



LAHDEN AMMATTIKORKEAKOULU
Lahti University of Applied Sciences

THE EFFECTS OF AN EIGHT-WEEK INTERVENTION ON ELDERLY PEOPLE'S BODY AWARENESS

An intervention study on home-living 69-79-year-old individuals

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Viivi Järvinen
Riikka Karplund

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JÄRVINEN, VIIVI & KARPLUND, RIIKKA:

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TIIVISTELMÄ

Tämä tutkimuksellinen opinnäytetyö käsittelee 8 viikon harjoitusohjelman vaikutuksia kotona asuvien 69–79 -vuotiaiden kehotietoisuuteen. Opinnäytetyön tarkoitus oli saada tietoa ikääntyneiden kehotietoisuudesta ja harjoittelun vaikutuksista siihen.

Tutkimus toteutettiin kahdeksan viikon mittaisena harjoitteluinterventiona kolmessa eri ryhmässä jotka toteutettiin Lahdessa, Seinäjoella ja Tartossa (EST). Opinnäytetyö on toteutettu kansainvälisessä Nordplus Joint Physiotherapy Education in Bachelor Thesis –projektissa, joka mahdollisti kansainvälisen yhteistyön opinnäytetyön toteutuksessa. Projektissa oli mukana opiskelijoita ja opettajia kaiken kaikkiaan seitsemästä Baltian ja Pohjoismaan maasta.

Tutkimukseen osallistui kokonaisuudessaan 25 ikääntynyttä. Kaikkien ryhmien rakenne oli samankaltainen ja niissä tehtiin samat mittaukset ja toteutettiin samaa harjoitusohjelmaa.

Harjoitusohjelmaa toteutettiin kahdeksan viikon ajan kahdesti viikossa ja se pysyi samanlaisena koko harjoittelun ajan. Harjoitusohjelma sisälsi harjoitteita tasapainolle, lihasvoimalle sekä kehotietoisuudelle. Tutkittaville tehtiin alku- ja loppumittaukset ennen ja jälkeen harjoittelun. Kehotietoisuutta mitattiin mukautetusti Body Awareness Scalen (BAS) avulla sekä Body Awareness Questionnairella (BAQ). Saatuja tuloksia analysoitiin laskemalla tuloksista keskiarvot, keskihajonnat sekä vaihteluväli. Tuloksista myös katsottiin osiot, joissa muutosta oli tapahtunut eniten ja vähiten.

Mittaustuloksissa BAS:n loppumittausten keskiarvo laski 43,3 % alkumittauksiin verrattuna, mikä tarkoittaa kyseisellä mittarilla alkuperäistä huomattavasti parempaa tulosta. Keskihajonta pienentyi BAS:ssa 4,4:stä yksiköstä 3,4:ään. Tulosten vaihteluväli oli alkutestauksissa 0-16 ja loppumittauksissa 0-13. BAQ:n tulosten keskiarvo parani 5,1 %. Keskihajonnat olivat alussa 18,9 yksikköä ja lopussa 15 yksikköä. Tulosten vaihteluväli alkumittauksissa oli 33-110 ja loppumittauksissa 42-102. Alkumittausten ja loppumittausten tulosten vertailussa oli siis havaittavissa kehotietoisuuden paranemista, etenkin BAS-mittarin tulosten perusteella.

Asiasanat: body awareness, body awareness therapy, ageing.

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ABSTRACT

This study is about the effects of an eight-week exercise program on 69-79 years old home living people's body awareness. The purpose of the study was to get more information from elderly people's body awareness and an exercise program's effects on it.

The study was implemented as an eight-week exercise intervention in three separate groups from Lahti, Seinäjoki and Tartu (EST). The present thesis is produced as a part of an international Nordplus Joint Physiotherapy Education in Bachelor Thesis –project. Altogether 25 elderly people took part in the interventions. The composition of the groups was similar everywhere and they performed the same measurements and exercise program.

The exercise program was executed during eight weeks, twice a week, and it stayed the same during the whole period. The exercise program included exercises for balance, muscle strength and body awareness. Before and after the intervention initial and final measurements were implemented. Body awareness was measured with a modified Body Awareness Scale (BAS) and with Body Awareness Questionnaire (BAQ). The results were analyzed by calculating the averages, standard deviations and ranges. Also the sections where the increase was the lowest and highest were under estimation.

The average of the final results of BAS decreased 43,3% in comparison to the initial results. In that indicator it means a significantly better result. The standard deviation in BAS declined from 4,4 units to 3,4 units. The range of the results from the initial measurements was 0-16 and in the final measurements 0-13. In BAQ, the averages of the results increased 5,1%. The standard deviation was 18,9 units in the initial measurements and 15 units in the final measurements. The range of the results in the initial measurements was 33-110 and in final measurements 42-102. Therefore when comparing the initial results to the final results it seems that there was improvement in body awareness after the eight-week intervention, especially measured with BAS.

Key words: body awareness, body awareness therapy, ageing.

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1 INTRODUCTION

In the year 2010 18% of the population in Finland was over 65-year-old and it is predicted to increase to 28% until year 2050 (Statistics Finland, 2009). This bachelor thesis focuses on elderly people and their body awareness and the purpose of the study was to find out if exercise program can affect it.

Body awareness as a term means how person experiences and uses the body, performs body management, body consciousness and deepened body experience (Roxendal 1985, 10). Initially the idea for the theme came from the work life partner of the present thesis, Harjula Settlement Association. The association works with elderly people by providing rehabilitation, homecare services and physical activities for aging individuals. As the amount of elderly people increases constantly the theme is up-to-date.

The authors of this thesis have had personal interest on elderly people's body awareness partly because of the fact that there are only very few studies on this theme. The questions in which is searched to get the answers in this thesis were that how is the body awareness with elderly people and how does an eight-week intervention affect it, or does it.

2 BODY AWARENESS

Since the 1950's the individual's comprehensive wellbeing has increasingly been under exploration (Roxendal 1993, 7). In recent years, a term of *body awareness* has emerged as a subject of research across a wide range of health topics (Mehling, Gopisetty, Daubenmier, Price, Hecht & Stewart 2009, 1). In social and healthcare it has become obvious that the effects of the treatment consider both the physical and the mental dimension of life and health. If the physical pain is reduced with the help of treatment, the change often shows in the mental state of health as well. Reduced physical pain reduces mental stress and an individual becomes mentally more strong. (Roxendal 1993, 7.)

The body responds to different things in different ways. Mental stress is reflected in the body. An unprocessed crisis can cause physical reaction, and sometimes it can lead to a pathological condition, so the individual becomes physically ill because of mental stress. The connection between mental stress and bodily reactions is not always easy to find. (Roxendal 1993, 7.)

Body awareness is an overall term for using the body (Kendall, Brodin-Magnusson, Sören, Gerdle & Henriksson 2001, 305). The word *awareness* can separately be defined as being fully present mentally, here and now and also accepting individual limitations and assets (Gyllensten, Hansson & Ekdahl, 2003 A). Body awareness is a challenging subject to be defined because it's about individual's experiences and consciousness (Skjaerven et al. 2010, 1480). The definition includes deeper body experience and body management (Roxendal 1985, 10). Within these sections an individual has a certain capacity to be aware of bodily states, processes and actions. Body awareness is formed by individual's attitudes, experiences and social and cultural context. (Mehling et al. 2009, 4-5.)

Body awareness originates from proprioceptive and interoceptive stimuli (Mehling et al. 2009, 2). In the body awareness context, movement is the basis of the awareness. The individual should first become aware of changes in posture and stability, because these changes are easier to feel than those that occur in the muscles themselves. (Feldenkrais 1977, 36-37.) In a focus group study on experiences among patients with chronic fatigue syndrome simple exercises for

neck and shoulder and stabilising exercises for muscles close to the joints were reported as helping the subjects to get started developing body awareness (Larun & Malterud 2011, 223). This is an example of how becoming aware of the ways used to keep up the posture means at the same time recognizing the stimulus of action (Feldenkrais 1977, 36–37). Improving body awareness has been reported as a key element for therapeutic approaches often categorized as mind-body approaches with reported benefits for a variety of health conditions (Mehling, Wrubel, Daubenmier, Price, Kerr, Silow, Gopisetty & Stewart 2011).

According to several researches it seems that normal motor awareness is about the relation between the sense of peripheral action and the prediction of the action. In other words, an individual should be able to recognize the match or mismatch of these sensations to gain normal motor awareness. Blakemore and Frith (2003) suggested that motor awareness is related to some signal that precedes the movement and that is formed prior to the processing of sensor feedback. The study by Libet, Gleason, Wright & Pearl (1983) also suggests that motor awareness emerges before any sensory input reaches the brain, and it is not linked in an absolute way to the feedback coming from the movements of muscles and joints. In addition, there is some evidence suggesting that somatosensory information is neither necessary nor sufficient in achieving the view of our own motor behavior, in other words achieving motor awareness. Even healthy subjects the sensations associated with the actual execution of movements can be unnecessary in achieving motor awareness. (Berti & Pia 2006.)

