



Bachelor Thesis

Benefit of the Body & Mind syncSystem - based on a combination of binaural beats and  
massage

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## 1. Abstract

This thesis deals with the topic of binaural brainwave stimulation in combination with a specially-developed massage. The Body&Mind syncSystem combines these two aspects. The aim is to capture the pure benefits of the relaxation system. To this end an empirical study was conducted over a total period of three months. 23 sedentary participants used the system twice a week. In this connection they answered a questionnaire before and after the study in order to compare the dates. For the qualitative part interviews were used to capture impressions and side effects. BMS combines aspects of workplace health promotion and health management to reduce stress and relieve back and neck pain caused by prolonged sitting and provides easy access to regeneration and relaxation for all. The so-called "Braintronics" application is based on the principle of binaural brain wave stimulation, in which the brain activity measured by EEG adapts to the given frequencies. This process is called follow-up effect (FFR), whereby different frequencies can trigger different states of mind and brain activity. This is accompanied by a specially-developed massage programme. This study is based on the various aspects that arise in connection with the system. The attached sources result from well-founded literature research, which is partly based on German and English literature, scientific papers and already existing studies. In summary the benefits in relation to the points examined were confirmed. Improved emotional sensitivity, a high degree of stress reduction and relaxation, regeneration and relief of back pain are among the results that confirm the health benefits. Due to its easy accessibility the system offers an ideal starting position for quick and effective recovery and relaxation, followed by increased motivation and efficiency in the favourable and domestic environment. The system is therefore well suited for integration of business structures.

## 2. Introduction

In a society such as ours focusing on knowledge and achievement, the hectic pace and stress of everyday life are constantly increasing. Permanent commitment and claims on our time can rapidly develop into stress-related health problems. If we do not guard against this in a timely fashion, sustained acute stress can rapidly develop into chronic stress, and initially quite minor tensions rapidly become overload. In parallel with increasing work-related strain in many employees and the eventual inability of individual resources to cope with this strain we are seeing growth in the necessity for broad social strata to actively be concerned about personal "work-life balance". There is a general awareness of the connection between overload, distress and bio-psycho-social diseases. The human body is exposed to a number of abnormal stresses and

mis-positions that may initiate and accelerate the occurrence of mental and physical diseases. In response to this recent years have seen development of interest in various relaxation techniques. Traditional relaxation methods require a significant commitment of time, finances and motivation, for which reason it is expedient to set up health prevention within a company. If the professional demands expected of employees exceed their individual capacities, we speak of work-related stress (c.f. Bamberg University 2017). This is also quoted by employees themselves as the most frequent cause of work-related diseases (Parent-Thirion 2007). Neither employers nor employees profit from health problems within a company. On the other hand healthy, confident and motivated employees raise the productivity of an operation and thus preserve competitiveness. If a company manages to promote holistic employee health and the associated increase in work satisfaction, side effects such as employee passivity, presenteeism and turnover can be prevented, leading to simpler working conditions and resources. This broad spectrum of potential induces an on-going increase in work health measures by employers. An especially profitable starting point is offered by the persistent inclusion of health-specific measures in the structural rhythm and working procedures of a company. A number of companies endeavour to improve working conditions, organisation and environment from the perspective of their employees, for instance giving them the opportunity to increase productivity by means of motivational incentives. These measures are aimed at enabling the employees to undertake their health management themselves and be proactive in the sense of empowerment. There exist many basic approaches for intervention at the personal level and also at the level of the working climate, work organisation and environment. Specific working conditions can be seen as risks or opportunities to damage, maintain or improve our health (c.f. Bamberg University 2017). One simply accessible method of overcoming stress as well as preventing and combatting back pain is a specially-developed massage chair in combination with audio stimulation of the brain waves. The specially-developed Casada “Body&Mind syncSystem” relaxation programme comes under the category of promotion of overall employee well-being and is intended to combat typical common diseases such as back pain and elevated stress levels. The advantage focuses on making timely provision for relaxation in line with individual needs adjusted to the professional conditions. The present research work has the aim of summarising and testing the benefits of this



relaxation method by various means to show whether the test subjects experience other side-effects in connection with their own health and the associated individual health-related behaviour from regular use. In the introductory theory section present expressions and subsectors are defined, and thereafter the current research status is discussed and the methods employed are highlighted, followed by presentation, analysis and discussion of the results of the empirical study. The present work concludes with a discussion examining the results obtained and giving a prognosis.

### 3. Expressions

#### 2.1. Definition of “health”

*“Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” (WHO 1968: S.1).*

According to this definition by the World Health Organisation, the health of a human being depends on several factors and is not limited only to the presence or absence of disease. Instead it refers holistically to the physical, mental and social aspects of a human being. There is general agreement that a healthy condition is not automatically present, simply because disease appears to be absent, indeed here health is equated with complete well-being. Nevertheless in all three respects this condition is actually wishful thinking that only rarely accords with reality. So Hurrelmann expanded the definition of health to include objective and subjective assessment of the state of health at the bio-psycho-social level. So contrary to the WHO definition health is not a static condition, but rather undergoes continual change, which necessitates a balance between individual health resources, aims and external living conditions (Hurrelmann and Altgeld 2009). This identification of a not purely dichotomous health condition forms the central element of the salutogenic road-map. The health-disease-continuum espoused by Antonovsky also includes several stages between the extreme poles of health and disease, which can have various manifestations. There exists not only the pure condition of disease or health, as is the case in the bio-medical, patho-genetic model. Höfer describes an on-going switch between health-promoting and health-damaging factors evincing a certain state of health in a person (Höfer 2000). Contrary to the patho-genetic model the salutogenic model espoused by Antonovsky probes the health-preserving resources that can be developed and reinforced

in a targeted way, in order to combat distress-producing factors and do justice to the demands of work in the modern world of work (Antonovsky 1997). “How does the health of human beings develop? This is the mystery the salutogenic approach seeks to unravel” (Antonovsky 1997). The current condition of a person on the continuum is shown by the available resistance resources he or she can summon up. The type of resources available for deployment and application in a crisis are called coping strategies, and they represent a person’s potential ability to overcome stress (Blättner 2007). The Antonovsky 1997 salutogenesis model states that health is additionally an expression of a marked sense of coherence consisting of the three factors of comprehensibility, the feeling of manageability and that of significance. In 2001 Bengel et al. described the sense of coherence as a kind of fundamental attitude and internal approach to the environment and personal life. Antonovsky proceeds from the assumption that human beings with a marked sense of coherence are able to identify their resources and understand their use and appropriate application, in order to maintain their health (Antonovsky 1997). Hurrelmann, Klotz and Haisch maintain that Antonovsky’s salutogenesis model revolutionised the prevention theory and shaped the expression “health promotion” (Hurrelmann and Altgeld 2009). This research study presupposes an understanding of a holistic and salutogenic health process, since “company health management” measures are designed to maintain health and are reflected in the three above-mentioned factors.

## 2.1. Company health promotion

The conclusion of the Ottawa Charter in 1986 produced the first firm definition of “health promotion” and thus laid the foundation of further expansion and development. The World Health Organisation (WHO) initiated these first international conferences with the primary aim of “health for all”. As a result the task of health promotion according to the understanding of the Ottawa Charter is to create an equal starting point for all and eliminate social inequality. Responsibility should additionally be borne by all institutions and areas influencing and shaping living conditions (WHO, 1986). BGF focuses on the health-promoting adjustment of work and thus concurrently living conditions and not the targeted change of individual behaviour. This means separating “company health promotion” from “health promotion at work”. Health promotion at work is seen as an “instrument for stabilising and optimising salutogenic organisation through corresponding offers in the

behaviour area” (Westermeyer et al. 2006). These offers may include: health days, information events on specific subjects, sufficient possibilities for movement and sport, nutrition programmes, etc. On the other hand “company health promotion” should actually influence and change the structure of a company and thus aims at behavioural prevention. Health potential and resources should be promoted, health-damaging factors and risks controlled or eliminated and “existing facilities and services adapted to the changing disease panorama” (Westermeyer et al. 2006). Creation of working and living conditions is guided by the holistic approach to health and thus all factors that might influence the well-being of employees. Besides classic factors like shaping of the working environment and resources there are additionally numerous psycho-social aspects, such as sufficient recognition, room for manoeuvre and social integration. Implementation is closely linked to the internal structures and procedures and is dependent on hierarchical organisation (Faller 2010). Besides the understanding in line with the Ottawa Charter there exists a company health promotion in line with the Luxemburg Declaration. “Company health promotion covers all measures by employers, employees and the company aimed at improvement of health and well-being in the workplace” (Westermeyer et al. 2006). Employees should be encouraged and enabled to actively shape their health behaviour themselves, while their personal resources and competencies are boosted. This can be achieved through improvement in working conditions and organisation in general (company network for company health promotion in the European Union e. V., 2007). Corresponding measures can not only minimise disease and increase employee productivity, which greatly influences corporate success, but also encourage mutual appreciation, recognition and a positive working climate. Modern man spends the majority of his life in his working environment, so the “workplace setting” occupies extreme significance in the BGF measures, and concurrently shows optimal opportunities to achieve health potential and shape it positively at a bio-psycho-social level (Faller 2010).

