.89	2.23			Creative Self	16.73	2.70			Positive Thinking	16.02	3.26		
T4	*M*	*SD*	*t*	*p*	T4	*M*	*SD*	*t*	*p*	T4	*M*	*SD*	*t*	*p*
Emotional Control	13.40	2.86	-9.907	.000	Emotional Control	12.48	3.34	-10.521	.000	Emotional Control	12.07	3.29	-4.277	.000
Goal-Orientation	17.16	1.95			Positive Thinking	16.43	3.14			Positive Thinking	15.82	4.22		
T5	*M*	*SD*	*t*	*p*	T5	*M*	*SD*	*t*	*p*	T5	*M*	*SD*	*t*	*p*
Emotional Control	13.24	2.82	-9.784	.000	Emotional Control	12.31	4.11	-3.628	.001	Emotional Control	12.00	2.81	-5.673	.000
Goal-Orientation	17.30	2.23			Social Mobilizing	15.83	3.78			Creative Self	16.35	3.97		
T6	*M*	*SD*	*t*	*p*	T6	*M*	*SD*	*t*	*p*	T6	*M*	*SD*	*t*	p
Emotional Control	13.04	3.18	-8.874	.000	Emotional Control	12.08	4.41	-5.185	.000	Emotional Control	11.33	3.68	-5.383	.000
Goal-Orientation	17.19	2.11			Social Mobilizing	16.48	3.58			Social Mobilizing	17.33	2.99		

5.4 Comparison of PICI results of hypnosis, music and special attention groups at the six measuring points

5.4.1 Comparison of cumulative PICI and PICI scales between groups

In the following sections differences between the three intervention groups were compared at each measuring point by using one-way ANOVA with a robust Welch test due to differing sample size (replacing the traditional F test) for pairwise comparison the Games-Howell post-hoc test was calculated. For defining effect size, ω^2 was used with Cohen's rule of thumb for interpretation (small ~ .02; medium ~ .13; large ~ .26) (Ellis, 2010).

5.4.1.1 Comparison of cumulative PICI

When the cumulative scores were compared between the three groups at the six measuring points, PICI showed 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 (Table 8).

Table 8.: Descriptive statistics of cumulative PICI results between the three groups at the six measuring points

	Hypnosis		**Music**		**Special Attention**		**F**	**p**	**ω2**
	M	**SD**	**M**	**SD**	**M**	**SD**			
cumPICI T1	235.59	31.54	231.87	35.60	232.45	31.45	.175	.840	-.01
cumPICI T2	241.63	28.48	219.32	30.66	227.06	34.19	4.455	**.016**	.06
cumPICI T3	245.57	27.99	235.24	34.38	234.24	38.28	1.525	.224	.01
cumPICI T4	244.66	30.65	239.45	34.86	230.07	40.08	1.289	.283	.01
cumPICI T5	243.55	30.72	227.10	41.91	239.13	40.70	1.499	.233	.01
cumPICI T6	243.89	32.56	234.56	48.00	235.83	45.83	.390	.681	-.02

5.4.1.2 Comparison of PICI scales and subsystems

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

There were statistically significant differences between the groups on one PICI scale and one subsystem at T2 measuring point, (after 12 weeks of treatment): Impulse Control ($F(2,91) = 9.061$, $p<.001$, $\omega^2 = .12$), Self-Regulating Subsystem ($F(2,91) = 6.298$, $p=.003$, $\omega^2 = .08$) The highest scores were in the hypnosis group (Table 9a)

Table 9a.: Statistically significant differences between the three groups at T2.

T2	**Hypnosis (H)**		**Music (M)**		**Special Attention (SA)**		**F**	**p**	**Post-Hoc**
	(n=30)		**(n=31)**		**(n=33)**				**(Games-Howell)**
	M	**SD**	**M**	**SD**	**M**	**SD**			
Impulse Control	16.13	2.26	13.55	3.13	13.85	3.19	9.061	<**.001**	H>M=SA
Self-Regulating Subsystem	57.4	8.46	49.48	9.44	51.76	11.17	6.298	**.003**	H>M; SA=M, SA=H

For nonsignificant results see Appendix 4.

Further, those explorative results will also be introduced (see table 9b for an overview), where the difference between groups was practically significant, namely ω^2 indicated at least small effect.

At T2 $\omega^2 > .02$ in case of five scales and 1 subsystem: 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 ($F(2,91) = 3.068$, $p=.089$, $\omega^2 = .03$). In all these cases hypnosis had the highest mean. In case of Irritability Control ($F(2,91) = 2.523$, $p=.054$, $\omega^2 = .04$) the post-hoc test revealed no difference between the groups.

At T4, $\omega^2 > .02$ in two scales: Goal-Orientation ($F(2,103) = 5.629$, $p=.006$, $\omega^2 = .07$) and Impulse Control ($F(2,103) = 3.448$, $p=.038$, $\omega^2 = .03$). In both cases the hypnosis group scored the highest

At T5 $\omega^2 > .02$ in four scales. In case of Change and Challenge Orientation ($F(2,82) = 3.656$, $p=.033$, $\omega^2 = .06$), special attention group shows higher mean compared to music, and hypnosis was in between the two groups. In case of Problem Solving Capacity

($F(2,82) = 2.161$, $p = .126$, $\omega^2 = .03$), Social Creating Capacity ($F(2,82) = 2,461$ $p = .096$, $\omega^2 = .04$), however, the post-hoc test revealed no difference between the groups. In terms of Goal-Orientation ($F2,82) = 3.973$, $p = .025$, $\omega^2 = .06$) the hypnosis group scored the highest.

At T6 $\omega^2 > .02$ in two scales. In the case of Social Monitoring Capacity ($F2,61) = 1.619$, $p = .218$, $\omega^2 = .03$) and Goal-Orientation ($F2,61) = 2.488$, $p = .101$, $\omega^2 = .04$) Post hoc test revealed no difference (Table 9b).

Table 9b.: Practically significant differences between the three groups at T2, T4, T5, T6 **(**$\omega^2 > .02$).

	Hypnosis (H)		**Music (M)**		**Sp.attention (SA)**				
	(n=30)		**(n=31)**		**(n=33)**				
T2	**M**	**SD**	**M**	**SD**	**M**	**SD**	**F**	**p**	**Post-Hoc (Games-Howell)**
Change and Challenge Orientation	14.43	2.97	12.68	2.87	13.42	2.65	2.739	.073	H>M; SA=M, SA=H
Social Monitoring Capacity	14.77	3.10	12.29	2.90	13.73	2.94	5.229	.008	H>M; SA=M, SA=H
Problem-SolvingCapacity	15.47	2.94	13.39	3.09	13.88	3.08	3.961	.024	H>M; SA=M, SA=H
Emotional Control	16.13	2.26	13.55	3.13	13.85	3.19	4.747	.012	H>M; SA=M, SA=H
Irritability Control	13.97	2.54	12.52	2.53	13.03	2.93	2.523	.089	H=M=SA
Monitoring-Creating-Executing Subsystem	122.43	17.56	111.65	16.22	116.42	18.31	3.068	.054	H>M; SA=M, SA=H
	H		**M**		**SA**				
	(n=38)		**(n=40)**		**(n=28)**				
T4	**M**	**SD**	**M**	**SD**	**M**	**SD**	**F**	**p**	**Post-Hoc (Games-Howell)**
Goal-Orientation	17.16	1.95	15.98	2.61	15.39	2.48	5.629	.006	H>SA; M=H, M=SA
Impulse Control	15.45	2.25	14.53	3.10	13.86	2.66	3.448	.038	H>SA; M=H, M=SA
	H		**M**		**SA**				
	(n=33)		**(n=29)**		**(n=23)**				
T5	**M**	**SD**	**M**	**SD**	**M**	**SD**	**F**	**p**	**Post-Hoc (Games-Howell)**
Change and Challenge Orientation	14.36	3.2	12.55	3.57	14.91	2.94	3.655	.033	SA>M; H=SA, H=M
Problem Solving Capacity	14.82	2.67	13.52	3.38	15.3	3.11	2.161	.126	H=M=SA
Social Creating Capacity	14.7	2.94	12.9	3.71	14.74	3.8	2.461	.096	H=M=SA
Goal-Orientation	17.3	2.23	15.79	2.92	15.57	3.09	3.973	.025	H>M=SA

	H (n=27)		M (n=25)		SA (n=12)				
T6	**M**	**SD**	**M**	**SD**	**M**	**SD**	**F**	**p**	**Post-Hoc (Games-Howell)**
Social Monitoring Capacity	15.07	2.59	13.52	4.08	15.83	4.73	1.619	.218	H=M=SA
Goal-Orientation	17.19	2.11	15.92	2.86	15.58	2.78	2.488	.101	H=M=SA

5.5 Effect of time on cumulative PICI and PICI scales and subsystems depending on groups

In the following sections the effect of time was measured, based on intervention groups, among those patients who had available data at each of the six measuring points throughout the three-year study period. Those patients whose PICI data was available at each of the six measuring points constituted less than 20% in the hypnosis/music group and 10% in the special attention group. Therefore, the statistical analysis to measure the effect of time was performed T1 – T4 (hypnosis: n=21; music n=23; special attention: n=17). Data was analysed in a descriptive way for those who had PICI data at each measuring points (T4 – T6) (hypnosis: n=11; music n=10; special attention: n=4).

The cumulative PICI and PICI scales and subsystem scores were compared between T1, T2, T3, and T4 to measure the changes in time considering groups using 4x3 repeated measures factorial ANOVA.

5.5.1 Effect of time on cumulative PICI (T1-T4)

In this repeated measures model, Time had a statistically significant main effect ($F(3,174) = 6.403$, $p < .001$; partial $\eta^2 = .10$). Cumulative PICI score at T4 ($M = 238.10$; $SD = 34.58$) was significantly higher than at T1 ($M = 227.92$; $SD = 34.31$) and T2 ($M = 230.26$; $SD = 33.67$). T3 showed an intermediate value ($M = 234.26$; $SD = 35.15$). Time × Groups interaction was non-significant ($F(6,174) = 1.088$; $p = .371$; partial $\eta^2 = .04$).

5.5.2 Effect of time on PICI subsystems (T1-T4)

In the case of the Approach-Belief Subsystem, the Time main effect was statistically significant ($F(3,174) = 5.986$, $p = .001$, partial $\eta^2 = .09$) and Time × Group interaction ($F(6,174) = 2.359$, $p = .032$, partial $\eta^2 = .08$) had a practical significance. Independently from Group, this subsystem score was the lowest at T1 ($M = 59.70$; $SD = 10.16$), T2 ($M = 59.70$; $SD = 9.90$), and the highest at T4 ($M = 62.67$; $SD = 10.49$), as well as T3 ($M =$

61.72; *SD* = 10.15) was in between. Between-subject effect (Groups) were non-significant (Table 10).

Table 10.: The effect of time, time x group and groups on PICI subsystems (T1-T4)

Bold = statistically significant difference between groups (Bonferroni adjusted value)
Italic = practical significance with $\eta^2_p > .06$ (Richardson, 2011)

	Time			**Time x Group**			**Groups**		
	F	***p***	η^2_p	***F***	***p***	η^2_p	***F***	***p***	η^2_p
Approach-Belief	5.986	**.001**	*.09*	2.359	.032	*.08*	1.401	.225	.05
Monitoring-Creating-Executing	3.321	.021	.05	.352	.908	.01	2.228	.117	*.07*
Self-Regulating	3.146	.027	.05	1.412	.213	.05	1.280	.286	.04

Time × Group interaction revealed practically significant result in the Approach-Belief Subsystem. In the music and special attention groups, the value of this scale increased after T3 to T4, while the hypnosis group showed increasing values throughout T1–T3. However, at T4, it decreased compared to T3; at the same time, the value of T4 was higher than at T1, T2 (Figure 7).

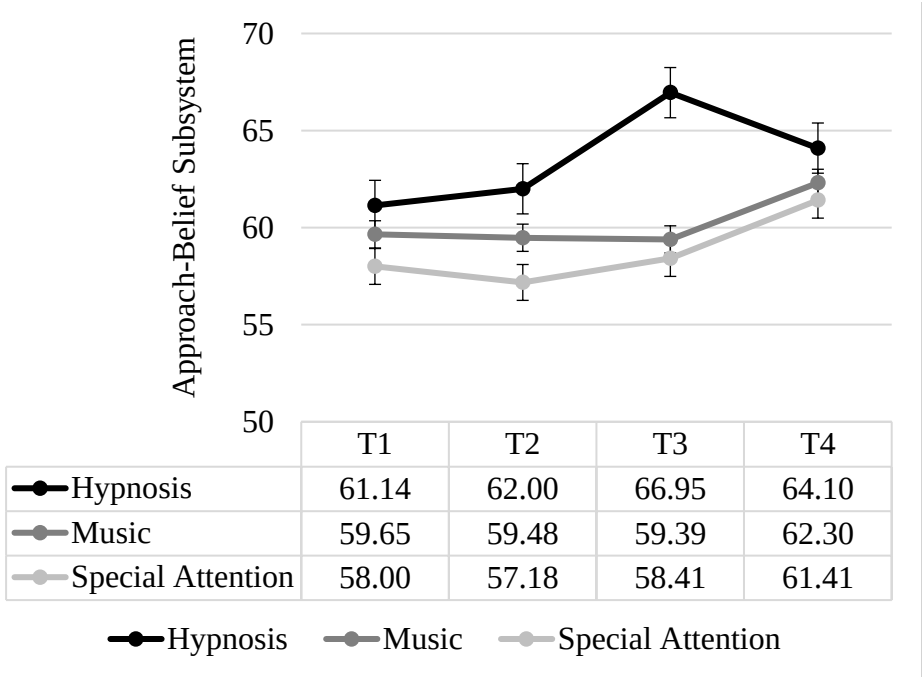


Figure 7.: Time × Group interaction in the Approach-Belief Subsystem

Monitoring-Creating-Executing Subsystem indicated a between-subject effect (Groups) with practical significance. No further significant main effect or interaction could be detected in case of subsystems (Table 10., Table 11).

Table 11. Descriptive statistics on PICI subsystems T1-T4.

Monitoring-Creating-Executing Subsystem						
	Hypnosis		**Music**		**Special Attention**	
	(*n* = 21)		**(*n* = 23)**		**(*n* = 17)**	
	M	***SD***	***M***	***SD***	***M***	***SD***
T1	123.52	18.13	113.96	19.96	113.65	21.13
T2	113.96	19.96	113.65	21.13	117.16	19.91
T3	113.65	21.13	117.16	19.91	124.57	16.90
T4	117.16	19.91	124.57	16.90	112.30	16.17
Self-Regulating Subsystem						
	Hypnosis		**Music**		**Special Attention**	
	(*n* = 21)		**(*n* = 23)**		**(*n* = 17)**	
	M	***SD***	***M***	***SD***	***M***	***SD***
T1	52.14	6.21	50.78	12.81	50.06	9.50
T2	57.24	8.37	50.30	9.58	53.41	10.52
T3	56.91	7.21	51.78	12.53	52.00	12.71
T4	56.10	8.06	53.87	8.81	52.00	12.71

5.5.3 Effect of time on PICI scales (T1-T4)

There was only one scale where Time had a statistically significant main effect: it was in case of Emotional Control ($F(3,174) = 6.027$, $p = .001$, partial $\eta^2 = .09$) (Table 12)

Below Table 12 summarises the effect of Time, Time x Group and Groups on the 16 scales of PICI T1-T4

Table 12.: The effect of Time, Time x Group and Groups on the 16 scales of PICI T1-T4.

Bold = statistically significant difference between groups (Bonferroni adjusted value)
Italic = practical significance with $\eta^2_p > .06$ (Richardson, 2011)

	Time			**Groups**			**Time x Group**		
	F	***p***	η^2_p	***F***	***p***	η^2_p	***F***	***p***	η^2_p
Positive Thinking	*4.590*	*.004*	*.07*	1.027	.365	.03	.678	.668	.02
Sense of Control	*3.687*	*.013*	*.06*	1.694	.193	.05	*1.736*	*.115*	*.06*
Sense of Coherence	2.806	.041	.05	1.322	.274	.04	*2.102*	*.055*	*.07*
Creative Self Concept	1.918	.128	.03	.883	.419	.03	.532	.784	.02
Sense of Self Growth	.994	.397	.02	.619	.542	.02	1.548	.165	.05
Change and Challenge Orientation	1.086	.375	.02	*2.411*	*.099*	*.08*	1.251	.283	.04
Social Monitoring Capacity	.948	.419	.02	*1.980*	*.147*	*.06*	*2.093*	*.056*	*.07*
Problem Solving Capacity	1.696	.170	.03	*3.859*	*.027*	*.12*	1.430	.205	.05
Self-Efficacy	2.160	.094	.04	1.270	.288	.04	.102	.996	.00
Social Mobilizing Capacity	1.518	.212	.03	.105	.901	.00	.200	.976	.01
Social Creating Capacity	1.563	.200	.03	*2.362*	*.103*	*.08*	.125	.993	.00
Synchronicity	2.490	.062	.04	.342	.712	.01	*2.508*	*.024*	*.08*
Goal-Orientation	1.374	.252	.02	*1.739*	*.185*	*.06*	.860	.525	.03
Impulse Control	*3.818*	*.011*	*.06*	*2.857*	*.066*	*.09*	1.208	.304	.04
Emotional Control	**6.027**	**.001**	**.09**	1.666	.198	.05	*1.842*	*.094*	*.06*
Irritability Control	.306	.821	.01	.260	.772	.01	.494	.812	.02

At the same time, there were practically significant changes in time (Time main effect) in the case of 3 scales ($\eta^2_p > .06$). Descriptive statistics of the significant and practically significant scales are presented in Table 13.

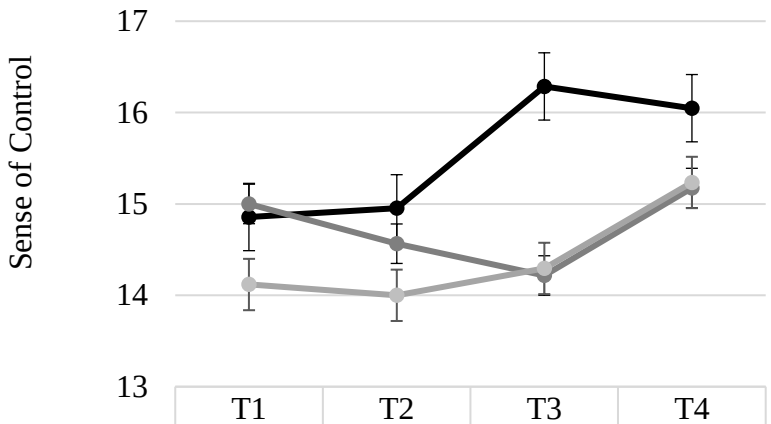
Table 13.: Descriptive statistics on PICI scales with significant Time main effect (T1-T4)

	Emotional Control							Positive Thinking					
	Hypnosis		Music		Special Attention			Hypnosis		Music		Special Attention	
	(*n* = 21)		(*n* = 23)		(*n* = 17)			(*n* = 21)		(*n* = 23)		(*n* = 17)	
	M	***SD***	***M***	***SD***	***M***	***SD***		***M***	***SD***	***M***	***SD***	***M***	***SD***
T1	10.95	2.04	10.96	4.20	11.06	2.41	T1	16.33	3.86	15.35	3.74	14.77	3.19
T2	13.24	3.02	10.74	3.09	12.00	3.74	T2	15.81	3.44	15.83	3.59	14.59	3.26
T3	13.05	2.89	11.35	3.34	12.24	3.96	T3	17.24	2.64	16.17	3.59	15.24	3.17
T4	13.43	2.64	11.61	3.03	11.94	3.45	T4	16.95	3.38	16.17	3.10	15.94	4.34
	Sense of Control							**Impulse Control**					
	Hypnosis		Music		Special Attention			Hypnosis		Music		Special Attention	
	(*n* = 21)		(*n* = 23)		(*n* = 17)			(*n* = 21)		(*n* = 23)		(*n* = 17)	
	M	***SD***	***M***	***SD***	***M***	***SD***		***M***	***SD***	***M***	***SD***	***M***	***SD***
T1	14.86	1.96	15.00	2.26	14.12	2.67	T1	13.95	1.66	13.52	3.62	12.94	3.07
T2	14.95	2.82	14.57	2.66	14.00	2.94	T2	15.95	2.01	13.65	3.23	13.94	2.22
T3	16.29	1.85	14.22	2.15	14.29	3.26	T3	15.10	1.87	13.87	3.40	13.24	3.09
T4	16.05	2.33	15.17	2.12	15.24	2.75	T4	15.00	1.58	13.96	2.50	13.53	2.48

Between-subject effect (Groups) revealed no statistically significant differences (Bonferroni adjusted value) However, practical significant between-subjects effect (Groups) appeared in case of 6 scales: Change and Challenge Orientation, Social Monitoring Capacity, Problem Solving Capacity, Social Creating Capacity, Goal-Orientation and Impulse Control. (Table 12)

There was no statistically significant Time × Group interaction in case of PICI scales, however, 5 scales revealed practically significant results with small to moderate effect (Table 12).

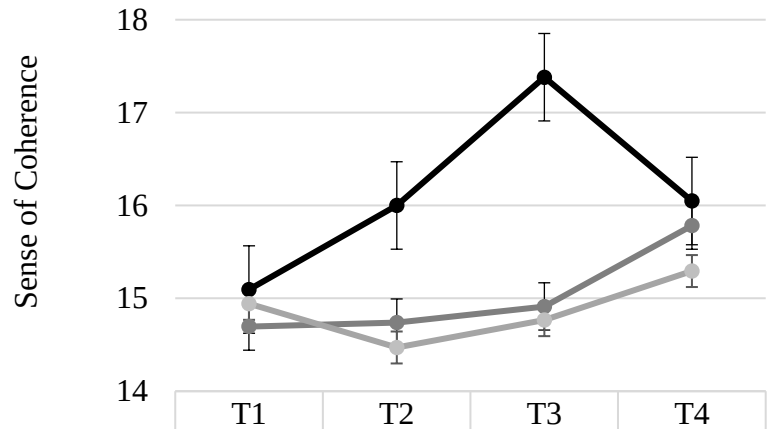
In the case of Sense of Control, in the music groups, the value of this scale decreased T1-T3 than returned to the baseline level, in special attention group remained around the same value T1–T3 and reflected an increase from T3-T4, while the hypnosis group showed continuous increase, the greatest increase was from T2 –T3, at T4 it decreased compared to T3; at the same time, the value of T4 was higher than at T1 and T2 (Figure 8a).