2.1 The self

When discussing body awareness and body awareness exercises the term *self* is crucial to understand. The self consists of an individual's experiences of the body, an individual's attitudes towards the actions of the body, the body's ability to perform movements and movement patterns. It represents experience of the body as a whole including abilities, limitations and difficulties, bodily abilities in posture, breathing and voice production and the expression forms and behaviour patterns of the body, for example nonverbal communication. (Roxendal 1993, 9.)

An action is performed through a combination of neurobiological events that are often not available to consciousness, but people usually have awareness of their movements (or being still). Therefore people have the motor awareness of different actions, and also the awareness of intentional attitudes that represent for example the feeling of starting to make the movement that finally results in executing a specific motor action. People also have a strong sense of controlling their own actions. The normal integration of these aspects seems to be crucial for the building of one's sense of self. (Berti & Pia 2006.)

2.2 Movement harmony

Movement harmony is one of the key themes to understand body awareness. According to Dropsy's theory, movement harmony means co-ordinated flow of movement expressed in space (balance), time (free breathing) and energy (awareness). Balance, free breathing and presence are connected to the concept of movement harmony. According to the theory; it isn't possible to make a difference between being in one's body and acting with one's body. Movement harmony can also be the same as mental awareness and movement flow. Components of feeling being present are mental awareness, postural stability and free physiological processes. A mentally present individual can perform movements that are in harmony while there are rhythmical co-ordinated flow and central co-ordinations. (Skatteboe 2005, 48, 89.)

2.3 Breathing

Breathing is one of the key points of body awareness. Breathing is partly conscious and partly unconscious, and usually people don't notice the way they breathe. Breathing gives the rhythm to the body functions and it also represents the psychological status. (Dropsy 1975, 77–78.) Therefore the feelings and emotions can stimulate or block breathing. That's why breathing can be discussed both from a physical and a mental point of view. (Roxendal 1985, 13; Skatteboe 2005, 18.) Breathing becomes easier when a peaceful state of mind is achieved, and there are no tensions in the body. If the maximum effort is put into exercising, the breathing becomes locked, the observation becomes hard and the progression

is impossible. (Feldenkrais 1977, 58-59.) Rhythmic and free breathing is a prerequisite for movement harmony (Skatteboe 2005, 18).

2.4 Body image

The term *body image* is also related to body awareness. In psychiatric literature it is the most used term. (Roxendal 1985, 9.) However, body image refers mostly to individual's attitudes towards the external qualities of the body and it is based on perception of the body (Mehling et al. 2009, 10; Roxendal 1985, 9). The focus of the present thesis is on inner body awareness, and therefore the term body image will not be under further discussion.

3 BASIC BODY AWARENESS THERAPY

Body awareness can be improved by different methods. These are for example the Feldenkreis therapy, the Mensendieck method, Body Awareness Therapy and the Alexander technique (Roxendal 1985, 6-7). These approaches enjoy an increasing popularity in the Western world (Mehling et al. 2011).

Body Awareness Therapy (BAT) aims to increased body consciousness as the goal is to improve an individual's possibilities to control painful movements by utilizing the individual's own resources. The method pursues increased functional ability in daily life. (Kendall et al. 2001, 305.) BAT can be divided to Advanced Body Awareness Therapy (A-BAT) and Basic Body Awareness Therapy (B-BAT). These methods are partly the same, but B-BAT is more structured than advanced therapy. A-BAT is initiative and the physiotherapist is in a less active role. (Roxendal 1985, 12-14.)

3.1 Background

Basic Body Awareness Therapy (B-BAT) is based on the theory of Jacques Dropsy (Skatteboe 2005, 15). It is a method that includes a certain rehabilitation program and valid and reliable assessment tools (Malmgren-Olsson, Armelius & Armelius 2001, 78). In Scandinavia B-BAT has been used in physiotherapy for more than 30 years. It is used in multiple clinical settings like in psychiatric physical therapy, primary health care and pain rehabilitation. (Skjaerven et al. 2010, 1480.)

Dropsy had a hypothesis of a three-fold contact problem that contained lack of awareness of the physical body and internal life, the relationship to other people and the physical environment. The lack of awareness can be seen in the body and can cause dysfunctional movements without vitality, rhythm, unity and flow. This three-fold contact theory has shown to be useful to work with in practice. (Skjaerven et al. 2010, 1480.)

According to Dropsy, there is an inner connection between balance, presence and physiological processes. There are three factors that author the integration of all dimensions. These are free breathing, balance and awareness. (Skatteboe 2005,

17-18.) In other words, B-BAT represents working with all the body's resources at the same time (Gyllensten, Hansson & Ekdahl 2003 B, 173). Therefore the body and movements are seen as an integrated part of the human being (Gyllensten et al. 2003 A, 179). When the attention is at the same time turned to the doing itself and what is experienced during the different movements, both the physical and mental sides of the self are practiced (Gyllensten et al. 2003 B, 173).

On the other hand, according to Roxendal, Basic Body Awareness Therapy can be described as a group of different treatment and training methods that aim to building a strong self. According to Roxendal's theory, one half of the self is called general while the other half is called personal. It is necessary to divide the general self to different dimensions to be able to assess the resources and disorders of the individual. The dimensions of the general half of the self are the relation to the underlay/the relation to the midline, the centering/breathing, flow (blocks in the flow) and the mental presence. These dimensions can be trained for example with B-BAT. (Roxendal 1993, 9.)

However, balance, free breathing and presence are the key concepts of both Dropsy's and Roxendal's theory. Balance represents the ability to uphold the position of the body and the centre of the gravity in some certain space. Free breathing consists of mental and physical aspects and it occurs under harmonious movement. Awareness means being present in the moment and it's very subjective experience of an individual's existence. Listening to oneself is a key point of B-BAT, both in practical exercise and in theory. The aim is to learn to listen and feel your own body and to be aware of the movement pattern that is as free from tension as possible. (Skatteboe 2005, 15-18.)

3.2 B-BAT in practise

The techniques that B-BAT utilizes are for example movements, breathing techniques, massage and awareness as the goal is to restore balance, freedom, unity and cooperation of body and mind (Gyllensten et al. 2003 B, 173). Often the patient performs simple movement exercises together with the physiotherapist. Basic co-ordinations create a basis for integration of the different body parts. They also can set person's vitality free by relaxation of the autonomic functions. Good

position in the person's midline can make changes in respiration and relax autonomic functions. Also being mentally present is important for combining psychological and physical processes. (Skatteboe 2005, 10.) It means that in order to learn to improve body awareness the powers of sensing must be sharpened, but that process can't be forced (Feldenkrais 1977, 58-59). It is also vital to be released from tensions and to gain balanced, pure movement. The balance in the movement and being aware of the body's midline improve breathing and relax the autonomic nervous system. The basic movement elements that are used in B-BAT are relationship to the ground, to the midline, to the movement centre and to breathing. (Skatteboe 2005, 15-16.) Also sensation of the muscular tension and relaxation and being conscious of the limits of the body are elements of B-BAT (Roxendal 1985, 12-13).

In B-BAT movements which are practiced are present in daily life: sitting, standing, lying, walking and running and using voice (Skatteboe 2005, 15). B-BAT can be performed both as an individual therapy method and as group exercises (Gyllensten et al. 2003 B, 174). Also pair exercises can be included in practice. While standing, the target is to achieve congruence of the postural balance. When a person is mentally present and listens accurately it leads finally to an awareness of muscle tensions. Awareness is essential before changes can take place. (Skatteboe 2005, 15.) Therefore when learning to perform the exercises, the inner feelings and sensations should be noticed. The reduction of effort is important; the exercises themselves are easy, but the key point is the way of performing them. (Feldenkrais 1977, 58-59.)

When performing the B-BAT exercises, the therapist tries to encourage the patient to perform different movements in the way that is the most optimal for breathing, postural control and balance (Gyllensten et al. 2003 B, 174). The physiotherapist has an educative role when guiding the structured exercises (Roxendal 1985, 12). Other important things when aiming to help the patient to achieve better quality of movement are the therapist's own embodied presence and own movement awareness. To be both physically and mentally present in current situation is also important. A physiotherapist has to be open and non-judgmental to create trust and good communication with patient. Also the atmosphere of the room affects. Other affecting things in therapy are the physiotherapist being present in the

movement, the use of words, learning the cycle of movement awareness and guiding instead of correction. (Skjaerven et al. 2010, 1481-1484.)

3.3 Measurements

There has been developed many measurement tools to assess body awareness. Body Awareness Scale and Body Awareness Questionnaire are examples of body awareness measurements tools being used. Body Awareness Scale is based on physiotherapist's observation and Body Awareness Questionnaire is based on subject's own estimation.