### **3.1. Corporate health management**

Healthy employees in a company can result in full achievement and bear greater responsibilities. Thus health promotion through appropriate BGM measures is required, in order to enhance staff motivation, maintain competitiveness and ensure sustainable success through integration and participation. In a number of larger companies

there already exist BGM, whereas a division into small and medium-sized companies appears troublesome (Pfannstiel and Mehlich 2016). The aim of BGM measures is to minimise health-damaging factors that burden employees and concurrently have a negative effect on working behaviour. This requires a structured, sophisticated approach by employers and employees, with the aim of entrenching it in the fixed company structures and procedures. This guarantees management and employees control over their own health and health-related behaviour and proactive shaping of them (Pfannstiel and Mehlich 2016). The BGM players take preventive action, in order to facilitate early influence on health. An increasing number of SMEs and large companies realise the need to re-evaluate perceptions as employers, in order to promote the productivity of their employees, re-invigorate the working climate and counter high rates of illness. In this process it emerged how important the “human production factor” really is for success, and that the growing number of psycho-somatic sick-leave applications can be reduced with appropriate BGM measures (Esslinger et al. 2010). Demographic change means employees in Germany are ageing, and this implies greater importance for the inclusion of older employees in the modern world of work. If a company succeeds in integrating its older staff, shaping their working environment attractively and teaching them innovation, their economic advantages can be fully exploited, and also in the closing years of the employee relationship they can be profitably leveraged (Naegele and Sporket 2009). Besides the aspect of integrating ageing staff through age-management there are numerous other promising features of BGM such as: concentrating on qualified employees, appropriate measures for achieving “work-life balance” and optimised, participation-oriented management (Pfannstiel and Mehlich 2016). If these important measures are not taken, the probability of chronic stress in employees is higher, and the risk exists that elevated frailty rapidly transforms into chronic disease. Further psycho-somatic stresses in the workplace include: workplace bullying, burnout, internal resignation, insufficient recognition/appreciation, or for instance a lack of possibility for individual development (Pfannstiel and Mehlich 2016). “Company health management is important and increasingly influences company profits” (Esslinger et al. 2010). The success of BGM measures is dependent on integration and participation of employees, which means management bears an extreme exemplary function (c.f. Bamberg University 2017). Successful integration means the whole staff have the

chance of active participating in all measures offered. One of the aims is to counter the stress the employees are under and thus achieve sufficient stress-reduction. The following chapter examines the causes of stress and contains a sub-section *overcoming stress*, which is relevant as regards the therapeutic function of the Body&Mind syncSystem.

#### 4.1. The widespread disease of stress

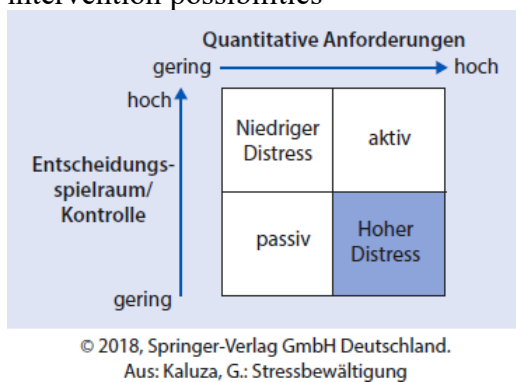
The most usual word “stress” can be traced back to the Latin verb *stringere*, which means “tie up” or “press together”. However the modern meaning refers to testing materials for resilience and comes from the English (Litzcke et al. 2013). As early as 1974 the bio-chemist Selye discovered that under greatly elevated external environmental influences such as heat or cold the human body displays a certain reaction, in order to counter it, and since that time the expression is used in human medicine and psychology. Selye defined stress as activation of the body as a reaction to an irritant, and this “activation” can occur with both positive and negative stimuli (Serban 1976). So there are all types and manifestations of stimuli, such as heartache, hatred, fury or even the joy of a car purchase.

*“Stress is an activation reaction of the whole body with its current resilience, experiences, motives and thought patterns to stressors, thus to everything perceived individually as demand, threat or damage” (Wagner-Link 2009).*

This definition contains the word “perception”, and this means the “perception” of a given stressful situation is individual and differently perceived by each human being. According to the *transactional stress model* (Lazarus 1984) in a given situation a person compares the challenge or demand arising with his own possible overcoming resources and thus immediately determines the seriousness of the “stress level”. So stressors are all internal and external demands the human body automatically categorises as positive, neutral or negative stimuli (Wagner-Link 2009). Stressors can be categorised as follows (Bernhard and Wermuth 2011): physical stressors such as noise and dirt; task-related stressors such as overload/underload and bore-out; work-related stressors such as standby duty; social stressors such as bullying; change-related and traumatic stressors. “Human beings can subjectively evaluate objectively identical stresses differently, and also one and the same person may evaluate a strain in different situations differently” (Litzcke et al. 2013).

If varying demands are made at the same time, be it at work, in the love or family life, the person is more susceptible to chronic stress, which can rapidly transmute into disease, in which case we speak of the “cascade effect”. This may be either positive or negative and accumulates different stressors until a certain point is exceeded. Overload may lead to cognitive, emotional, vegetal or muscular reactions. On the cognitive level on-going stress in the individual leads to altered perception and limited information intake, during which learning processes in the brain can reduce dramatically, and the memory suffers. Especially the professional life highlights this negatively, if for instance the concentration lapses and certain tasks can no longer be completed reliably. Symptoms of emotional overload reaction can be: feelings of anxiety, insecurity, depression, imbalance and its concomitant extreme excitability, aggression patterns etc. (Wagner-Link 2009). Chronic stress induces a vegetal hormonal overload reaction. This determines the release of stress hormones (e.g. cortisol, noradrenaline), which may be the cause of psycho-somatic complaints such as coronary/circulatory complaints, hyper-ventilation and sleep disturbance. Most physiological changes are due to activation of sympathetic nerves and adrenal cortex. Both systems are controlled and activated by the Hypothalamus, which is why the Hypothalamus is also known as the *stress centre* (Litzcke et al. 2013). Chronic stress often also leads to muscular changes marked by a chronic or excessive tensing of the muscles. Chronic tension takes much more energy, so the person affected tires easily. This gives rise to mis-positions, and additional stress is applied to adjacent muscle groups, which can lead to tension in entire muscles. Muscular imbalance and inadequate oxygen supply due to “pinching” the blood vessels in adjacent muscle groups cause acute and even chronic pain (Wagner-Link 2009). All four examples of overload reactions also influence working and its environment. Work-related stress arises frequently in the modern world and is present in all age groups. Identity building follows at the workplace and due to the employment relationships and work ensures for one’s own existence, physical and mental well-being correlate very strongly with gainful employment and the tasks involved (Kaluza 2018). According to Karsasek and Theorell 1990 the demand/control model explains the connections and occurrence of workplace stress. In line with the model an especially high demand profile and a

small amount of autonomy in connection with the tasks occurring in combination count as significantly stress-inducing. In addition to this model there is the model of professional gratification crises (Yougrist 1996). It describes the occurrence of a professional gratification crisis, which assumes a higher profile with the occurrence of stress. If the outlay applied does not attract sufficient remuneration, the person affected works very exhaustingly but might not receive a reasonable salary in return, so a professional gratification crisis arises. Due to the high possible stresses in the workplace the work setting is an appropriate starting point for suitable preventive measures at a primary, secondary and tertiary level. There exist numerous intervention possibilities



to aid overcoming stress that assist in stabilising the human body. The next chapter lists and explains possible types of intervention and measures at the muscular, vegetal, emotional and cognitive level.

Quantitative demands

Low-----high

Room to decide low-----high

Low distress, active, passive, high distress

Figure 1: Occurrence of stress at work (Kaluza 2018)

### 2.1.1. Overcoming stress

Due to rapid development and associated information overload stress in the modern world of work is increasing steadily, and the subjects of proactive relaxation, overcoming stress to prevent chronic load and occurrence of diseases and how to maintain personal well-being are of increasing importance. Science discovers ever more connections and gains far-reaching knowledge of links between socio-emotional load and the overall physical and mental well-being. There already exist many proposed solutions to combat stress, however there is a current notable lack of implementation of health-promoting programmes (Kaluza 2018). There is no one method that suits every individual, so it is important to have a wide range of coping strategies at the ready for deployment in the most varied situations (Litzcke et al. 2013). A study by Kaluza (1999) produced considerable improvement in sustainable stress overcoming through the systematic undergoing of a stress management programme to teach participants a great variety of stress reduction techniques (Kaluza 1999). These programmes promote skills

of self-discipline and organisation aimed at an individual, sustainable system of overcoming stress



(Litzcke et al. 2013). Within the overcoming stress area we differentiate a long-term change (relaxation, time management, internal attitude change) and short-term moderation characterised perhaps by spontaneous relaxation or positive self-devices (Wagner-Link 2009). Both changes aim at reduction of the stress level and can be achieved with various methods. Approaches to overcoming stress are offered on the one hand by the stressors, the person themselves with their individual features or the stress reaction where the stressors accumulate, and the chance exists of intervening at the right moment, in order to prevent further escalation. Long-term measures aim to identify the causes and source of stress, fight the stresses directly or make the individual body more stress-resistant. Measures aiming at short-term success do not address the cause, but rather attempt to reduce the acute stress perception and prevent potential “escalation processes”. Short-term measures can be: Abreaction through sport, distraction, arresting thoughts, spontaneous relaxation, decrease in speed and also positive self-instruction through internal monologues talking of courage and motivation. On the contrary long-term measures are marked by: structured time management, intrinsic internal attitudinal and behavioural change and social support from close persons at work or in the private life (Litzcke et al. 2013). So from the employer’s point of view it is worth offering appropriate measures and integrating them in a targeted and participation-related way into the structures of corporate health management.

### **5.1. The widespread disease of back pain**

In Germany back pain has come to represent one of the most frequent causes of incapacity to work. The typical manifestation is so-called “lower back pain” between the rib cage and the gluteal folds, which appears frequently in those undertaking predominantly sedentary activity (Ohlendorf and Bundschuh 2015). There is a difference between specific and non-specific back pain. The latter affects some 85% of all patients, and it means that pathologically no specific substance is present in the body to cause the complaints (Sendera and Sendera 2015). Despite the high number of disease incidences in the musculo-skeletal system and the fact that back problems are the most expensive disease manifestation in modern industrialised countries, the problem of back pain remains basically unresolved (whoever sits longer dies earlier 2017). This development correlates with the demands of a service and information society in the modern world of work. The

invention of the computer changed the working day, forcing many human beings to adopt a sedentary, passive posture. “There are no sitting muscles in our body. Sitting requires none of the 600 muscles functioning naturally.” (Whoever sits longer dies earlier 2017) This suggests the adoption of muscular imbalance as a result of long-term sitting, because other muscle groups have to maintain the skeleton upright against their nature, which leads to pain caused by incorrect loading. “Frequently back pain is due to muscular tension from mis-positions, one-sided stresses and inadequate movement resulting in the occurrence of muscular imbalance, and in the worst-case scenario pain can follow” (Ohlendorf and Bundschuh 2015). This phenomenon can be combatted with adequate movement and an adjusted working environment perhaps with an ergonomic workplace design. Besides the physical, anatomical aspect back pain can also be mental in nature, and frequently sleep disturbance or similar combines with chronic back pain (Ohlendorf and Bundschuh 2015). So there is a chance of using improvement of physical well-being to achieve mental balance and strength. If the sufferer manages to apply appropriate measures to minimise or completely combat his chronic back pain, this can lead to improved sleep and improvement in spiritual strength and vitality at work. So for a few years there have existed numerous concepts and approaches aiming primarily to restore work capability and strengthen participants on a mental, physical and social level. Possibilities of treatment are divided into medication, non- medication and operations (Raspe 2012). Non-medication treatment includes massage and relaxation methods (Raspe 2012). The Body&Mind syncSystem consisting of massage and binaural brain wave stimulation uses both aspects. The massage function loosens tight, stiff upper and lower back muscles and the neck area, and acute pain is combatted and relieved. This produces a reduction in resting pulse, followed by deep relaxation offering the body regeneration, also in parallel treating disease occurring. Through enhanced attentiveness and mental and physical freshness and vitality the quality and quantity of employee productivity can be increased enormously by a reduction in the subjective perception of pain.