	T1	T2	T3	T4
Hypnosis	14.86	14.95	16.29	16.05
Music	15.00	14.57	14.22	15.17
Special Attention	14.12	14.00	14.29	15.24

Figure 8a.: Time × Group interaction on the scale of Sense of Control (T1-T4)

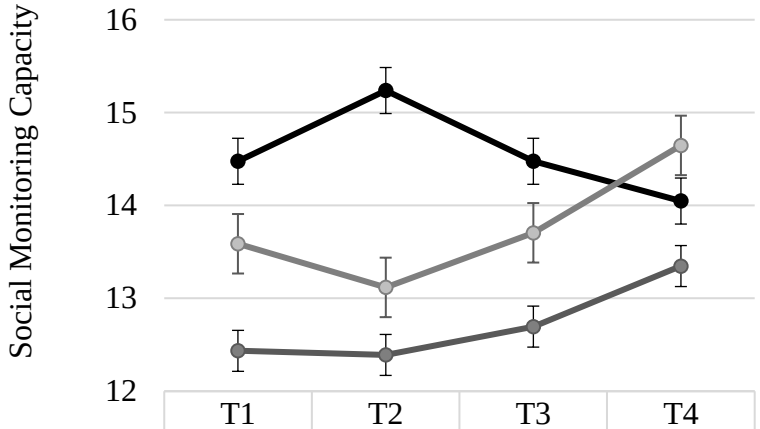
In the case of Sense of Coherence, in the music and special attention groups remained around the same value T1–T3 and reflected an increase from T3-T4, while the hypnosis group showed increasing values throughout T1–T3. However, at T4, it decreased compared to T3; at the same time, the value of T4 was higher than at T1 (Figure 8b).



	T1	T2	T3	T4
Hypnosis	15.10	16.00	17.38	16.05
Music	14.70	14.74	14.91	15.78
Special Attention	14.94	14.47	14.77	15.29

Figure 8b.: Time × Group interaction on the scale of Sense of Coherence (T1-T4)

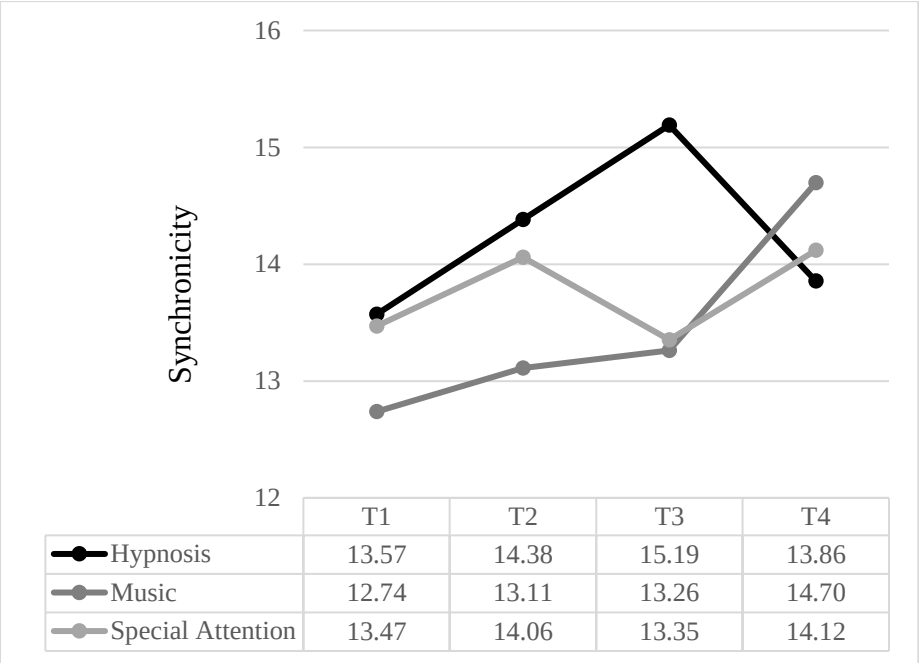
In case of Social Monitoring Capacity, in the music and special attention groups, the value of this scale increased T2 – T4, while the hypnosis group showed increasing value from T1–T2 and decreased afterwards (Figure 8c).



	T1	T2	T3	T4
Hypnosis	14.48	15.24	14.48	14.05
Music	12.44	12.39	12.70	13.35
Special Attention	13.59	13.12	13.71	14.65

Figure 8c.: Time × Group interaction on the scale of Social Monitoring Capacity (T1-T4)

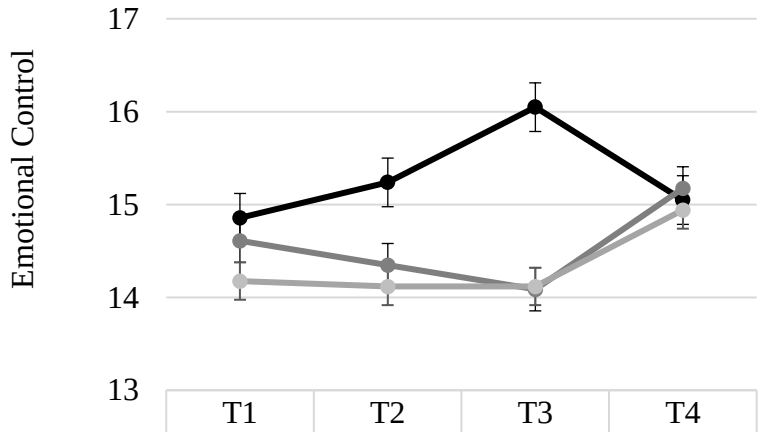
In case of Synchronicity in the music and special attention groups, the value of this scale increased continuously throughout T1–T4, while the hypnosis group showed increasing values throughout T1–T3. However, at T4, it decreased compared to T3; at the same time, the value of T4 was higher than at T1 (Figure 8d).



	T1	T2	T3	T4
Hypnosis	13.57	14.38	15.19	13.86
Music	12.74	13.11	13.26	14.70
Special Attention	13.47	14.06	13.35	14.12

Figure 8d.: Time × Group interaction on the scale of Synchronicity (T1-T4)

In the case of Emotional Control, in the music and special attention groups, the value of this scale showed almost no change from T1–T3 and an increase to T4, while the hypnosis group showed increasing values throughout T1–T3. However, at T4, it decreased compared to T3; at the same time, the value of T4 was higher than at T1 (Figure 8e).



	T1	T2	T3	T4
Hypnosis	14.86	15.24	16.05	15.05
Music	14.61	14.35	14.09	15.17
Special Attention	14.18	14.12	14.12	14.94

Figure 8e.: Time × Group interaction on the scale of Emotional Control (T1-T4)

5.5.4 Effect of Time on cumulative PICI and PICI scales and subsystems in the follow-up period (T4-T6)

Due to the small sample size of patients (hypnosis: n=11; music n=10; special attention: n=4) who had all the PICI at each measuring points (T1-T6), in the follow up period (T4-T6) the data analysis is explorative and descriptive. The Time main effect ($F(2,44) = .758$, $p = .475$, partial $\eta^2 = .03$), Time x Group interaction ($F(2,44) = 1.195$, $p = .326$, partial $\eta^2 = .09$) and between-subjects effect (Groups) ($F(2,22) = 2.362$, $p = .118$, partial $\eta^2 = .17$) were statistically non-significant in case of cumulative PICI. Although, the effectsize show small to medium effect in between-subjects effect (Groups) and Time x Group interaction, due to the small sample size it cannot be considered relevant.

None of the three subsystems showed any statistically significant Time main effect, Time x Group interaction, and the between-subject effect was also non-significant either, Although, the effect size show medium effect in between-subjects effect (Groups) and Time x Group interaction, due to small sample size it cannot be considered relevant. For non-significant data see Appendix 5.

In PICI scales there was no statistically significant (Bonferroni adjusted value) Time x Group interaction, between-subject effect (Groups) or Time main effect.

Although no statistically significant effects could be detected; at the same time, there were PICI scales where effect size (practical significance) indicated a medium to high effect (Table 14).

Table 14.: The effect of Time, Group and Time x Group on the 16 scales of PICI (T4-T6).

Italic = practical significance with $\eta^2_p > .13$ (Richardson, 2011)

	Time			**Group**			**Time x Group**		
	F	**p**	**η^2_p**	**F**	**p**	**η^2_p**	**F**	**p**	**η^2_p**
Positive Thinking	2.259	.116	.09	.847	.442	.07	1.650	.179	*.13*
Sense of Control	.070	.933	.00	3.817	.038	*.26*	.258	.903	.02
Sense of Coherence	.719	.493	.03	.791	.466	.07	.975	.431	.08
Creative Self Concept	.561	.575	.03	.903	.420	.08	.472	.756	.04
Sense of Self Growth	.849	.435	.04	.412	.667	.04	2.214	.083	*.17*

Change and Challenge Orientation	.170	.844	.01	4.206	.028	*.28*	.706	.592	.06
Social Monitoring Capacity	.549	.581	.02	4.942	.017	*.31*	1.174	.335	.10
Problem Solving Capacity	.219	.804	.01	3.740	.040	*.25*	4.544	.004	*.29*
Self-Efficacy	.883	.421	.04	1.041	.370	.09	.821	.519	.07
Social Mobilizing Capacity	.424	.657	.02	2.022	.156	*.16*	.193	.941	.02
Social Creating Capacity	.360	.700	.02	4.780	.019	*.30*	1.823	.141	*.14*
Synchronicity	.263	.770	.01	.304	.741	.03	2.525	.054	*.19*
Goal-Orientation	.243	.785	.01	1.404	.267	.11	.808	.527	.07
Impulse Control	.427	.655	.02	.284	.756	.03	.190	.942	.02
Emotional Control	.115	.892	.01	1.184	.325	.10	1.297	.286	.11
Irritability Control	.715	.495	.03	.951	.402	.08	.710	.590	.06

The between-subject effect was practically significant on the scales of Sense of Control, Change and Challenge Orientation, Social Monitoring Capacity, Social Creating Capacity, and Social Mobilizing Capacity. In all five cases, the hypnosis and special attention groups scored higher than the music group. (Table 15.)

Table 15.: Descriptive statistics on PICI scales with the between-subject effect (Groups).

	Sense of Control							**Social Monitoring Capacity**					
	Hypnosis		**Music**		**Special Attention**			**Hypnosis**		**Music**		**Special Attention**	
	(*n* = 11)		**(*n* = 10)**		**(*n* = 4)**			**(*n* = 11)**		**(*n* = 10)**		**(*n* = 4)**	
	M	***SD***	***M***	***SD***	***M***	***SD***		***M***	***SD***	***M***	***SD***	***M***	***SD***
T4	16.46	2.50	14.50	2.12	16.25	2.87	**T4**	14.82	2.52	12.50	3.37	16.00	2.45
T5	16.36	2.11	14.10	2.56	16.75	3.40	**T5**	15.73	2.10	11.60	3.89	15.25	3.86
T6	16.46	1.69	13.80	2.39	16.50	3.11	**T6**	16.00	2.19	12.10	3.48	16.00	3.37
	Change and Challenge Orientation							**Social Creating Capacity**					
	Hypnosis		**Music**		**Special Attention**			**Hypnosis**		**Music**		**Special Attention**	
	(*n* = 11)		**(*n* = 10)**		**(*n* = 4)**			**(*n* = 11)**		**(*n* = 10)**		**(*n* = 4)**	
	M	***SD***	***M***	***SD***	***M***	***SD***		***M***	***SD***	***M***	***SD***	***M***	***SD***
T4	15.18	2.23	12.80	2.44	13.50	2.65	**T4**	15.73	2.49	13.10	1.91	14.50	3.70
T5	15.18	3.03	11.80	1.75	14.25	3.30	**T5**	15.36	3.61	10.90	2.56	15.75	4.19
T6	14.82	2.68	11.90	2.33	14.00	3.56	**T6**	15.73	3.17	12.20	2.62	14.50	4.51

	Social Mobilizing Capacity							Problem Solving Capacity					
	Hypnosis		Music		Special Attention			Hypnosis		Music		Special Attention	
	(*n* = 11)		(*n* = 10)		(*n* = 4)			(*n* = 11)		(*n* = 10)		(*n* = 4)	
	M	***SD***	***M***	***SD***	***M***	***SD***		***M***	***SD***	***M***	***SD***	***M***	***SD***
T4	15.73	3.26	14.20	3.52	17.50	3.00	**T4**	15.55	2.42	13.70	1.70	14.25	3.86
T5	15.27	2.97	13.50	3.57	14.96	3.47	**T5**	15.55	2.54	12.20	2.44	16.00	4.55
T6	15.73	3.32	14.60	3.98	15.60	3.57	**T6**	16.73	2.90	12.50	2.80	14.76	3.62

As regards Problem Solving Capacity, Time x Group interaction ($F(2,44) = 4.544$, $p = .004$, partial $\eta 2 = .29$) and between-subject effect (Groups) ($F(2,22) = 3.740$, $p = .040$, partial $\eta 2 = .25$) indicated large and medium effect. The Time main effect was non-significant ($F(2,44) = .219$, $p = .804$, partial $\eta 2 = .01$). Examining Time x Group interaction, hypnosis group reflected slight increase, while music group showed slight decrease. In the case of Special Attention, there was a marginal increase until T5 and a decrease at T6. Figure 9a below shows the Time x Group interaction. The between-subjects effect showed that the hypnosis and special attention groups scored higher than music, independently of time.

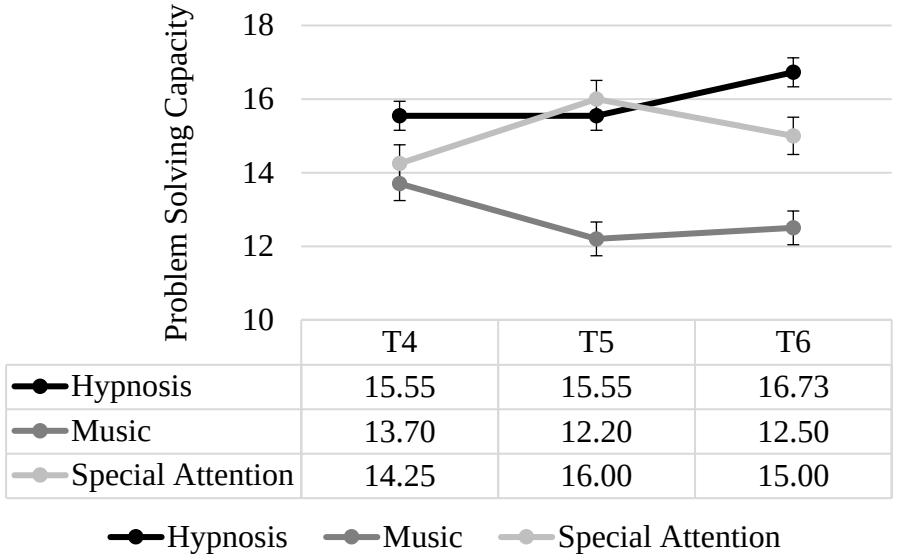
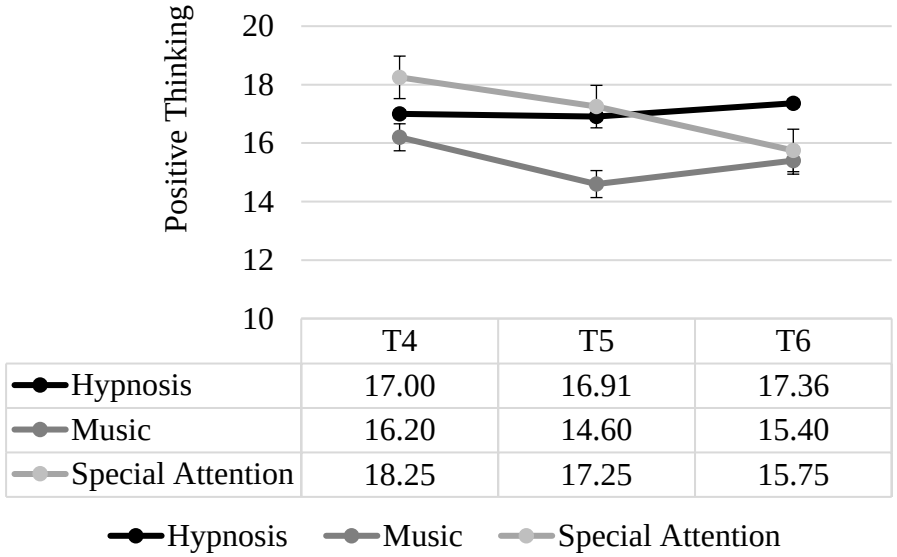


Figure 9a.: Time × Group interaction on the scale of Problem Solving Capacity (T4-T6)

Further PICI scales indicated notable interaction with medium effect size (practical significance). These scales were 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), 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). In case of Positive Thinking the mean of hypnosis group remained stable, music group reflected a small decrease, while special attention demonstrated a monotonous decrease (Figure 9b.)



	T4	T5	T6
Hypnosis	17.00	16.91	17.36
Music	16.20	14.60	15.40
Special Attention	18.25	17.25	15.75

Figure 9b.: Time × Group interaction on the scale of Positive Thinking (T4-T6)

In case of Sense of Self Growth, the mean of the hypnosis group showed a monotonous increase, while music and special attention both showed a slight decrease (Figure 9c)

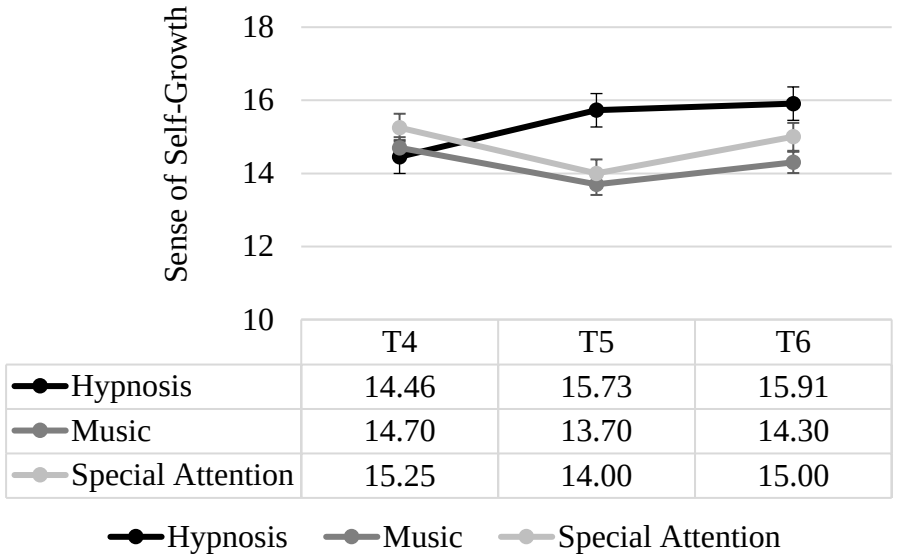


Figure 9c.: Time × Group Interaction on the scale of Sense of Self-Growth (T4-T6)

In regard to Synchronicity, the mean of the hypnosis group also showed a monotonous increase, while music and special attention both showed a slight decrease (Figure 9d)

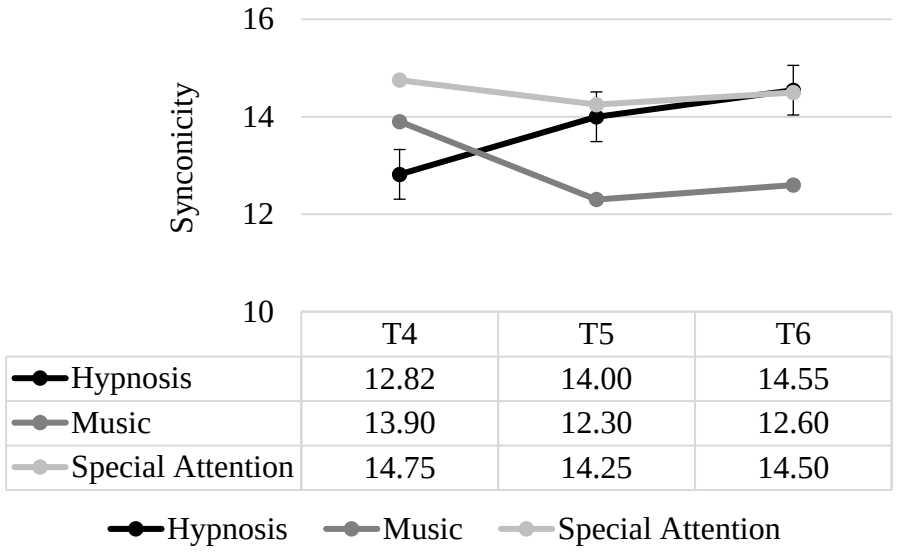
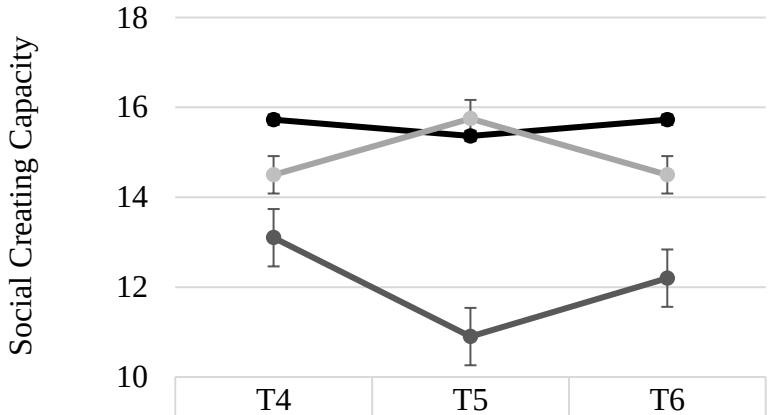


Figure 9d.: Time × Group interaction on the scale of Synchronicity (T4-T6)

In regard to Social Creating Capacity, the mean of the hypnosis group showed a stable level, while in case of music group it reflected a decrease (T4-T5) and an increase (T5-

T6). The special attention group showed an increase followed by a return to the original value (Figure 9e)



	T4	T5	T6
Hypnosis	15.73	15.36	15.73
Music	13.10	10.90	12.20
Special Attention	14.50	15.75	14.50

Figure 9e.: Time × Group interaction on the scale of Social Creating Capacity (T4-T6)

In the remaining 7 scales of PICI there was no significant main effect or interaction, and effect size did not indicate a notable effect either (Table 14) (Vargay, Józsa, Pájer & Bányai, 2019).

5.6 Analysis of subjective experience

In the following section, the analysis of patients' subjective experience of received psychological intervention (hypnosis/music/special attention) is introduced. First, the developed encoding systems will be described, then the reliability analysis of the encoding systems, according to raters' agreement, will be demonstrated.

5.6.1 Description of the encoding systems

5.6.1.1 Codes for the Characteristics of Involvement (CI)

As the methodology of IPA and content analysis was described in the method section, grouping of the emerging categories reflects a certain intensity of involvement in the available support reported by patients, as well as patients' intrapsychic work. The

characteristics of involvement (CI) consists of the following codes: 1) Somatic complaints, 2) Internal or external disturbances, 3) Pleasant somatic experiences, 4) Non-verbal sensory experiences, 5) Positive or negative personal memories, 6) Visualization of symbols, 7) Elaboration of symbols. The codes of CI are described in more details in Table 16.

