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BRAIN HEALTHY EXERCISE

Guide for Seniors

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ABSTRACT

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The subject of this thesis is the role of physical activity in maintenance of brain health and prevention of memory diseases. This thesis was commissioned by Northern Finland's SenioriKaste program. SenioriKaste is part of the National Development Program for Social Welfare and Health Care (KASTE) which is used in reforming Finnish social and health policy. The objective of the SenioriKaste program is to develop the structure and content of services for older people. Due to the aging of our population the number of people suffering from memory diseases is increasing and memory disorders have become a major societal and economic challenge of our time. One of the main goals of the SenioriKaste program is the promotion of brain health by raising public awareness and developing preventive measures.

This thesis was carried out as a product development project. The purpose of the project was to create an exercise guide for older adults which emphasizes the influence of exercise on brain health and in particular, cognitive function. The result of the project was a 12-page guide titled "Brain Healthy Exercise -Guide 60 +" (Finn. "Aivoterveellinen liikunta"). The guide is targeted for persons 60 years of age and older. The guide includes up-to-date information on the effects of physical activity on the brain, as well as practical exercise instructions. The objective of the guide was to promote brain health among older people by encouraging regular physical activity. Moreover, the objective was to support the functional capacity of older adults and thus facilitate independent life for as long as possible. Brain Healthy Exercise – Guide 60+ was developed in co-operation with SenioriKaste program representatives and outside partners.

The knowledge base of the project is derived from scientific articles and other relevant source literature. To ensure the quality of the finished product, the developers used the quality criteria for health promotion material set by Finnish Centre for Health Promotion as a guideline. Before finalizing the product, a survey was conducted among the representatives of the target group to evaluate the guide. The results of the survey were collected using a semi-structured questionnaire.

Key words

Cognition, memory, older adults, physical exercise, product development project.

TIIVISTELMÄ OPINNÄYTETYÖSTÄ

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Tämän opinnäytetyön aiheena on liikunnan rooli aivoterveyden ylläpidossa ja muistisairauksien ehkäisyssä. Opinnäytetyön tilasi Pohjois-Suomen SenioriKaste-hanke. SenioriKaste on osa kansallista sosiaali- ja terveydenhuollon kehittämisojelmaa (KASTE) jonka avulla johdetaan ja uudistetaan suomalaista sosiaali- ja terveyspolitiikkaa. SenioriKaste-hankkeen tavoitteena on ikäihmisten palvelujen rakenteen ja sisällön kehittäminen. Väestömme ikääntyessä on muistisairauksista kärsivien määrä lisääntynyt ja muistisairauksista tullut yksi aikamme suurista yhteiskunnallisista ja taloudellisista haasteista. Eräs SenioriKaste-hankkeen keskeisistä päämääristä on aivoterveyden edistäminen kansalaisten keskuudessa tietoisuutta lisäämällä ja ennaltaehkäiseviä toimia kehittämällä.

Opinnäytetyö toteutettiin tuotekehittelyprojektina. Projektin tarkoituksena oli tuottaa senioreiden liikuntaopas, jonka painopisteenä on liikunnan vaikutus aivoterveyteen ja erityisesti kognitiiviseen toimintakykyyn. Projektin tuloksena syntyi 12-sivuinen ”Aivoterveellinen liikunta -Opas 60+”. Oppaan kohderyhmä oli 60–vuotiaat ja sitä vanhemmat henkilöt. Oppaaseen sisällytettiin ajantasaista tietoa liikunnan vaikutuksista aivoihin sekä käytännön liikuntaohjeita. Opinnäytetyön tavoitteena oli edistää aivoterveyttä ikääntyvien keskuudessa kannustamalla heitä säännölliseen liikuntaan. Lisätavoitteena oli tukea ikääntyvien toimintakykyä ja itsenäistä elämää mahdollisimman pitkään. Opas kehitettiin yhteistyössä SenioriKaste-hankkeen edustajien ja ulkopuolisten yhteistyökumppaneiden kanssa.

Projektin tietoperustan muodostivat tieteelliset tutkimusartikkelit sekä muu aihetta käsittelevä kirjallisuus. Lopputuotoksen laadun takaamiseksi opasta luotaessa noudatettiin Terveyden edistämisen keskuksen terveysmateriaalille asettamia laatukriteerejä. Ennen tuotteen viimeistelyä oppaan arvioimiseksi tehtiin kyselytutkimus kohderyhmän edustajien keskuudessa. Kohderyhmän palautteet kerättiin käyttäen puolistrukturoitua kyselykaavaketta.