## 6.1. Relaxation methods

“Relaxation is a specific physical process that can be grouped under the continuum of “activation – deactivation” moving towards the pole of a fictive resting condition” (relaxation methods 2009). We are talking here of a natural phenomenon of a biological kind, which human beings can summon up with their behaviour, and not a strange phenomenon. At the level of neuro-biology the relaxation reaction is traceable to fundamental biological characteristics. In order to generate relaxation, it is good to measure the sequences of various fundamental biological characteristics and in a targeted way, to connect parts of the various relaxation methods together. (relaxation procedures 2009) Many methods with various traditions, techniques and goals are grouped under the expression “relaxation methods”. The overarching goal of each procedure is to summon up the so-called relaxation reaction, which is characterised by psycho-physiological changes in the human body. (Wittchen and Hoyer 2011) In the clinical sense relaxation methods are divided into the following main types:

- Hypnosis
- Autogenic training (AT)
- Meditation methods
- Progressive muscle release (PMR)
- Imaginative procedures
- Bio-feedback

As described above, summoning up a relaxation reaction is the common goal of all types of relaxation method. The relaxation reaction set in motion itself reduces the sympatho-adrenergic preparedness for stimulation and modulates the central nervous system (relaxation methods 2009). In other words the goal is a vegetal switching of the body. It should lead to a reduction in sympathetic activity and then an increase in para-sympathy activity. The various procedures cannot be joined in a homogenous group, since every procedure evidences individual characteristics. So each procedure influences the three levels of the psycho-somatic process in a different way, namely on the physical, behavioural and emotional level. However only with continuous use does the relaxation reaction achieve the desired effect, whereby short-term changes lead to long-term acquired effects (Wittchen and Hoyer 2011). If the patient succeeds in using the relaxation methods and incorporates them into his daily life, and the learned skills can be accessed at will, desensitisation occurs and external influences can more easily be averted

(relaxation methods 2009). These psychological effects help the user in everyday life as a method of coping strategy and may manifest as follows (Wittchen and Hoyer 2011): improved self-control, specific possibilities to control physical and physiological processes (in combination with bio-feedback), sensitisation of physical reactions through increased focus and strengthened imaginative processes. Neuro-muscular changes halted through the use of relaxation methods may trigger peripheral expansion of vessels (vasodilation) used for measuring heart rate and a fall in blood pressure and reduction in heart frequency, reduce cholesterol and trigger gastro-intestinal changes. A further common goal of all existing procedures is a reduction in muscle tone. There also occurs a change in blood sugar and an elevated number of natural killer cells forming a sub-group of Leukocytes and for instance able to identify and eliminate tumour cells. In order to be able to measure the actual influences of relaxation methods, the most suitable are methods that analyse brain structure and function and observe central nerve process either before, during or after use (Wittchen and Hoyer 2011).

## 1. Electroencephalogram (EEG)

The electroencephalogram (EEG) is a measurement that shows electric brain activity. It facilitates recording of electric potential swings on the cranium surface that arise in the cerebral cortex through a given stimulation condition. The stimulation emits a weak electric signal, which can be received through the EEG.

So-called “pyramid cells”, a certain kind of nerve cells in the cortex are responsible for measurability.

“Decisive for

the EEG signal are the electric activity of the apical

dendrites and the vertical arrangement of

the cortical module.“ (Practice book on bio-feedback and neuro-feedback 2016) The apical dendrites are cell continuations of nerve cells and primarily receive stimulation.

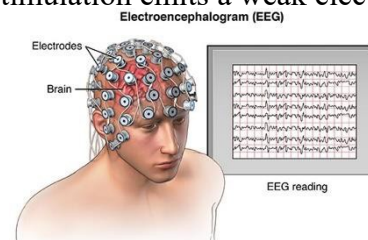


Figure 2: Functioning of EEGs (Michigan Advanced Neurology Center 2018)

*“If the excitatory synapses on the apical dendrites are activated, the corresponding membrane area experiences depolarisation through an accumulation of positive charge inside the cell. This means inside more negative than outside changes to inside more positive than outside. But the rest of the cell is at that moment still at rest, i.e. inside more negative than outside. So there is now a potential difference outside the cell. But since there is no*

*membrane between the particles, there now arises a current along the cell of positive to negative”*  
*(Practice book on bio-feedback and neuro-feedback 2016).*

However this current is seen only if some 1,000 neurons evidence a similar change at the same time and an identical oscillation is recorded by the EEG. This introduces the concept of macro rhythms. Amongst 1,000 neurons the signal would be too weak and could not be captured. In the process the velocity with which the various potential shifts take place is measured, namely the number of stimulations of the neurons per second and the associated swings in the EEG, measured in Hertz (Hz). This measurement facilitates division into various “frequency bands”. Classic bands include alpha, beta, theta and delta. Depending on the state of the human mood and the current stimulation condition the respective frequency bands predominate. As shown, certain EEG readings facilitate a statement about the degree the current activity in the cerebral cortex and identify the degree of wakefulness of the person. By capturing several EEG readings it is possible to characterise various behavioural stages of an individual and divide the activation degree into various steps (relaxation methods 2009). So the EEG is regarded as an excellent measure that identifies the effects of relaxation methods. “An electroencephalogram can be subdivided into various frequency areas, which can be assigned certain subjective experiences. In this process the higher frequencies equal an external attentiveness focus and the lower frequencies an internal attentiveness focus.” (Pirker-Binder 2008) So the various frequency areas serve as indicators of electric brain activity (relaxation methods 2009). The division of EEG frequencies is highlighted in the following graphic. The

Name	Frequenzband	Erregungszustand
High-Beta	20–30 Hz	Anspannung
Low-Beta	15–20 Hz	Wach fokussiert, konzentriert
SMR	12–15 Hz	Motorisch ruhig fokussiert, aufmerksam
Alpha	8–12 Hz	Unaufmerksam, entspannt, wach
Theta	4–7 Hz	Schläfrigkeit
Delta	1–3 Hz	Tiefschlaf
Infra-low	0,1–0,0001 Hz	Erregbarkeit

EEG frequencies offer all relaxation methods a potential measurement for assessment, not simply bio-feedback. Regular use of the above relaxation methods over a long period initiates structural change of brain function, and there is a consciousness change that is measurable by EEG indicators (Pirker-Binder 2008).

Name, frequency band, excitement situation

Figure 3: Frequency areas of EEGs (Pirker-Binder 2008)

Tension  
 Awake, focused,  
 concentrating  
 Motor quiet, focused, alert

## Benefit of the Body & Mind sycSystem

Not alert, relaxed, awake

Sleepy

Deep sleep

Excitability

## 1. Bio-feedback

Bio-feedback is already regarded as a classic relaxation method and is a collective expression for certain therapeutic measures and methods (relaxation methods 2009). There is a sub-division into neuro-feedback, also known as EEG bio-feedback, and peripheral bio-feedback (Wittchen and Hoyer 2011). There follows a focus on peripheral bio-feedback. In the following sub-section neuro-feedback is examined and differentiated. The method involves sending back bio-signals emitted during processes of the human body and not falling under conscious perception (relaxation methods 2009). The interplay of all physical processes is pivotal for the overall mental and physical well-being of a person. Bio-feedback aims to make the emitted bio-signals visible to the self and in a targeted way influence internal physical processes (Wittchen and Hoyer 2011). This produces an on-going reporting of physical processes, e.g. optic or acoustic, and positive effects are strengthened during treatment, so the patient learns to influence his bodily functions. The patient thus learns, using instrumental conditioning, to better perceive bio-signals, and after regular training he is finally able to control them also without using an “aid”

(Dr. Nor-

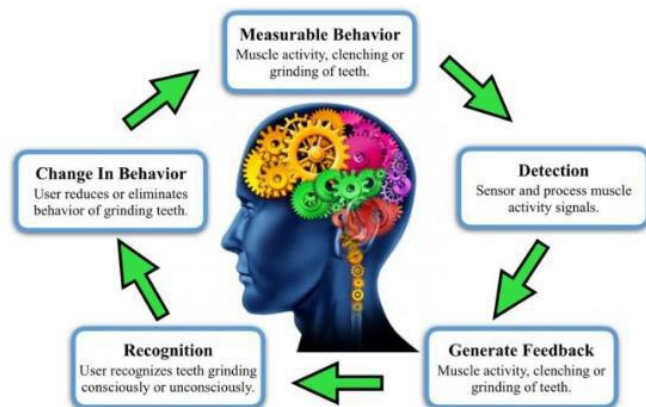


Figure 4: neuron process during bio-feedback (IN-DIEGOGO)

man Schmid 2016). Biofeedback is virtually a reflection of internal reality and facilitates conscious control of e.g. breathing, muscle tension, pulse rate and hand temperature (my path to relaxation 2013). “Bio-feedback is the umbrella term for all possibilities of measuring body signals and training for change” (Wittchen and Hoyer 2011). Training builds on the now perceived feedback, and operator conditioning takes place (Wittchen and Hoyer 2011). Through various external influences such as optic and acoustic signals, the brain receives additional information on the bodily functions and learns in a targeted way to influence and regulate them. However the training must be tailored to each patient individually and the overarching goal is the control of activation and deactivation. Training takes place in the following steps (Practice book on bio-feedback and neuro-feedback 2016):

*F 5: Training steps in bio-feedback (own concept)*

Examples of regulative feedback mechanisms of the human body (Wittchen and Hoyer 2011): Regulation of the blood sugar level and hormone production, regulation of blood pressure, motor and vegetal control circuits, etc. Bio-feedback facilitates influencing all these physiological processes and simplifies the perception, identification and control of stimulation conditions (Practice book on bio-feedback and neuro-feedback 2016). Bio-feedback procedures frequently aim at the specific, frequently closely-defined control of individual physiological functions and not on producing a general relaxation reaction.