Table 16.: Characteristics of Involvement codes

Code	**Summary**	**Detailed description**	**Example**
1 Somatic complaints	*Somatic complaints*	The patient described her somatic problems, e.g.: pain or nausea that occurred while listening to the hypnosis/music, or while receiving special attention only. Bodily problems dominate the experience of the interventions, no sign of immersion in the psychological help.	"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." "I felt nauseous."
2 Internal /external disturbances	*Internal or external disturbances*	The patient claims that she could not pay attention because, for instance, the noise from the ward distracted her. Attempted to relax but claimed that distracting thoughts made it impossible;	"Noises from outside distracted me."
3 Pleasant somatic experiences	*Pleasant somatic experiences (relaxation, looseness, sleepiness as a sign of relaxation without any further visualization)*	The patient felt relaxed, calm, and free of stress. The patient claimed that the intervention had a beneficial effect on her in physical or psychological sense but experienced no further vision or sensation.	"It was a pleasant, gratifying, relaxing experience."
4 Non-verbal sensory experiences	*Non-verbal sensory experiences, hallucinations*	Visual or other sensory hallucinations e.g.: visual hallucinations of colours like the appearance of yellow bubbles or olfactory hallucination like the smell of pine trees.	"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."

5 a Positive personal memories	*Positive personal memories, visions of people or settings of positive significance to the patient, important personal ties with symbolic meanings*	The patient recalled positive memories of existing places (e.g. a fountain where she used to spend time with her grandmother as a child) or remembers to a situation with people (parents, children) that were significant or symbolic in some way. Conjures up positive, supportive images from her past. Images of home, or of an existing place where she feels safe.	"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." "The last time I was dancing with my daughter, because her boyfriend was just staring at her, how strange, you know, almost like a near-death experience, with my bald head… and I was dancing with my daughter, and then I saw something in her eyes, like lightning, and I knew what she was thinking about ... I had to hold back my tears, because what I saw in her eyes was pity. And I said to myself: I never liked to dance, but it is never too late."
5 b Negative personal memories	*Negative personal memories in connection with significant others*	Negative personal memories in connection with beloved people, or of personal significance. By recalling them, the altered state of consciousness allows recontextualization.	"I know that this feeling that I should not hurt anyone comes from my childhood. Yes, you should be a good girl, my little daughter. And I really believed it, that I must be good all the time. And we cannot be good all the time… If we try to always be good, we might not be good to ourselves. We need to find a balance that is good to us and to our surroundings." "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 it now, and it doesn't look like anything in my life would do it"
6 Visualization of symbols	*Visualization of symbols, visualizing the "content" of the suggestion/music, images with symbolic meaning*	Visualized the images of the suggestion provided by the music or hypnosis (healing images (fountain of inner strengths), symbols of stress reduction (balloons flying away), nature symbols, symbols of healing body functions (white blood cells in action). Images with symbolic meanings independent from the provided suggestions.	"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." "I imagined I had a fountain protecting my good cells." "I recalled a Hindu man sitting cross-legged with multiple hands, and in his hands, he held life goals, such as optimism"

7 Elaboration of symbols	*Elaboration of symbols, complex symbols unfolding based on the given suggestions or music or independently from it*	By further elaborating on the symbols, the image became personal, original and unique. This represents an increased level of intra-psychic work. Compound images with symbolic meaning	"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" "Balloons, balloons, and then I had an idea: I'll put my headache in the balloons, and let it fly away." "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." "I always see the red liquid (chemotherapy) going to the tumor cells and squeezing it. Because they said it is very aggressive. And there are my own white blood cells, we are behind a double-winged iron gate, it has to be opened, and there they are like bright white beads. There's only a little white light at first, but when a light comes on and it falls on them, they become more and more bright, like pearls and I see more and more of them"

The first four categories can be interpreted as representing an increasing involvement in the psychotherapeutic interventions. Those who reported only somatic complaints or internal/external disturbances were less likely to become involved in intrapsychic work than those who reported having had a pleasant somatic experience, or a non-verbal sensory experience. The other three categories (personal memories, visualization, and elaboration) do not represent increasing involvement, but rather a separable characteristic of involvement.

5.6.1.2 Codes for Intensity of Involvement (II)

Once the first set of ratings was completed, the need for a more general category system became apparent. The reason was that even though the categories represented a certain, distinct type of intensity, the researchers 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.

5.6.2 Raters' agreement

5.6.2.1 Raters' agreement across Characteristics of Involvement

The two independent raters involved in measuring the reliability of the coding system identified a total of 3408 codes. There were 186 codes only identified by Coder 1, and 172 only identified by Coder 2. The number of matching codes was high: 2930, resulting in 96.2% agreement between the coders. For further analyses, only those codes which were identified by both raters were taken into account.

5.6.2.2 Interrater Reliability of the 2 subcategories: Intensity of Involvement

The measure of agreement between the two independent raters was calculated with Cohen's Kappa. The value of kappa is.951 (p <.001) which corresponds to a strong, almost perfect agreement between the two raters.

As shown in Table 17, the two raters had a total of 1532 matched cases (out of 1568 hypnosis/music/special attention experiences). Most of the experiences fall into the low intensity category (965), with the coders agreeing in 959 cases. The remaining experiences fall into the high intensity category (603), with the coders agreeing in 573 cases. Raters had 99.0% agreement for high and 97.0% for low intensity experiences.

Overall, our results show that trained raters can reliably judge the intensity of experience using the subcategory system and can accurately determine whether a given experience is of low or high intensity.

Table 17.: Agreement Between Coders in The Subcategory System

			Coder 2		Total
			Low intensity	High intensity	
Coder 1	Low intensity	Case	**959**	30	989
		% within Coder 1	**97.0%**	3.0%	100.0%
	High intensity	Case	6	**573**	579
		% within Coder 1	1.0%	**99.0%**	100.0%
Total		Case	965	603	1568
		% within Coder 1	61.1%	38.5%	100.0%

5.6.3 Distribution of codes

5.6.3.1 Distribution of codes: Characteristics of Involvement

The most common code was pleasant somatic experience in all three intervention groups: raters found the category applicable 1014 times. Somatic complaints (695), internal/external disturbances (409), visualization of symbols (469) all had a high rate of occurrence as well. Non-verbal sensory experiences (88), positive personal memories (148), and elaboration of symbols (98) occurred in the reports of a relatively small number of patients. Negative personal memories were identified only 10 times, which may argue for merging or eliminating this category altogether.

In the hypnosis group the most dominant category was pleasant somatic experience (27.4%) immediately followed by visualization of symbols (24.6%). In the music group pleasant somatic experience was the most dominant (38.6%), followed by somatic complaints (25.1%). Categories representing more involvement, like visualisation of symbols (10.2%) and elaboration of symbols (2%) were less likely to appear in the hypnosis group. In the special attention group pleasant somatic experiences were likewise the most dominant (46.6%), followed by somatic complaints (38.5%). Table 18 shows the distribution of codes between the three intervention groups according to their intensity of characteristics of involvement.

Table 18.: 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	.2	148
5 b Negative personal memories	5	.4	4	.3	1	.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

5.6.3.2 Distribution of Codes in Groups: Intensity of Involvement

To calculate the distribution of codes in groups, only the matching codes were used. Based on the results, almost all the experiences of the special attention group fell into the low intensity category (93.2%). In the hypnosis group, the majority of patients reported high-intensity involvement (61.9%), while in the music group low intensity involvement was the most 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 $V = .44$). Figure 10 shows the percentage of II codes.

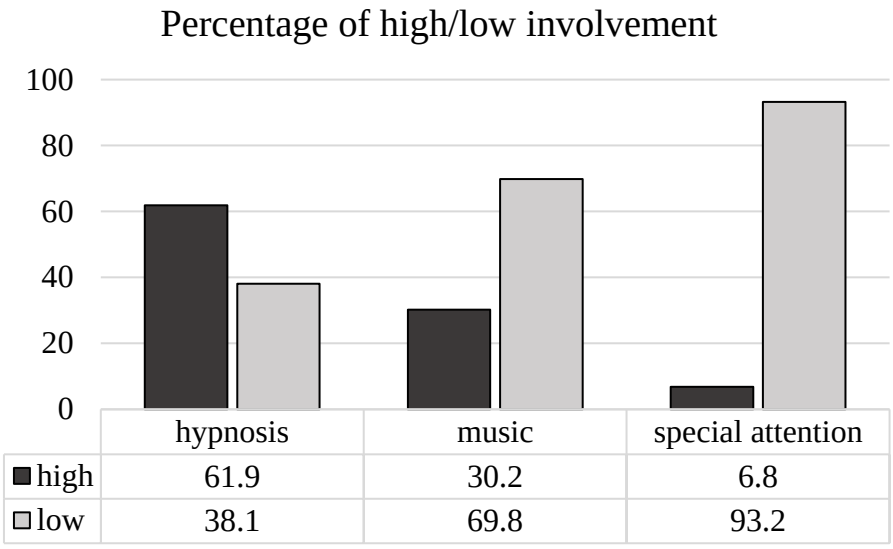


Figure 10.: The percentage of II codes

Note 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 et al., 2018)

5.7 Analysis of the relationship between subjective experience and psychological measures (psychological immune competence, quality of life, posttraumatic growth)

In the following section, psychological immunity, quality of life and posttraumatic growth results of patients are analysed according to the level of involvement in the received intervention. Results are compared according to intervention (hypnosis, music, special attention) and also according to level of involvement (high/low).

5.7.1 Results based on the subjective experience of patients and intensity of involvement

Examining the patients' involvement in the psychological interventions based on the previously introduced intensity of involvement encoding system (high vs. low involvement in intervention). Only the codes found by both raters were analysed. Those patients were included who had data from at least one-third (seven sessions) of the overall 21 sessions. At the present stage of the study, 102 patients' subjective experiences have been analysed. 16 patients have been excluded for missing data. For a detailed description

of patients' participation see Appendix 3. The following analysis was based on the data of 86 patients.

For all patients, an average intensity of involvement throughout the period of intervention was calculated as follows: first, each session was coded either 1 (low) or 2 (high) and then a mean value was calculated (SUM of session/ TOTAL sessions). These calculated mean values take the values 1 or 2. Dichotomization was based on 1.25 cut-off. It is important to note that this cut-off can be regarded as arbitrary, but it ensured the distinction between the following groups: (1) below the mean of 1.25 – in more than half of all occasions high involvement was ***not identified*** – It. was regarded as 'low involvement'. This means that during the majority of occasions the patient reported subjective experiences that had no sign of intrapsychic work. (2) above a mean of 1.25, – in more than half of all occasions high involvement was ***identified*** – It. was regarded as 'high involvement'. This means that the patient showed clear indications of intrapsychic involvement on several occasions. This overall intrapsychic involvement (low/high) will serve as a basis for further analysis. Out of the remaining 86 patients, 42 (48.8%) fell into the low-involvement group and 44 (51.2%) into the high-involvement one (Table 19).

Table 19.: Number of patients in the high/low overall intensity involvement groups

Level of overall involvement	**Number of patients (N)**	**Percent (%)**
Low involvement	42	48.8
High involvement	44	51.2
All	86	100

Patients' psychological immunity, quality of life, and posttraumatic growth were examined based on two different classification aspects: (1) the original grouping based on intervention – hypnosis/music/special attention (intervention group) – and (2) based on involvement – high vs. low (involvement group). Patients in the hypnosis group mainly demonstrated high involvement (87.5% of all cases), while in the music group low involvement predominated slightly (57.1%). In the special attention group, only one person had high overall involvement (Table 20). This person reported a subjective experience considered high by the raters on 6 out of 20 occasions. This type of psychological involvement in the special attention group was not observed in any other

case. To avoid bias resulting from the special attention group's generally low involvement, their data was excluded from further analysis.

Table 20.: Frequency of high/low involvement in intervention groups

Intervention group	Level of Involvement	Number of Patients (n)	Percent (%)
Hypnosis	low involvement	4	12.5
	high involvement	28	87.5
	all	32	100
Music	low involvement	20	57.1
	high involvement	15	42.9
	all	35	100
Special attention	low involvement	18	94.7
	high involvement	1	5.3
	all	19	100

For further analysis two classifications was used: type of intervention (hypnosis: n=32, 47.8%; music: n=35, 52,2%) and level of involvement (high: n=43, 64.2%; low: n=24, 35.8%).

5.7.2 Hypnotic susceptibility and involvement

Association between hypnotic susceptibility and involvement was analysed and was found to be non-significant ($\chi 2(1) = .687$, $p = .449$). However, the rate of high hypnotic susceptibility was slightly more frequent (60.5%) in high-involvement groups than in low-involvement ones (50.0%).

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

In the next sections PICI, WHOQOL-100 and PTGI results of breast cancer patients are compared based on the one hand on the intervention they received (hypnosis/music) and on the other hand based on how deeply involved they became in the intervention (high/low). Then the involvement group membership is predicted based on PICI and WHOQOL-100 results at T1. After the exclusion of special attention group, Table 21 show the number of patients in the intervention and involvement groups who had available PICI results at the six measuring points

Table 21.: Number of patients at intervention and involvement groups who had available PICI results at the six measuring points

	Intervention groups (n)		Involvement groups (n)	
	Hypnosis	**Music**	**High**	**Low**
T_1	31	33	42	22
T_2	21	24	24	21
T_3	26	30	35	21
T_4	29	33	42	20
T_5	27	27	37	17
T_6	21	23	32	12

5.8.1 Psychological Immune Competence (PICI)

5.8.1.1 Cumulative PICI

Comparing the hypnosis and music groups, the only significant difference was at T2 ($t(43) = 3.167$, $p = .003$, $g = .93$). Examining the mean of cumulative PICI, the hypnosis group revealed a higher score than the music group (Table 22). At further measuring points, the hypnosis group showed a higher score than the music group with moderate effect size (Hedges' g: .29-.52).

Table 22.: Comparison of cumulative PICI scores between intervention groups (hypnosis/music)

	Hypnosis		Music		t	p	Hedges'
	M	**SD**	**M**	**SD**			**g**
Cumulative PICI T1	239.90	33.01	225.55	36.65	1.649	.104	.41
Cumulative PICI T2	244.29	30.98	214.96	31.00	3.167	.003	.93
Cumulative PICI T3	247.12	29.58	232.30	35.94	1.691	.097	.45
Cumulative PICI T4	245.90	32.80	235.06	35.67	1.246	.218	.31
Cumulative PICI T5	245.26	32.33	225.63	42.76	1.903	.063	.52
Cumulative PICI T6	247.19	34.42	234.70	49.98	.973	.337	.29

When the patients' cumulative PICI was compared based on level of involvement, there were significant differences at T1–T4. The high involvement group showed higher scores than the low involvement group.

Although there were non-significant differences between the involvement groups at T5–T6, the high-involvement group revealed a higher mean at these measuring points than the low-involvement group (Figure 11). Based on Hedges' g effect size, the differences between the groups were moderate to large at all measuring points (.69–.87).

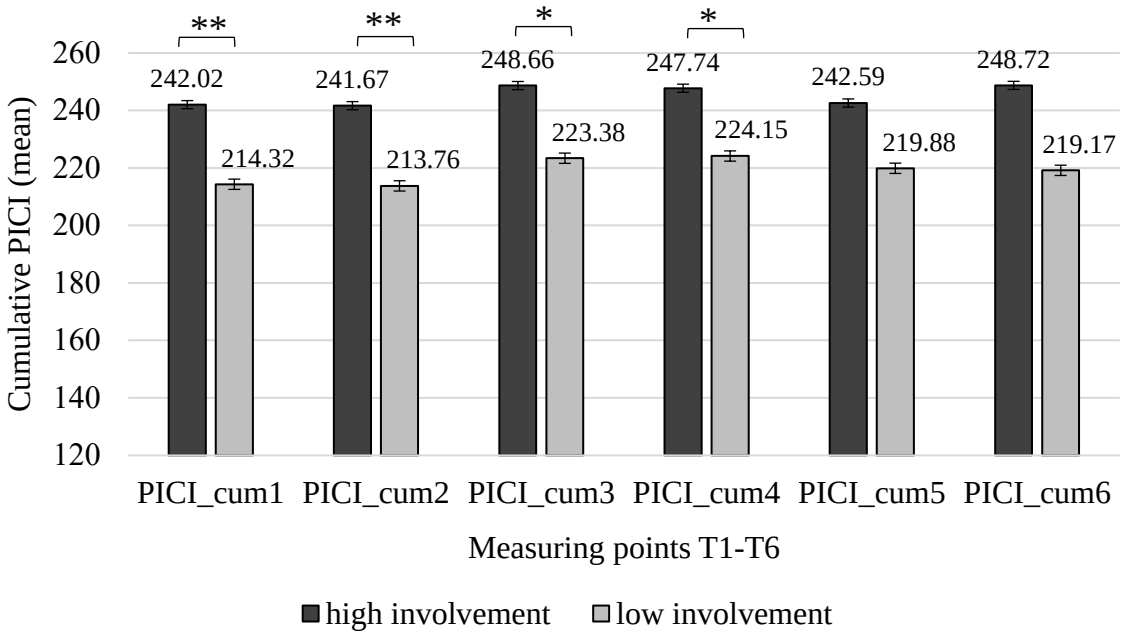


Figure 11.: Comparing cumulative PICIs in the high/low involvement groups (* p < .050, ** p < .010; error bar: standard error)

5.8.1.2 PICI scales and subsystems

The PICI scales of intervention groups and involvement groups were compared at the six measuring points. Based on the comparison of intervention groups at baseline (T1), there were no statistically significant difference in patients' scores. In case of one scale the hypnosis group showed higher scores with practical significance (Table 23 a). At the same time, based on the comparison of involvement groups, patients in the high-involvement group showed higher scores than those in the low-involvement group on 8 scales and in 2 subsystems (Table 23b).

At T2 and T5, in terms of the number of scales, intervention groups and involvement groups differ from each other almost equally. In the case of intervention groups, the

hypnosis group's scores were higher than those of the music group, while in the case of involvement groups, the high-involvement group's scores were higher than those of the low-involvement group (Table 23 a, b). However, at T3, T4, and T6, if the comparison is based on involvement as opposed to type of intervention, there is a greater difference between the groups on several scales.

When comparing intervention groups and examining which scales showed significant and continuous differences during the period of the study, Goal-Orientation was the only scale on which the hypnosis group scored significantly higher, from T1 to T5, than the music group.

When comparing involvement groups, the high-involvement group scored significantly higher than the low-involvement group, from T1 to T6, on the Self-Efficacy and Impulse Control scales in the Self-Regulating Subsystem, and in the Approach-Belief Subsystem. On the sense of self-growth and Goal-Orientation scales from T1 to T5. There was a significant difference at five measuring points on the scales: Sense of Coherence There was a significant difference at four measuring points on the scales of Positive Thinking, Sense of Self Growth, and Synchronicity, (Table 23 a b).

Table 23a.: Significant differences on the PICI scales and in their subsystems based on intervention groups

Bold = statistically significant difference between groups (Bonferroni adjusted value)
Italic = practical significance with Hedges' g > .50

T1	**Hypnosis**		**Music**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Goal-Orientation	17.07	2.17	15.61	3.05	2.212	.031	*.55*
T2							
Sense of Coherence	16.24	2.81	14.29	2.73	2.351	.024	*.69*
Sense of Self-Growth	15.43	2.77	13.21	3.24	2.478	.017	*.73*
Change and Challenge Orientation	14.33	3.29	12.46	3.06	1.969	.056	*.58*
Social Monitoring Capacity	14.71	3.16	12.21	3.16	2.651	.011	*.78*
Problem Solving Capacity	15.76	2.96	13.25	3.30	2.689	.010	*.79*
Self-Efficacy	16.14	2.46	14.71	2.97	1.773	.083	*.51*
Social Creating Capacity	14.67	3.28	12.75	3.57	1.879	.067	*.55*
Goal-Orientation	16.76	2.43	14.79	2.81	2.522	.015	*.74*
Impulse Control	16.14	2.24	13.13	3.25	3.662	**.001**	*1.06*
Emotional Control	12.95	3.22	10.29	3.16	2.793	.008	*.82*

Irritability Control	14.24	2.95	12.75	2.74	1.746	.088	*.52*
Approach-Belief Subsystem	63.00	9.12	56.54	9.55	2.319	.025	*.68*
Monitoring-Creating-Executing Subsystem	123.90	18.72	109.92	16.74	2.627	.012	*.78*
Self-regulating/Self-Regulation Subsystem	57.38	9.16	48.50	9.85	3.118	**.003**	*.92*
T3							
Self-Efficacy	16.85	2.19	15.27	2.89	2.325	.024	*.61*
Sense of Coherence	17.15	2.65	15.60	3.25	1.969	.054	*.51*
Goal-Orientation	17.27	2.16	15.63	2.43	2.665	.010	*.70*
T4							
Goal-Orientation	17.41	1.97	15.58	2.57	3.175	**.002**	*.79*
Impulse Control	16.00	2.20	14.52	3.08	2.200	.032	*.55*
T5							
Sense of Control	15.93	2.54	14.59	2.47	1.955	.056	*.52*
Sense of Self-Growth	15.93	2.91	14.15	3.46	2.044	.046	*.55*
Change and Challenge Orientation	14.63	3.47	12.52	3.70	2.162	.035	*.58*
Goal-Orientation	17.56	2.17	15.63	2.91	2.755	.008	*.75*
Impulse Control	15.56	2.78	13.74	3.45	2.130	.038	*.58*

Table 23b.: Significant differences on the PICI scales and in their subsystems based on involvement groups

Bold = statistically significant difference between groups (Bonferroni adjusted value)
Italic = practical significance with Hedges' g > .50

T1	**High**		**Low**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	16.57	3.28	13.77	4.41	2.622	.013	*.75*
Sense of Coherence	16.05	2.90	12.86	2.53	4.544	**.000**	*1.13*
Sense of Self-Growth	15.29	3.13	12.91	3.28	2.796	.008	*.74*
Self-Efficacy	16.38	2.15	14.64	3.59	2.090	.046	*.63*
Synchronicity	14.83	3.22	11.59	3.50	3.616	**.001**	*.96*
Goal-Orientation	17.05	2.37	14.91	2.91	2.970	.005	*.82*
Impulse Control	14.95	2.67	12.05	3.58	3.353	**.002**	*.95*
Emotional Control	11.71	3.03	9.68	3.46	2.329	.025	*.63*
Approach-Belief Subsystem	63.10	9.39	54.55	10.39	3.230	**.003**	*.87*
Self-Regulating Subsystem	56.12	10.19	46.55	11.91	3.206	**.003**	*.87*