Asiasanat

Ikääntyvät, kognitio, liikunta, muisti, tuotekehittelyprojekti.

ABBREVIATIONS

AD	Alzheimer's disease
ADLs	Activities of daily living
APOE	Apolipoprotein E
BDNF	Brain-derived neurotropic factor
CAIDE	Cardiovascular Risk Factors, Aging and Dementia
FINGER	Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability
fMRI	Functional magnetic resonance imaging
FTD	Frontotemporal dementia
GM	Grey matter
IGF-1	Insulin-like growth factor
KASTE	National Development Program for Social Welfare and Health Care
LTPA	Leisure-time Physical Activity
MCI	Mild cognitive impairment
MET	Metabolic equivalent of task
PA	Physical activity
RCT	Randomized controlled trial
UAS	University of Applied Sciences
VO2 max	Maximal oxygen uptake
WHO	World Health Organization
WM	White matter

1 INTRODUCTION

Memory diseases are affecting an increasing number of individuals around the world due to aging of populations. Current projections estimate a fourfold increase in prevalence of memory related diseases in the next 35 years. (Alzheimer's Disease International 2013; Viramo & Sulkava in Erkinjuntti, Remes, Rinne & Soininen (Eds.) 2015, 35-37.) Worldwide, 4.6 million people are diagnosed with memory diseases each year. According to calculations 11.2% of disability years are caused by dementia in population over 60 years of age, which is higher than in any other chronic disease. (Imtiaz, Tolppanen, Kivipelto & Soininen 2014.) In Finland, progressive memory diseases pose a significant public health and economic challenge. It is estimated that there are 100 000 people with mild memory disorder in our country and approximately 93 000 individuals suffer from moderate to severe dementia. Furthermore, nearly 200 000 Finns experience less severe cognitive problems. In summary, approximately 393 000 Finns suffer from some degree of memory problem that hinders their daily life. Nearly 14 500 new cases are diagnosed each year and numbers are expected to rise. According to latest estimates, by 2060 there will be approximately 240 000 people with moderate to severe dementia in Finland. (Viramo & Sulkava in Erkinjuntti et al. 2015, 35-37.)

Memory diseases pose the largest threat for need of institutionalized care, thus placing considerable burden on society and public resources. Moreover, they cause significant personal suffering to the patients and their loved ones. (Duthey 2013; Imtiaz et al. 2014; Finnish Medical Society Duodecim 2012.) Despite vigorous research, there is currently no curative therapy available. Consequently, World Health Organization (WHO 2012) and Health Ministers of G8 Dementia Summit (2013), have stressed the importance of prevention in counteracting the dementia epidemic. Several risk factors for memory diseases have been identified which, with the exception of age and genetic heritage, can be affected for example with lifestyle choices. (Ngandu, Lehtisalo, Solomon, Levälahti, Ahtiluoto, Antikainen, Bäckman, Hänninen, Jula, Laatikainen, Lindström, Mangialasche, Paajanen, Pajala, Peltonen, Rauramaa, Stigsdotter-Neely, Strandberg, Tuomilehto, Soininen & Kivipelto 2015.)

Physical activity (PA) is one of the most important factors affecting both general and brain health. Researchers have sought to determine the impact of PA on brain health and cognition for several decades and the results have been largely encouraging. It appears that regular PA has beneficial effects on many of the known risk factors for memory diseases, for example,

hypertension and obesity. In addition, PA may have positive impact on the chemistry, structure and functioning of the brain. Considering the rapid increase in memory diseases and the promising results from scientific research, it seems appropriate to recommend exercise for the promotion of brain health. (Tolppanen, Solomon, Kulmala, Kåreholt, Ngandu, Rusanen, Laatikainen, Soininen & Kivipelto 2015; Hillman, Erickson & Kramer 2008.)

The purpose of this thesis was to create an exercise guide for Northern Finland's SenioriKaste program. The exercise guide was developed in cooperation with representatives of the SenioriKaste program and outside partners. The focus of the guide is exercise as a preventive method for memory diseases. The objective of the guide was to promote brain health among the older adults by encouraging regular PA. Moreover, the objective was to support the elderly in maintaining their functional capacity, thus facilitating independent living for as long as possible. Brain health in this thesis project means the overall wellbeing of the brain which along with exercise, is supported by a healthy diet, adequate rest, social and intellectual activities as well as avoidance of stress, smoking and excess alcohol consumption. Although the aforementioned as well as a number of other factors affect the wellbeing of the brain, the subject of this thesis is limited to the effects of exercise in maintaining brain health.