### **1.1. Neuro-feedback**

As already discussed, electrical brain activity can be measured using an electroencephalogram (EEG). “Neuro-feedback is the feedback of brain activity, [...]” (Wittchen and Hoyer 2011). It aims to change the electro-cortical stimulation level, whereby certain EEG rhythms are influenced by operator conditioning (relaxation methods 2009). Improved perception of physiological processes follows feedback of the individual’s EEG activity, leading to improvement of self-regulation and also brain function. The goal of neuro-feedback is to use targeted influence over one’s own electrical brain activity to remedy erroneous regulation and create improved functioning condition of the brain. Although neuro-feedback only measures and reports electrical activity in the upper cortex layers, larger networks including the subcortical and brain stem areas can also be trained through the complex inter-connection of the various areas (Wittchen and Hoyer 2011)

## **7.1. Influence of massage**

In Greek the word “massein” stands for “knead”, originating the expression “massage”. Massage is arguably the oldest form of therapy and dates from far BC. The whole field of massage is hardly found in German literature and any representations available characterise massage forms very differently (Kolster and van den Berg 2015). This fact may appear bizarre, since our thoughts of the word “massage” stem from numerous existing publications. The inventor of Swedish massage finally achieved official



recognition by mainstream medicine for massage. This led to it assuming a firm position in current medicine, and it is used preventively, but also as a treatment of various diseases (Kolster and van den Berg 2015). Existing current publications show that the following basic categories are practiced (Storck and Hoffa 2004):

- Effleurage – stroking
- Pétrissage – kneading
- Friction – rubbing
- Tapotements – chopping, slapping, hitting

In practice the various skills are often combined and used alternately. There also exist other sub-genres, however inevitably they do not fit into the above categories (Kolster and van den Berg 2015). However in this research work these sub-genres are disregarded and simply the connection to the massage technique chosen is addressed.

*Effleurage*, otherwise known as stroking, sensitive movements, normally start the treatment. Their purpose is to give the patient an initial feeling and prevent any sudden deterrent effect in the patient. This mode of action elicits pain relief in the affected area by reducing muscle and sympathetic tone. Tissue fluids are generated to improve the venous backflow and this leads to unblocking (Kolster and van den Berg 2015). Stroking generally takes place outside to central, so they follow the flow of lymph towards the heart. This mobilises and accelerates the flow of tissue fluids (Storck and Hoffa 2004).

*Pétrissage* is powerful kneading reaching deep under the *subcutis* and exerting elevated stress on the various muscle bundles and fibres, or if desired it takes place only on the skin (Storck and Hoffa 2004). This “muscle kneading” triggers a relaxation condition in the respective muscle groups that in turn leads to metabolism optimisation through improved circulation. Furthermore the muscles become smoother through slow, consistent “kneading” (Kolster and van den Berg 2015). This massage technique is very suited to treatment of muscle cramp, which occurs increasingly due to the stiff, one-sided posture during sedentary activity (Kolster and van den Berg 2015).

*Friction* is rubbing, circular and intensive movements, which in a targeted way work muscle hardening and damage between skin and muscles and seeks to release anatomical

statist structures. This method is divided into mechanical, bio-chemical and reflexive effects, whereby the duration and specificity of treatment have great significance in connection with healing the affected areas (Kolster and van den Berg 2015).

*Tapotements* cover all chopping, slapping and hitting movements. Short, springy and heavy blows to the skin of the patient lead to a neuro-reflexive effect, which greatly improves circulation and introduces a pleasant warming effect (Kolster and van den Berg 2015).

As mentioned, the sub-division is into mechanical, bio-chemical and reflexive effects (Kolster and van den Berg 2015): *mechanical effects* primarily promote circulation in the affected areas, which accelerates lymph flow, followed by elevated excretion of finished products and optimised transport of metabolised nutrients. Clogged tissue structures are released and thus mobilisation is increased. As a result of *bio-mechanical effects* certain substances such as proteins are released, leading to a desired improvement in tissue perfusion and wound healing and generally moderating local pain (Kolster and van den Berg 2015). *Reflexive effects*, introduced by the central nervous system, adjust muscle tone, moderate pain and can additionally achieve a sympathy-reducing effect. This inhibition can be achieved through the stimulation of receptors in skin, joints or muscles (Kolster and van den Berg 2015).

Additionally depressive postures can be minimised, the feeling of pain desensitised and the overall mood improved. Deep relaxation followed by stress reduction encourages higher productivity in employees, since they feel more balanced and can focus on their work. Thus massage arrangements in the context of the BGM count as an excellent chance to improve the overall well-being of employees. Thus massage is much more than only a pure muscle kneading and can also have many positive effects on the human body. The use of massage of the Body&Mind-syncsystem includes the four massage techniques listed; Effleurage, Pétrissage, Friction and Tapotements. These are transmitted via a kind of joint, whereby the fingers of the masseur are replaced by rubber rollers, which imitate the movement very well. Support is given by 26 air cushions as acupressure massage and massage the muscle groups of shoulders, arms, hands and legs. The feet are treated with a certain “Gua-Sha” technique and reflexology massage, which stimulate the circulation and blood flow. This is therapeutic to the system and relieves over-used and over-loaded

muscle groups arising from prolonged sitting and lack of movement. Additionally regular use acts as a preventive measure and prevents potentially arising pain.

## 8.1. Body&Mind syncSystem

### 2.1.2. Product

The BMS “Braintronics” technology synchronises brain waves using audio stimulation. There is enclosed a specially-developed massage programme consisting of various massage techniques, which were already listed under 4.7. Internal “Casada” studies have shown that through the combined application of massage and audio stimulation of brain waves the degree of relaxation increases by up to 80%. The system has built in an “L-shape technology” of some 135cm length and with the “Zero Space” procedure a protection of the space is facilitated through a minimal wall distance. The massage programme includes kneading, blows, finger stress and synchronised kneading and blows technology. As an accessory the user can

optionally choose a heating function, and switch on the compression massage mode, whereby the various muscle groups can be massaged by 26 intelligently distributed air cushions. The “Braintronics” programme offers four different tracks, consisting of an introduction to relaxation with background music



Figure 6: Massage functions (Casada International GmbH 2016)

and phases with rhythmic stimulation in

combi-

nation with an individual massage programme. The duration of the individual relaxation programmes equals 21 min., whereby at the beginning of a relaxation phase of some 8 min. body and spirit should sensitively get used to the device. Then there follows use with a duration of 7 min. and finally there is a six-minute regeneration phase. The overarching goal of Braintronics use is to put the user’s brain waves into a certain condition involving stress-resistant action, restoring the feeling of balance and a noticeable increase in physical and mental well-being (Casada International GmbH 2016). The Body&Mind syncSystem is an instrumental

relaxation method, whereby the various programmes can be accessed via a control unit and



Figure 7: Dimensions in initial position and lying position (Casada International GmbH 2016)

## 1. Brainwave

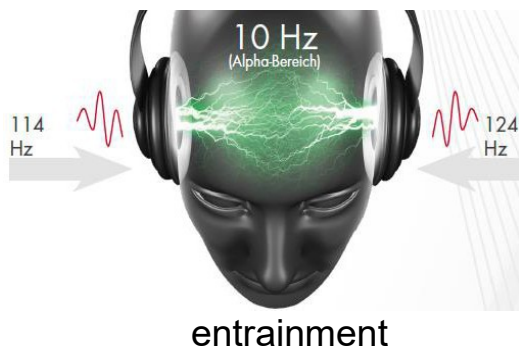


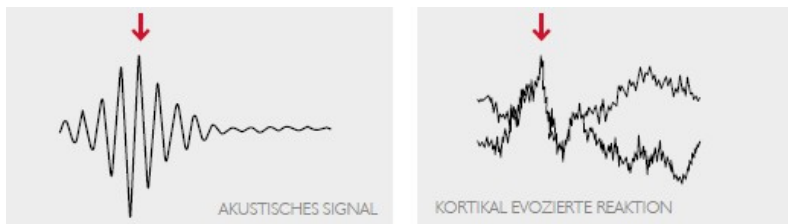
Figure 8: Difference in carrier frequency (Casada International GmbH 2016)

The invention of binaural beats is attributable to German physicist Heinrich Wilhelm Dove in 1839, and it was taken up again by bio-physicist Gerald Oster in 1973. Oster states a binaural beat arises via interaction of brain activity directly in the human brain (Schamber et al. 2015). Through separate playback of various carrier frequencies

over e.g. headphones in the low-frequency spectrum and a certain frequency difference (at least 10Hz) the interference process is shifted to the brain and circumvented in the ear. This way with binaural stimulation it is possible to perceive a difference in carrier frequencies in the low-frequency spectrum. The figure selected highlights the different frequencies in the low-frequency spectrum with a carrier frequency of at least 10 Hertz. The listening apparatus does not perceive the different beats, producing displacement of the interference process in the brain (Oster 1973). Thus binaural beats are defined as exceptional acoustic processes, namely different from music and other environmental noise (Oster 1973). These discoveries gave rise to a further research area, which examines the targeted induction of specific psycho-physical activity through binaural stimulation (Schamber et al. 2015). Under the expression “brainwave entrainment” we understand the synchronisation of at least two rhythm cycles, which were already defined under 4.6.1 as so-called macro rhythms (Casada International GmbH 2016).

“Entrainment is the process whereby two interacting oscillating systems, which have different periods

when they function independently, assume the same period. The two oscillators may fall into synchrony” (Zhuang et al. 2009). Entrainment aims at a changed reaction of electric brain-flows, whereby the spontaneous EEG adjusts to external influences such as tone impulses, light and clapping and adopts their rhythm. We speak here of a cortically-evoked reaction of the brain, thus a response to all external influences, which can be added consciously or unconsciously (Casada International GmbH 2016). This results in a frequency counter-



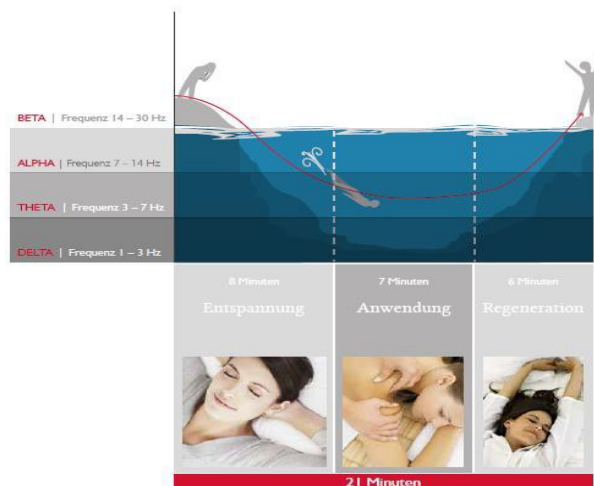
reaction in the brain (Zhuang et al. 2009).