T2							
Positive Thinking	16.54	2.98	14.10	4.23	2.214	.033	*.66*
Sense of Coherence	15.96	3.13	14.33	2.42	1.963	.056	*.57*
Sense of Self-Growth	15.54	2.83	12.76	3.00	3.186	**.003**	*.94*
Problem Solving Capacity	15.33	3.10	13.38	3.41	1.997	.052	*.59*
Self-Efficacy	16.50	2.30	14.10	2.83	3.101	.004	*.92*
Synchronicity	14.54	3.68	11.52	2.86	3.090	.004	*.89*
Goal-Orientation	16.75	2.75	14.52	2.38	2.909	.006	*.85*
Impulse Control	15.63	2.41	13.29	3.54	2.555	.015	*.77*
Emotional Control	12.38	3.24	10.57	3.44	1.801	.079	*.53*
Approach-Belief Subsystem	63.00	8.16	55.62	10.21	2.653	.012	*.79*
Mobilising-creating-executing Subsystem	122.08	16.66	110.00	19.52	2.217	.032	*.66*
Self-Regulating Subsystem	56.58	9.60	48.14	9.68	2.930	**.005**	*.86*
T3							
Positive Thinking	17.31	2.75	15.19	3.44	2.403	.022	*.69*
Sense of Coherence	17.34	2.16	14.62	3.61	3.137	.004	*.96*
Sense of Self-Growth	16.06	2.96	13.24	3.10	3.353	**.002**	*.92*
Self-Efficacy	16.69	2.22	14.86	3.04	2.401	.022	*.71*
Social Creating Capacity	14.97	3.03	13.24	3.38	1.931	.061	*.52*
Synchronicity	15.31	3.59	12.62	4.02	2.528	.016	*.71*
Goal-Orientation	17.03	2.09	15.33	2.63	2.512	.017	*.73*
Impulse Control	15.17	2.56	13.29	3.55	2.124	.041	*.62*
Emotional Control	12.80	3.40	10.71	3.61	2.139	.039	*.59*
Approach-Belief Subsystem	66.40	7.42	58.00	9.84	3.376	**.002**	*.99*
Self-Regulating Subsystem	57.66	10.09	49.48	13.09	2.459	**.019**	*.71*
T4							
Sense of Control	15.88	2.19	14.70	2.03	2.088	.043	*.54*
Sense of Coherence	16.81	3.13	15.00	2.43	2.492	.016	*.61*
Sense of Self-Growth	15.88	3.36	13.80	3.05	2.428	.020	*.63*
Self-Efficacy	16.45	2.43	14.70	2.87	2.359	.024	*.67*
Goal-Orientation	17.26	2.11	14.70	2.32	4.185	**.000**	*1.16*
Impulse Control	15.98	2.37	13.60	2.96	3.139	.004	*.91*
Emotional Control	13.33	3.17	11.65	3.18	1.949	.059	*.52*
Approach-Belief Subsystem	65.24	10.24	58.45	9.02	2.650	**.011**	*.68*
Monitoring-Creating-Executing Subsystem	123.62	16.12	113.55	20.42	1.936	.062	*.52*
Self-Regulating Subsystem	58.88	10.63	52.15	9.28	2.545	**.015**	*.65*

T5							
Sense of Self-Growth	15.81	2.93	13.35	3.48	2.528	.018	*.78*
Change and Challenge Orientation	14.16	3.63	12.29	3.67	1.744	.091	*.50*
Self-Efficacy	15.86	2.73	14.29	3.12	1.786	.085	*.51*
Synchronicity	15.03	3.66	12.53	3.39	2.449	.020	*.69*
Goal-Orientation	17.19	2.72	15.29	2.31	2.644	.012	*.72*
Impulse Control	15.27	3.07	13.29	3.26	2.109	.044	*.62*
Approach-Belief Subsystem	63.89	10.03	57.59	11.41	1.957	.060	*.56*
Self-Regulating Subsystem	57.32	12.31	50.47	10.50	2.108	.042	*.57*
T6							
Positive Thinking	16.88	3.58	14.25	3.96	2.010	.060	*.67*
Creative Self Concept	16.59	3.55	13.67	4.81	1.921	.073	*.64*
Sense of Coherence	16.78	3.05	13.83	3.27	2.712	.014	*.93*
Self-Efficacy	16.41	2.51	14.08	3.61	2.053	.058	*.68*
Impulse Control	15.72	2.92	12.67	3.39	2.756	.013	*.98*
Emotional Control	13.34	3.83	10.67	3.92	2.031	.056	*.67*
Approach-Belief Subsystem	65.44	10.95	57.08	12.47	2.044	.056	*.67*
Self-Regulating Subsystem	58.63	12.73	48.92	12.41	2.294	.033	*.75*

For non-significant results see Appendix 6.

5.8.2 Quality of Life (WHOQOL-100)

The WHOQOL-100 scores of the intervention groups and those of the involvement groups were compared at the six measuring points. Comparing intervention groups, only the Environment domain yielded statistically (T1) and practically (T2 and T5) significant differences between the hypnosis and the music groups. Comparing involvement groups, there were significant differences in several domains of the WHOQOL-100 scores. High involvement groups showed significantly higher QoL than low-involvement groups from T1–T6 in the domains of Physical Health, Psychological domain and Level of Independence. Furthermore, there was significant difference between involvement groups in the domains of overall quality of life and general health (T1; T3; T6), Social Relations (T6), Environment (T1; T2; T3; T6) and Spirituality/Religion/Personal beliefs (T3; T4; T6) (Table 24 a, b.). Based on Hedges' g effect size, the differences between the groups at all measuring points were moderate to large (.5-.94).

Table 24a.: Significant differences in WHOQOL-100 scores based on intervention

Bold = statistically significant difference between groups (Bonferroni adjusted value)
Italic = practical significance with Hedges' g > .50

Environment	Hypnosis		Music		t	p	Hedges'g
	M	SD	M	SD			
T1	16.03	1.53	14.83	1.87	2.873	**.006**	*.70*
T2	16.02	1.71	15.04	2.10	2.092	.040	*.50*
T5	16.31	2.23	15.13	2.10	2.064	.044	*.54*

Table 24b.: Significant differences of the WHOQOL-100 scores based on involvement (in case of Overall Quality of Life and General Health α-value = .05).

Bold = statistically significant difference between groups (Bonferroni adjusted value)
Italic = practical significance with Hedges'g > .50

Overall Quality of Life and General Health	High		Low		t	p	Hedges' g
	M	SD	M	SD			
T1	14.60	2.17	13.39	2.46	2.403	**.019**	*.53*
T3	15.21	2.10	13.90	2.71	2.452	**.017**	*.55*
T6	15.60	2.48	14.20	2.29	2.120	**.040**	*.57*
Physical Health							
T1	15.11	2.03	13.78	2.76	2.525	.014	*.57*
T2	14.73	2.37	13.13	2.92	2.741	**.008**	*.60*
T3	15.03	2.50	13.13	2.77	3.293	**.001**	*.72*
T4	15.79	2.57	13.89	2.91	3.045	**.003**	*.70*
T5	15.35	2.57	13.57	2.38	3.021	**.004**	*.70*
T6	15.27	2.39	12.67	3.46	2.983	**.006**	*.94*
Psychological domain							
T1	14.84	1.93	13.15	2.43	3.526	**.001**	*.79*
T2	14.80	2.13	13.23	2.62	2.992	**.004**	*.65*
T3	15.29	1.90	13.74	2.63	3.076	**.003**	*.70*
T4	15.81	2.40	14.04	2.73	3.021	**.004**	*.69*
T5	15.31	2.43	13.98	2.87	2.082	.042	*.51*
T6	15.30	2.32	13.00	2.80	3.116	**.004**	*.92*
Level of Independence							
T1	15.90	2.46	14.12	2.79	3.116	**.003**	*.68*
T2	15.95	2.29	14.15	2.64	3.322	**.001**	*.72*
T3	15.78	2.51	14.39	2.66	2.466	.016	*.54*
T4	16.44	2.68	15.04	2.64	2.323	.023	*.52*

T5	16.23	2.62	14.75	2.64	2.364	.021	*.56*
T6	16.33	2.69	14.50	3.00	2.258	.030	*.65*
Social Relations							
T6	15.35	2.31	14.05	2.22	2.063	.045	*.56*
Environment							
T1	15.75	1.62	14.79	1.83	2.531	.013	*.55*
T2	15.83	1.88	14.82	1.76	2.554	.012	*.55*
T3	16.04	1.63	15.00	2.12	2.510	.014	*.56*
T6	15.84	1.90	14.62	2.18	2.099	.043	*.61*
Spirituality/Religion/Personal Beliefs							
T3	17.05	2.21	14.98	3.68	3.086	**.003**	*.72*
T4	16.58	3.07	14.61	3.60	2.590	.012	*.60*
T6	16.03	3.05	14.10	3.23	2.174	.036	*.61*

5.8.3 Posttraumatic growth (PTGI)

There was no significant difference on the scales and in the total scores of posttraumatic growth inventory between the intervention groups. Comparing involvement groups, every scale and the total score were significantly different between high- vs. low-involvement groups. High-involvement group showed significantly higher scores than low-involvement groups (Table 25).

Table 25.: Significant differences in the PTGI scores based on the comparison of intervention and involvement groups

Bold = statistically significant difference between groups (Bonferroni adjusted value)
Italic = practical significance with Hedges'g > .50

INTERVENTION	**Hypnosis**		**Music**		**t**	**p**	**Hedges'g**
	M	**SD**	**M**	**SD**			
Total PTGI	57.63	41.34	46.11	39.93	1.157	.252	.28
Appreciation of Life	9.22	6.29	7.97	6.55	.795	.429	.19
Relating to Others	19.22	14.03	15.74	14.12	1.010	.316	.24
Personal Strength	11.38	8.16	9.34	8.22	1.014	.314	.25
New Possibilities	13.53	10.38	10.31	9.45	1.322	.191	.32
Spiritual Change	4.28	3.89	2.74	2.99	1.803	.077	.44

INVOLVEMENT	High Involvement		Low Involvement		t	p	Hedges'g
	M	SD	M	SD			
Total PTGI	10.37	6.09	5.33	5.76	3.363	**.001**	*.83*
Appreciation of Life	20.42	13.30	12.00	14.07	2.394	.021	*.61*
Relating to Others	12.42	7.84	6.54	7.59	3.004	**.004**	*.75*
Personal Strength	14.21	9.61	7.63	9.34	2.739	**.009**	*.68*
New Possibilities	4.33	3.59	1.96	2.84	2.971	**.004**	*.70*
Spiritual Change	4.46	3.65	1.86	2.87	3.678	**<.001**	*.79*

5.8.4 Prediction of involvement group membership (high/low) based on cumulative PICI and WHOQOL-100 at baseline.

Two models were tested to predict involvement group membership.

At first (Model 1), a binary logistic regression was conducted to ascertain the effect of cumulative PICI at baseline (T1) on the likelihood that participants are classified as high involvement. The logistic regression model was statistically significant ($\chi2(1) = 9.243$, $p = .002$). The model explained 18.6% (Nagelkerke R^2) of the variance in group membership and overall correctly classified 68.8% of the cases (high: 85.7%, low: 36.4%). Increasing the cumulative PICI at T1 was associated with an increased likelihood of being classified as high involvement (Table 26).

Secondly (Model 2), a binary logistic regression was performed to examine the effects of the domains of WHOQOL-100 at baseline (T1) – i.e., Physical Health, Psychological domain, and Level of Independence – on the likelihood of Involvement classification. The model was significant ($\chi2(3) = 15.502$, $p = .001$) and explained 28.9% (Nagelkerke R^2) of the group membership's variance. 74.2% of the cases were overall correctly classified based on the independent variables (high: 88.4%, low: 47.8%). Out of the 3 dimensions, only the psychological domain was a significant predictor in this model. Increasing the psychological domain at T1 was associated with an increased likelihood of being classified as high involvement (Table 26).

Table 26.: Prediction of involvement group membership based on cumulative PICI (Model 1) and WHOQOL-100 (Model 2) at T1.

T1	B	SE	Wald	df	p	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Model 1								
Cum PICI	.024	.009	7.714	1	.005	1.025	1.007	1.043
Model 2								
Physical Health	-.318	.227	1.956	1	.162	.728	.466	1.136
Psychological domain	.620	.227	7.487	1	.006	1.860	1.192	2.901
Level of Independence	.134	.147	.832	1	.362	1.144	.857	1.527

5.9 Summary of results

Bellow the main findings of the thesis will be summarised

It seems that breast cancer patients have significantly higher psychological immunity than women in the healthy control group, at base line as well as during the treatment period. The difference is the greatest at T1, T3 and T4.

In each group, as a least dominant scale Emotional Control showed the lowest mean at every measuring point. In the hypnosis group, Goal-Orientation showed the highest mean at each measuring point**.** 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.

PICI scores were compared according to the three different groups: hypnosis/music/special attention. Cumulative PICI, PICI subsystem and scales showed significant differences 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 other groups. No statistically significant differences were observed between the three groups at T1, T3, T4-T6. At T2 there were significant differences between the groups on one PICI scale and one subsystem (Impulse Control ($F(2,91) = 9.061$, $p<.001$, $\omega^2 = .12$), Self-Regulating Subsystem ($F(2,91) = 6.298$, $p=.003$, $\omega^2 = .08$).

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

In the first year after diagnosis (T1 – T4) in cumulative PICI time had a statistically significant Time main effect ($F(3,174) = 6.403$, $p < .001$; 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, statistically significant main effect of Time could be detected in case of Emotional Control ($F(3,174) = 6,027$, $p = .001$, partial $\eta^2 = .09$). There were 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 this period (T1-T4) was statistically non-significant, however, practical significance was revealed in the Approach - Belief Subsystem, Synchronicity, Sense of Control, Sense of Coherence, Social Monitoring Capacity and Emotional Control. In almost all of these cases the score of the hypnosis group increased from T1-T3 and reached its peak at the end of chemotherapy treatment period, falling back after chemotherapy ended. However, it still reflected a higher level than in initial functioning. In the case of the music or special attention groups, however, 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 diagnosis (T4).

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

When analysing patients' subjective experience of the received intervention, two types of coding system were developed:

- Characteristics of Involvement (CI): consists of the following codes: *1) Somatic complaints, 2) Internal or external disturbances, 3) Pleasant somatic experiences, 4) Non-verbal sensory experiences, 5) Positive or negative personal memories, 6) Visualization of symbols, 7) Elaboration of symbols.*
- Codes for Intensity of Involvement (II) consists of: *Low involvement/ High involvement.*

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 $V = .44$).

Patients' data was compared not only according to intervention (hypnosis/music) but to involvement (high/low). Cumulative PICI T1 – T4 were statistically significantly higher in the high involvement group. In the case of PICI scales and subsystem: T1 – T6 several scales and subsystem were significantly higher in the high involvement group compared to low involvement.

The same tendency was observable in case of WHOQOL-100: almost no difference between the hypnosis and music groups, but the high involvement group scored significantly higher on several domains T1-T6; the greatest difference being in physical health, the 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 area.

Group membership was predicted in two models. Model 1was significant ($\chi^2(1) = 9.243$, $p = .002$): PICI at T1 explained 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, however only the psychological domain was a significant predictor in this model.

6 Discussion

6.1 Comparing the PICI results of breast cancer patients to healthy Hungarian sample

As a first step in our study the PICI results of breast cancer patients were compared to healthy Hungarian women sample collected in the past 5 years. There are very few available published data on coping mechanism, especially on psychological immune competence of Hungarian cancer patients. According to our results, breast cancer patients in our sample at baseline report significantly higher psychological immunity compared to healthy Hungarian women, on Positive Thinking, Sense of Control, creative self-concept, Change and Challenge Orientation, Self-Efficacy, Social Mobilizing Capacity, Social Creating Capacity, Goal-Orientation, Irritability Control. There were only two scales where the results signalled lower than healthy average psychological immunity in case of breast cancer patients. These two scales were Sense of Self Growth and Social Monitoring Capacity. Sense of self-growth in the psychological immunity reflects the well examined self-growth approaches. It represents a possibility for personal development and assimilation of new experiences (Oláh, 2005a). According to the literature of posttraumatic growth, personal changes due to traumatic events take place when deliberate rumination processes can assimilate the consequences of trauma in the cognitive schema and result in a better apperception of life, enhanced spirituality, more meaningful relationship with significant others, personal strength, and better use of opportunities and new possibilities (Tedeschi & Calhoun, 2004). This is a process that begins at the onset of trauma, increases in time and can be discovered early in the cancer trajectory 4-6 month after diagnosis (Manne et al., 2004; Silva et al., 2012). It is possible that at the time of our baseline, these processes had not yet begun. Social Monitoring Capacity represents an openness to contact and an ability to deal with people (Oláh, 2005a). Cancer diagnosis is still considered a social stigma (Koncz, 2019; Bányai, 2015a; Riskó Ágnes, 2017). It might hinder social interaction and, in this sense, the Social Monitoring Capacity of breast cancer patients. One year after the diagnosis both Sense of Self Growth and Social Monitoring Capacity reflected a normalizing function, it increased as much in case of breast cancer patients that it was no longer significantly lower than in healthy Hungarian women. At the same time, Synchronicity and Emotional Control of breast cancer patients increased from the end of chemotherapy, so it reflected

higher capacity than in the healthy Hungarian population. Synchronicity represents the ability to change promptly with environmental demands. Coping with cancer requires great flexibility. Presumably, the experience gained during treatment prepares patients to respond effectively to the challenges of new life situations, and as a new skill a higher level of Synchronicity is acquired. Emotional Control is the capacity to regulate feelings and anxiety. It helps to become mentally distanced from worries and preoccupations. As with Synchronicity, the experience of cancer probably teaches patients to regulate the negative emotions that are inevitably there due to the nature of the disease, and to anticipate positive outcomes. At this point it is not clear whether these changes are caused by the interventions that all our patients received, since the study sample lacks a no-intervention control group. Our results contradict Oláh's results (2005b) on cancer patients where cancer patients were found to have significantly lower psychological immunity than healthy persons on 12 scales of PICI. Although it is hard to know the reason for the contradiction, it has to be kept in mind that since that data was collected at least 15 years have passed. There has been a great change in Hungary in the status of cancer and its treatment. Although it is still a life-threatening disease, new and more effective treatments are available, and the availability of alternative treatments and psychosocial help has widened as well. These results might reflect a shift in patients' attitudes. It is also possible that patients in our sample, even in the special attention group, were open to receive psychological help, even if just extra attention. It is possible that their psychological immunity differs from those who refuse help entirely. There is no information on diagnosis or stage of disease in the Oláh (2005b) sample. Type and stage of diagnosis could cause the difference as well.

6.2 Highest and lowest PICI scales according to intervention groups

Emotional Control was the lowest scale in all intervention groups throughout the treatment and follow up period. At baseline, however, this scale did not differ from healthy Hungarian women. Emotional Control represented an increase in time, and eventually rose higher than in the case of healthy Hungarian women.

In the hypnosis group, Goal-Orientation was the strongest component of psychological immune competence at baseline and at all the other measuring points. It might be the inherent characteristic of this group but the fact that it remained constant and even increased might be owning to the beneficial effect of hypnosis. Goal-Orientation in

psychological immunity is the capacity to be capable of continuing a task or decided behaviour even when facing difficulties or obstacles. It also requires a well-defined, visualized goal that is reached even at times of adversities. High Goal-Orientation individuals execute decisions that drive them closer to their formulated end state. As one of our patients said it in the final interview:

> *"When er... I sat down in the chair in the chemo room and I heard the professor's voice I could literally concentrate on one thing only: that there was nothing else in my head except for what the professor* (i.e.: hypnotist's voice on the recording) *was saying—what I should focus on and what effects hypnosis is going to have this time. And I really felt that during chemotherapy, whenever it was necessary... we really built a protective bastion around the cells; at other times, when it was necessary, we were watering our hair. I always and always concentrated on what I needed and I can tell that hypnosis is something very, very good."*

Bányai, Jakubovits, Vargay & Horváth (2018).

Hypnotic suggestions in general, especially at the last phase of chemotherapeutic treatment, focus not only on short term goals of healing, but on future goals as well, continuing life after the disease, employing positive images and perspectives. It seems that these suggestions and healing metaphors are internalised and expand their influence even in the period after the active treatment ends.

The highest scales in music group (Positive Thinking, Social Mobilizing Capacity and creative self-concept) and in the special attention group (Positive Thinking, Goal-Orientation, Social Mobilizing Capacity and creative self-concept) might reflect a greater coping flexibility (Cheng et al., 2014) The received intervention in this two group did not offer direct solutions to specific problems and situations, this could be behind the observed variability.

6.3 Comparing the psychological immune competence in the intervention groups along the treatment and follow up period

In this section the results and effects of both therapeutic intervention (hypnosis, music, special attention) and time on psychological immune competence throughout the study

period will be summarised. To our knowledge this is the ***first study*** to date that investigates in an integrative way personality resources (in terms of ***psychological immunity)*** that may be behind ***successful coping, adaptation, and personal growth***, in this case of a ***homogeneous group of breast cancer patients*** who received standardized chemotherapeutic treatment and ***psychological intervention in a longitudinal design***.

6.3.1 Difference in psychological immune competence between intervention groups at each measuring points

Patients' PICI results were compared at each measuring points according to the intervention they received. 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. Patients called it 'raspberry syrup' due to its colour, and they dreaded it due to its severe side-effects. This treatment period is likely to be characterised by even more elevated stress than the period that follows it, with PAC treatment entailing fewer side-effects. So, the protective functions of psychological intervention in keeping up the effective coping strategies seems to be even more important.

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*. The Self-Regulating Subsystem incorporates impulse- emotional- and Irritability Controls, and it guarantees the stable functioning of the other two subsystems, through regulating the emotional reactions that interfere with achieving the planned goals (Oláh, 2005a). Hypnosis seems to help higher self-regulation in a highly challenging treatment period with severe side-effects by regulating patient's emotional state to create an ideal emotional atmosphere for carrying out realistic and logical actions. Control functions help stabilise the process of coping for optimal functioning. With high Impulse Control, decision making happens in an exceedingly thoughtful manner. In the cancer context, decision making, regulated by emotions, impacts on patients' physical and mental well-being. Emotional Control helps to readjust especially negative feelings to achieve goals and manage challenges. In the case of cancer, it has the same effect as engagement emotional regulation strategies, which can be connected to well-being and positive emotions, and to better quality of life. (Conley, Bishop & Andersen, 2016).

Further beneficial effect of hypnosis could be traced in *Social Monitoring Capacity* that helps to better understand meta-communicative messages, and covert relations between people, and helps to build social interactions and to use their help to reach long-term goals (Oláh, 2005a). The interpersonal and relational nature of hypnosis (Shor, 1962) might have facilitated the improvement of Social Monitoring Capacity. Social Monitoring Capacity can have its beneficial effect in terms of building and maintaining a social support network. Social support has a wide range of positive effect in the cancer continuum, but in connection with coping, it can influence the choices of coping strategies (Kim et al., 2010). Furthermore, it might have an important role in orientation in health services through a more successful communication with the medical team (D'Agostino et al., 2017). Social Monitoring Capacity and, through this, more intense social support during the initial period of treatment is highly adaptive, contributing to positive post-traumatic growth through positive rumination (i.e. sharing experiences). However, the literature also tells (Roussi et al. 2007). that this type of coping will not prove to be effective in the future and indicates that the internal work is stuck. So, it is important that hypnosis supports this in due time and the difference disappears later. *Problem Solving Capacity* represents wide range of new and innovative ideas, alternative solutions, and the belief as well of finding new possibilities in the face of obstacles (Oláh, 2005a). When effective Problem Solving Capacity was examined in cancer patients, it was found to be an important moderator and limiter of disease-related distress and depression. (Carvalho & Hopko, 2009; Hopko et al., 2011; Nezu, Nezu, Felgoise, McClure & Houts, 2003). *Change and Challenge Orientation* is closely connected to the hardiness concept of Kobasa (Oláh, 2005a) and helps one to tolerate high level of uncertainty, and be able to notice change in flexible way. People with high Change and Challenge Orientation are open to new experiences and to renewing themselves. The flexibility in the highly challenging period of cancer treatment is a key element of successful adaptation (Roussi, Krikeli, Hatzidimitriou & Koutri, 2007) Hardiness seems to have an important role in resilience, and have a protective function against depression (Tadayon, Dabirizadeh, Zarea, Behroozi, & Haghighizadeh, 2018).