The information in the guide is based on recent studies such as FINGER (Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability) and CAIDE (Cardiovascular Risk Factors, Aging and Dementia), as well as other relevant literature on the subject of PA, brain health and cognition. The guide contains information regarding the risk factors for memory diseases and how these can be influenced through PA. Furthermore, practical advice and exercise instructions created by a professional exercise instructor were included in the guide. The suggested amount of exercise in the guide follows the national recommendations for weekly PA. The target population of the guide are people 60 years of age and over.

In order to ensure a high quality for the guide, the developers used the quality criteria for health promotion material set by the Finnish Centre for Health Promotion as a guideline (Rouvinen-Wilenius 2007; Parkkunen, Vertio & Koskinen-Ollonqvist 2001). The layout of the guide was created by an experienced layout designer and the guide's photographs were taken by a professional photographer. The guide was printed in a printing house using high-quality materials. A preliminary draft of the guide was tested among representatives of the target group

and the survey results were taken into account in finalizing the product. The feedback from the target group was collected using a semi-structured questionnaire.

The development of the exercise guide was motivated by the objectives set forth by the National Memory Program 2012-2020, the National Development Program for Social Welfare and Health Care (KASTE) and the Quality Recommendation to Guarantee a Good Quality of Life and Improved Services for Older Persons (2014). In addition, the objective of the exercise guide is in accordance with the primary goal of Finnish Government's elderly policy, which is to support the quality of life and independent living of the older persons through preventive and rehabilitative activities (Elderly Services Act 2012/980).

2 PRODUCT DEVELOPMENT PROJECT

In Finnish Universities of Applied Sciences, students have the choice of making a project type thesis instead of a research based thesis. In a thesis project, the goal is to produce a product or a service. Thesis projects are commonly commissioned by client organizations and have a designated supervisor from the working world who represents the client. The role of the commissioning party is to define the goals of the project and to promote its progress by providing necessary information and supervision for the student from the viewpoint of the client organization. (Centria UAS 2014, 4-12.) The word project comes from Latin and means a proposal or a plan (Ruuska 2007, 18). Cambridge Dictionaries define project as "a piece of planned work or an activity that is finished over a period of time and intended to achieve a particular purpose" (Cambridge Dictionaries Online).

This thesis was carried out as a product development project. The goal of product development is to create a new or an improved product. In the social and health care field product development projects can be utilized to create a variety of products, services or combinations thereof. Products in the social and health care field must comply with the ethical guidelines and international and national objectives. Additionally, social and health care products must be developed taking into account the special characteristics and requirements of the target group. (Jämsä & Manninen 2000, 13-14.)

2.1 Background of the project

The National Development Program for Social Welfare and Health Care 2012-2015 (KASTE) is a strategic steering tool utilized in managing and reforming Finnish social and health policy. The KASTE program emphasizes comprehensive promotion of wellbeing and rehabilitation. The goals of the KASTE program are to reduce health and wellbeing inequalities and to create client-oriented and economically sustainable social welfare and health care structures. SenioriKaste is one of the six KASTE sub-programs funded by the Ministry of Social Affairs and Health and local municipalities. (KASTE 2012–2015.)

The goal of the SenioriKaste program is to reform the structures and practices of elderly services. Particular areas of development are: supporting elderly people's functional capacity

and independent living, diversification of the contents of everyday life and development of rehabilitative activities and expertise. A total of 40 municipalities participating in Northern Finland's SenioriKaste program are divided into four functional areas; Kainuu, Central Ostrobothnia, Lapland and Oulunkaari region. The functional areas highlight different aspects of the SenioriKaste program goals according to their own region's needs. One of the primary objectives of the SenioriKaste program is the promotion of brain health through provision of information and development of best practices. (KASTE 2012–2015.)