3.3.1 Body Awareness Scale (BAS)

The Body Awareness Scale (BAS) was developed by Gertrud Roxendal in early 1980's as a response to a need of a treatment assessment tool in health care. It was piloted as a part of a doctoral thesis. BAS was developed to describe the body's current reactions both from the patient's and the therapist's view. The original BAS-protocol is suitable for patients from many different categories. For relatively healthy individuals the original BAS was too inaccurate. Because of this complexity, BAS-hälsa was developed for relatively healthy individuals. (Roxendal 1993, 5.)

Competence needed for using the BAS is the ability to accomplish the interview in a therapeutic manner, the ability to instruct the movement test and basic knowledge about Basic Body Awareness Therapy to make reliable observations concerning the self's functions. A person that has this competence can mainly practise alone to gain high reliability in BAS-evaluation. For those who don't have this competence it is necessary to attend some education. BAS can be performed also partly and it is possible to focus on some of the dimensions of the self. (Roxendal 1993, 5-9.)

In BAS every section is evaluated with a score from 0-3. Score 0 represents normal status. Score 3 represents big abnormalities in status. The smaller the total score is the less abnormalities there are. Modified BAS is as an appendix (APPENDIX 1).

3.3.2 Body Awareness Questionnaire (BAQ)

The Body Awareness Questionnaire (BAQ) is a quantitative measurement tool for body awareness. BAQ is a self-report scale that expresses an individual's attentiveness to normal, non-emotive bodily processes. (Mehling et al. 2009, 10; Shields, Mallory & Simon 1989, 802.) The items which are included to the scale measure the sensitivity to body cycles and rhythms, the ability to detect small changes in normal functioning and the ability to anticipate bodily reactions (Shields et al. 1989, 803). After careful testing the 18-item version of the test was developed (APPENDIX 2). Each question is scored by the patient on a scale from 1-7 in which 1 represents "Not at all true at me" and 7 represents "Very true of me". The higher the total score of BAQ is the more sensitive the patient's body is to different bodily reactions; in other words patient's body awareness is better.

In a study by Mehling et al. (2009) the psychometric quality of 39 self-report measures was assessed. The systematic review showed that only two of the items were high standard for reliability and four for validity. According to the study the Body Awareness Questionnaire is both reliable and valid as self-report measure. (Mehling et al. 2009, 1.) Multiple studies by different authors have strongly shown that the questionnaire is reliable and convergent and discriminantly valid. Sensitivity to assess changes wasn't estimated. (Mehling et al. 2009, 10.)

4 PREVIOUS STUDIES OF B-BAT

Studies of body awareness and Basic Body Awareness Therapy are mostly carried out with subjects around illnesses. B-BAT has shown positive effects in randomized controlled studies in different kinds of patients. Its effects upon healthy old people have been studied only little.

B- BAT has shown effects on psychiatric disorder patients, for example on treatment of schizophrenia (Gyllensten et al. 2003 A, 186). Some possible benefit from B-BAT for patients suffering from eating disorders has been shown (Catalan-Matamoros, Skjaerven, Labajos-Manzanares, Martinez-de-Salazar-Arboleas & Sánchez-Guerrero 2011, 621; Skjaerven et al. 2010, 1480). Also positive results in psychiatric patients' personal involvement, balance and posture, awareness and handling of body signals and body movement control has been shown. In study by Gyllensten et al. (2003 B) changes in the personal involvement were only reported with patients with best progress during the treatment. The most frequently commented and subjectively improved category was the category of balance and posture. Some patients had difficulties understanding the meaning of the exercises, and some patients found some exercises meaningless. (Gyllensten 2003 B, 181-182.)

In a randomized controlled trial of patients in psychiatric outpatient care (2003) B-BAT showed significant improvements concerning the quality of movements. Improvements occurred also in psychiatric symptoms and attitudes towards movement and body. The study results indicate a good short-term outcome of Basic Body Awareness Therapy. (Gyllensten et al. 2003 A, 621.) In a fresher study by Gyllensten et al. (2009) it was concluded that B-BAT seems effective as an intervention in psychiatric outpatient care also in the long term for patients who in addition to psychiatric disorders also present somatic symptoms. (Gyllensten, Ekdahl & Hansson 2009.)

The purpose of the study by Freiburger et al. (2007) was to find out the effects of psychomotoric intervention (body awareness, body experience and coordination exercises) on active elderly individuals' risk of falling. As a result in the 12-month

follow-up there was no significant reduction in falls in the psychomotor intervention group. (Freiberger, Menz, Abu-Omar & Rütten 2007.)

Basic Body Awareness Therapy has been reported to decrease pain. Malmgren-Olsson et al. (2001) reported B-BAT to be effective for chronic pain treatment (Malmgren-Olsson et al. 2001, 90). Also Gard (2005) reviewed Basic Body Awareness Therapy for patients with chronic pain and concluded that the therapy can reduce pain (Skjaerven *ym.* 2010, 1481).

5 AGING

In Finland babies born in 2008 can expect a life duration of 76,3 years for men and 83,0 years for women. Babies born in 1950-1954 were expected to live 63 years and 69 years. The age that is now predicted for them is 74 years for men and 82 years for women. (Myrskylä & Rapo 2010.) In the year 2010 17,5% of the population in Finland was over 65-years-old and it is predicted to increase significantly in the forward decades (Statistics Finland, 2009).

Aging is a process that starts in the uterus and it represents the passage of time. However, chronological age is not always similar to physiological age. For example, a specific 70-year-old man can have an aerobic capacity that is similar to that of the average of a 60-year-old. Therefore the person's individuality must be acknowledged. (Kauffman & Schulte 2007, 3.)

There are a few accepted theories that aim at explaining aging biologically. The first one suggests that everything in our body progressively declines. It is well recognized that there are actual changes with the passage of time. The second theory is the biological clock theory which suggests that aging is regulated by biological time. Research has already demonstrated that in some cells there is a finite number of replications after which programmed cell death occurs. The third theory, free radical theory, posits that during the normal biological reactions free radicals are generated. This damage increases with age and can cause changes in cell function and tissues. Oxygen radicals contribute to the pathophysiological changes associated with aging. (Kauffman & Schulte 2007, 6-7.)

However, aging is a life journey that leads to changes, uniqueness and often multiple diagnoses. The journey ends in death. Healthcare providers should recognize these changes and complexities and the whole patient should be considered. (Kauffman & Schulte 2007, 7.)

5.1 Age-related changes

In old age the body changes and many physiological and functional changes can be found. The changes that normally occur in different systems and consequences they may have are presented in table (TABLE 1).

TABLE 1: Age-related changes. Modified from Higuchi dos Santos, Frontera & Larsson 2007, 9-11; Umphred & Lazaro 2007, 21-22; Cohen 2007, 33-34; Tilvis 2010 A-D.

Systems	Some of the changes	Effects on functional ability
Cardiovascular system	<p>Heart loses it's capacity of resiliency</p> <p>Blood vessels shrink and harden</p> <ul style="list-style-type: none"> • volume of heart decreases • heart can get less blood itself <p>The cardiac reserve reduces and heart loses it's resiliency</p> <p>Pulse rate, force of mechanical heart beat and diastolic functioning declines in strain</p> <p>Suppleness of pulmonary tissue and weakness of breathing muscles</p>	<p>Aging individual is less able to respond to increased stress of greater workload and tires easier</p> <p>Risks of arrhythmia, vulvular defect, coronary heart disease, carditis and high blood pressure</p> <p>Breathing capacity declines and breathing gets harder → more work to get oxygen</p>
Musculoskeletal system	<p>Muscle strength decreases</p> <p>Mass of the bones and muscles decrease</p> <p>Stiffness and pain of joints</p>	<p>Slowing of movements and early muscle fatigue</p> <p>Constricted ROM (range of movement)</p> <p>Problems and limitations on walking</p>
Senses (hearing and vision)	<p>Declining of hearing</p> <p>Declining of visual accuracy</p>	<p>Need of extra light</p> <p>Focusing to certain point is</p>

	between the ages 60 and 80 Adaptation becomes slower	difficult, can cause balance problems
Proprioceptive system and balance	Problems to recognize and reintegrate information from proprioceptive system Proprioceptive inputs can be distorted in some situations	Dizziness Swaying while standing Challenging to get information of movements, position of the joints and force of muscle contractions
Nervous system	Volume of brain becomes smaller	Reduction of attention and memory partly caused by brain changes Slowness of functions

5.2 Geriatric physiotherapy

In geriatric rehabilitation, there is poor correlation between the person's functional ability and the disease problem list. Treating an old patient is complex, so latest researches emphasize the need to consider the patient as a wholen, in other words instead of the illnesses the patient's functional ability should be observed.

(Kauffman & Schulte 2007, 4.) Things that often affect functional ability are divided into internal and external factors. Internal factors can consist of life style and psycho-social vitality, external factors consist e.g. illnesses and physical environment. In recent years differences between disability, frailty and comorbidity have been under study. (Pitkälä, Valvanne & Huusko 2010, 440.)