Hypnosis had a facilitating role in *Goal-Orientation and Impulse Control* at T4, which is one year after the diagnosis of breast cancer, and approximately half a year after the end of the chemotherapeutic treatment. Since after chemotherapy, radiotherapy was also applied, T4 followed the end of the treatments by approximately four months. This so-

called re-entry period of cancer survivorship is linked to insecurity, due to loss of the safety net provided by health care professionals, a weakened social support, the emerging long term physical and psychological results of the treatment, an increasing distress, difficulty in continuing former roles and returning to work (Stanton, Rowland & Ganz, 2015). In this sense hypnosis might have a role, through increased Goal-Orientation and Impulse Control, to successfully adapt to the new challenges of cancer survivorship, to be able to persistently focus on personal goals even in the elevated challenges of the re-entry period. Higher level of Goal-Orientation seems to be present even during the second year of survivorship (T5). Patients reported that they use the hypnotic suggestions they received during the treatment period to help themselves and they practise techniques useful for their long-lasting goal of maintaining their health. A verbatim quote from a patient in the hypnosis group demonstrates this:

> *"it felt so good to recall them* (ie.: hypnotic suggestions*). I still remember them today—obviously not the whole thing, but the main points, the words, the sentences are still in my memory. Yes, and I've been practicing them to this very day. I do the whole process again when I clean the house. (Really?) Yes. I imagine that I need to do some cleaning in my body too. And I ask my friendly cells to drive the bad ones out and send them outside. That's what I usually say."*

Bányai, Jakubovits, Vargay & Horváth (2018).

6.3.2 The effect of time on psychological immune competence

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. 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. This result can demonstrate that going through the challenges of the cancer trajectory and coping with the arising stressors results in a perceived increase in psychological immune competence. These results seem to parallel the findings of research on posttraumatic growth where PTG was recorded already on the early onset of the breast cancer trajectory (4-6 month after diagnosis) (Manne et al., 2004; Silva et al., 2012) It seems that the psychological immune

system is activated as coping begins with the life-threatening illness. Just as in the case of PTG, through successful efforts women feel stronger and more skilled to deal with difficulties, achieving a sense of competence in stressful situations, which also increases the likelihood of assertive problem-solving when faced with traumas in the future. In studies examining PTG, the level of growth reached a plateau at the end of treatment, and remained stable 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). According to our findings, psychological immunity can also go through such increases until it reaches a plateau, and functions accordingly even three years after diagnosis.

In the *Approach-Belief Subsystem*, the above-mentioned increase in time was also reflected independently from the received interventions. This subsystem enables the individual to appraise the environment as positive rather than chaotic and threatening. It may be surmised that as the initial distress decreases (Silva, Crespo, & Canavarro, 2012; Schwarz et al., 2008) and effective coping and adaptational processes begin, patients feel more confident, and begin to appraise the treatment in a more positive way (Oláh, 2005a). This type of change in appraisal has been noted in the literature. According to Bowman, Deimling, Smerglia, Sage & Kahana (2003) there is a shift in the appraisal of the cancer experience: while during treatment periods, cancer may be appraised as mostly stressful, when the active treatment ends, more positive or at least neutral perspectives appear.

In terms of the 16 PICI scales from the start of chemotherapy treatment (T1), until a one-year follow-up (T4) *Emotional Control* represented the greatest increase. The significance of Emotional Control has been discussed earlier: it helps to transform failures and threats into positive emotions and constructive actions. Trait-like characteristics and emotional regulation strategies can change due to psychological interventions, and for example patients can become more expressive in their emotions without being more hostile (Giese-Davis, 2002; Conley, Bishop, & Andersen, 2016). At this moment it is not clear whether the increase which can be observed in Emotional Control was due to the fact that all intervention groups received extra care, but it is important to note that it eventually became greater than in the healthy population.

Less dominantly however increase in time could be observed in case of Positive Thinking, Sense of Control and Impulse Control. These scales of PICI that show an increase in time reflect the above-mentioned similarity to post-traumatic growth. According to Calhoun & Tedeschi (2006), following a traumatic event automatic contemplations take place; later, as the trauma becomes more integrated into one's personal history, more conscious coping processes replace it. Meaning-making can be achieved through these conscious cognitive and emotional efforts. The increases in time in Positive Thinking, Sense of Control and Sense of Coherence may reflect the conscious processing in an increasingly stabilised emotional environment (Emotional and Impulse Controls).

The remaining eleven scales showed small increases or stability in time, or a small fluctuation around an average value during this one-year period. It is very important to state that no scale showed a monotonous decrease. The stability of PICI scales in time can be interpreted with the dispositional characteristics of psychological immune traits that enables individual-specific management of stress and recovery (Oláh, 2005a). Also, it can reflect the protective function of the received interventions.

6.3.3 Effect of interventions in time during treatment and follow up period on psychological immune competence

Time x group interaction revealed only practically significant results. It seems that the change of Approach-Belief Subsystem, Synchronicity, Sense of Control, Sense of Coherence, Social Monitoring Capacity and Emotional Control, where practical significance was present, share the same tendency: Namely that hypnosis as an intervention increased protective personality resources during the chemotherapy treatment period when it was the most needed, and this boosting effect dropped after the most stressful period was over. A continuous increase was present in almost all of these scales from T1 to T3, and reached its peak at the end of the chemotherapy treatment period and fell back after chemotherapy had ended. However, it still reflected a higher level than in initial functioning. As opposed to the music or special attention group, where 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) and reached the level of the hypnosis group. It seems that hypnosis can enhance coping skills and personality resources that help patients view their treatment process in a more optimistic and meaningful way, with greater Sense of Control over the situations, to react with flexibility to varying challenges, while being able to renew

themselves and find creative solutions to problems with the help of significant others in an emotionally stabilised environment (Oláh, 2005b). This type of change also takes place in the other intervention groups with a time delay.

The effect of different interventions in time: During the two-year follow up period

Although none of the scales indicated statistically significant Time x Group interactions (with Bonferroni adjusted level) in the follow up period, practically significant (effect size) of Time x Group interaction could be detected in the case of *Problem Solving Capacity, Positive Thinking, Sense of Self-growth, and Synchronicity and Social Creating Capacity*. In all these cases, hypnosis represented a slight increase in the two-year follow-up period, whereas music and special attention either decreased or remained at around the same level. *Problem Solving Capacity*, as stated above, is linked to the belief that a person can find solutions to arising problems. High Problem Solving Capacity is associated with the ability to innovate and think constructively (Oláh, 2005a) .It is an important moderator in the cancer context, decreasing distress and depression (Nezu et al., 2003). It seems that hypnosis is the strongest in triggering a long-term flexibility in finding solutions and might enhance problem-solving techniques by teaching new solutions to existing problems. *Positive Thinking* in psychological immunity is linked with anticipation of positive outcomes, and is closely related to dispositional optimism and hopefulness (Oláh, 2005a). In the case of breast cancer patients, hope and optimism are frequently examined dispositions, and have been found to be behind better psychological adjustment (Casellas-Grau et al., 2016). *Sense of Self-growth*, in the psychological immunity sense, is premised upon self-growth approaches, and means the capacity to perceive oneself as a constantly growing agent. It also contributes to openness and the assimilation of new experiences. *Synchronicity* has been described above. In this sense, hypnosis might have a long-term beneficial effect on priming the cognitive system to perceive changing environment as favourable, and in fostering adaptation in the long term. *Social Creating Capacity* represents the ability to solve problems with the power of a community that otherwise would be to difficult for the individual. It is more than asking for help, it is rather an ability to organise help through one's social network. For cancer patinets it seems to be indispensable because of the changed living conditions and limited self-sufficiency.

6.3.4 Summary of psychological immune competence in the intervention groups

As a result of coping with a life-threatening disease, patients perceived an increased level of psychological immunity over time, which reaches a plateau and functions accordingly afterwards. It seems that the increase was generally unrelated to the type of intervention they received, but some further advantage of hypnosis through its direct suggestions could be noted when compared to the non-directive music and special attention in developing successful coping strategies. However, further research with a greater sample size is needed to confirm these results. Positive changes in psychological immunity seem to take place despite the physically and emotionally burdensome treatment period. In the absence of a regular medical treatment/no intervention control group at this stage, it is not clear whether this change is due to the help that each patient received from the research team or whether it can happen also without interventions such as PTG. Based on our hypothesis, a greater difference in the benefit of hypnosis between the intervention groups was expected. In the following sections we further explore an explanation for the effectiveness of this method of interventions. Former studies with guided imagery proved that it is not only the type of intervention that grants benefits in clinical outcomes, but the level of active involvement, absorption, vividness of imagery, frequency of practice also count (Eremin et al., 2009; Kwekkeboom, Hau, et al., 2008; Kwekkeboom et al., 2003; Kwekkeboom, Wanta, et al., 2008; Walker et al., 1999). In the following sections we explore the subjective experience of cancer patients and its effect on psychological immunity, quality of life and personal growth.

6.4 Discussion of the results concerning the analysis of subjective experience of interventions

The subjective level of involvement in the provided intervention (hypnosis, music, or special attention) was examined. Patients were asked to report on their experience right after receiving the type of intervention according to their group membership. The verbatim text was content-analysed. Although the phenomenology of subjective experience of altered states of consciousness is frequently studied in the field of hypnosis, the study of such states in music has been studied less frequently (Hilgard, 1968; Siuta, 1996; Wagstaff, Cole & Brunas-Wagstaff, 2008; Pekala, 1991; Pekala et al., 2010; Wagstaff, 2010; Sheehan & McConkey, 1982; Varga, 2013; Szabó, 1993; Hejja-Nagy & Szabó, 2006;Gabrielsson & Wik, 2003; Sandstrom & Russo, 2013). Those studies which

do exist have mostly been conducted on healthy subjects by self-reported questionnaires. Furthermore, subjective experience is rarely implemented in studies that examine the effectiveness of such interventions in the case of cancer patients***. 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. So emerging themes reflect a more genuine aspect of personal involvement than in studies where a Likert scale or paper-pencil questionnaires were used (Eremin et al., 2009; Kwekkeboom, 2000; Kwekkeboom et al., 2018; Walker et al., 1999). It also does not require a judgement over patients' own experience e.g. whether it represents high or low involvement, vividness etc. These judgements would might cause an effect on further involvement in the intervention e.g. if the patients signal constantly low values it also provides a feedback for her that might cause disappointment which can further escalate in her attitude towards the intervention. It would also cause constraints to meet external expectations in a sensitive period.

6.4.1 The developed encoding systems: their reliability and connection to existing models

Through analysing patients' subjective experiences, two types of encoding systems were developed, *Characteristics of Involvement* (CI) describing personal involvement based on analysing the appearance of certain themes that indicate different aspects of involvement and *Intensity of Involvement* (II) reflecting high or low intrapsychic involvement based on general content. Both developed category systems correspond to existing literature on the subjective depth and experience of hypnosis, music and guided imagery.

The first four categories of characteristics of involvement show similarities to the linear one-dimensional model, with increasing involvement (LeCron, 1953; Tart, 1970). The additional CI categories (personal memories, visualization or elaboration) represent similarities to the multidimensional models. From the phenomenological method of Shor (1962) relaxation, vividness of imagery, accessibility to unconscious material are similar to our categories. From the 'Hypnotic Experience Questionnaire' of Kelly & Matheson (Matheson et al., 1989) dissociation/altered state, relaxation, visual imagery, cognitive rumination, and from the factors of the 'Phenomenology of Consciousness Inventory' by

Pekala (1991) altered experience (perception), attention (direction, absorption) visual imagery (amount, vividness) memory show similarities to our CI categories. CI shows similarities to the categories of strong experiences related to music (Gabrielsson & Wik, 2003) such as cognition, perception and personal-social aspects. The high-low category of intensity of involvement shows similarities to the musical involvement scale (Nagy & Szabó, 2002).

In line with our results, both category systems may be reliable tools for examining breast cancer patients' subjective experiences. Two independent raters who were previously trained could reliably judge the characteristics as well as the intensity of involvement based on the verbatim text. In fact, the agreement between the raters was very high in both encoding systems.

Our results further indicate that patients accepted, interpreted and made use of hypnosis, music and special attention in an individual or personal way and the 'message' of the different interventions interacted with the patients' idiosyncratic perception. This data was collected in the same way as in techniques that allow free report of experiences of altered states of consciousness such as the Experiential Analysis Technique (Sheehan & McConkey, 1982).

6.4.2 Description of experiences that characterised breast cancer patients' involvement in hypnosis/music/special attention

6.4.2.1 Somatic complaints

Chemotherapy treatment usually comes with a range of physical, psychological, and psychosocial side effects. Side effects can be clinical syndromes (e.g., depression, anxiety, cognitive impairment), observable physical problems (e.g., nausea, vomiting, hair loss), subjective physical problems (e.g., pain, fatigue), as well as psychosocial difficulties (e.g., job and financial problems) (Wagland et al., 2015). Patients in our sample talked about their experience right after an actual chemotherapy treatment or one week after when they came for their blood test result checks. When they were asked to tell about their experience of the intervention, some in our sample spoke of physical problems. These physical problems were represented in the category of somatic complaints. This category covers any disturbing somatic experience that was present at the same time when the patient was receiving the intervention. (i.e. listening to hypnosis, or music, or receiving extra attention from the research team). This included the treatment

itself, the medical environment, conditioned physical responses such as anticipatory nausea, but somatic complaints could also include the symptoms themselves if the patient was not sufficiently diverted from them. These Somatic complaints, however, appeared in the three groups with highly different frequencies. The highest occurrence was in the special attention group, as somatic complains appeared twice as frequently as in the hypnosis groups and 1.5 times more than in the music group. The least occurrence of somatic complains was in the hypnosis group. It seems that hypnosis was the most capable of reducing disturbing somatic symptoms. This is consistent with the large number of studies which have proved that hypnosis can modulate conscious bodily experience like chronic or procedural pain, nausea, and vomiting (Carlson et al., 2018; Cramer et al., 2015; Montgomery et al., 2013; Wortzel & Spiegel, 2017).

6.4.2.2 Internal/external disturbances

Internal/external disturbances describe the attempt to become involved in the intervention; however, inner thoughts or outside events distracted the patients from becoming involved. Its highest occurrence was in the music group. This could be owing to the fact that special attention did not require a focused immersion on the part of the patients, and it seems that the verbal nature of hypnosis was more successful in orienting attention.

6.4.2.3 Pleasant somatic experiences

Despite the generally frequent somatic side effects and negative psychological consequences of chemotherapy, a pleasant somatic experience was the most dominant response in all three types of interventions. Pleasant somatic experience refers to a state when patients feel relaxed, calm, and free of stress in a mental or physical sense. Above all it seems to be one of the most important merits of this study that all three types of interventions could outweigh the side effects of chemotherapy, and treatment time could be referred to as a pleasant somatic experience. The beneficial effect of achieving a relaxed state during chemotherapy has a long history in easing emotional adjustment, anxiety, depression, improving treatment related symptoms, and immune functions, to mention but a few (Gruzelier, 2002; Luebbert, Dahme & Hasenbring, 2001) It seems that hypnosis providing direct suggestions to achieve a state of relaxation, and music working in a non-verbal fashion are both highly conductive to such a state. In the special attention group, pleasant somatic experiences occurred most frequently out all types of

involvement. This result has an important clinical significance, showing that simple intervention, such as the social support provided by special attention, can generate such beneficial state. At the same time, with hypnosis and music, patients talk about a wider range of other experiences of deeper involvement (sensory experiences, personal memories, visualisation or elaboration of symbols), while in the special attention group these categories representing positive, altered states of consciousness are almost entirely absent.

6.4.2.4 Nonverbal sensory experiences and positive personal memories

There were no direct instructions for non-verbal sensory experiences such as visualization of colours, smelling a certain aroma like a pine tree, or of feeling as though floating on waves, or positive personal memories such as childhood experiences or recent affirmative, sometimes symbolic positive events. It is important to highlight that the appearance of these experiences was spontaneous, and therefore their occurrence might denote a greater degree of intrapsychic work. When they talk about their experience, patients usually realise the personal significance of these sensory experiences and positive memories. These types of involvement happened only in the case of music and the hypnosis group. Literature examining experiences of hypnosis as well as music, denotes the occurrence of both positive personal memories and sensory delusions (Dileo, 2006; Pekala, 1991). Both categories appeared most frequently in the hypnosis group, while nonverbal sensory experience did not occur in the special attention group and a positive memory was reported only once.

6.4.2.5 Visualization of symbols

Visualization of symbols was mentioned in 331 sessions in the hypnosis group, 120 sessions in music and 18 in the special attention group. In the case of hypnosis, suggestions were overt messages given for therapeutic reasons, and contained images to help relieve stress-induced anxiety, as well as metaphors for ego-strengthening, helping to increase motivation for recovery, dealing with the side-effects of chemotherapy, activating inner healing resources, and facilitating immune functions. Music was designed to match the themes, moods, and dynamics of the hypnotic text. It seems that symbols and images similar to the ones given overtly in hypnosis could be evoked by the non-verbal channels of music, but less frequently than in hypnosis. Visualization of symbols in the case of special attention was rare, though still detectable. Symbols in this

group were in connection with symbols of physical healing, auto suggestions such as visualising the chemo as it helps to cure, but these images were vaguely described by the patients.

6.4.2.6 Elaboration of symbols

Elaboration of symbols represents compound images that become personal, original, and unique, they contain meaningful extra details more than the original suggestions gave. This extra meaning is generated by the patient. The occurrence of elaboration of symbols was again highest in the hypnosis group (in case of 75 sessions) but it also appeared in music group (in 23 sessions), where these symbols were activated nonverbally. None of the patients in the special attention group reported symbols in such manner. Both the visualization of symbols and the elaboration of symbols have clinical importance, since previous studies have proved that vividness of imagery is correlated with clinical response to cancer treatment (Eremin et al., 2009; Walker et al., 1999).

6.4.2.7 Relative precedence of categories in the different involvement groups

In the hypnosis group, somatic complaints and internal/external disturbances were mentioned in 30.2 % of all sessions. Pleasant somatic experience was almost as high as the previous two, with 27.4% reporting nonverbal sensory experience, while memories and the visualization and elaboration of symbols were mentioned in 42.5% of cases. In the music group the figures were 42.5% – 38.6% – 18.9 % respectively, and in the special attention group 48.5% – 46.6% – 4.8 % So, in case of hypnosis, in almost half the sessions some kind of intrapsychic involvement more than a simple relaxed feeling was registered. This type of involvement was lower in case of music group, and almost absent in special attention. It is important to note that both music and special attention had the same relative pattern, with equally high occurrences of somatic complaints, internal/external disturbances and pleasant somatic feelings.

6.4.3 Description of intensity of experiences

Intensity of involvement categories (high/low) was based on the overall evaluation of each session by independent raters. Their evaluation was based on the overall characteristics of the experience of each session. Due to its dichotomised nature, this type of evaluation was the basis of further statistical analysis concerning psychological immunity, quality of life and posttraumatic growth. In the overall evaluation, high

intensity involvement occurred in 61.9% of sessions in hypnosis group, whereas this figure was 38.7% in the music group and 6.8% in the special attention group. Hypnosis, probably through its interpersonal and relational nature (Shor, 1962) and through its direct suggestions, could mobilize hidden resources in a way that allowed patients take part more intensively in their own psychological healing process. Music was also capable of evoking thoughts, images, and feelings similar to hypnosis, resulting in highly involved intrapsychic work and the disclosure of contents with personal significance or symbolic meaning, although in a smaller number of patients. Hejja-Nagy & Szabó (2006) found in connection with music that a trance-like experience occurred among high involvers in laboratory settings: they experienced increased imagery, positive feelings, focused attention, alteration in meaning, perception, sense of time, body image, consciousness and self-awareness. Furthermore, they found that the phenomenological changes of high involvers were very similar to changes due to hypnosis. Even special attention could trigger intense involvement where healing process appeared in a symbolic way.

6.4.4 Hypnotisability and subjective experience

There was no significant association between hypnotic susceptibility and level of involvement. This result is in accordance with the earlier results of our research team demonstrating that within laboratory circumstances low hypnotisable young healthy volunteers report subjective experiences characterising altered states of consciousness as often as highly susceptibles (Bányai, 1991). The rate of high hypnotic susceptibility was slightly more frequent (60.5%) in high-involvement groups than in low-involvement ones (50.0%). As it was introduced earlier, according to Shor (1962) the three dimensions of hypnotic depth (trance, unconscious involvement and archaic involvement) can be regarded as interrelated factors, but this is not necessarily the case in individual level. This may explain the fact that in clinical practise, patients with low hypnotic susceptibility can have deep personal experience of hypnosis, and due to motivational and interpersonal factors can become just as involved in a therapeutic process as patients with high hypnotic susceptibility.

6.4.5 Summary of the content analysis of patients' experience.

In sum, the developed category system seems to be a reliable tool for examining breast cancer patients' subjective experiences. It seems that hypnosis as intervention may result in more extended subjective experiences in characteristics and intensity of involvement,

since it seems that the intervention is capable of evoking contents with personal significance and symbolic meaning referred to as deeper intrapsychic involvement, whereas music and special attention can counteract the unpleasant side-effects of cancer treatment with pleasant somatic experiences such as feeling relaxed. These findings support studies that found the beneficial effect of implementation in clinical practice of such simple methods as music medicine or a pre-recorded series of suggestions as a general practice during chemotherapy treatment (Berlière et al., 2018; Zhang et al., 2012). As patient-reported outcomes have become an important indicator of person-centred medical care, both methods are cost effective, can be implemented with a small number of personnel and can result in significant benefits. (LeBlanc & Abernethy, 2017).

Since our study was conducted on a clinical sample of cancer patients, this category system could serve as a useful tool for comparing clinical responses in oncology settings and outcomes with the level of patients' involvement, as it has been done in the present study.

6.5 Discussion of the relation between subjective experience and psychological measures (PICI, QOL, PTGI)

As mentioned in the previous section, patients became involved in the provided psychological interventions to different degrees. A group of patients were capable of deep immersion in the given suggestions or in the music they listened to, while others felt unaffected by it. The question arose whether those who became more intensively involved in the intervention, and reported subjective experience according to it, would have better outcome on psychological measures. This section therefore discusses the connection between breast cancer patients' subjective experience of a given intervention and the integrated cognitive, motivational, and behavioural personality dimensions of psychological immune competence, quality of life, and long-term posttraumatic growth. As well as being compared according to the type of interventions they received (hypnosis/music), patients were also compared according to the intensity of 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 and furthermore based on psychological immune competence and quality of life before intervention, level of involvement could

be predicted. These results are similar to those studies that already investigated patients' subjective experience and used it 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). The special attention group was excluded from this analysis, since their answers reflected low intensity involvement, and predominantly due to the nature of this type of involvement, including them would lead to misleading results.