2.2 Purpose and objectives of the project

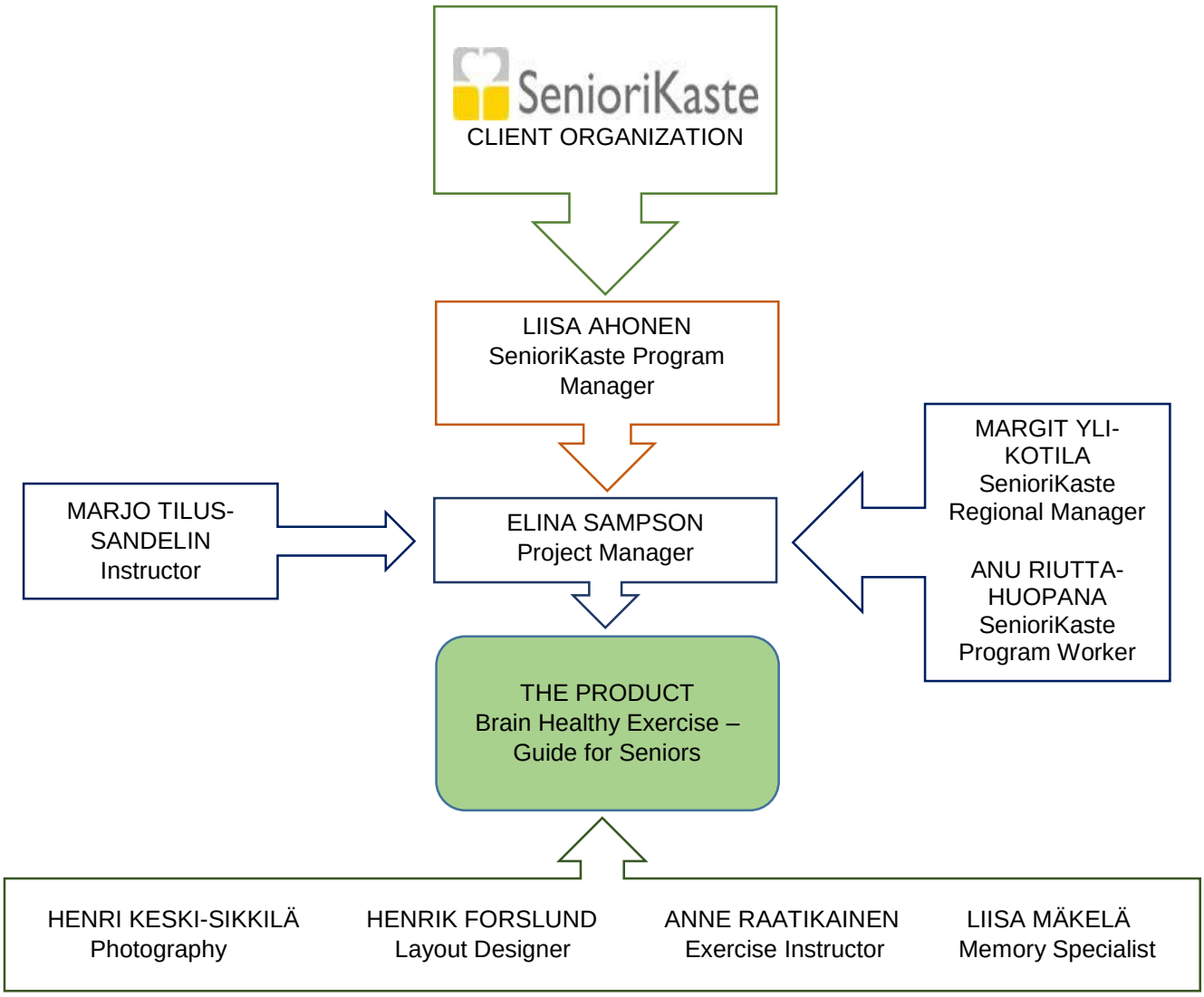
The purpose of this project was to produce an exercise guide for older adults with a focus on the influence of exercise on brain health and in particular, the role of PA in the prevention of memory disorders. The objective of the developers was to create a guide that would provide the target group with reliable and up-to-date information about the effects of PA on brain health. Moreover, the objective was to include in the guide easy-to-implement physical exercises that would be suitable for the widest possible user base.

The objective of the project was to raise brain health awareness among seniors by offering information on the effects of PA on the brain through a guide. The objective of the guide was to encourage older adults to foster brain health by increasing PA and by avoiding sedentary behaviors. The overall objective of the guide was to support the older adults in maintaining their functional capacity, thus facilitating independent living for as long as possible.

2.3 Project organization

A project requires the establishment of a project organization. A project organization includes a project manager, a project team and a project steering group. Moreover, many projects depend on outside partners who contribute to the project on a part-time basis. The project manager is responsible for project management, preparation of the project plan and the achievement of the pursued objectives. (Jämsä & Manninen 2000, 29; Paasivaara, Suhonen & Virtanen 2013, 23-24.) The success of the project depends on the project team's commitment

to the common goal and objectives (Paasivaara et al. 2013, 26-27). Graph 1 illustrates the structure of the project organization.