When planning the therapy sessions and the goals of the therapy, the total interaction between the body systems should be considered. Some systems may not recover fast because the change has been taking place over a long period of time, for example joint contractures. Some systems may not have the ability to adapt at all. (Umphred & Lazaro 2007, 27.)

When dealing with a geriatric patient, it must be remembered that there can be various chronic diseases and many systems that are involved: the respiratory system, the musculoskeletal system, the cardiovascular system, the digestion system, the nervous system, hormones and the immune system. (Kauffman & Schulte 2007, 7; Tilvis 2010 C, 20-50.) Also sensation, movements and perception decrease in old age. In old age the whole balance systems degenerates. Also the regulation mechanism recently gets slower. Sensation of movement and position decreases when tendon reflexes become slower. Also the balance organ's declined function in ear and diminishing of sight create more instability. Often also drugs used by elderly people cause dizziness and tiredness. (Tilvis 2010 D, 323-327.) Due to all these factors the aging patient is more vulnerable to the stress caused by rehabilitation. When dealing with the elderly people, accurate functional assessment is necessary if the rehabilitation is supposed to be effective. The improvement may be seen slowly and there can be a great variety of different reactions to the rehabilitation. (Kauffman & Schulte 2007, 7.)

When there is a need to introduce a new activity including motor learning, it must be considered how it should be taught: in separate parts and then put them together, or as progressive sequence of parts. Simple tasks are the easiest to teach (like standing from a chair). Complex activities are easiest to teach when they are in separate parts first. A progressive method is often the best when teaching activities of middle level or serial tasks. (Umphred & Lazaro 2007, 28.)

In geriatric physiotherapy, maintaining motivation and high rate participation is challenging. Exercise periods that emphasize individual goals have better compliance. The goal is to make the individual familiar with the safe progression of exercise activity and enable the exercising also in an unsupervised environment. The training program for elderly people should roughly consist of three parts: warm-up, stimulus or endurance and cool-down. (Reynolds 2007, 255.)

Body awareness is not really widely studied theme and studies of body awareness with elderly people don't really exist.

6 PURPOSE OF THE STUDY

This bachelor thesis is a part of a Nordplus Joint Physiotherapy Education-program that aims to co-operation via a bachelor thesis project between physiotherapist students from different countries. This particular thesis was carried out in co-operation with students from Seinäjoki and Tartu (Estonia), every unit having their own objects of interest. This thesis is about body awareness.

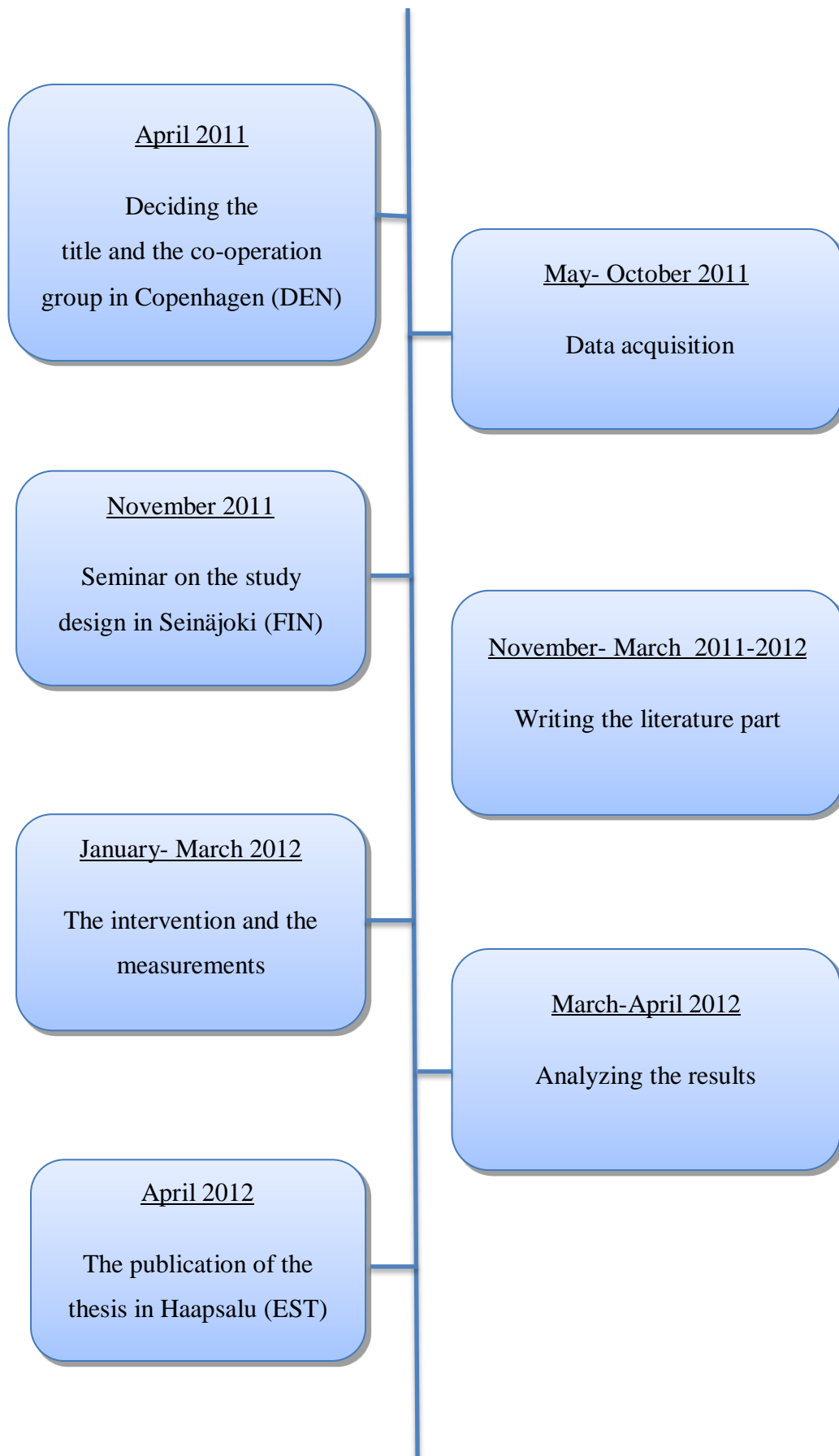
Originally the work life partner of this thesis posed a worry of the body awareness of the elderly people, especially elderly people with memory illnesses. The worry of the situation had originated from the work life partner's experiences that elderly people have problems to figure their body, existing abilities and perceptive skills. The work life partner hoped to get more information about body awareness of elderly people and advice how to practice it. After the discussions with co-operators from Seinäjoki and Tartu it occurred that the common interests weren't in memory illnesses but in elderly people in general. Thus, since there are no studies in official databases of elderly people's body awareness (even if body awareness in general is studied), the theme was very interesting.

In this thesis the research questions are:

1. What kind of body awareness do elderly people aged between 69 and 79 have, measured with BAS and BAQ?
2. How does an eight-week exercise program affect the body awareness of elderly people aged 69-79, measured with BAS and BAQ?

The intervention groups' inclusion and exclusion criteria and exercise program were decided together with the three co-operators, aiming to utilize the same exercise program and measurements in the three different intervention groups and thereafter sharing the test results with other units. In this particular thesis, only the results from two measurements, the body awareness scale (BAS) and the body awareness questionnaire (BAQ), of all three groups were analyzed by this thesis's authors.

6.1 Timeline of the study



7 SUBJECTS

7.1 Inclusion/exclusion criteria

TABLE 2. Inclusion and exclusion criteria for the subjects.

Inclusion	Exclusion
living at home 69-79 years old	still in work life walking aids indoors doctor's prohibition against exercising

7.2 Collecting the group

The work life partner of this thesis, Harjula Settlement Association, provided all the equipment and space for the intervention in Lahti. They also helped to gather the participants by handing out advertisement which was distributed in the exercise groups of Harjula Settlement Association. In the advertisement the content of the study, its duration, the requirements for the participants and the schedule of the study were described. People who were interested contacted the authors by phone. It was made sure that they had understood the requirements and were suitable for the study. Altogether 15 phone calls were received and 11 of the interested people were suitable. One of them was left as a backup member because only 10 subjects were needed. Their participation was verified a couple of weeks before starting the intervention and they were also informed on the schedule of the first week. At that point two of the participants hesitated and decided to drop out, and one backup member got into the intervention group. Finally there were nine subjects for the Lahti intervention group, five men and four women.

7.3 Description of the subjects

The results were gathered from all 25 subjects out of three groups in Lahti, Seinäjoki and Tartu. There were altogether 19 women and 6 men. All the subjects were retired persons. The results in the following table are the subjects' personal estimations of their own health and physical condition at the beginning of the intervention (TABLE 3). The results in the table are chosen from Physical Activity Questionnaire and from Health Questionnaire in Fitness for Health: The ALPHA-FIT Test Battery for Adults Aged 18-69 (UKK-health questionnaire). In the Questionnaire Physical leisure time activity level is estimated on a scale 1-6 in which 6 is the highest activity level and 1 the lowest. Health is estimated on a scale 1-5 in which 5 is the best and 1 the poorest health condition. Also physical condition compared to peers was estimated on a scale 1-5 in which 5 is a significantly better physical condition compared to peers and 1 significantly poorer condition compared to peers.