6.5.1 Intensity of involvement and psychological outcomes

6.5.1.1 Psychological Immune Competence and intensity of involvement

When patients were compared according to the type of intervention they received (hypnosis/music only, special attention was excluded this time), hypnosis achieved the greatest mobilizing effect in the PICI results after 12 weeks of chemotherapy treatment (T2). The first 12 weeks of chemotherapy is the most burdensome and challenging period. The AC treatment has the most severe (mostly emetogenic) side-effects, which affect the everyday life of patients between two rounds of treatment. Furthermore, alopecia happens during this period, that on the one hand affects the body image, and on the other hand has consequences in social relations as well, since it is the first time that the disease becomes evident to everyone who meets the patient. It is important to highlight the beneficial effects of hypnosis in fortifying patients' psychic 'bastion' during this period, and helping them to cope with the obstacles. A less dominant but still beneficial effect of hypnosis could be detected in the PICI scores at each measuring point. In contrast, when patients were compared by their PICI results according to level of involvement (high/low), patients in the high involvement group reflected significantly higher psychological immune competence in their cumulative results, in several scales and subsystems as well as before starting chemotherapy, during treatment period, and in the re-entry period. In long term survivorship the same tendency was true in terms of cumulative PICI with moderate to large effect size. Regarding PICI scales, the difference between high and low involvement groups was greatest at the beginning of chemotherapy, during treatment, immediately after ending the chemotherapy and one year after the diagnosis at re-entry period when life returned to normal. At a later stage of survivorship – two and three years after the diagnosis – this difference seems less marked. First, it is important to note that in case of PICI there is a greater difference between groups according to involvement

(high/low) than according to intervention (hypnosis/music) especially at the initial phase of their cancer trajectory and continuously during the first year after diagnosis. Later this difference diminishes. At this stage, due to sample size, it cannot be stated definitively whether results of T5, T6 would be different with a larger sample. Or it reflects the activation of the psychological immune system when facing serious life challenges. It could be supposed that high involvers have a greater degree of psychological immune reaction that is behind the greater significant differences at T1, T2, T3, T4.

Based on our results, high-involvement patients had higher scores in several aspects of psychological immunity at baseline: Positive Thinking, Sense of Coherence, sense of self-growth, Self-Efficacy, Synchronicity, Goal-Orientation, Impulse Control, and Emotional Control. These scales mainly belong to the Approach-Belief Subsystem and Self-Regulating Subsystem. Approach-Belief Subsystem is responsible for primary appraisal processes, and initiates the exploration of the environment for resources, while Self-Regulating Subsystem helps to control emotional aspects of behaviour. If Approach-Belief Subsystem and self-regulating tendencies are in balance, then the person feels competent to assimilate the results of whatever approaches in a positive and emotionally stable state. The cognitive components of the Approach-Belief Subsystem underlie the evaluation of a positive, manageable, and meaningful environment, in a condition where sense of personal growth remain untouched. While the Self-Regulating Subsystem provides emotional regulation in order to provide a constant implementation of personal goals and planned actions (Oláh, 2005a, 2005b). It seems that those patients who had an attitude that filters environmental information in a positive, optimistic framework and felt self-confidently competent and effective, and at the same time were capable of regulating the emotional impact of cancer treatment, demonstrated a stronger psychological response to interventions.

When challenges are less present, the difference between the high and low involvers seems to diminish more. The initial increased level of distress and anxiety around the diagnosis period is well established in the literature. For most patients an adaptation takes place and the level of distress decreases, although transitional periods such as the end of treatment and return to normal life can hold challenges (Beauregard, 2014; Miller et al., 2008; Saboonchi et al., 2015; Schwarz et al., 2008). Another explanation for this result would be that the changing pattern of significant difference between the high/low involvers represent different psychological immune response trajectories in line with the

different distress, anxiety, and depression trajectories of cancer patients (Beauregard, 2014; Miller et al., 2008; Saboonchi et al., 2015; Schwarz et al., 2008). Further studies are needed to explore this field of research in more depth.

6.5.1.2 Quality of life and intensity of involvement

The same tendency was present in WHOQOL-100 results as in psychological immunity. When the quality of life of the hypnosis and music groups was compared, the hypnosis group scored higher in the environment domain before chemotherapy treatment (T1), after 12 weeks of chemotherapy (T2), and two years after the diagnosis (T5). The environment domain deals with patients' safety, in terms of physical and general environment (noise, air pollution, etc.), quality and availability of health and social services, accessibility of transportation, financial safety, possibilities to learn new skills and knowledge, availability of recreation and relaxation programmes. Through its interpersonal nature (Shor, 1962) hypnosis as an intervention may have influenced the perceived quality of medical care, by creating an extra sense of support and personal attention, to a greater degree than music. Hypnosis as a mind-body, self-regulation intervention can operate on the attentional, emotional, cognitive and behavioural level, and through its direct suggestions may have provided new skills that promote the self-control to cope with the challenges of the disease, and to deal with the physical symptoms (Sawni & Breuner, 2017). Furthermore, it can provide new knowledge and personal experience about the interconnected nature of mind and body functioning. It also can represent a form of recreation.

At the same time, if patients were compared according to level of involvement, high involvement patients scored higher throughout the examined cancer trajectory (T1 – T6) in physical health, psychological domain and level of independence. A better quality of life in terms of physical health is reflected in lower level of pain, higher level of energy for daily tasks, better rest and sleep quality, and more intact sexual activity and sensory functioning. Higher psychological quality of life is realised predominantly in a more positive emotional life, with higher level of self-esteem, a greater acceptance of altered body image, retained memory functions and focused attention and concentration. Independence in terms of quality of life is manifested in generally greater mobility, good work capacity and activity in everyday work, and less dependence on medical and non-medical substances. Additionally, the high involvement group showed significantly

higher scores in all the other domains reflected at some point of the study period (overall quality of life and general health at T1; T3; T6, Social Relations at T6, Environment at T1; T2; T3; T6 and Spirituality/religion/personal beliefs at T3; T4; T6.

The greatest difference between the high and low involvement group in terms of quality of life is at T6, where the two groups differ from each other in all domains. It seems that being involved in the intervention generate processes that affect long term quality of life. At this stage it is unclear what underlies these results: it might be a positive cycle in the coping trajectory that results in better quality of life in the everyday functioning of long-term survivorship, this active-successful coping trajectory can also indicate a greater level of personal growth that affects the perceived level of well-being. This last suggestion is supported by number of studies that relate positive coping strategies to posttraumatic growth which is also associated to a better quality of life and optimal functioning in cancer (Arpawong, Richeimer, Weinstein, Elghamrawy & Milam, 2013; Danhauer et al., 2013, 2009; Morrill et al., 2008). See more details below.

6.5.1.3 Posttraumatic growth and intensity of involvement

When interpreting the results of PTGI inventory, it is important to highlight that in our sample, three years after diagnosis more than 97% of the patients experienced at least a small degree of change, and even a more interesting result is that the total mean score of our sample seems to be higher than in studies examining posttraumatic growth with PTGI on breast cancer patients with (Pat-Horenczyk et al., 2015) or without intervention (Lelorain, Tessier, Florin & Bonnaud-Antignac, 2012; Silva et al., 2012). Interpreting this result is beyond the scope of the present paper, but a detailed description is given in Zsigmond, Vargay, Józsa & Bányai, (2019). However, it is important to observe that either due to the interventions, or due to the relatively long time that passed since the diagnosis when PTGI was assessed, or due to the amount of social support which is prerequisite for PTG, and which patients received from the research team, or for some other, undiscovered reason, almost all patients in our sample experienced personal growth. So, when no significant difference is described between posttraumatic growth of hypnosis and music groups, it must be clearly stated that both groups reported higher than average growth, independently of the type of intervention. Again, however, when PTGI was compared between high or low intervention groups, high involvers showed a generally greater posttraumatic growth three years after diagnosis in all aspects of PTGI,

with a significant difference and large effect size. Patients in the high-involvement group perceived increased appreciation of life, more meaningful relationships, increased sense of personal power, discovered new possibilities and experienced spiritual change. In the theoretical framework of posttraumatic growth, social support – through its comforting effect and also by granting safe social environment for deliberate rumination processes – can be considered as one of the key factors for mobilizing resources that can lead to personal development both at the time of diagnosis and during cancer treatment period. (Tedeschi & Calhoun, 2006; Ramos, Leal & Tedeschi, 2016; Scrignaro et al., 2011). As Tedeschi & Calhoun (2004) proposed, early levels of success in coping (i.e. effective, non effective) determine an adaptive PTG or a maladaptive trajectory. Personality dispositions like optimism, hope and humour that can foster positive coping, and which in turn enhance positive cognitive processing, can result in a greater PTG. Coping can therefore be considered as key component of PTG (Kolokotroni et al., 2014; Rajandram et al., 2011; Silva et al., 2012). It was also found that psychological immunity, together with posttraumatic stress, could explain the 30% of PTG variance in our sample (Zsigmond, Vargay, Józsa & Bányai, 2019). It can be assumed that those who had higher psychological immunity, a better quality of life in psychological domain and experienced a greater involvement in psychological intervention could therefore experience a greater level of psychological support and feel a safer social environment where deliberate rumination could take place either as a result of intervention or in their everyday life. Further, it can be assumed that for high involvement group a greater positive coping resulted in greater PTG.

6.5.2 Predictability of high/low involvement group membership

It may be assumed that different personality characteristics can be connected to the degree to which patients become involved in psychological interventions. Higher psychological immunity and better quality of life (in terms of more positive emotional life, higher level of self-esteem, greater acceptance of altered body image, retained memory functions and focused attention) at baseline resulted in greater intrapsychic work in patients, as a result of psychological interventions. Level of involvement, especially high level of involvement, could be predicted by the cumulative psychological immunity scores and by the psychological domain of quality of life at baseline.

Psychological immunity at baseline accounted for 18.6%, whereas quality of life in the psychological domain accounted for 28.9% of the variation in group membership. This is an acceptable value, but it can be assumed that additional factors play a role in group affinity. In both models, high involvement could be better classified.

Hejja-Nagy & Szabó (2006) studied the effects of music in laboratory settings: subjects received hypnosis induction before listening to music. According to their findings, hypnotic induction influenced only low involvers in their experience, although the experience was still not as strong as for high involvers. For high involvers music may have a parallel effect to a hypnotic induction. For high involvers, the type of music did not affect the experience, whereas for low involvers, the type of music determined the involvement. Several conclusions can be drawn from this study: first it further supports the more frequent occurrence of high involvement in hypnosis, and also explains the fact that only some patients were deeply involved in music: they can be considered as the high involvers in the Hejja-Nagy & Szabó (2006) study, and it is possible that some patients in the low involvement group who listened to music would eventually be more involved if they had received hypnosis. Furthermore, the type of music that patients listened to was predefined by the research team. It is possible that if the freedom of choice had been given in selecting preferred music, there would be more patients highly involved in the music group. In line with this finding, a group of patients can be supposed who are in the 'middle' and with a proper intervention can become highly involved. This may be a factor that influences the predictions of group membership.

6.5.3 Conclusion drawn from the results of intensity of involvement

In sum, an association seems to exist 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 booster 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, to have a greater protective effect on the above-mentioned factors. For clinical practice, one factor to consider would

be that for a group of breast cancer patients, baseline characteristics allow them to mobilize hidden resources, become involved in psychological interventions that represent all this, provide protective factors for stressors in the cancer trajectory, and 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. Further baseline characteristics could influence this coping trajectory, such as levels of perceived stress and social support (Yeung & Lu, 2018), illness representation (Richardson, Schüz, Sanderson, Scott & Schüz, 2017), changes in the neuroendocrine system due to traumatic experiences causing changes in the brain due to its plasticity (Kolb & Gibb, 2014) and perceived control and outcome expectations (Kwekkeboom et al., 2018) etc which should be examined in the future.

7 Conclusion

Breast cancer patients begin their cancer trajectory with initial coping resources such as optimism, hope, Self-Efficacy, Sense of Control, or Sense of Coherence (Applebaum et al., 2014; Gallagher, Long, Richardson & D'Souza, 2019 Stanton et al., 2000; Stanton, Danoff-Burg & Huggins, 2002; Chirico et al., 2017; Merluzzi et al., 2018; Henselmans, Fleer, et al., 2010; Rohani, Abedi, Sundberg & Langius-Eklöf, 2015), personal psychosocial characteristics and medical background (such as age, education, former psychological states, type of diagnosis, illness representation, body image, quality of life, level of social support etc.). All of these factors influence whether the patient steps onto an effective or less effective coping trajectory, which, later on, determines the extent of the adaptation in terms of such symptoms as distress, anxiety, depression, or further quality of life, as well as the cognitive, emotional, motivational, and physical aspects of survivorship, and the rate of personal growth (Brandão et al., 2017; Shapiro et al., 2010).

The coping process is influenced by the type, duration and intensity of stressors throughout the treatment, which can arise from the nature of the cancer treatment, but also from other aspects of life. While successful coping at an early stage of the cancer trajectory can induce a sense of competence or mastery, and therefore an adaptive trajectory, failure in coping can, by contrast, induce a negative feedback loop (Tedeschi

& G Calhoun, 2004), thereby further influencing the patient's quality of life and sense of self-growth.

Psychological interventions can break negative cycles and divert them onto more adaptive trajectories. In one part of our study we aimed to explore how certain interventions, such as hypnosis, music, or special attention, affect the coping process in terms of psychological immunity. As outlined in the method section measuring points were determined at such phases of the cancer treatment where we assumed that changes would occur and result in elevated levels of distress. We assumed that the patients in the three intervention groups did not differ significantly at baseline in terms of their psychological immunity and quality of life. We also assumed, based on previous studies, that time affects and modifies coping in ways that are reflected in psychological immune competence, which was indeed supported by our findings. We further assumed that hypnosis as a form of psychological intervention, as an effective tool in regulating emotions and improving coping skills (Bányai, 2015), based on its interactional nature, can have a beneficial effect on psychological immunity, which was also observable, albeit only slightly, in our results. Previous studies contend that imagery vividness and subjective experience during interventions influence cancer patients' outcome measures (Eremin et al., 2009; Kwekkeboom et al., 2003; Kwekkeboom, Wanta, et al., 2008;Walker et al., 1999). Based on the exploratory analysis of the patients' subjective experiences in our study, we found that certain patients became deeply involved and showed signs of greater intrapsychic work, whereas other patients remained unaffected. Analysing our data based on categorizing patients into high involvement and low involvement groups, differences in PICI and WHOQOL scores could be identified at baseline, which not only remained stable throughout the examined period, but also re-appeared in posttraumatic growth at T6. More importantly, high–low involvement could be predicted by the cumulative PICI at baseline, and by the psychological domain of WHOQOL100. It is also important to note that high involvement could be predicted to a greater degree. With our current dataset, the proposed model, which will be discussed below in more detail, was only testable up to this point.

According to our model, patients' baseline psychological characteristics, such as psychological immunity and quality of life, affect their possible coping trajectory and, as a result, their adjustment process. It could be proposed that higher levels of psychological immunity and increased levels of psychological health (i.e., the psychological domain) in

quality of life are associated with a higher involvement in an intervention, such as music or hypnosis, all of which, in turn, can result in more successful coping trajectories, better adjustment outcomes (e.g., a generally better quality of life), and higher levels of personal growth. In contrast, lower levels of psychological immunity and psychological health in quality of life can lead to lower levels of involvement in interventions and result in less adaptive outcomes with lower levels of personal growth. It is these coping trajectories that can be modified by psychological intervention. Hypnosis seems to have a stronger influence on these trajectories than music; most probably due to its verbal and more directive nature, which offers a clear solution for patients by broadening their coping repertoire. Research on hypnosis also points in this direction, and considers hypnosis to be an evidence-based form of psychological intervention in oncology (Carlson et al., 2018; Montgomery et al., 2013; Wortzel & Spiegel, 2017).

For patients with high levels of psychological immunity and/or psychological health in quality of life, intervention can provide a maintaining role; this is especially important when further negative life events occur in the treatment process. Patients with low levels of psychological immunity and/or psychological health in quality of life do not seem to profit from the types of standardised interventions used in our study; in their case, therefore, patient-specific coping skills training are of the utmost importance (Antoni, Lechner, et al., 2006; Antoni et al., 2001; Antoni, Wimberly et al., 2006; Groarke et al., 2013; McGregor & Antoni, 2009; Phillips et al., 2008). For those with medium levels of psychological immunity and/or psychological health in quality of life, a more intensive intervention, such as hypnosis used as a form of psychotherapy, can help to put patients on a more successful coping trajectory. Given these considerations, our results seem to be consistent with both the findings of previous cancer research and clinical practices in cancer treatment. Although the majority of patients can cope with the diagnosis and the negative emotional stress that accompanies the examinations and treatments alone or with minimal support, at least one third of patients require psychological support, while another third reach clinical levels of distress that require professional, psychological, or psychiatric help (Gregurek et al., 2010; McFarland & Holland, 2016; Mitchell et al., 2011; Riskó, 2006). Accordingly, focusing on patients' varying needs, different levels of psychological interventions are available in oncological practice, such as psychoeducation, consulting, or psychotherapy (Strada & Sourkes, 2010). However, in further research studies, it would be of great value to determine the diagnostic cut-off

point of the psychological immune competence inventory and the WHOQOL100 psychological domain in oncological settings for a more adequate screening.

Based on the above, I suggest a hypothetical model, that could be tested with further studies (Figure 12).

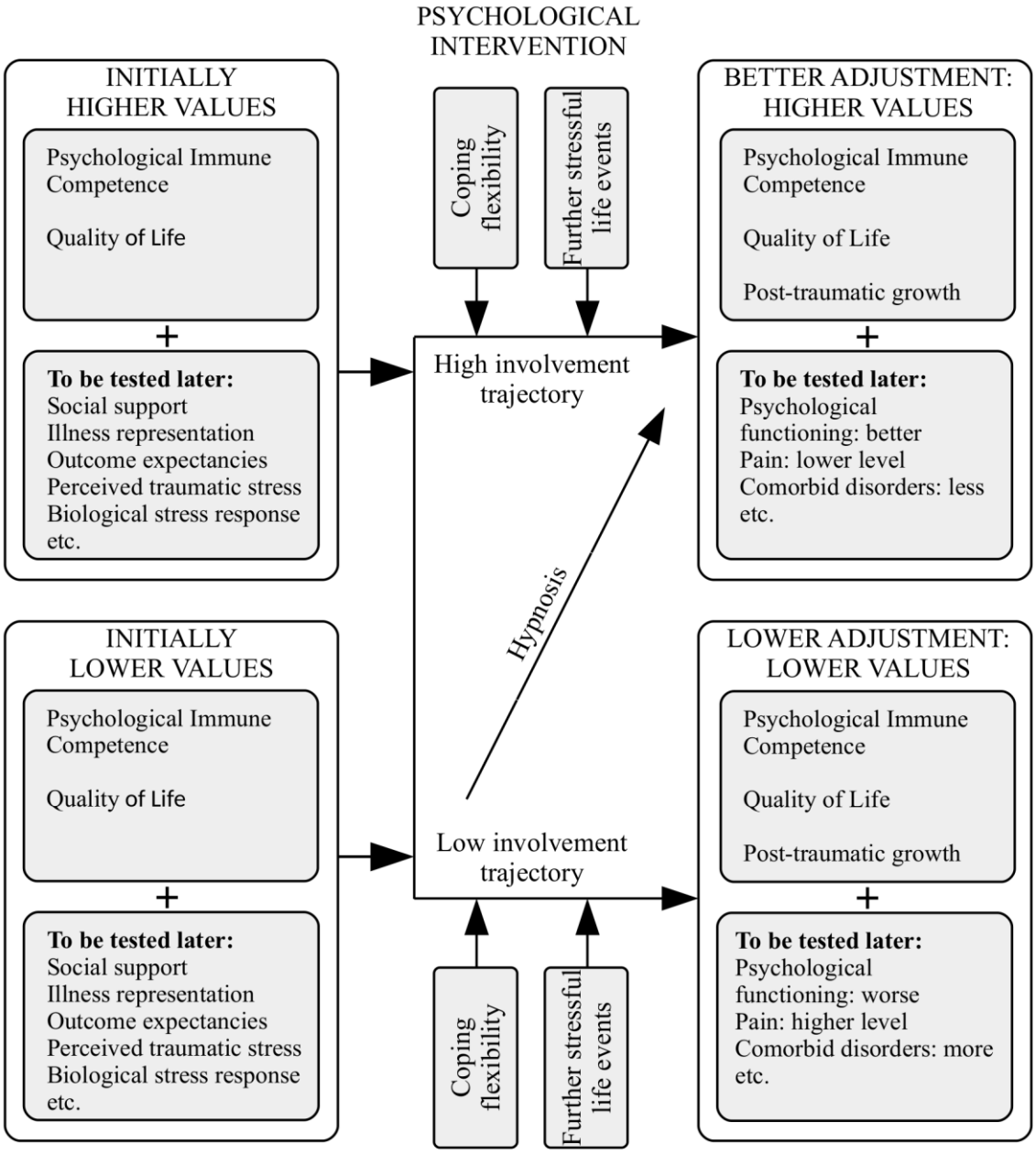


Figure 12.: A proposed and partly tested model of low and high involvement trajectory

Further studies should test this model by determining outcome measures – such as comorbid disorders or pain, as well as traditional outcome measures of adjustment, such as depression or psychological distress, but also other domains of functionality, such as quality of life, cognitive, emotional, behavioural, and psychological factors of wellbeing, or personal growth (Dekker & de Groot, 2018) – and by identifying further predictors and confounding variables to examine mediating and/or moderating effects.

8 Difficulties while conducting the research

Difficulties were encountered on several occasions. A number of organizational and practical difficulties were encountered during the research which required a high degree of flexibility from the staff.

Although professional knowledge and financing (for the NK measurement), and ethical approval were ensured by the research team, it took years to achieve allowance and approval from the medical institutions involved in the research.

It was difficult to find a calm place in the institutions where the research team could meet the patients in calm circumstances. Even after receiving a room, the research team had to move several times due to overcrowded health conditions.

It was hard to find a psychologist for the study in Szombathely. That is the reason for the small sample size in the follow up period from Szombathely, since the data collection stopped when the only psychologist left the oncology department due to financial problems.

Patients were waiting in line to see their oncologist before chemotherapy treatment, so treatment was delayed for hours and the team had to stay overtime.

Blood samples had to be transferred to another location to measure immunological parameters. To organise transfers from Debrecen and Szombathely to the Semmelweis University of Budapest was always a day to day problem involving many volunteers.

When designing the research, the ultimate goal was to choose the most advanced chemotherapy protocol, so that the patients included in the research would be guaranteed to receive the most up-to-date care on the one hand, and, on the other hand, to follow the latest protocol, which will probably be acquired for a long time. Unfortunately, patients' selection for the study was very slow because of the concurrent testing of new

pharmacological treatments. In the meantime, the chemotherapy protocol had changed. Obviously, when the chemotherapy protocol chosen for the research was not the most up-to-date solution, the patient selection was finished. This is the reason why the number is our sample is smaller than in the original design.

9 Limitations

In our study several limitations should also be identified.

Methodologically the most serious limitation of the study is the fact that we did not have a control group of patients who received only the 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 who received only 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 feel rejected by not receiving any psychological help. That is why patients were not randomised to a standard medical care group.

This research does not cover those who reject the investigation completely. However, this seems to be a general problem of clinical research using psychological interventions, and seems to be ethically unavoidable.