Figure 9: Cortically-evoked reaction (Casada International GmbH 2016)

The individual electric frequency of the brain oscillates in time with the increased frequency and imitates the beats (Wittchen and Hoyer 2011). This answer to stimulation of a sense organ takes the form of an electric current and can be measured using electrodes (c.f. EEG measurement 4.6.1). As mentioned, electrical brain-flows are measured in Hertz (Hz) and facilitate making a statement on the given mood status of a human being (Zhuang et al. 2009). The goal of the instrumental procedure of audio-visual stimulation is to influence mental conditions, mostly characterised by a resulting relaxation condition of body and mood (Björn Riegel, Maria Kowalski, Pablo Hidalgo & Sven Tönnies). So the set rhythm of the binaural beats is an external influence, which must be perceived and identified in the sense of neuro-feedback training. This is achieved by regular Braintronics use, and through a targeted change of the electrical brain flow facilitates control of inner physical and physiological processes. If after continual training the human brain once becomes used to the rhythmic and/or sensory stimulation, after a given time it is possible to trigger this stimulation condition of the brain even without external influence (Wittchen and Hoyer 2011). Thus binaural brainwave stimulation is a coping strategy within neuro-feedback and can be summoned up in every-day situations by the affected person, be a method against stress perception, create regeneration or stimulate creativity. Through targeted training certain moods can also be implied, by triggering certain EEG frequencies. Regular use of BMS facilitates rapid production of a marked individual

relaxation condition. This is triggered by altered electric brain activity using the binaural beats

Frequenzspektrum	Psychophysiologische Aktivität
Delta-Wellen (0.5-4Hz)	Delta-Wellen werden oft mit dem Zustand der traumlosen Tiefschlafphase charakterisiert, die dem dritten und vierten Schlafstadium entspricht.
Theta-Wellen (5-7Hz)	Beim Übergang vom dösenden Wach- in den Schlafzustand, d.h. den ersten beiden Schlafstadien, liegen vermehrt Theta-Wellen vor. Diese zeigen sich auch in tiefer Entspannung.
Alpha-Wellen (8-13Hz)	Alpha-Wellen sind charakteristisch für einen entspannten Wachzustand, vor allem, wenn die Augen geschlossen sind und keine Ruminaton (Grübeln) vorliegt.
Beta-Wellen (14-30Hz)	Dieser Wellenbereich kennzeichnet das Wachsein, d.h. mentale und körperliche Aktivität mit einem hohen Aufmerksamkeitsfokus oder tritt bei psychischen Problemen auf.
Gamma-Wellen (31-100Hz)	Gamma-Wellen werden häufig im Zusammenhang mit der Repräsentation und Analyse von Wahrnehmungsobjekten verstärkt untersucht



and in combination relaxes tense muscle groups.

Figure 10: Overview of the correlation between brain spectrum and psycho-physiological activity; comparison with Braintronics use (Casada International GmbH 2016; Georg Schamber and Eva Meinicke)

#### 4. Current state of research

There follows a comparison of the current state of research in binaural brainwave stimulation, its effectiveness and available studies. In conclusion the results are filtered and presented together with a conclusion. Studies by Pratt et. al have repeatedly shown that certain areas of electrical brain activity can be synchronised with binaural beats, and concurrently the result was an increase in brain activity in the affected areas (Pratt et al. 2009). This neuro-physiological phenomenon is known in current research literature under the synonyms “frequency reaction” (FFR), “auditory steady state evoked response“ (ASSR) and “follow-up effect” (Schamber et al. 2015). In a further pilot study “Brainwave entrainment for better sleep and after-sleep state of young elite soccer players” it was shown that improved quality of sleep and improved general physical well-being in young football players through regular use over eight weeks of “brainwave entrainment” in the low-frequency range. A side-effect proved to be improved physical achievement with improved ability to concentrate (Abeln et al. 2014). In a further study by Casciaro et al. (Casciaro et al. 2013) significant stress reduction was shown using heart-rate variability (HRV) with the use of audio-visual alpha-stimulation. This involved comparing the HRV in a resting condition and after 20 minutes of alpha-stimulation, in order to evidence the specific effect of brainwave stimulation and exclude the effect of inserting the resting condition as

disruptive element. In the following study Reedijk et al. investigated the influence of binaural beats on creativity (Reedijk et al. 2013). This produced the finding that binaural beats have no direct influence on convergent thinking. Additionally no significant difference between alpha and gamma stimulation was shown in connection with the improvement of creativity, whereas they discovered improved sustainable synchronisation of neuron activity using binaural beats (Reedijk et al. 2013). In the “A Study of Brainwave Entrainment Based on EEG Brain Dynamics” study (Zhuang et al. 2009) continuous synchronisation of spontaneous EEGs and the upper alpha-rhythm in the form of a frequency reaction (FFR) was observed at a difference in carrier frequencies of some 10.5 Hz. In a further study the specific effect and sustainable change in electrical brain activity (EEG) was shown after only one session with alpha and beta entrainment (Rosenfeld et al. 1997). Additionally different carrier frequencies within the alpha and beta-spectrums showed various effects. Participants with high alpha-frequency had only very small entrainment effects, whereas participants with low alpha-frequency revealed high entrainment effects (Rosenfeld et al. 1997). Pratt et al. reinforced this observation by showing that lower frequencies evoke stronger EEG potential (Pratt et al. 2009). In conclusion it remains to mention the missing breadth of scientific research, since the majority of available studies were initiated by the Monroe Institute. Some studies evidence an inadequate study design characterised by incorrect procedures and perhaps the lack of a control group. Additionally there exist no precise findings on the exact location of the binaural frequency reaction in the brain (Schamber et al. 2015). As a result there is a need for other thorough, methodically correct studies in this research area, in order to deliver sustainable proof of the effect of binaural beats.

## 5. Methodology

Using the chosen study design of the present research work, the aim is to show the efficiency of the Body&Mind syncsystem. We performed an experimental investigation of the effectiveness of the combination of binaural brainwave stimulation and a specially-developed massage programme in connection with the psycho-physiological well-being of participants.

### 2.2. Study design

The prospective study design of the present empirical research work required splitting the test subjects into an experimental and control group. The 23 test subjects in the



experimental group committed to regular Braintronics use twice per week over a period of four weeks. On the contrary the control group was given no relaxation application and was in good faith left to take part in a survey on employee health. Generation of test subjects for the experimental group took place with the help of the head of the technical body for building management at LMU, and participation in the study remained voluntary. There were no fixed provisions for the use of the four different Braintronics programmes, which were left to individual choice.

## **2.1.Data capture**

The quantitative empiricism of data was performed using an online questionnaire, whose contents and structure are shown in the following chapter. Criteria for ensuring representative character were regular use of the BMS and a complete and meticulous assessment of the questionnaire. Data capture took place anonymously, and simply the use of a pseudonym by the test subjects was required for comparison purposes. Experimental and control group were given identical questionnaires, so that upon conclusion of the study the results could be compared and evaluated. The reason for choosing this classic method for generating data was firstly the aspect of anonymity and secondly uncomplicated access via a link made available using an email server. Furthermore semi-standardized interviews took place with two test subjects from the experimental group, in order additionally to collect qualitative findings and include individual impressions in the evaluation and discussion.

### **2.2.1. Questionnaire**

The questionnaire used consisted of questions from the Body&Mind syncsystem questionnaire and a standardised SF-36 questionnaire to assess health together with further questions and rankings. The internationally-proven SF-36 questionnaire covers eight dimensions of health (Bellach et al. 2000): physical, spiritual and social functioning; role behaviour because of physical functional defects; pain; general health condition; role behaviour because of spiritual functional defects; vitality and physical energy. The before questionnaire contained 19 questions, and the after questionnaire contained 25 questions, whereby 19 questions were covered by the before questionnaire and additionally specific questions were posed in connection with the product itself and its use. The

before and after questionnaires of the control group had contents identical to the before questionnaire of the experimental group, and no specific questions on the product were posed, focus being simply on the health condition of the test subjects.

## 6. Results

### 2.3. Statistical procedure

The IBM SPSS Statistics 25 for Windows statistical program served for capture, evaluation and statistical analysis of all data generated. Thus the raw data were exported from the “lamapoll” online program for questionnaires, and the respective data sets of before and after questionnaires were then opened in the data view of the SPSS statistical program, whereby the corresponding variables were coded and arranged under value labels. In order to arrange the respective questionnaires and compare the respective variables, we performed sorting using the individually chosen pseudonyms. Identification and allocation of the IDs from all questionnaires facilitated a valid statement on correlations and served the examination of various hypotheses, interpretation and discussion. For direct comparison of the before and after median values we performed t-tests for the respective items. A pre-condition for the t-test is the present homogeneity of variances, so no very significant differences. This is tested with the Levene test, which automatically precedes every SPSS t-test and is located in the first column. If there is homogeneity of variances, the second column, which highlights the results of the t-tests, has a first line stating “variances are identical”. If there is heterogeneity of variances, the statement in the second line reads “variances are not identical” in the second column. This line shows the alternative Welch test.

### 2.4. Description of the sample

A total of  $N = 23$  persons aged 23 to 63 took part in the present study. Of these there were 14 persons of the female sex, eight persons of the male sex and one person who stated his sex to be neutral. 22 of the 23 participants carried out a sedentary activity and thus were just right as targets. On the contrary one person stated their profession involved a proactive style. The average age was 43 ( $M = 43.174$ ). In connection with the daily working rhythm and procedures the test subjects showed high homogeneity. This fact is unavoidable in understanding the pure, unfalsified benefit of Body&Mind syncsystem. When promoting participation, we prevented an excessively high heterogeneity within the experimental and control groups.