TABLE 3. Description of the subjects.

	Average (n= 25)	Variation	SD
Age (years)	74,2	69-78	2,4
Physical leisure time activity level (1-6)	3,4	1-6	1,5
Health (1-5)	3,1	1-5	0,8
Physical condition compared to peers (1-5)	3,0	1-5	0,9

8 METHODS

8.1 Measurements

The initial measurements were carried out during two days. On the first day participants were informed of the project and they had an opportunity to make questions about the process. Also the schedule for the second testing day was confirmed. After that the participants filled in the questionnaire forms according to instructions (UKK-health-questionnaire, Body Awareness Questionnaire, 3-item Loneliness Scale, The General Self-Efficacy Scale and The Falls-Efficacy Scale International). They filled in forms at the same time in a same room and they had an opportunity to ask for help when needed.

On the second testing day (two days after the first one) physical measurements were performed (Berg, Timed Up and Go and BAS). Testing time was afternoon from 12 until 5 pm. The participants came at hourly intervals two at a time and the personal measurements were performed by the two examiners (the authors).

The final measurements were performed on the next week after finishing the exercise program. On the first day physical measurements were performed and on the second day participants filled in the questionnaires. The tests and questionnaires were exactly the same as in the initial measurements.

8.2 Exercise program

The exercises were guided by examiners. On the first time the exercise program was introduced and techniques were taught. On the following times the programs were performed as planned. Some small variations were made for getting extra challenge when it was needed but otherwise the exercise program was the same during the eight weeks period.

The exercise program consisted of three parts. The first part was warm-up (10 min). For the warm-up part there were four different contents. There was a chair-dance, a pair warm-up with balls, a group warm up with balls and a group dance.

They were implemented by turns, so that each warm-up was performed four times during the intervention.

The second part of the program (30 min) included various balance exercises based on activities of daily living and some muscle strength exercises supporting balance. This part of the program was performed as circuit training. The circuit included ten different tasks. The exercise duration of each point was approximately 1,5 min. The description of each task is found as an appendix. (APPENDIX 3).

The last part of the program (15 min) was the body awareness part. The body awareness exercises included in the exercise program are based on Basic Body Awareness Therapy and they are part of the test movements of Skatteboe's Body Awareness Rating Scale (BARS) –manual (2005). The test movements as exercises practise the four basic movement elements of Basic Body Awareness Therapy method: the relationship to the ground, to the midline, to the movement centre and to breathing. The movements along the vertical axis train balance and the aim is to find and feel the axis, the polarisation from feet to head, the free breathing and the awareness. The symmetrical stretching exercise aims to facilitate the breathing reflex and set the physiological processes free. The central exercise aims at freeing the individual's breathing. (Skatteboe, 2005, 10, 96, 102, 112.) The exercises are presented as an appendix (APPENDIX 4).

The authors of this thesis have experienced similar exercises in a B-BAT demonstration, which was held by Kirsti Niskala (2011) who has an education in Basic Body Awareness Therapy. This shows that the exercises are also used in practice. The demonstration gave the authors also an image how to instruct a body awareness therapy exercise group.

8.3 Course of the intervention

The duration of the exercise program was eight weeks, and it was scheduled to start in week 3 and end in week 10 (in the year 2012). There were exercise lessons twice a week on Tuesdays and Thursdays at three to four pm, so altogether there

were 16 lessons. In addition, there were measurement weeks: a week before starting the exercise program and a week after ending it (weeks 2 and 11).



FIGURE 1. Course of intervention.

8.4 Statistical analysis

This thesis is a quantitative study. A quantitative study is suitable when variable of the phenomenon is well known. A quantitative study demands knowing the phenomenon and the factors that affect that. (Kananen 2011, 12, 17.) In this study body awareness was measured with Body Awareness Scale (BAS) and Body Awareness Questionnaire (BAQ) which both are quantitative measurement tools.

The analysis was defined based on the research questions. The changes between the before and after averages of the results of BAQ and BAS were calculated. Also standard deviations (SD) of the changes and ranges of the results were calculated. The purpose of SD was to show what kind of differences there occurred comparing to the averages of the results. The analysis of the results is based on averages, standard deviations and ranges of the results. Initial results and final results were compared to each other. Single subject's results weren't analyzed.

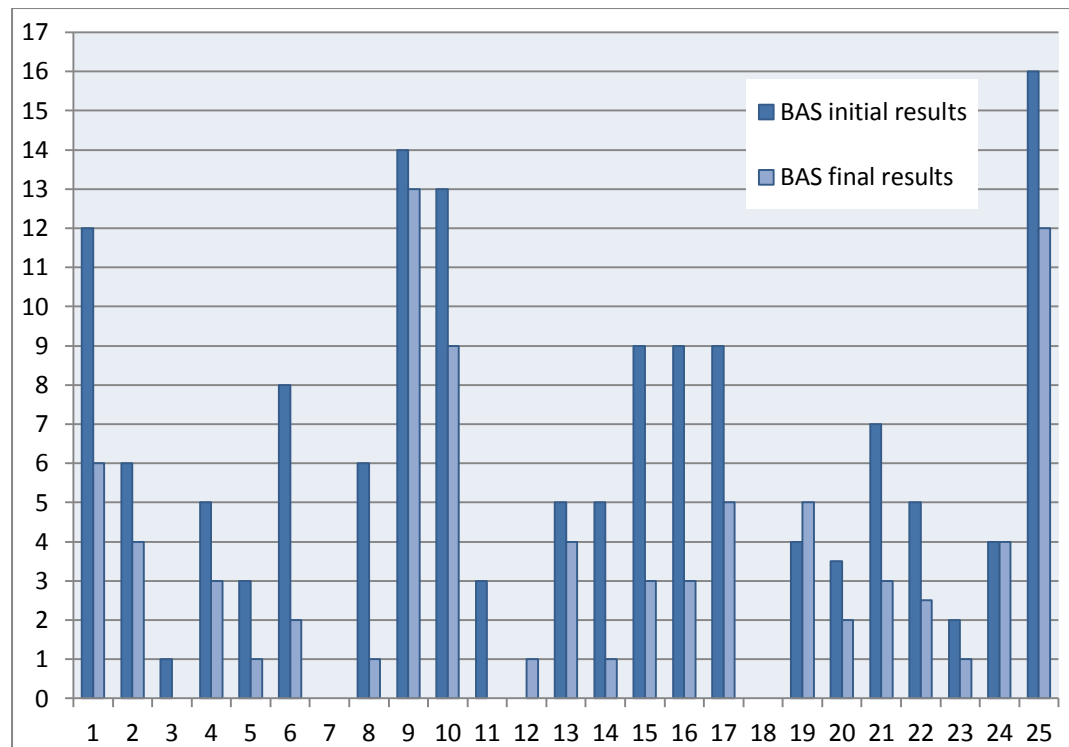
9 RESULTS

At the beginning of the intervention there were 32 subjects. In final results there are results from 25 subjects. There were four dropouts during the intervention and three of the participants were unsuitable for the study.

9.1 BAS

When comparing the initial and final results of BAS, 20 out of 25 subjects showed improvement in body awareness. Three of the subjects didn't have changes in their results and two of them had the best possible results already in the initial measurements. Two subjects' results had declined after intervention. Each subject's initial and final total score of modified BAS is presented in the table (TABLE 4).

TABLE 4. Initial and final results of BAS.



The average of the final results improved by 2,6 units compared to the initial results. Altogether the total scores of BAS decreased by 43,3%. In the final results standard deviation (SD) was one unit smaller than in the initial results. The averages, standard deviations and ranges are presented in table (TABLE 5).

TABLE 5. Average, SD and range of the BAS results.