Most participants in the special attention group were gathered in two cities distant from Budapest and from each other (Debrecen, and Szombathely). On the one hand, the advantage is that these two sites are far from the main site of the research, thus the patients did not experience social exclusion because of not being invited to compare interventions like hypnosis and music. On the other hand, these towns are smaller, have different social networks and other psychosocial properties, and also have small settlements in their catchment area. It can be assumed that the lifestyle and everyday problems of the inhabitants here are different from those in the capital, which can act as a distortion factor.

The characteristics of our sample should also be considered. It consists of a homogeneous group of breast cancer patients both in diagnosis and in treatment. This has advantages, but homogeneity hinders the generalisability of the present findings across other cancer

groups. 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.

For interpreting our results Bonferroni adjusted value was used. By this method the likelihood of type II errors can also increase, so truly important differences can be considered non-significant (Perneger, 1998). Therefore, results with notable effect size were also included for explorative purposes.

In our study, the hypnosis was audiotaped. According to several meta-analyses (Chen et al., 2017; Montgomery, David, Winkel, Silverstein & Bovbjerg, 2002; Schnur et al., 2008), hypnosis had significantly higher benefits in those studies where hypnosis was delivered live by a therapist who was present. Although listening to an mp3 player may be a cost-effective way of providing for large number of patients in overwhelmed health systems with little personnel to spare, the achieved trance is usually not as profound. It may be caused by environmental distraction, or it is even more probable that it is caused by the limited interpersonal interactions. Pre-recorded hypnosis cannot be adjusted according to the patient's needs. In this study, the research was matched to a clinical situation and reality. The oncological care system is overloaded, so a method that is also efficient with small human resources was tested. This justifies the use of mp3. I assume that hypnosis would have led to even more significant results in a personalised setting. Despite all this, pre-recorded hypnosis seems more suitable for everyday care.

Several important psychological factors could affect coping capacity and psychological immunity, of which the most important could be 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.

The questionnaires were long, and therefore their use is limited in clinical practice. A shorter version of PICI with 16 items is now available, but its factor structure was not confirmed in our sample (Vargay, Zsigmond, Józsa & Bányai, 2017).

Information was not gathered on whether patients asked for further psychological help outside of the study. To our knowledge, patients did not ask for further help during chemotherapy, but this was not inquired into systematically.

Although there was no significant association between study groups and level of education, it has to be mentioned that the level of education was highest in the hypnosis group and the lowest in the special attention group. Level of education affects the success of psychotherapy (Carkhuff, 2017). This may have influenced results.

Although, according to our intentions, raters were blind to the affiliations of the patients' groups, total blindness could not be achieved due to the nature of the texts, since from the content of the patients reports, group affiliation could be guessed. This could affect results.

Since this is a clinical trial for seriously ill patients, where several different "research crews" participated in multiple locations, human factors played a stronger role than in a laboratory-based research. On the side of the research team, the double-blind layout was not always feasible. Members of the research team accompanied each patient and asked about their physical and emotional state before, and about their experiences after, the chemotherapy treatment. They were the ones who gave the mp3 player to the patients and helped to start it whenever chemotherapy begin. They had to know to which group the patients belonged. When they asked about the experience they also became aware of which group the patient was in. Blindness in this case was almost impossible in practice, since the content of the experiences revealed the group affiliations. Although patients were asked not to talk about the interventions they received, it is possible that occasionally they talked about it to their fellow patients. The principal investigator as a hypnotist was present in the building during the experiment, and at the start of the treatments she performed the first interview and the measurement of hypnotic susceptibility. She was available later on as well, but the patients usually met the other members of the team. Research members, if they were involved in other phases of the research, generally had tasks related to data collection and the entering and processing of numerical data (i.e.: blood count). However, an ideal research team that only deals with the patients, and another team who deals with the data processing was not feasible. I also took part in both processes.

Nevertheless, the present study broadens the existing literature by giving better insight into the characteristic psychological immune functions of breast cancer patients: how these relate to the healthy Hungarian population, and how these functions change over the course of the disease and as a result of psychological interventions. Furthermore, it gives a better understanding of patients' subjective experience, and the connections between psychological immunity, quality of life and posttraumatic growth.

10 Clinical significance of the findings

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 is especially important for clinicians that hypnosis seemed to be the most effective among the used interventions. It is all the more important that in spite of the fact that hypnosis usually develops in a personal interaction between hypnotherapist and patients, a pre-recorded hypnosis session nevertheless proved to be effective in this study. It should be noted that in this research the hypnotist of the pre-recorded suggestions had a rapport with the patients, since she administered the Stanford Hypnotic Clinical Scale to the patients after conducting the first psychological interview.

The effect of rapport is important even in the case of the other two interventions. The research assistants asked the patients about their emotional and physical wellbeing before the chemotherapy treatment, and about their subjective experiences after the infusion was finished. Patients considered this as a chance to vent their emotional and physical problems. The fact that patients, even in the special attention group, had pleasant somatic experiences shows that even this opportunity has a beneficial effect: namely that it could outweigh the side effects of chemotherapy, and treatment time could be referred to as a pleasant somatic experience. This result has important clinical significance, showing that a simple intervention, such as the social support provided by research assistants, can generate such a beneficial state. Volunteer helpers trained for communicating with seriously ill patients might be helpful in improving the quality of cancer care.

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. In other words, it can be assumed that a group of patients can be identified at time of diagnosis, for whom pre-recorded hypnosis or music in the presence of a hypnotherapist has significant benefits and protective features, helps to alleviate and prevent the negative effects of treatments and illness. Another group of patients will benefit little from these standardised interventions, and needs other kind of supposedly personalized help. It seems that the Psychological Immune Competence Inventory and the WHO Quality of Life-100 test, administered after diagnosis but before the treatment phase begins, help to determine who can benefit from standardised interventions. Further studies are needed to determine what other characteristics of this patient group can be identified. Are these patients the ones, known to be about 30% of all patients, who need professional help in overcoming the psychological burden of the disease? A psychological screening protocol for cancer patients is currently being developed in Hungary to identify and provide further effective care to patients in need of help (Mailáth, Laczkóné Majer, Horváth & Szabó 2017). In my opinion, this research also provides important information on this topic.

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13 Appendix

13.1 Appendix 1.: List of hypnotic suggestions

Suggestions of first phase (8 occasions during AC treatment)

- Induction
- Positive role model: Lance Armstrong who won Tour de France after being diagnosed with advanced cancer (only first time)
- Positive suggestions about the medical team (only first time)
- Reducing anxiety with blowing away colorful balloons
- Safe place
- Finding inner resources
- Chemotherapy as alliance: protecting healthy cells, only cancer cells are destroyed
- Enhancing immune functions (imaginative active alert suggestions)
- "Big" clean up in the body
- Suggestions on hair follicles
- Antiemetic suggestions
- Posthypnotic suggestions
- Dehypnosis

Sugessions of second phase (6 occasions during PAC treatment)

- Induction
- Reducing anxiety with blowing away colorful balloons
- Safe place
- Finding inner resources
- Chemotherapy as alliance: protecting healthy cells, only cancer cells are destroyed
- Enhancing immune functions (imaginative active alert suggestions)
- "Big" clean up in the body
- Suggestions on hair follicles
- Antiemetic suggestions
- Metaphor, forest on a hill is replanted after fire
- Posthypnotic suggestions
- Dehypnosis

Sugessions of third phase (8 occasions during PAC treatment)

- Induction
- Reducing anxiety with blowing away colorful balloons
- Safe place
- Finding inner resources

- Chemotherapy as alliance: protecting healthy cells, only cancer cells are destroyed
- Enhancing immune functions (imaginative active alert suggestions)
- “Big” clean up in the body
- Suggestions on hair follicles
- Antiemetic suggestions
- Metaphor, body is like an orchestra, knows how to play in harmony together
- Suggestions for returning to normal life
- Posthypnotic suggestions
- Dehypnosis

13.2 Appendix 2.: Selection of classical music in music group.

Selection of first phase (8 occasions during AC treatment):

- E. GRIEG: Peer Gynt Suite No. 1, Op. 46. Moorning Mood
- W. A. MOZART: Concerto for Flute, Harp, and Orchestra in C major, K. 299/297c II. movement
- J. MASSENET: Meditation from Opera Thaïs Act II.
- C. DEBUSSY: La mer, trois esquisses symphoniques pour orchestre (The Sea, three symphonic sketches for orchestra) L109
- B. SMETANA: My homeland (six symphonic poems) 2. Vlatva
- P. I. TCHAIKOVSKY: Sleeping Beauty Op 66 The Waltz
- G. BIZET: L' Aresienne Suite No. 2: IV. Farandol
- VANGELIS: Chariots of Fire: Film music – Main theme
- VIVALDI: Il cimento dell'armonia e dell'inventione op. 8. Concerti 1-4.
- L. V. BEETHOVEN: Symphony No. 6 in F major, Op. 68,. IV.-V.
- F. SCHUBERT: Symphony No. 5 in B♭ major, D. 485

Selection of second phase (6 occasions during PAC treatment):

- E. GRIEG: Peer Gynt Suite No. 1, Op. 46. Moorning Mood
- W. A. MOZART: Concerto for Flute, Harp, and Orchestra in C major, K. 299/297c II. movement
- J. MASSENET: Meditation from Opera Thaïs Act II.
- C. DEBUSSY: La mer, trois esquisses symphoniques pour orchestre (The Sea, three symphonic sketches for orchestra) L109
- B. SMETANA: My homeland (six symphonic poems) 2. Vlatva
- P. I. TCHAIKOVSKY: Sleeping Beauty Op 66 The Waltz
- G. BIZET: L' Aresienne Suite No. 2: IV. Farandol
- VIVALDI: Il cimento dell'armonia e dell'inventione op. 8. Concerti 1-4.
- R. WAGNER: Siegfried, Forest murmurs WWV 86c
- L. V. BEETHOVEN: Symphony No. 6 in F major, Op. 68,. IV.-V.
- F. SCHUBERT: Symphony No. 5 in B♭ major, D. 485

Selection of third phase (8 occasions during PAC treatment):

- E. GRIEG: Peer Gynt Suite No. 1, Op. 46. Moorning Mood
- W. A. MOZART: Concerto for Flute, Harp, and Orchestra in C major, K. 299/297c II. movement
- J. MASSENET: Meditation from Opera Thaïs Act II.
- C. DEBUSSY: La mer, trois esquisses symphoniques pour orchestre (The Sea, three symphonic sketches for orchestra) L109
- B. SMETANA: My homeland (six symphonic poems) 2. Vlatva
- G. BIZET: L' Aresienne Suite No. 2: IV. Farandol
- VIVALDI: Il cimento dell'armonia e dell'inventione op. 8. Concerti 1-4.
- J PACHELBEL: Canon in D major

- L. V. BEETHOVEN: Symphony No. 6 in F major, Op. 68,. IV.-V.
- F. SCHUBERT: Symphony No. 5 in B♭ major, D. 485

13.3 Appendix 3.: Number of sessions in which patients participated. Line indicates election criteria

	Number of H/M/SA sessions	Number of patients (frequency)
Not included in the study	1	1
	2	1
	3	2
	4	2
	5	4
	6	6
	7	2
Included in the study	8	4
	10	3
	11	1
	12	5
	13	1
	14	3
	15	6
	16	8
	17	9
	18	8
	19	11
	20	11
	21	14
	All	102

13.4 Appendix 4.: Differences of PICI scales between the 3 groups at 6 measuring points: significant and nonsignificant results

	Hypnosis (H) (n=46)		Music (M) (n=45)		Special Attention (SA) (n=53)		F	p	ω^2
T1	**M**	**SD**	**M**	**SD**	**M**	**SD**			
Positive Thinking	16.02	3.42	15.69	3.83	16.30	3.11	.372	.691	-.01
Sense of Control	15.07	2.17	15.16	2.18	14.93	2.55	.117	.89	-.01
Sense of Coherence	15.48	2.92	15.13	3.03	15.13	2.84	.218	.805	-.01
Creative Self Concept	15.96	3.00	15.87	3.78	16.28	3.19	.214	.807	-.01
Sense of Self Growth	14.63	3.14	14.71	3.37	14.51	3.07	.049	.952	-.01
Change and Challenge Orientation	14.28	3.09	14.18	3.21	14.00	3.07	.106	.899	-.01
Social Monitoring Capacity	13.80	3.78	13.56	3.66	13.81	3.37	.075	.928	-.01
Problem Solving Capacity	14.87	3.00	13.71	3.51	14.34	3.52	1.423	.246	.00
Self-Efficacy	15.94	2.49	15.49	3.26	15.55	2.91	.369	.692	-.01
Social Mobilizing Capacity	15.67	3.23	16.27	3.22	15.94	3.35	.383	.683	-.01
Social Creating Capacity	14.24	3.44	13.82	3.89	13.96	3.42	.158	.854	-.01
Synchronicity	13.70	3.31	13.64	3.54	13.59	3.29	.014	.986	-.01
Goal-Orientation	16.72	2.30	16.24	2.99	15.93	2.45	1.381	.257	.00
Impulse Control	13.96	2.91	13.71	3.67	13.45	3.22	.331	.719	-.01
Emotional Control	11.35	2.77	11.13	3.63	11.55	3.20	.177	.838	-.01
Irritability Control	13.91	3.05	13.56	3.58	13.19	3.05	.69	.504	-.01
Approach-Belief Subsystem	61.20	9.57	60.69	10.30	60.87	8.62	.031	.969	-.01
Monitoring-Creating-Executing Subsystem	121.48	18.02	119.13	19.52	119.81	19.25	.192	.825	-.01
Self-Regulating Subsystem	52.91	9.83	52.04	11.96	51.77	10.47	.165	.848	-.01
	Hypnosis (H) (n=30)		**Music (M) (n=31)**		**Special Attention (SA) (n=33)**		**F**	**p**	**ω^2**
T2	**M**	**SD**	**M**	**SD**	**M**	**SD**			
Positive Thinking	15.67	3.42	15.13	3.68	15.76	3.13	.290	.749	-.01
Sense of Control	14.93	2.74	14.42	2.50	14.76	2.51	.308	.736	-.01
Sense of Coherence	15.90	2.77	14.71	2.70	14.58	3.21	1.990	.145	.02

Creative Self Concept	15.80	3.50	15.03	3.34	15.33	3.08	.383	.683	-.01
Sense of Self Growth	15.30	2.67	13.94	3.35	13.79	3.43	2.471	.093	.02
Change and Challenge Orientation	14.43	2.97	12.68	2.87	13.42	2.65	2.739	.073	.04
Social Monitoring Capacity	14.77	3.10	12.29	2.90	13.73	2.94	5.229	.008	.08
Problem Solving Capacity	15.47	2.94	13.39	3.09	13.88	3.08	3.961	.024	.06
Self-Efficacy	15.80	2.37	14.90	2.90	15.12	2.93	.997	.375	.00
Social Mobilizing Capacity	15.30	3.05	15.29	3.19	15.61	3.34	.096	.909	-.02
Social Creating Capacity	14.33	3.01	12.97	3.21	13.58	3.19	1.467	.239	.01
Synchronicity	14.30	3.22	12.90	3.59	13.21	3.81	1.431	.247	.01
Goal-Orientation	16.53	2.15	15.10	2.70	15.76	3.06	2.683	.077	.02
Impulse Control	16.13	2.26	13.55	3.13	13.85	3.19	9.061	.000	.12
Emotional Control	13.00	3.17	10.52	3.09	11.67	3.42	4.747	.012	.07
Irritability Control	13.97	2.54	12.52	2.53	13.03	2.93	2.523	.089	.03
Approach-Belief Subsystem	61.80	8.53	58.19	9.49	58.88	10.34	1.385	.258	.01
Monitoring-Creating-Executing Subsystem	122.43	17.56	111.65	16.22	116.42	18.31	3.068	.054	.04
Self-Regulating Subsystem	57.40	8.46	49.48	9.44	51.76	11.17	6.298	.003	.08

	Hypnosis (H) (n=37)		**Music (M) (n=37)**		**Special Attention (SA) (n=41)**		**F**	**p**	**ω^2**
T3	**M**	**SD**	**M**	**SD**	**M**	**SD**			
Positive Thinking	16.41	3.14	16.51	3.10	16.02	3.26	.252	.778	-.01
Sense of Control	15.78	1.89	14.95	2.40	14.83	3.14	2.044	.137	.01
Sense of Coherence	16.81	2.93	15.65	3.08	15.39	3.10	2.417	.096	.02
Creative Self Concept	16.43	2.84	16.73	2.70	15.85	3.78	.697	.501	.00
Sense of Self Growth	15.81	3.08	14.65	3.24	14.51	3.33	1.920	.154	.01
Change and Challenge Orientation	14.43	3.08	13.51	2.86	14.05	2.88	.894	.413	.00
Social Monitoring Capacity	13.87	3.71	14.11	3.45	13.73	4.15	.100	.905	-.02
Problem Solving Capacity	15.16	3.02	14.32	2.88	14.39	3.60	.865	.425	.00
Self-Efficacy	16.41	2.30	15.49	2.74	15.83	2.90	1.272	.286	.00
Social Mobilizing Capacity	16.22	2.72	16.16	3.18	15.71	3.28	.313	.732	-.01
Social Creating Capacity	14.65	3.16	14.00	2.97	13.88	3.52	.622	.540	-.01
Synchronicity	15.05	3.52	13.89	3.96	14.12	3.69	1.050	.355	.00

Goal-Orientation	16.89	2.23	15.89	2.40	15.93	2.88	2.157	.123	.02
Impulse Control	14.92	2.67	14.03	3.30	14.02	2.99	1.245	.294	.00
Emotional Control	12.95	3.22	11.73	3.44	12.56	3.79	1.255	.291	.00
Irritability Control	13.78	2.97	13.62	3.42	13.42	3.50	.126	.882	-.02
Approach-Belief Subsystem	64.81	8.20	61.76	9.62	60.76	10.68	2.062	.134	.01
Monitoring-Creating-Executing Subsystem	124.05	15.00	120.22	16.89	119.37	21.72	.828	.441	.00
Self-Regulating Subsystem	56.70	9.40	53.27	12.40	54.12	12.04	1.065	.350	.00

	Hypnosis (H) (n=38)		**Music (M) (n=40)**		**Special Attention (SA) (n=28)**		**F**	**p**	**ω^2**
T4	**M**	**SD**	**M**	**SD**	**M**	**SD**			
Positive Thinking	16.24	3.57	16.43	3.14	15.82	4.22	.205	.815	-.01
Sense of Control	15.53	2.31	15.28	2.16	14.86	3.26	.437	.648	-.01
Sense of Coherence	16.34	3.02	16.25	2.70	15.21	3.50	1.067	.350	.01
Creative Self Concept	15.95	3.38	16.30	3.30	15.36	4.17	.497	.610	-.01
Sense of Self Growth	15.29	3.29	15.60	3.35	14.18	3.65	1.371	.261	.01
Change and Challenge Orientation	14.58	2.80	13.80	3.31	13.04	3.56	1.892	.159	.02
Social Monitoring Capacity	13.90	3.36	13.95	3.41	14.36	4.06	.130	.879	-.02
Problem Solving Capacity	15.03	2.68	14.25	2.73	14.14	3.84	.989	.378	.00
Self-Efficacy	16.45	2.44	15.60	2.77	15.07	3.61	1.910	.157	.02
Social Mobilizing Capacity	15.97	3.58	16.28	3.00	15.57	3.85	.332	.719	-.01
Social Creating Capacity	14.79	2.70	14.03	3.16	13.89	3.92	.894	.414	.00
Synchronicity	14.47	3.62	15.03	3.42	14.04	3.88	.622	.540	-.01
Goal-Orientation	17.16	1.95	15.98	2.61	15.39	2.48	5.629	.006	.07
Impulse Control	15.45	2.25	14.53	3.10	13.86	2.66	3.448	.038	.03
Emotional Control	13.40	2.86	12.48	3.34	12.07	3.29	1.676	.195	.01
Irritability Control	14.13	3.34	13.70	3.02	13.21	2.64	.773	.466	-.01
Approach-Belief Subsystem	63.39	9.82	63.55	9.88	60.07	11.87	.915	.406	.00
Monitoring-Creating-Executing Subsystem	123.82	16.59	120.18	18.19	116.82	25.51	.934	.399	.00
Self-Regulating Subsystem	57.45	9.45	55.73	10.70	53.18	9.39	1.641	.202	.01

	Hypnosis (H) (n=33)		Music (M) (n=29)		Special Attention (SA) (n=23)		F	p	ω^2
T5	**M**	**SD**	**M**	**SD**	**M**	**SD**			
Positive Thinking	15.94	3.10	15.45	3.67	16.26	4.10	.299	.743	-.02
Sense of Control	15.55	2.58	14.62	2.38	15.22	2.58	1.090	.344	.00
Sense of Coherence	16.36	2.64	15.28	3.24	15.65	3.37	1.093	.343	.00
Creative Self Concept	15.85	3.36	15.38	3.65	16.35	3.97	.409	.666	-.01
Sense of Self Growth	15.64	2.96	14.21	3.35	15.26	3.22	1.580	.216	.01
Change and Challenge Orientation	14.36	3.20	12.55	3.57	14.91	2.94	3.656	.033	.06
Social Monitoring Capacity	14.24	3.37	13.66	4.19	14.87	3.48	.645	.529	-.01
Problem Solving Capacity	14.82	2.67	13.52	3.38	15.30	3.11	2.161	.126	.03
Self-Efficacy	15.67	2.59	14.97	2.95	15.48	3.09	.491	.615	-.01
Social Mobilizing Capacity	15.58	2.97	15.83	3.78	15.78	4.39	.048	.953	-.02
Social Creating Capacity	14.70	2.94	12.90	3.71	14.74	3.80	2.461	.096	.04
Synchronicity	15.03	2.97	13.55	4.02	14.91	3.62	1.392	.258	.01
Goal-Orientation	17.30	2.23	15.79	2.92	15.57	3.09	3.973	.025	.06
Impulse Control	15.33	2.67	14.00	3.53	14.04	3.23	1.952	.153	.02
Emotional Control	13.24	2.82	12.31	4.11	12.00	2.81	1.424	.250	.00
Irritability Control	13.94	3.49	13.10	3.61	12.78	3.25	.876	.423	.00
Approach-Belief Subsystem	63.48	9.06	59.55	11.43	62.39	11.22	1.098	.341	.00
Monitoring-Creating-Executing Subsystem	122.52	16.73	114.59	20.80	123.00	23.99	1.508	.232	.01
Self-Regulating Subsystem	57.55	9.46	52.97	13.47	53.74	9.89	1.625	.207	.01

	Hypnosis (H) (n=27)		Music (M) (n=25)		Special Attention (SA) (n=12)		F	p	ω^2
T6	**M**	**SD**	**M**	**SD**	**M**	**SD**			
Positive Thinking	15.89	3.57	16.28	3.84	16.08	4.06	.071	.932	-.03
Sense of Control	15.56	2.33	14.96	2.62	15.33	4.03	.364	.698	-.02
Sense of Coherence	16.15	2.97	15.96	3.66	14.92	3.12	.670	.519	-.01
Creative Self Concept	15.96	3.68	15.76	4.13	16.08	4.38	.028	.972	-.03
Sense of Self Growth	15.70	3.37	15.36	4.01	14.58	3.00	.527	.595	-.02
Change and Challenge Orientation	13.48	3.27	13.72	3.76	13.00	3.93	.137	.873	-.03

Social Monitoring Capacity	15.07	2.59	13.52	4.08	15.83	4.73	1.619	.218	.03
Problem Solving Capacity	15.15	3.20	13.72	3.84	14.75	4.58	1.037	.368	.00
Self-Efficacy	16.04	2.74	15.08	3.13	16.08	3.53	.747	.483	-.01
Social Mobilizing Capacity	15.96	3.49	16.48	3.58	17.33	2.99	.767	.473	-.01
Social Creating Capacity	14.59	3.17	14.04	3.69	14.58	4.80	.173	.842	-.03
Synchronicity	14.70	3.78	14.48	4.50	13.00	3.41	1.009	.376	-.01
Goal-Orientation	17.19	2.11	15.92	2.86	15.58	2.78	2.488	.101	.04
Impulse Control	14.96	3.18	14.48	3.25	13.75	3.05	.632	.538	-.01
Emotional Control	13.04	3.18	12.08	4.41	11.33	3.68	1.076	.354	.00
Irritability Control	14.44	3.19	12.72	4.15	13.58	3.32	1.392	.264	.01
Approach-Belief Subsystem	63.30	9.96	62.56	12.96	60.92	11.14	.198	.821	-.03
Monitoring-Creating-Executing Subsystem	123.44	17.72	118.24	23.95	123.25	28.78	.398	.676	-.02
Self-Regulating Subsystem	57.15	10.35	53.76	14.50	51.67	10.47	1.252	.300	.00

Appendix 5.: The effect of Time, Time x Group and Groups on the PICI subsystems between T4-T6.