### 3.1. Experimental group at the beginning of the study

At the beginning of the study it was necessary to gauge the overall health condition of the respective test subjects, whereby the statements and the measurements took place subjectively. Recording of overall health condition used a 5-step scale (excellent, good, average, rather poor, poor). It was remarkable that none of the test subjects gave their individual health condition as rather poor or poor. Two of the test subjects said excellent and thus formed the upper 8.7%. The majority  $N = 15$  described their condition as good and thus form 65.2% of the total. The remaining six test subjects



Figure 11: Health condition in general  
How would you describe your health condition in general? Excellent, good, average.

characterised their overall health condition at the time as average (26.1%). The median value  $M$  was 2.17, showing the tendency of the health condition, where 1 shows an excellent condition, 2 a good condition and 3 an average condition. The majority health condition

of the test subjects at the beginning of the study was

good = 2, with a slight shift in the direction of average = 3. Furthermore it was recorded to what extent in the previous 4 weeks when carrying out everyday activities at home and at work the respective subjects had been troubled by pain. The results were as follows: 1 = not at all, 2 = average, 3 = neither one nor the other, 4 = reasonably, 5 = very. The arithmetical mean was ( $M$ ) = 1.83, thus between the descriptions “not at all” and “average”. Only two test subjects admitted to being “reasonably” hindered by pain and thus represented 8.7%, some one tenth of the subjects. An additional question sought to find out how the participants predominantly moved around. This variable was independent of residential address and distance to the workplace. Two said they predominantly walked, four persons primarily used the car, six test subjects preferred the train, while the majority of 10 persons (43.5%) predominantly used a bicycle. One other person was an exception, by the use of motorbike, underground and car under the category “others”. Thus the group of persons predominantly walking or cycling, demonstrating an active lifestyle, formed some half of the total sample. During the four previous weeks before the beginning of the study the remaining 11 test subjects preferred using vehicles, public transport or trains and thus moved mainly without using their

own muscles. Furthermore it was discovered using the questionnaire how frequently in a week the participants took part in sport, in order in retrospect to exclude possible influences of active movement on physical and mental well-being as a confounding variable and to check whether regular use of the Body&Mind syncsystem involved sustainable effects in the test subjects on the frequency of individual sports units. Five test subjects admitted doing sport less than once per week, giving a percentage of 21.7%. The absolute majority was active in sport between 1-2x per week and with twelve test subjects this formed some half of the total sample. Four of the 23 participants stated they had two to three sports units per week, and with 17.4% they represented barely one sixth of the sample. At this time only two persons were active in sport 3-4x per week, and thus they formed a small marginal group. More than 4x per week at this time was denied by all test subjects. A following question determined whether the participants were suffering from a physical strain or disease. There was a multiple choice of answers split into six given physical diseases, the choice “no, under no physical strain or disease” and an open field with room to describe various diseases and stresses. At the beginning of the study 13 persons sampled were suffering from a physical strain or disease, while the remaining 10 participants revealed no physical stresses or diseases. Nine persons stated they were suffering from back or neck pain, covering some 40% of all participants. This showed an enormously high number of persons at this time suffering from the widespread illness of back pain. It was a matter of conjecture whether this high number of test subjects with acute or chronic back pain was due to their sedentary activity. Since the absolute majority of subjects in the control group undertook a daily sedentary activity, the raw data could not be used to draw direct conclusions on the cause. Nevertheless there seems to exist a causal connection, since several studies have shown that persons with a predominantly sedentary activity tend to fall ill with neck/back pain earlier than persons with an active lifestyle outside the office. Before beginning the study, 21.7% of participants were affected by allergies in their everyday life, equalling a number of N = 5 and counting as second most frequent cause of the physical diseases or stresses under the test subjects. Four of the 23 participants suffered from high blood pressure and three others from a disease of the stomach/intestinal tract, forming some one third of the total sample. One person was afflicted

with a respiratory illness, and three other participants said they were suffering from an aneurysm, a bladder infection and tinnitus. In conclusion there were a high number suffering from neck or back pain. The specially-developed massage programme by Body&Mind syncsystem is designed to soothe taut and stiff muscles and moderate pain in a targeted way, and thus is an ideal counteragent. An explicit comparison between experimental and control groups before and after continual use is drawn and discussed in the following chapter. Besides the physical stresses or diseases in the participants mental diseases were also recorded, in order to observe and include the holistic definition of health. Against a background of clear anonymity the subjects had to show no inhibition and were able to be open and honest in their answers as to what diseases they were suffering from at this time. This is a very important aspect, since up until now mental illnesses in our society have tended to be suppressed as taboo, so that diseases of this kind tend to be skirted around. The findings showed that one person was suffering from depression, two persons from sleep disturbance, two persons from fatigue and anxiety, and some 35% of all subjects from elevated stress. So eight test subjects revealed elevated stress and thus accounted for a high number within the sample. The most frequent cause of mental stress amongst the test subjects in the experimental group was elevated stress and an associated heightened stress perception. This was again supported by the answers the subjects gave in connection with their stress perception in the four weeks preceding the beginning of the study. The subjectively perceived degree of stress perception, divided into five degrees ranging from 1 = low stress perception to degree 5 = high stress perception, was probed under the aspect of assessing health using eight levels. The modal value with N = 12 test subjects was at level 4. Two participants actually found their degree of stress very high, while just two test subjects determined a relatively low stress level, which gave a median value  $M = 3.61$ . As already mentioned, in a 2013 study Casciaro et al. observed that above-average stress reduction follows use of audio-visual alpha-stimulation. This effect was measured using heart frequency variability (HRV). Braintronics audio-stimulation begins at the lower beta-frequency areas, followed by synchronisation using the lower and upper alpha frequencies and finally theta and delta waves to achieve deep relaxation and regeneration (Casada International GmbH 2016). The system

also examined in a targeted way the reduction of stress using binaural beats triggering a frequency reaction (FFR) and producing a relaxation condition. The results in connection with stress perception at the beginning of the study correlated with the question on the degree of relaxation for the period covered. The modal value at this time was level 2 and can thus be regarded as relatively slight. The median value M was 2.35. The two variables stress perception in the preceding four weeks and degree of relaxation were checked for a connection using the Pearson correlation coefficients. The correlation coefficient  $r = -.702$  and the available bilateral significance of ,000 pointed to a highly significant connection and showed that test subjects with a very high degree of stress perception also revealed a very low degree of relaxation.

## Correlations

		Indicate your degree of relaxation over the last 4 weeks: degree 1= low; degree 5= high	Indicate your stress-perception in the last 4 weeks: degree 1= low; degree 5= high
Indicate your degree of relaxation over the last 4 weeks: degree 1= low; degree 5= high	correlation using Pearson	1	-,702 **
	Significance (bilateral)		,000
	N	23	23
Indicate your stress- perception in the last 4 weeks: degree 1= low; degree 5= high	correlation using Pearson	-,702 **	1
	Significance (bilateral))	,000	
	N	23	23

\*\* . The correlation is significant at the level of 0,01 (bilateral).

Table 1: Correlation between degree of relaxation and stress perception

in addition commitment in connection with the maintenance of individual health was questioned, whereby level 1 meant a low and level 5 a high commitment. With a modal value of 4 and a median value  $M = 3.48$  the before-value in the experimental group tends to be high. This pointed to a majority being committed already before the study to maintenance of individual health. The results of a further question in connection with healthy and balanced nutrition also pointed to a tendency in the healthy direction. 56.5%, which is more than the half of those indicating at the beginning of the study their nutrition was rather healthy,

whereas just two participants tended to display unhealthy nutrition behaviour. In addition the mental and physical well-being of participants were

collected. 43.5% assessed their mental well-being as good, some 40% as neutral, and the remaining 16.5% as rather poor or predominantly poor. So the modal value of the sample was good = 2.

Similar results came from the question on physical well-being before the study. Around 40% answered this question with “good”, 47.8% with neutral and just three participants assessed their subjective well-being as “rather poor”.

A further important aspect was to understand the concepts and wishes of the participants in connection with the Body&Mind syncSystem. The online questionnaire asked what the individual expected of regular use of the system and wanted to achieve with continuous use. There were various answer choices that could be expanded on in a field marked “others”. The after-questionnaire was then used to check to what extent the concepts of the participants were lived up to. 15 participants looked for elevated to deep relaxation conditions; eleven test subjects wanted to be able to mentally “switch off”; ten test subjects were expecting physical “disengagement”; similarly there were ten subjects looking for targeted relief of back pain; nine persons wanted to achieve a regenerating effect, five a reduction in mental stress followed by minimised stress perception, and two expanded on their concepts under “others”. Juxtaposition of the data is found in the following chapter.

#### **4.1. Experimental group after conclusion of the study**

Upon conclusion of the study after five weeks and continuous use of the Body&Mind syncsystem by the test subjects 2x per week, we performed another survey using a similarly structured online questionnaire. The first 19 significant questions did not differ from the first questionnaire, and just five other questions were added in connection with use of the product per se. The ensuing results and data were now compared with the initial data and represented in a comparative and analytical way. It should first of all be mentioned that all participants made regular use, and similar conditions were present within the field of activity. Although the study was performed during the changeable weather of the spring months April and May, weather and temperature change were able to be virtually excluded as confounding variables. Throughout the total period there were similar weather conditions in the form of constant sunshine and small temperature swings. If during the study an abrupt change from winter to summer weather had happened, there could well have been stronger variable effects in connection with general well-being and mood. Further exclusion of another confounding variable was the present working conditions by reason of homogeneity.



The normal working day of test subjects in experimental and control group took place throughout in a sedentary position in front of a computer with similar ambient structures and a constant working climate within the staff.

At the beginning the subjectively-perceived overall health condition was captured. A tendency to slightly improved overall conditions in the study-population was identified in direct comparison with the results before the beginning of the study. This was interpreted from the direct juxtaposition of the two median values, with a scale of 1 = excellent to 5 = poor. This used a t-test for dependent samples, since the respective median values or data of two different times could be compared in a targeted way. The before/after comparison took place using the pseudonyms allocated by the test subjects. This facilitated a direct juxtaposition of the data and was vital for comparison. In connection with the present empirical study the following null hypothesis was produced: "The data of the experimental group before and after the study differed, so the differences in median values are not equal to 0." To this extent the respective differences in median values of the different items before and after the study were compared with one another and assessed using t-tests for dependent samples. All p-values falling in the significance level of 0.05, confirmed and concurrently retained the null hypothesis. If this is the case, there are significant differences within the experimental group before and after regular use of the relaxation system (Raab-Steiner and Benesch 2015). The t-test for the two present connected samples referring to overall health condition produced a p-value of 0.266 ( $t(22)=1.41$ ), a value that is not significantly below the 5% level and thus has not resulted in any particular change. This implies that despite a tendency to improved overall health condition, after performance of the study no significant influence of the relaxation system was noticeable. Nevertheless we can assume with 73% probability that the improvement in overall health condition in the experimental group is attributable to regular use of the BMS. Various factors may play a role here, for example physiological or psychological aspects or improved perception of the individual health condition perhaps through relief of the debilitating back pain.