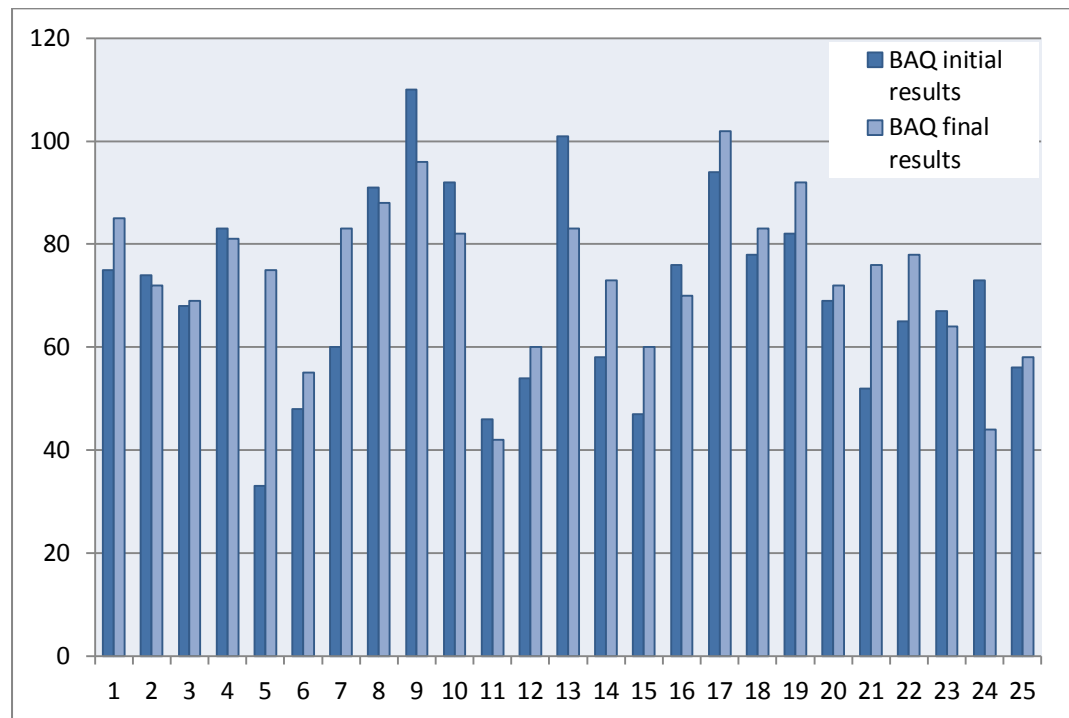
	Average	SD	Range
Initial results	6,0	4,4	0-16
Final results	3,4	3,4	0-13

In BAS there were most significant improvements in sections “Relation to the ground, contact surface” and “Relation to the ground in lying down and lying”. In the former section the improvement was 69,2% compared to initial results and in the second one 55,6%. The smallest improvement was in section “Relation to the ground, weight transfer” in which improvement was 21,7% compared to the initial results.

9.2 BAQ

16 out of 25 participants had improvement in body awareness measured with BAQ. Decline occurred in nine subjects' final results. The initial and final results of BAQ are presented in the table (TABLE 6).

TABLE 6. Initial and final results of BAQ.



The average of the final results improved by 3,6 units compared to the initial results. In the final measurements the standard deviation (SD) was 3,9 units smaller than in the initial measurements. The averages, standard deviations and ranges are presented in the table (TABLE 7).

TABLE 7. Average, SD and range of BAQ.

	Average	SD	Range
Initial results	70,1	18,9	33-110
Final results	73,7	15,0	42-102

The most significant improvements in the averages of the separate sections of the BAQ were in the sections 3 (“I always know when I’ve exerted myself to the

point where I'll be sore the next day") and 5 ("I know in advance when I'm getting the flu") in which the improvement percentages of the average results were 36,7 and 26,7. In the section 16 ("When my exercise habits change I can predict very accurately how that will affect my energy level") there was a decline of 18,8% in the average of the initial and final results. Also in sections 11 ("As soon as I wake up in the morning, I know how much energy I'll have during the day"), 12 ("I can tell when I go to bed how well I will sleep at night") and 15 ("I can predict how much sleep I will need at night at order to wake up refreshed") there was a small decline in the averages.

10 CONCLUSION

The purpose of the study was to find out if the eight-week intervention affects body awareness of home-living 69-79 years old elderly people. The results were gathered from 25 subjects and they were measured with Body Awareness Scale and Body Awareness Questionnaire before and after the intervention.

After an eight-week intervention there seemed to be improvement in body awareness measured with BAS and BAQ. In percents the average results of BAS improved by 43,3% and the average results of BAQ by 5,1%. Two out of 25 subjects got decline in body awareness and three had the same results after the intervention measured with BAS. 16 out of 25 subjects had improvement in body awareness measured with BAQ and 9 had decline in the results.

The standard deviations of the results decreased in both measurements after the intervention. In the initial results of BAS standard deviation was 4,4 and in the final results it was 3,4. In the initial results of BAQ SD was 18,9 and in the final results it was 15,0. In the results of BAQ there occurred more dispersion in the total scores than in the total scores of BAS.

Based on the results it seems that subjects' body awareness was better after intervention than before measured with Body Awareness Scale and Body Awareness Questionnaire.

11 DISCUSSION

Considering the body awareness measurement tools and the exercise program there occurred a couple of issues that need further discussion. The first somewhat challenging issue was that there were different instructors in the three groups. Even if the exercise program was the same in each group and the mode of giving instructions was practiced beforehand, there was some variation in the way of instructing the exercises. In body awareness exercises the instructor's voice, presence and sensitiveness are important.

As the inclusion and exclusion criteria were decided, the attempt was to get quite good conditioned participants to the intervention group. That was because the exercises had to be safe to perform with only one instructor's presence. Most of the subjects participating in the intervention were in a relatively good condition and they were physically active. Considering the group in Lahti, the fitness of the participants is strongly explained with the fact that the advertisement for the intervention was handed out in the exercise groups of Harjula Settlement Association. However, after the initial measurements it appeared that two subjects out of total 25 gained the best possible score from BAS already in the initial measurements. It is possible that either the exercise program didn't challenge those subjects enough. Still in authors' opinion the inclusion-exclusion criteria were good, because if they had been stricter, collecting the group would have been too challenging.

When it comes to the exercise program, it's impossible to assess the influence of different exercises. The result of this intervention study was only that this particular exercise program as a whole has effects on elderly people's body awareness. The influence of for example body awareness exercises alone remains unknown. Therefore the correlation between the thing being practiced and the thing being measured is somewhat unclear.

It was a challenge to choose the measurement tools for this study. It originated from the fact that either elderly people's body awareness or the proper measurement tools for it haven't, as far as is known, been studied yet.

BAS includes 57 different parts, and naturally there wouldn't have been the time to perform the whole procedure with each patient. Some of the parts are supposed to do as an interview, but the questions in the interview are developed for patients that have psychiatric diagnosis so the interview was excluded. Because of the lack of experience of assessing body awareness, it was preferred to include those parts of BAS that are the most familiar through posture and gait assessing lessons at school and in clinical training periods. Finally nine sections that are supposed to assess different parts of body awareness were picked, and it was considered that they represent the things which are under interest of the study in best manner.

In comparison of the initial and final measurements, there were changes in both BAS and BAQ measurement results. What is interesting is, that the change of the average results in BAQ was very small compared to the change of the average results in BAS, which reported significant improvement. It is possible that BAQ is not the best measurement tool for body awareness on elderly people. On the other hand, it may be that the nine sections of BAS that were decided to be used to measure body awareness were the easiest ones to improve. It is also possible that in those sections the improvement was the most visible and easy to be reported by the instructor. These particular sections are also dependent on balance and muscle strength, and it may be so that by developing them the results is shown in the results of BAS, even if the body awareness itself wouldn't have been changed. In theory, this could be ensured with another measurement tool or implementing the whole BAS-procedure to the participants.

There was discussion about the sensitivity of the BAS when choosing the measurement tools for this intervention. Another option for a measurement tool would have been BAS-H, which is a version of BAS that is planned for relatively healthy individuals. Before the intervention started, there was no certainty about the functional ability or health of the participants and the original BAS was chosen. With BAS-H it would have been possible that none of the subjects had gained the best achievable score in the initial measurements and it would have been possible to see the change with each subject. On the other hand, now the two subjects' results remaining the same (best achievable) tell, that at least the exercise program did not worsen their score in BAS.

A problematic issue about the BAS-measurement is that the BAS-results depend a little on the instructor's subjective opinion. Furthermore, despite of the attemption to carry out the assessment as objectively as possible, the expectations of the authors can have affected the final results. However, to minimize the influence of this and to increase the reliability of the study, the measurements were executed so that the same instructor executed the measurements to the same subjects before and after the intervention.

In the analysis of the results, the averages didn't quite tell the whole truth of the results, because some subjects' individual results were so far from the averages of the whole group. The possibility of distortion was minimized by analyzing also the standard deviations of the results. That indicates also the spread between the highest and the lowest value of the results. Based on the results, the improvements were the most significant among the subjects with the poorest results and that affected the final results to a great extent. It seems that the subjects with poorest results had the best possibilities to develop during the intervention. As a conclusion it seems that the decrease in SD in both measurements is mostly explained through the fact that the poorest results improved more than the others and approached the average of all results.

The validity of this study has been tried to get as high as possible by using two measurement tools. In a study by Shields et al. (2005) BAQ was considered valid and reliable measurement tool for body awareness, and it also increases the validity and reliability of this study. For getting the reliability into the better level, the results were gathered from the bigger group. Still the total amount of subjects weren't so big and a bigger group would have provided more reliability for the study. The resources of the study still didn't allow bigger amount of subjects.