	Time			Time x Group			Groups		
	F	**p**	**η^2p**	**F**	**p**	**η^2p**	**F**	**p**	**η^2p**
Approach-Belief	.452	.638	.01	1.843	.128	*.08*	.583	.563	.03
Monitoring-Creating-Executing	.876	.420	.02	2.295	.065	*.09*	1.209	.308	.05
Self-Regulating	.716	.494	.03	.671	.616	*.06*	.823	.452	*.07*

13.5 Appendix 6.: Comparison of PICI results based on interventions (hypnosis/music) and intensity of involvement (high/low) (non significant results included)

T1	Hypnosis (H) (n=31)		Music (M) (n=33)		t	p	Hedges' g
	M	SD	M	SD			
Positive Thinking	16.10	3.75	15.15	4.06	.968	.337	.239
Sense of Control	15.36	2.18	14.91	2.26	.803	.425	.198
Sense of Coherence	15.52	3.19	14.42	3.06	1.395	.168	.345
Creative Self Concept	16.32	3.18	15.36	4.04	1.059	.294	.260
Sense of Self Growth	15.00	3.39	13.97	3.30	1.231	.223	.304
Change and Challenge Orientation	14.13	3.19	13.97	3.45	.192	.848	.047
Social Monitoring Capacity	13.52	4.02	13.46	3.68	.064	.949	.016
Problem Solving Capacity	14.84	3.23	13.33	3.69	1.741	.087	.428
Self-Efficacy	16.52	2.20	15.09	3.20	2.088	.041	.510
Social Mobilizing Capacity	16.03	3.03	15.79	3.26	.311	.757	.077
Social Creating Capacity	14.52	3.79	13.70	3.99	.842	.403	.208
Synchronicity	14.29	3.49	13.18	3.75	1.225	.225	.302
Goal-Orientation	17.07	2.17	15.61	3.05	2.212	.031	.541
Impulse Control	14.61	2.73	13.33	3.68	1.586	.118	.389
Emotional Control	11.48	3.02	10.58	3.54	1.107	.273	.272
Irritability Control	14.61	3.24	13.70	3.67	1.060	.293	.261
Approach-Belief Subsystem	61.97	10.40	58.45	10.44	1.348	.183	.333
Monitoring-Creating-Executing Subsystem	122.94	19.24	116.30	20.22	1.466	.148	.332
Self-Regulating Subsystem	55.00	10.40	55.00	10.40	1.466	.148	.000

T2	Hypnosis (H) (n=21)		Music (M) (n=24)		t	p	Hedges' g
	M	SD	M	SD			
Positive Thinking	16.19	3.56	14.71	3.91	1.332	.190	.388
Sense of Control	15.14	2.52	14.33	2.63	1.054	.298	.309
Sense of Coherence	16.24	2.81	14.29	2.73	2.351	.024	.691
Creative Self Concept	16.24	3.86	14.75	3.58	1.335	.189	.394
Sense of Self Growth	15.43	2.77	13.21	3.24	2.478	.017	.720
Change and Challenge Orientation	14.33	3.29	12.46	3.06	1.969	.056	.581
Social Monitoring Capacity	14.71	3.16	12.21	3.16	2.651	.011	.778
Problem Solving Capacity	15.76	2.96	13.25	3.30	2.689	.010	.784
Self-Efficacy	16.14	2.46	14.71	2.97	1.773	.083	.514

Social Mobilizing Capacity	15.29	3.02	15.00	3.31	.303	.764	.088
Social Creating Capacity	14.67	3.28	12.75	3.57	1.879	.067	.548
Synchronicity	14.05	3.35	12.33	3.73	1.624	.112	.474
Goal-Orientation	16.76	2.43	14.79	2.81	2.522	.015	.733
Impulse Control	16.14	2.24	13.13	3.25	3.662	.001	1.050
Emotional Control	12.95	3.22	10.29	3.16	2.793	.008	.821
Irritability Control	14.24	2.95	12.75	2.74	1.746	.088	.515
Approach-Belief Subsystem	63.00	9.12	56.54	9.55	2.319	.025	.679
Monitoring-Creating-Executing Subsystem	123.90	18.72	109.92	16.74	1.345	.184	.777
Self-Regulating Subsystem	57.38	9.16	48.50	9.85	3.134	.003	.915

T3	**Hypnosis (H) (n=26)**		**Music (M) (n=30)**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	16.65	3.06	16.40	3.32	.298	.767	.078
Sense of Control	16.00	1.92	14.90	2.64	1.797	.078	.464
Sense of Coherence	17.15	2.65	15.60	3.25	1.969	.054	.513
Creative Self Concept	16.42	3.09	16.57	2.86	-.180	.858	.048
Sense of Self Growth	15.77	3.23	14.33	3.24	1.657	.103	.438
Change and Challenge Orientation	14.19	3.21	13.27	3.06	1.099	.277	.291
Social Monitoring Capacity	13.50	3.81	14.10	3.63	-.601	.551	.159
Problem Solving Capacity	15.15	3.18	14.20	3.12	1.128	.264	.299
Self-Efficacy	16.85	2.19	15.27	2.89	2.325	.024	.602
Social Mobilizing Capacity	15.96	2.76	15.97	3.35	-.006	.995	.002
Social Creating Capacity	14.73	3.34	13.97	3.18	.873	.387	.231
Synchronicity	15.15	3.61	13.57	4.13	1.534	.131	.401
Goal-Orientation	17.27	2.16	15.63	2.43	2.665	.010	.698
Impulse Control	15.12	2.58	13.90	3.40	1.518	.135	.393
Emotional Control	12.89	3.64	11.27	3.44	1.702	.095	.451
Irritability Control	14.31	3.30	13.37	3.54	1.030	.308	.271
Approach-Belief Subsystem	65.58	7.75	61.23	10.13	1.815	.075	.470
Monitoring-Creating-Executing Subsystem	124.08	16.36	118.97	17.77	1.120	.268	.294
Self-Regulating Subsystem	57.46	10.45	52.10	12.64	1.737	.088	.453

T4	**Hypnosis (H) (n=29)**		**Music (M) (n=33)**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	16.14	3.92	16.09	3.29	.051	.960	.013

Sense of Control	15.93	2.25	15.12	2.10	1.458	.150	.368
Sense of Coherence	16.38	3.20	16.09	2.90	.370	.713	.093
Creative Self Concept	15.66	3.55	15.91	3.41	-.286	.776	.072
Sense of Self Growth	15.17	3.39	15.24	3.43	-.081	.936	.020
Change and Challenge Orientation	14.62	2.72	13.52	3.46	1.408	.164	.349
Social Monitoring Capacity	13.62	3.43	13.58	3.37	.052	.959	.013
Problem Solving Capacity	15.10	2.78	14.00	2.86	1.538	.129	.386
Self-Efficacy	16.59	2.49	15.27	2.74	1.978	.053	.494
Social Mobilizing Capacity	16.03	3.65	15.88	3.04	.181	.857	.046
Social Creating Capacity	14.72	2.96	13.67	3.24	1.343	.184	.335
Synchronicity	14.28	3.83	14.79	3.56	-.543	.589	.137
Goal-Orientation	17.41	1.97	15.58	2.57	3.175	.002	.785
Impulse Control	16.00	2.20	14.52	3.08	2.200	.032	.541
Emotional Control	13.52	3.01	12.15	3.36	1.690	.096	.422
Irritability Control	14.72	3.53	13.67	3.20	1.229	.224	.311
Approach-Belief Subsystem	63.62	10.46	62.55	10.28	.407	.685	.102
Monitoring-Creating-Executing Subsystem	123.76	17.84	117.39	18.05	1.394	.168	.350
Self-Regulating Subsystem	58.52	9.98	55.12	11.06	1.271	.209	.317

T5	**Hypnosis (H) (n=27)**		**Music (M) (n=27)**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	16.19	3.27	15.26	3.73	.970	.336	.260
Sense of Control	15.93	2.54	14.59	2.47	1.955	.056	.524
Sense of Coherence	16.56	2.76	15.22	3.36	1.594	.117	.428
Creative Self Concept	15.78	3.61	15.19	3.70	.596	.554	.160
Sense of Self Growth	15.93	2.91	14.15	3.46	2.044	.046	.548
Change and Challenge Orientation	14.63	3.47	12.52	3.70	2.162	.035	.580
Social Monitoring Capacity	13.96	3.60	13.59	4.16	.350	.728	.094
Problem Solving Capacity	14.78	2.78	13.56	3.49	1.424	.161	.382
Self-Efficacy	15.78	2.79	14.96	3.04	1.025	.310	.275
Social Mobilizing Capacity	15.56	3.13	15.82	3.91	-.269	.789	.072
Social Creating Capacity	14.52	3.14	12.93	3.78	1.683	.099	.452
Synchronicity	15.07	3.17	13.41	4.12	1.666	.102	.447
Goal-Orientation	17.56	2.17	15.63	2.91	2.755	.008	.739
Impulse Control	15.56	2.78	13.74	3.45	2.130	.038	.571
Emotional Control	13.30	2.89	12.04	4.12	1.300	.200	.349
Irritability Control	14.19	3.64	13.04	3.69	1.151	.255	.309
Approach-Belief Subsystem	122.56	17.88	122.56	17.88	1.872	.067	.000

Monitoring-Creating-Executing Subsystem	122.56	17.88	114.19	21.22	1.567	.123	.420
Self-Regulating Subsystem	58.11	9.86	52.22	13.54	1.827	.074	.490

T6	**Hypnosis (H) (n=21)**		**Music (M) (n=23)**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	16.10	3.74	16.22	3.99	-.105	.917	.031
Sense of Control	15.91	2.41	14.96	2.72	1.226	.227	.361
Sense of Coherence	16.24	2.93	15.74	3.73	.495	.623	.145
Creative Self Concept	15.95	4.01	15.65	4.25	.241	.811	.071
Sense of Self Growth	16.05	3.54	15.22	4.06	.725	.473	.214
Change and Challenge Orientation	14.10	3.45	13.74	3.92	.320	.750	.094
Social Monitoring Capacity	14.71	2.49	13.74	4.09	.964	.342	.280
Problem Solving Capacity	15.48	3.39	13.78	3.95	1.530	.134	.450
Self-Efficacy	16.48	2.60	15.13	3.24	1.526	.135	.448
Social Mobilizing Capacity	16.05	3.76	16.48	3.59	-.388	.700	.115
Social Creating Capacity	14.76	3.25	14.13	3.73	.599	.552	.177
Synchronicity	15.10	3.43	14.48	4.64	.504	.617	.147
Goal-Orientation	17.24	2.34	15.91	2.98	1.645	.107	.482
Impulse Control	15.29	3.27	14.52	3.38	.761	.451	.225
Emotional Control	13.19	3.46	12.09	4.44	.924	.361	.271
Irritability Control	14.57	3.57	12.91	4.14	1.425	.162	.419
Approach-Belief Subsystem	64.29	10.07	62.13	13.41	.606	.548	.177
Monitoring-Creating-Executing Subsystem	124.76	18.94	118.57	24.54	.942	.352	.276
Self-Regulating Subsystem	58.14	10.95	54.00	15.01	1.052	.299	.307

T1	**High (n=22)**		**Low (n=42)**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	16.57	3.28	13.77	4.41	2.622	.013	.681
Sense of Control	15.19	1.97	15.00	2.67	.295	.770	.076
Sense of Coherence	16.05	2.90	12.86	2.53	4.544	.000	1.184
Creative Self Concept	16.50	2.88	14.55	4.60	1.817	.079	.470
Sense of Self Growth	15.29	3.13	12.91	3.28	2.796	.008	.728
Change and Challenge Orientation	14.31	3.17	13.55	3.57	.845	.403	.218
Social Monitoring Capacity	13.60	4.03	13.27	3.48	.333	.740	.089
Problem Solving Capacity	14.55	3.35	13.14	3.75	1.483	.146	.385
Self-Efficacy	16.38	2.15	14.64	3.59	2.090	.046	.541
Social Mobilizing Capacity	16.07	3.15	15.59	3.13	.582	.563	.151

Social Creating Capacity	14.36	3.66	13.59	4.34	.707	.484	.185
Synchronicity	14.83	3.22	11.59	3.50	3.616	.001	.939
Goal-Orientation	17.05	2.37	14.91	2.91	2.970	.005	.772
Impulse Control	14.95	2.67	12.05	3.58	3.353	.002	.868
Emotional Control	11.71	3.03	9.68	3.46	2.329	.025	.604
Irritability Control	14.62	3.34	13.23	3.61	1.502	.141	.390
Approach-Belief Subsystem	63.10	9.39	54.55	10.39	2.882	.006	.839
Monitoring-Creating-Executing Subsystem	122.81	17.90	113.23	22.28	1.568	.127	.453
Self-Regulating Subsystem	56.12	10.19	46.55	11.91	3.206	.003	.833

T2	**High (n=21)**		**Low (n=24)**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	16.54	2.98	14.10	4.23	2.214	.033	.648
Sense of Control	14.96	2.63	14.43	2.56	.684	.498	.201
Sense of Coherence	15.96	3.13	14.33	2.42	1.963	.056	.578
Creative Self Concept	16.38	3.02	14.38	4.26	1.788	.082	.526
Sense of Self Growth	15.54	2.83	12.76	3.00	3.186	.003	.935
Change and Challenge Orientation	13.92	3.22	12.67	3.29	1.285	.206	.377
Social Monitoring Capacity	14.13	3.39	12.52	3.22	1.623	.112	.479
Problem Solving Capacity	15.33	3.10	13.38	3.41	1.997	.052	.586
Self-Efficacy	16.50	2.30	14.10	2.83	3.101	.004	.908
Social Mobilizing Capacity	14.79	3.50	15.52	2.71	-.789	.435	.231
Social Creating Capacity	14.29	3.43	12.90	3.58	1.322	.193	.389
Synchronicity	14.54	3.68	11.52	2.86	3.090	.004	.908
Goal-Orientation	16.75	2.75	14.52	2.38	2.909	.006	.856
Impulse Control	15.63	2.41	13.29	3.54	2.555	.015	.750
Emotional Control	12.38	3.24	10.57	3.44	1.801	.079	.531
Irritability Control	14.04	2.96	12.76	2.76	1.502	.140	.441
Approach-Belief Subsystem	63.00	8.16	55.62	10.21	2.653	.012	.779
Monitoring-Creating-Executing Subsystem	122.08	16.66	110.00	19.52	2.217	.032	.651
Self-Regulating Subsystem	56.58	9.60	48.14	9.68	2.930	.005	.860

T3	**High (n=21)**		**Low (n=35)**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	17.31	2.75	15.19	3.44	2.403	.022	.652
Sense of Control	15.69	2.27	14.95	2.54	1.088	.283	.299
Sense of Coherence	17.34	2.16	14.62	3.61	3.137	.004	.851
Creative Self Concept	16.77	2.49	16.05	3.60	.813	.422	.220

Sense of Self Growth	16.06	2.96	13.24	3.10	3.353	.002	.913
Change and Challenge Orientation	14.03	3.13	13.14	3.15	1.021	.313	.279
Social Monitoring Capacity	13.77	3.71	13.90	3.75	-.129	.898	.034
Problem Solving Capacity	15.03	2.89	14.00	3.55	1.124	.269	.306
Self-Efficacy	16.69	2.22	14.86	3.04	2.401	.022	.653
Social Mobilizing Capacity	16.31	2.82	15.38	3.43	1.053	.299	.285
Social Creating Capacity	14.97	3.03	13.24	3.38	1.931	.061	.524
Synchronicity	15.31	3.59	12.62	4.02	2.528	.016	.686
Goal-Orientation	17.03	2.09	15.33	2.63	2.512	.017	.685
Impulse Control	15.17	2.56	13.29	3.55	2.124	.041	.576
Emotional Control	12.80	3.40	10.71	3.61	2.139	.039	.583
Irritability Control	14.37	3.27	12.86	3.55	1.590	.120	.431
Approach-Belief Subsystem	66.40	7.42	58.00	9.84	3.376	.002	.918
Monitoring-Creating-Executing Subsystem	124.60	14.47	115.90	20.11	1.730	.093	.470
Self-Regulating Subsystem	57.66	10.09	49.48	13.09	2.459	.019	.669

T4	**High (n=20)**		**Low (n=42)**		**t**	**p**	**Hedges' g**
	M	**SD**	**M**	**SD**			
Positive Thinking	16.67	3.58	14.95	3.33	1.851	.072	.498
Sense of Control	15.88	2.19	14.70	2.03	2.088	.043	.560
Sense of Coherence	16.81	3.13	15.00	2.43	2.492	.016	.670
Creative Self Concept	16.26	3.19	14.80	3.85	1.476	.150	.395
Sense of Self Growth	15.88	3.36	13.80	3.05	2.428	.020	.651
Change and Challenge Orientation	14.45	3.02	13.15	3.33	1.483	.147	.397
Social Monitoring Capacity	13.71	3.52	13.35	3.12	.413	.682	.109
Problem Solving Capacity	14.69	2.58	14.15	3.41	.629	.534	.168
Self-Efficacy	16.45	2.43	14.70	2.87	2.359	.024	.631
Social Mobilizing Capacity	16.19	3.53	15.45	2.82	.889	.379	.239
Social Creating Capacity	14.60	2.72	13.25	3.77	1.429	.164	.384
Synchronicity	14.93	3.94	13.75	2.95	1.314	.195	.353
Goal-Orientation	17.26	2.11	14.70	2.32	4.185	.000	1.121
Impulse Control	15.98	2.37	13.60	2.96	3.139	.004	.842
Emotional Control	13.33	3.17	11.65	3.18	1.949	.059	.522
Irritability Control	14.64	3.40	13.15	3.17	1.694	.098	.454
Approach-Belief Subsystem	65.24	10.24	58.45	9.02	2.650	.011	.712
Monitoring-Creating-Executing Subsystem	123.62	16.12	113.55	20.42	1.936	.062	.519
Self-Regulating Subsystem	58.88	10.63	52.15	9.28	2.545	.015	.683

T5	High (n=17)		Low (n=37)		t	p	Hedges' g
	M	SD	M	SD			
Positive Thinking	16.24	3.30	14.59	3.78	1.555	.131	.447
Sense of Control	15.59	2.62	14.53	2.38	1.481	.148	.426
Sense of Coherence	16.24	3.09	15.12	3.14	1.230	.228	.353
Creative Self Concept	16.03	3.43	14.29	3.89	1.578	.126	.457
Sense of Self Growth	15.81	2.93	13.35	3.48	2.528	.018	.730
Change and Challenge Orientation	14.16	3.63	12.29	3.67	1.744	.091	.504
Social Monitoring Capacity	13.86	4.01	13.59	3.62	.252	.803	.071
Problem Solving Capacity	14.51	2.84	13.41	3.83	1.061	.299	.305
Self-Efficacy	15.86	2.73	14.29	3.12	1.786	.085	.515
Social Mobilizing Capacity	15.62	3.44	15.82	3.76	-.188	.852	.054
Social Creating Capacity	14.14	3.10	12.82	4.31	1.129	.270	.327
Synchronicity	15.03	3.66	12.53	3.39	2.449	.020	.708
Goal-Orientation	17.19	2.72	15.29	2.31	2.644	.012	.766
Impulse Control	15.27	3.07	13.29	3.26	2.109	.044	.610
Emotional Control	13.19	3.37	11.53	3.86	1.526	.138	.440
Irritability Control	13.84	3.98	13.12	2.98	.740	.464	.214
Approach-Belief Subsystem	63.89	10.03	57.59	11.41	1.957	.060	.565
Monitoring-Creating-Executing Subsystem	121.38	17.90	111.82	22.88	1.521	.141	.439
Self-Regulating Subsystem	57.32	12.31	50.47	10.50	2.108	.042	.609

T6	High (n=12)		Low (n=32)		t	p	Hedges' g
	M	SD	M	SD			
Positive Thinking	16.88	3.58	14.25	3.96	2.010	.060	.669
Sense of Control	15.66	2.60	14.75	2.56	1.041	.310	.347
Sense of Coherence	16.78	3.05	13.83	3.27	2.712	.014	.902
Creative Self Concept	16.59	3.55	13.67	4.81	1.921	.073	.635
Sense of Self Growth	16.13	3.71	14.25	3.86	1.450	.163	.483
Change and Challenge Orientation	14.09	3.78	13.42	3.45	.565	.578	.186
Social Monitoring Capacity	14.22	3.36	14.17	3.74	.042	.967	.013
Problem Solving Capacity	15.03	3.45	13.42	4.40	1.146	.268	.379
Self-Efficacy	16.41	2.51	14.08	3.61	2.053	.058	.682
Social Mobilizing Capacity	16.56	3.67	15.50	3.58	.871	.394	.289
Social Creating Capacity	14.81	3.23	13.42	4.08	1.067	.301	.352
Synchronicity	15.38	3.93	13.17	4.17	1.587	.129	.528
Goal-Orientation	16.94	2.54	15.50	3.12	1.429	.171	.475
Impulse Control	15.72	2.92	12.67	3.39	2.756	.013	.914

Emotional Control	13.34	3.83	10.67	3.92	2.031	.056	.673
Irritability Control	14.19	4.13	12.42	3.12	1.528	.138	.509
Approach-Belief Subsystem	65.44	10.95	57.08	12.47	2.044	.056	.679
Monitoring-Creating-Executing Subsystem	124.66	19.41	113.17	27.00	1.349	.197	.447
Self-Regulating Subsystem	58.63	12.73	48.92	12.41	2.294	.033	.763