A significant observation was due to the reduced stress perception of test subjects in the experimental group after performance of the study. By a direct comparison of the two median values  $M(\text{before}) = 2.61$  and  $M(\text{after}) = 2.91$  there was the effect that it resulted in a reduction of

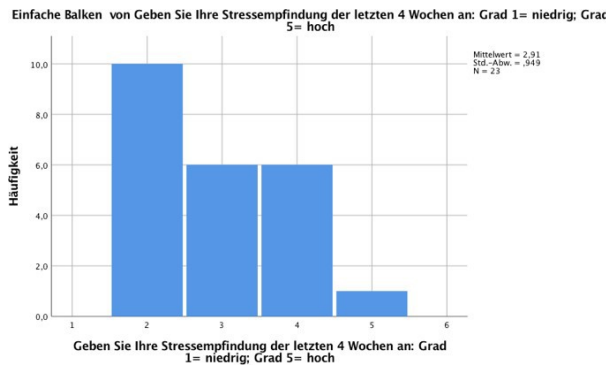


Figure 12: Stress perception in the final four weeks before conclusion of the study

stress perception by barely a third of one level within the study population (with a scale of 1 = low to 5 = high). The t-test for the two samples dependent on one another in the experimental group before and after produced a p-value of 0.002 ( $t(22)=3.42$ ).

For this reason it was right to keep the null hypothesis and

assume that these were significant differences between the before and after median values, and a reduced stress perception in the experimental group is attributable to the effects of the regularly completed relaxation application. It has already been stated that there is a correlation between stress perception and degree of relaxation. Thus an additional method was performed by t-test in connection with the degree of relaxation before and after the study, and it was checked whether a similarly significant change had set in. The degree of relaxation was rated 1 = low to 5 = high. The t-test for the two connected samples again produced a very significant change of relaxation degree in the study population before beginning regular relaxation application, and of the relaxation degree after the study. With virtually identical variances and a significance of p-value = 0.001 ( $t(22)=-3.89$ ) the null hypothesis had to be retained, with the assumption that the increased degree of relaxation after the study is attributable to the Body&Mind

syncSystem. The degree to which this elevated degree of relaxation seemed to be individually marked and observable could not be filtered out using this study.

Furthermore before and after median values of the item “commitment in connection with the maintenance of own health” were compared with one another and a t-test was applied. So the participants had the chance to grade their commitment (1 = low; 5 = high). The t-test for the two dependent samples produced p-value = 0.186 ( $t(22) = -1.37$ ). So the null hypothesis needed to be rejected on the assumption that no significant change in connection with the commitment to maintenance of own health had been achieved. In the process beginning and end values of nutrition behaviour were similarly compared with one another. Under the aspect of exactly identical variances, scarcely any change in the two median values could be identified by the t-test. So nutrition behaviour does not receive influence from the relaxation application,

and a change in the sample could not be seen or induced. Now juxtaposition took place of the perception the four weeks preceding the beginning of the study and the perception within the four-week period before the after-questionnaire. If the beginning values of the “painful” feature are compared with the end values by the identical principle, there is a minimal shift from “sometimes” in the direction “rarely”. However this fine difference is so minor that it possesses no strong statement capacity and assumption would be wrong. However a positive effect can be seen, if one compares the two median values in answer to the question on hindrance through pain with one another. With a shift in the respective median values of 1.83 (before) to 1.65 (after) and a difference of 0.174 before the background of a virtually identical standard deviation, now 13 persons (previously 9) claimed to be not at all damaged or hindered by pain. Supplementary comparison took place before and after regarding peaceful and relaxed behaviour among the test subjects. The difference in the two median values of M (before) = 3.43 and M (after) = 3.26 produces a value of 0.174, so there was a shift in the direction of increasingly heightened relaxation within the samples taken. There is no significant difference, however two other persons claimed more than before the study to adopt a mostly peaceful and relaxed posture. An increase of 8.7% in the group of test subjects who claimed to act mostly peacefully and relaxed. As regards the general movements of the participants, after performance of the study there was no change and all details remained as previously. In this respect regular use had no direct influence on the general movements of the participants. A further statistical test took place covering work hindrance through pain. For this purpose the before and after median values from study participants were compared with one another. On condition of virtually identical variances the p-value 0.426 ( $t(22) = 0.81$ ) was produced, thus overthrowing the null hypothesis and meaning no significant change occurred. Another investigation covered the effects of sport behaviour, details being in sports units per week.

So there was again a t-test for two paired samples. The value label “1” gave the lowest number of less than 1x per week, while the value label “5” allowed a number of sports units exceeding 4x per week to be given. Through the shift of

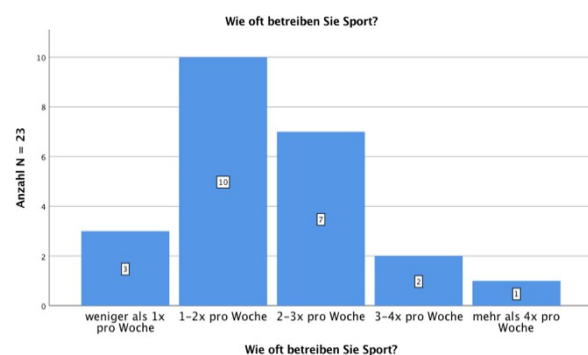
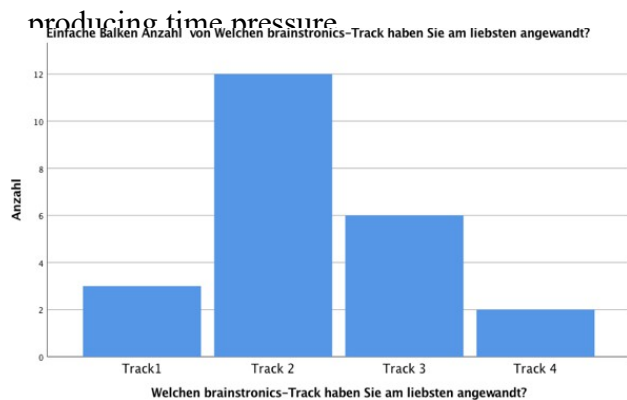


Figure 13: Sport behaviour after performance of the study

the median values of 2.09 (before) to 2.41 (after) and a p-value of exactly 0.005 ( $t(21) = -3.13$ ) the null hypothesis is to be retained, and there is a significant difference. So the relaxation programme triggered a marked, significant change in sporting behaviour within the experimental group. So regular use had a direct influence on sporting behaviour in the test subjects, expressed in terms of an enormously heightened number of sport units per week. Two other items contributed to capturing the current mental and physical well-being. The t-test regarding the median values of mental well-being produced a difference between the two median values of 0.565 and a p-value of 0.001 ( $t(22) = 3.72$ ). So the relaxation application had meant a marked change, expressed in the form of heightened mental well-being. The effects of continuous use were reflected in a heightened mental well-being and more stable psyche. There were similar changes in the median values of heightened physical well-being. The t-test performed produced a p-value of exactly 0.050 ( $t(22) = 2.077$ ), and as a result still lay exactly within the 5% level. So relaxation application had entailed a significant change, so it is to be assumed that the positive effect of heightened mental well-being is attributable to the BMS.

It emerged that with 52.2% some half of the study population preferred Braintronics track 2. Conclusions can be drawn from this on the favourite contents of the track. About half the participants thus quoted music and speech of track 2, which is structured around the wave-noise of the sea and was found especially pleasant. The voice is soothing to the participants, such that they can imagine they can now dismiss all deadlines and as a result escape distress-



In second place came track 3, whose input 6 test subjects used the most. About one quarter preferred the contents of track 3, which addresses self-acceptance of the ego, and as a result felt personally directly addressed. Only three test subjects preferred during use

to listen to track 1, and two test subjects gave track 4 as their favourite.

Figure 14: Ranking of favourite Braintronic tracks

Then the participants were asked what effects were evoked through use and what physiological conditions were noticed. Almost half the participants experienced regeneration with the help of regular use. After the course of five weeks a very high number of 17 participants claimed that Braintronics use in combination with specially adapted massage had given rise to deep relaxation. During a session 30.4% managed to “switch off” mentally and get rid of troubling thoughts and 34.8% were additionally able to relax physically. In some half of participants use led to relief of back pain. Three participants imagined that in the long term with the aid of the system mental stress could be reduced and eroded. Approximately one third found use of the individually chosen tracks encouraged stimulation of the spirit, although the precise manifestation of this effect was not really tangible. Following this the participants were asked how they assessed use regarding taking charge of their professional day. With 26.1% about a quarter found use very effective. 16 test subjects saw a neutral connection. About half assessed the relaxation application as very effective when it came to improvement of their overall well-being. A similar question was additionally posed in connection with assessment of use as regards improvement in overall well-being. Here an identical effect is observed. Half the participants rated use very effective, while eleven test subjects felt use was neutral, and one person saw no effects. 87.00% of the study population found Braintronics use pleasant, which equates to an enormously high number. 82.6% claimed that use had a calming effect on them, whereas the remaining 17.4% found no effect in this respect, and again this equates to an enormously high number.

### **5.1. Effects within the control group**

The average age of test subjects was 48 ( $M = 48.1$ ). In the control group, where no treatment was given, they were simply asked about their health condition, so again comparisons in the form of t-tests were performed. In the process there was examination of what relationship exists between before and after-values and whether the sample experienced changes.