There was one factor that might impact on the reliability of the thesis: The other measurement tool BAS was used only partly. Parts which were used were decided by authors. The argument for using only parts of the measurement tool was lack of time for evaluation and the decided parts were the nearest to physiotherapist's every day work and easy for authors to evaluate. On the other hand according to Roxendal (1985) BAS can be used also only partly.

Also the ethical aspects were taken notice during the study. The results of the subjects were handled anonymously and the results were exterminated after the analysis. Participants of the intervention were all the time aware of the purpose of the study and their results were not supposed to improve during the intervention, so they didn't have any pressure from authors to get better results in the final measurements. They were allowed to leave off the study whenever they want. The authors were under the professional confidentiality. These things were agreed in contracts between the subjects and authors before starting the intervention.

When executing the final measurements, the subjects of the Lahti-group had a chance to give anonymous feedback about the intervention (TABLE 8).

TABLE 8. The feedback from the subjects of the Lahti-group.

The subjects reported following feelings after the intervention:	About the intervention arrangements:
<ul style="list-style-type: none"> • better concentration ability • more relaxed feeling • more courage for exercising • less fear for moving • better balance • willingness to continue the same exercises at home 	<ul style="list-style-type: none"> • social interaction was natural • instruction was clear and fair • the intervention's duration could have been longer • the exercises were suitable and versatile enough • there could have been more variety in the exercises

In a study by Gyllensten et al. (2003 A) the subjects also reported better posture after the intervention. The subjects reported that attitudes towards the movement and body had changed, and that was mentioned also in the feedback by the subjects of this study. The feedback like this tells that the exercise program was valuable for the participants.

For the authors of this thesis the whole process brought up both the possibilities and the challenges of co-operation. Furthermore, the process improved the linguistic skills of the authors through discussions and presentations with co-operators and also through writing the literature part and reporting of the thesis. The processing of the literature part was occasionally burdensome, because the authors wanted to mainly use as new references as possible. It occurred that a major part of the original literature of body awareness is written even in 1970's-1980. However, mainly there are officially published research articles as the references of this thesis.

From professional point of view, the offered a lot of information of body awareness and how to improve it, and it let the authors understood better the concept of comprehensive wellbeing. During the bachelor's thesis process the discussions with the supervising lecturer gave new perspectives for developing the thesis further. After the final measurements the schedule was strict, and that posed challenges for analyzing and discussing the results carefully. However, the authors are particularly satisfied with the executing the intervention and cooperation with other students and the work life partner.

As a conclusion, the results from this intervention study suggest that an eight-week intervention has positive effects on elderly people's body awareness. A randomized controlled study on elderly people's body awareness would be more informative about the effects of Basic Body Awareness Therapy. Additionally, another interesting aspect is what the results would have been if the intervention had been longer. It is worth discussion and maybe a topic of a new study, whether the results would have been more significant with a longer intervention, or was the maximum change gained already during the eight weeks.

However, when having the resources, a control group and a bigger number of subjects would be useful when studying a relatively new theme like this. Body awareness on elderly people is definitely a theme that needs further research.

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APPENDICES

APPENDIX 1. Body Awareness Scale

Repeat every movement 1-5 times or until you have enough information scoring.

A) WALK

- forwards
- backwards
- sideways (one foot out and the other moved up to it)
- bending the knees on every step (springy)
- with stiff legs
- on the toes
- on the heels
- with stamping

The leader tries to walk at different distances from the patient, very close (almost touching), as well as some distance from him. The leader also tries to walk in front of, besides and behind the patient.

37. Relation to the centre-line, abnormalities A

Representing clear deviations in the posture, e.g. inclining forwards, backwards, to one side, exaggerated hunchback or swayback, deviation of the head. Clear asymmetry in posture and muscular strength will be scored in this item.

0 No deviation from the centre line

1 A small deviation, or a big deviation that gets corrected in movements, e.g. the head inclined, exaggerated swayback, bent back.

2 Marked deviation that doesn't get corrected and that impedes other movements (breathing, walking).

3 Constant, fixed deviation which influences badly the balance

39. Relation to the ground in walking, A

Representing disability to direct movements towards the floor when walking (especially bend the knees). Exaggerated bending of the knees in walking is scored with "0".

0 Walks with flexibility in the knees, with a slight bending while walking jogging etc

1 Walks with straight knees (gives increased movements sideways in the pelvis while walking), can bend the knees in movement exercises. Has possibly raised shoulders now and then.

2 Walks with straight knees, can possibly bend them sometimes but not following rhythm. Possibly raised shoulders.

3 Walks stiffly or shuffling with straight knees and raised shoulders or walks on the toes. Stiff even in movement exercises

52. Stamp, A

Representing the ability to stamp strongly with the foot in the floor.

- 0 Stamps strongly, making a sharp noise
- 1 Stamps obviously, but without force and sound
- 2 Puts the foot in the floor without stamp or force
- 3 Doesn't take part in the stamping exercise

48. Associated movements in walking, A

Representing movements in head, shoulders, trunk and arms when walking. The item should be scored upon consequent behaviour during the rating session.

- 0 Walks with free posture in the head and with co-ordinated movements in the trunk, shoulders and arms
- 1 Walks with the head and trunk almost still and with some associated movements from the shoulders
- 2 Walks stiffly without co-ordinated movements in the head, trunk and shoulders, small co-ordinated movements in arms
- 3 Walks with head, trunk, arms and shoulders still

B) TRANSFER THE WEIGHT OF THE BODY FROM FOOT TO FOOT

Stand with feet wide apart, transfer the weight with straight knees
Transfer the weight to both legs in gait position
Swing one leg in front of the body
Stand on one foot at a time, for at least 30s

40. Relation to the ground, weight transfer, B

Representing the ability to move the weight of the body from one foot to the other.

standing position: Standing legs apart, shoulder wide standing position

one leg swinging: standing on one leg and the other leg swings across in front of the other.

- 0 Performs weight transferring in standing position and in gait position, one leg swinging across the other and one-leg-standing (30s)
- 1 Manages two to three of these tasks
- 2 Manages one to two of these tasks
- 3 Doesn't manage to perform any of the tasks, walks with dragging steps

C) ISOLATED MOVEMENTS

-bend the head forwards and up again

-bend the head to both sides

-turn the head to both sides

Lift the shoulders:

-lift both shoulders at the time

-lift one shoulder at a time

-pull the shoulders backwards

-pull the forwards

- rotate the shoulders forwards, upwards, backwards, down
- bend the arms
- straighten them in front of the body
- lift the arms towards the ceiling and stretch the whole body
- clench the hands
- straighten the fingers
- Hold the hands on the chest
- move the pelvis from side to side
- move the pelvis round in circles

50. Isolated movements, C

Representing the ability to move certain parts of the body, keeping the rest of the body still.

Reciprocal movements are alternating diagonal in the body, for instance normal walking with diagonal associated movements in the shoulders and arms. Examples of non-reciprocal movements are: jump with both feet together, clapping of hands.

0 Manages to perform isolated movements in respectively head, shoulders, arms, pelvis, hips, knees, feet. Can perform reciprocal movements.

1 Manages most of the isolated movements, can't isolate certain factors, for example the whole body moves while hip or head moves, can perform reciprocal movements.

2 can isolate some movements but manages to do it in less than half of the movements. Sometimes cannot perform reciprocal movements

3 Doesn't manage to isolate movement

D) LIE DOWN ON THE FLOOR

Turn on to the stomach ("How is it?")

Turn on to the back

Stretch the arms, first one at a time, then both together

Stretch one leg at a time, the both legs

Stretch the whole left side with the arm and leg, then repeat on the right side

Stretch both arms and legs and the whole body

42. Relation to the ground in lying down and lying, D

Representing the willingness and ability to lie down on the floor.

Distinguish from Relation to the ground, surface of contact (43).

0 Lies down fluently and willingly.

1 Lies down hesitating or with some difficulty

2 Lies down very unwillingly or with great difficulty, or need to be persuaded, or lies only on a mat

3 Doesn't lie down on a mat or on the floor

43. Relation to the ground, contact surface, D

Represents the surface of contact between the body and the floor instanding, sitting and lying.

Distinguish from Relation to the ground in lying (42).

0 Stands, Sits and lies with a relaxed and functioning surface of contact with floor

1 Sits and lies at times with a small surface of contact with the floor, e.g. with bent knees and arms in lying, standing on one's toes

2 Sits constantly with a very small surface of contact. Lies with a very small surface of contact, e.g. keeps the head and the shoulders up from the floor

3 Sits and/or lies, but stands immediately up, or refuses to sit and/or lie down

56. Breathing, spreading to the body D

Assess the visible spreading of the breathing to the body

0 Freely functioning breathing in whole body when lying, sitting and standing

1 Clear, free breathing in lying position

2 Obviously locked breathing even in lying position

3 Constantly and obviously locked breathing

APPENDIX 2. Body Awareness Questionnaire

Body Awareness Questionnaire (Shields, Mallory & Simon, 1989)

Instructions:

Listed below are a number of statements regarding your sensitivity to normal, nonemotive body processes. For each statement, select a number from 1 to 7 that best describes how the statement describes you and place the number in the box to the right of the statement.

	Not at all true of me							Very true of me
	1	2	3	4	5	6	7	
1.								<input type="checkbox"/>
2.								<input type="checkbox"/>
3.								<input type="checkbox"/>
4.								<input type="checkbox"/>
5.								<input type="checkbox"/>
6.								<input type="checkbox"/>
7.								<input type="checkbox"/>
8.								<input type="checkbox"/>
9.								<input type="checkbox"/>
10.*								<input type="checkbox"/>
11.								<input type="checkbox"/>
12.								<input type="checkbox"/>
13.								<input type="checkbox"/>
14.								<input type="checkbox"/>
15.								<input type="checkbox"/>
16.								<input type="checkbox"/>
17.								<input type="checkbox"/>
18.								<input type="checkbox"/>

Note: * indicates a reversed scored item.

APPENDIX 3. Circuit training program

GROUP-BASED BALANCE TRAINING PROGRAM FOR INDEPENDENTLY LIVING ELDERLY PEOPLE

- Circuit training 30 min – 2 min per exercise, 10 exercises RPE as measurement of strain, participant begins at different exercise point each time REQUIREMENT: STOP WATCH, BENCH TO REST, WATER, CUPS
 - Getting up from chair (quadriceps) REQUIREMENTS: CHAIR WITH BACKREST BUT WITHOUT ARMRESTS
 - Can begin with support from chair, but later move on to getting up without support (arms across chest)
 - Extra challenge: In standing position, lift knee up
 - Sitting on physioball + moving ball from one hand to other, looking up, rolling ball under foot (Trains core muscles, vestibular system by distracting vision and proprioception) REQUIREMENTS: LOCATION IN CORNER FOR SUPPORT, MATTRESS UNDER BALL, BIG PHYSIOBALL, SMALLER BALL
 - Participant sits on physioball, lifts smaller ball off the ground, moving ball from one hand to other. Challenge: Lift arms up and look up while moving ball from one hand to other. 1 minute.
 - Participant puts ball under foot, rolls ball under foot, change feet. 1 minute.
 - Hanging clothespins on towel hem from varied places (Upper body rotation trains vestibular system by distracting vision. Uneven base adds challenge by distracting also proprioception.) REQUIREMENTS: WALL BARS, TWO HAND-TOWELS 50X70 cm, 20 CLOTHESPINS, TWO CONTAINERS, 1-2 MATTRESSES, 1 DYNAIR BALANCE CUSHION
 - Towels are located on wall bars on appropriate height for participant (need to reach, but not stand on toes)
 - Clothespins in jars on both sides of participant
 - Movement: Reach a clothespin from your left and hang it on to the hem of the towel on the right. Continue by reaching clothespin from your right and hanging it on the left. Pause if you feel dizziness.

- Challenge: uneven base with 1-2 mattresses or Dynair balance cushion under one foot, vary feet

- Getting up from floor p.149 REQUIREMENTS: MATTRESS (THICKNESS 1,5-2 cm), STURDY CHAIR
 - Lie on the floor in supine or prone position with one arm extended and the opposite knee flexed to a side-lying position, push with arms into side-sitting position, knees flexed. Rotate body until kneeling with hands on the floor. Vary rotation side!!
 - Easy: Walk on all fours to an external support (for example chair) and get up. Vary location of chair for challenge.
 - Medium challenge (upper body strength): From kneeling position start walking up using arms.
 - More challenge (lower body strength, good range of motion in hips): From kneeling position move to a half-kneeling position, get up using legs.
 - Most challenge (very good lower body strength): Move from lying position to a symmetrical sitting position. Move from a squat to leg reliance to standing up.

- Slalom walking + different surfaces (Trains agility and vision by distracting proprioception and vestibular system)

REQUIREMENTS: 6 CONES (by shortening distance of cones, challenge grows), 4 MATTRESSES, ROLLED TOWELS, PILLOWS, GROCERY BAGS OR PAILS, LAUNDRY BASKET OR PLASTIC BOX

 - Participant walks slalom walk between cones to the mattresses
 - Two mattresses have been placed on top of each other, with varied “fillings”, participant walks on mattresses, quick turn around cone, returns to beginning through track.
 - More challenge: Carry grocery bags / pails or laundry basket through track, vary weight

- Weight shifting, standing on support leg, other leg taps 12, 3, 6 o'clock marked on to floor with tape (Trains step strategy (and strength of support leg, if challenged version)) p. 141

REQUIREMENTS: 6 PIECES OF COLOURED TAPE, BEAN BAG

- Participant stands with legs apart or together (more challenge), tapping spots marked with tape, on leg at a time, vary order of tapped spots, vary speed and weight put on to tapping leg
 - Challenge: hands behind back
 - Challenge: train strength of support leg by placing bean bag under tapping legs place in the middle, so that weight is on the support leg most of the time (tapping leg only lightly returns on to the bean bag)

- One leg-stance with variations (Trains all three parts of the balance system and strength of core muscles, support leg, especially gluteus-muscles, muscles supporting the ankle and small muscles of foot.) p. 140 REQUIREMENTS: LOCATION IN CORNER, WALL ON BOTH SIDES FOR SAFETY
 - Participant stands on either leg for one minute / only toes touching floor / semi tandem / tandem
 - Challenge: look over shoulder on both sides, while balancing / close eyes (vision and/or vestibular system distracted)

- Step-board, touching the wall with hand (Trains muscle strength of legs, gluteus-muscles, vestibular system, distracts vision and proprioception) REQUIREMENTS: STEP BOARD FACING WALL, 6 PICTURES OF HANDS, TAPE
 - Participant steps on board (both feet), reaches to touch pictures of hands according to location of pictures, one hand at a time.
 - Challenge: Take step down with one foot and at the same time reach forward to the wall with opposite hand.

- Square walk 2,5x2,5 m (walk the line forward and backward + grapevine) (Trains all three parts of the balance system by diminishing area of support) REQUIREMENTS: TAPE TO DRAW LINE AND / OR OBJECTS TO MARK DISTANCES, 2-3 DIFFERENT OBJECTS TO LIFT FOR EXAMPLE COMB & SCARF AND BALL (TWO HANDS REQUIRED)
 - Participant walks straight line, lifts object from end of trail, takes “grapevine”-sidesteps carrying object, puts object down, walks straight line backwards, lifts other object, takes “grapevine”-sidesteps carrying object, puts object down.

- First object ball, which needs to be carried with both hands
 - Second objects comb (difficult to grab) and scarf, while walking, wave scarf
- Ankle-hip-step-strategy on floor or foam surface (Trains vision and vestibular system by distracting proprioception, trains different balancing strategies) p.180-> REQUIREMENTS:
TOWEL ROLL AND SUPPORT FROM STURDY RAIL
- Participant stands on uneven surface (towel roll) and swings forward to toes and backward to heel, using different strategies to correct posture
 - Challenge: Different sized towel roll / how much speed in swing

EXCEPTIONS: If an exercise is done even more easily or difficultly than the options that are given, this must be documented.

APPENDIX 4. Body awareness exercises

1.
 - a. " Find a position where your knees are free, open and flexible. Let your arms hang loose by your side. Move sideways shifting weight from the left to the right foot without losing contact with the vertical line. Search for lightness and freedom in the movement"
 - b. "When you have found a balanced position, flex your knees without lifting your heels from the ground. Move down, without any effort in your legs and without flexing your body. Maintain contact with the midline while moving downwards. Return to the starting position." Make movement gradually smaller and find the movement's midline. Repeat about ten times.
 - c. Lift your shoulders upwards, relax then quickly and let them fall with their own gravity. Repeat about ten times. Finally find a nice, natural position for your shoulders.
2. " Search for your vertical axis, where your joints are free. Give the breathing time to find its rhythm. Let the arms hang loosely from the shoulders along the sides of the body. Start turning from the centre, to the left and to the right around the vertical axis. The whole body takes part in the movement from your feet to the top of your head."
3. "Find a good standing position, with open knees and loose arms. Lift your heels a little, and move up and down the midline. Increase the tempo to produce a rapidly bouncing movement."
4. " Stretch the arms and legs slowly from the centre of the body in opposite directions, like one long rubber band. Stretch as a whole from toes to fingertips, comfortably and at ease without pushing yourself. Start with small movements and increase the intensity if possible. Release the stretching suddenly, or alternatively doing the stretch smoothly to invite an awareness of melting. Repeat the sequence of stretch-release about ten times. Stretch long, long, long and release etc. At the end of each exercise, invite yawn reflex."
5. "Rest your fingers on your abdomen above the navel and below the ribs at the angle of the breastbone. Fingers apart, the pads resting on the soft part of the abdomen. Let the elbows rest on the floor. First notice what happens under your fingers without judging it right or wrong. Allow time to find the rhythm and to adjust to the situation".