All items of the experimental group and control group covered by the questionnaire contents were analysed in direct comparison with one another. So for each item a comparison of median values before and after took place. At the beginning was a t-test to compare the median values of the

overall health condition of participants before and after the course with one another. The median values before the study  $M(\text{before}) = 2.00$  and  $M(\text{after}) = 2.10$  produced a scarcely remarkable difference of 0.10. The p-value of 0.722 ( $t(18) = -0.36$ ) also produced no significant difference. The median values of the stated sports units per week showed a difference of 0.10, and the modal value remained at 2, so an unchanged majority admission of one to two sports units per week. The p-value was 0.866, on condition of identical variances, and again showed no significant change. Between the before and after median values of the perceived achievement stress there was no difference and thus identical median values before and after the study. In this respect we observed the clear finding of a p-value of 1.000 ( $t(18) = 0.00$ ). Additionally there took place comparison of the before and after median values of the relaxation degree and stress perception in the four weeks preceding this time. Testing of the relaxation degree in participants before beginning the study produced a median value of 3.10, the median value after the study produced a value of 3.00, so a difference of 0.10 occurred. The p-value of 0.777 ( $t(18) = 2.87$ ) again showed no significant difference between before and after data. Comparison of the median values of the stated stress perception produced an identical difference of 0.10, and the p-value of 0.813 ( $t(18) = 2.39$ ) showed that again no significant differences were to be identified. The comparison of the median values of the item “commitment in connection with the maintenance of individual health” showed a shift of 3.50 (before) to 3.60 (after), so a shift of 0.10, whereby the t-test showed no particular difference, so no remarkable change in commitment was noticeable. There were additionally no significant median value differences in the item nutrition behaviour, expressed through the p-value = 0.833 ( $t(18) = 2.14$ ). The median values of the item “mental well-being” before and after the study produced a difference of 0.10. The p-value 0.795 ( $t(18) = 2.64$ ) showed no significant differences, and the majority statement regarding subjectively-perceived mental well-being before and after the study fell under the heading “good”. Finally there was a comparison of the beginning and end values for “physical well-being”, in which no difference was noticeable. The before median value = 2.60 was similar to the after median value, clearly observed with a p-value of 1.000 ( $t(18) = 0.00$ ).

In conclusion similarly small differences tended to be produced between before and after median values in the control group. This fact was possibly attributable to the small sample size of  $N = 10$ . We determined scarcely remarkable changes in

beginning and end values regarding the items investigated. This was confirmed using the respective t-tests, which showed no significant differences. It should be explained here that the outline conditions remained identical, in particular the overwhelming form of sedentary activity in offices. So there were similarly homogeneous conditions between experimental and control groups.

### **6.1. Comparison of experimental and control groups**

This point explains and compares the significant observations within the two groups. In the experimental group there was a significant difference in beginning and end median values for stress perception. The noticeable stress-reduction effect referred to regular use of the BMS. As mentioned, the degrees of relaxation and stress perception correlated with one another, and additionally in a further t- test a significant change in the form of elevated relaxation condition was calculated. Additionally there was a noticeable, significant change in connection with sporting behaviour, expressed in sports units per week. Trigger for this could be direct and continual contact with the relaxation system under the health-promoting aspect. Regular contact could have represented a stimulus to maintenance of individual health, which motivated participants to action. Additionally the BMS had direct influence on physical and mental vitality and overall well-being in the test subjects, since significant differences were measured that are not attributable to disruptive influences. The contents of tracks 2 and 3 were predominantly preferred. This implies conclusions on what tones, musical forms and forms of address the participants found especially pleasant and well-suited to accelerating the relaxation condition.

If one also investigates the above items in the control group and compares the resulting effects, in this respect differences between experimental group and control group are noticeable. So it is fair to say that the effects within the experimental group are attributable to the effects of Braintronics use in combination with the specially-developed massage.

## **7. Interviews**

As an additional data capture instrument we used two anonymous interviews using open questions in writing. Two test subjects made themselves voluntarily available for questioning. This instrument was chosen, in order to supplement the quantitative research part with qualitative results and thereby maintain impressions and additional information regarding the Body&Mind syncsystem in a targeted way. These individual



assessments were discovered using the questionnaire containing no open questions. The survey took place using seven selected questions:

1. *"How is your overall impression of the Body&Mind syncsystem?"*
2. *"How do you assess its effectiveness in connection with stress reduction, relief of pain etc?"*
3. *"Which Braintronics track did you find best, and why?"*
4. *"How would you rate user-friendliness of the system?"*
5. *"Would you recommend use, and if yes, why?"*
6. *"Which specific aspects were achieved through continual use?"*
7. *"Did you occasionally have the feeling of wanting a session and find yourself looking forward to it?"*

### **7.1. Interview 1**

Re. question 1)

The first person asked claimed the overall impression was good. The external appearance was very prestigious, and despite its size the system was elegant. The skin felt good on the upholstery fabric, and the massage functions were full of variety. Another comment was that regulation of the intensity of massage would be helpful. In conclusion this participant was very pleased with Braintronics use.

Re. question 2)

Until this time this person has still not been able to make a judgement in connection with long-term stress or pain reduction, since continuous duration of the study would be required. Nevertheless it was identified that immediately after use a wonderful feeling of lightness and relaxation set in.

Re. question 3)

This participant preferred track 3, since the statement in connection with self-acceptance was very applicable. Track 2 always evoked a spirit of contradiction, since this participant was very well on top of deadlines and quoted the statement in track 2 that one should abandon them.

Re. question 4)

The user-friendliness of the system was very good. Although this person had read only the brief instructions, handling of the system was said to have been excellent. Additionally several keys were self-explanatory due to the appropriate abbreviation or sign.

Re. question 5)

The person asked would recommend the Body&Mind syncSystem to all. They said especially in companies this would give the chance of rapid passive relaxation, followed by motivation and efficiency increases in the participating staff.

Re. question 6)

To the question on specific effects after continuous use the person answered that even after only a few applications an effect of relaxation and lightness set in, triggered by the appearance of the first sentences and tones. After long-term, regular use this “immediate effect” would greatly increase, and there were already the first signs of rapid and direct bio-feedback to be identified.

Re. question 7)

The interviewee claimed occasionally to look forward to a session and to already imagine it in pictures. In several specific stress situations she had then consciously proceeded with an application and also achieved the goal of relaxing.

## **2.1. Interview 2**

Re. question 1)

Another person asked claimed that the overall impression was definitely positive and the relaxation during use was definitively good.

Re. question 2)

This person assessed the effectiveness in connection with pain alleviation over the long-term only as very slight. Pain and certainly tension could only be alleviated over the short term.

Re. question 3)

This participant was in particularly taken by track no 2. Music and the sound of the sea were very pleasant. Overall this person would prefer only to listen to music and ignore the instructions, and simply run the binaural beats with background music, in order to increase the user’s relaxation and concentration degree.

Re. question 4)

The system was basically good to handle, but the person asked could not make it clear how to ensure further massage after Braintronics use without having to completely switch the device off and on again.

Re. question 5)

The interviewee would recommend use immediately, since it was simply pleasant, and you could take the odd time for a 20-minute relaxation.

Re. question 6)

Through regular and continual use a person could create a short-term relaxation condition and rest physically and mentally. During use they were successful in shutting out stress indicators and focussing on pure relaxation.

Re. question 7)

The person claimed often to have the feeling of wanting a session at this time and to already anticipate it, which itself produced a positive side-effect at a psychological level.

In conclusion concise statements were produced. Two persons asked rated the quality very high, saying the relaxation condition during Braintronics use was complex and the available massage and audio programmes very varied. Immediately after use there began a light feeling of vitality accompanied by short-lived back pain relief. However on a long-term basis it required further research to see to what extent sustainable relief could take place. User-friendliness was very good, easy to understand and indeed to put into practice. Both interviewees claimed this relaxation system could be recommended, since it offered an accessible and un-complicated opportunity for relaxation and regeneration. Both persons claimed it was better to use the system in certain situations as a matter of choice, in order to achieve a given effect in the form of stress reduction, mental tuning out or physical relaxation.

## 8. Discussion

In conclusion the effectiveness of BMS in connection with certain aspects of items investigated within the sample was confirmed. Improved emotional sensitivity, a

high degree of stress reduction, besides further effects like a pleasant feeling of freshness and relief of back pain are clear indicators of health-promoting benefits the relaxation system has to offer. The elevated degree of relaxation prevents further development of acute and prolonged stress, thus preventing vegetal and hormonal over-reaction (c.f. chapter 4.4). Associated complaints such as coronary and circulatory diseases and sleep disturbance can be avoided in a targeted way, and in many respects there is a feeling of relaxation and balance. However it should be noted that the results were gathered from a relatively small sample limited to a certain activity area in test subjects. Other studies are required to identify and ensure long-term results and effects. The findings made in the present study could be made available in a different form as basis of a follow-up study. Thus it would be possible to gauge whether manifestation of all the effects was observed. To this extent specific questions on effects arising through BMS could be addressed in future surveys, in order for example in the context of stress reduction to gain deeper awareness. A targeted investigation of the preferred tracks 2 and 3 could possibly lead to development of further tracks, in order to achieve heightened efficiency. Additionally a closer investigation of automatisms occurring during regular use would be interesting in the sense of bio- and neuro-feedback. This is because using the Interviews already revealed that after a certain duration a much more rapid certain feeling of relaxation and internal rest (mental and physically) set in. So it would be sensible to source other potential patient groups as participants and check to what extent they profit from regular relaxation induction with Braintronics use and whether use for persons in given activity fields is especially helpful and conducive. Additionally it would be possible to establish other effects on a long-term basis and as necessary to establish certain characteristics for the different patient groups as regards age, activity field, health condition, given environmental influences, etc.. A major aspect is integrating the relaxation system in the firm and routine procedures of a company that would guarantee regular use and an ideal foot forward under the umbrella of corporate health management. This would allow the Body&Mind syncSystem to act as a suitable instrument. The high degree of flexibility the system offers represents a simple and rapid possibility for regeneration, relaxation and stress reduction, followed by motivation and

efficiency increases in companies and the domestic environment. BMS is an optimal method for generating physical and mental relaxation. The uncomplicated participation means BMS is a simply-accessed method reaching the wide masses of employees, which may be an initial trigger for a sustainable struggle with personal health by the user. All test subjects in this study expressed positive feedback and were very happy to use the relaxation system.

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**Sworn Declaration:**

I hereby swear on oath that I prepared the present Bachelor Thesis independently and without using other than the specified assistance. All sections that are literally or in sense terms borrowed from publications are marked accordingly.

Munich 02.08.2018

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