GRAPH 1. Structure of the project organization

The exercise guide was developed in collaboration with SenioriKaste program representatives. Regional Manager Margit Yli-Kotila and Program Worker Anu Riutta-Huopana served as the steering group of the project and formed the project core team together with the project manager. SenioriKaste Program Manager Liisa Ahonen directed the implementation of content-related objectives of the guide and was responsible for approving the project budget and the final product. The project manager's responsibilities included literature review on the effects of PA on cognition and the aging brain, project activity and resource planning, scheduling and documenting as well as acting as the contact person within the project

organization. Furthermore, the project manager was in charge of conducting the survey among the representatives of the target group. Senior lecturer Marjo Tilus-Sandelin served as the thesis instructor and monitored the realization of the objectives for thesis work set by the educational institution, Centria UAS. The project employed four outside partners: exercise instructor Anne Raatikainen, layout designer Henrik Forslund, memory specialist Liisa Mäkelä and photographer Henri Keski-Sikkilä.

2.4 Project schedule and budget

A schedule is one of the most important aspects of a project. The schedule provides a basis for anticipating the project activities and monitoring its progress. The most successful projects have a realistic and clear goal and a rapid implementation schedule. A project schedule is best managed by dividing the project workload into deliverables or tasks. (Ruuska 2007, 188-190.) Different product development tasks were scheduled in the project calendar in the project launch meeting in August 2015 (APPENDIX 2). The project had a clear goal and the actual development phase was purposely kept short and intense. The project calendar was monitored at regular intervals and an activity log was kept throughout the course of the project by the project manager.

Calculating costs is an integral part of project management and adhering to a budget plan can be seen as a one of the primary meters of success of a project. However, during a project life cycle changes will inevitably occur and they commonly have immediate effects on the budget. (Kettunen 2009, 117.) A preliminary budget plan was created in the project launch meeting. The salaries of SenioriKaste and City of Kokkola employees were excluded from the budget plan and only the direct production costs of the exercise guide were included in the estimate. The preliminary budget plan was revised after receiving cost estimates for the photography and layout design. At the closing phase, actual expenses were calculated and project budget performance was evaluated by the project core team. A detailed budget breakdown is found in APPENDIX 3.

3 AGING, BRAIN AND MEMORY

3.1 Age-related brain changes

Numerous changes in the brain associated with normal healthy aging have been documented and they begin as early as the third decade of life (Colcombe, Erickson, Scalf, Kim, Prakash, McAuley, Elavsky, Marquez, Hu & Kramer 2006; Kirk-Sanchez & McGough 2014). Anatomic changes include a gradual decrease of gray (GM) and white matter (WM), growth of lesions in the WM tracts and a decline in brain connectivity. Moreover, the number of cerebral blood vessels decreases and their tortuosity increases. (Bullit, Zeng, Mortamet, Ghosh, Aylward, Lin, Marks & Smith 2009.) Age-related changes in the brain, their extent and impact on functional abilities vary significantly between individuals (Erkinjuntti, Hietanen, Kivipelto, Strandberg & Huovinen 2009, 113). Likewise, neuroimaging has revealed that the brain ages heterogeneously, meaning that there are regions in the brain that are specifically vulnerable to aging, including the hippocampus, an area of the brain essential for memory formation. Other areas subject to early atrophy include frontal, parietal and temporal cerebral regions and age-related cognitive decline has been connected to these as well as other functional, molecular and structural changes in the brain. (Leckie, Weinstein, Hodzic & Erickson 2012; Bherer, Erickson & Liu-Ambrose 2013; Kirk-Sanchez & McGough 2014.)

3.2 Cognition and memory

Cognition refers to a set of mental functions related to information processing. Key areas of cognition include memory, orientation, maintaining of attention and concentration, visual and spatial processing as well as language and executive functions. Cognitive symptoms refer to information processing problems such as difficulties with abstract thinking and perception, or learning and memory problems. Mild cognitive impairment (MCI) refers to a situation where an individual's memory or other cognitive abilities have declined. In MCI there is a deterioration of information processing from previous level of performance however, the person does not meet diagnostic criteria for a memory disease. (Current Care Guidelines 2010.) Cognitive speed usually decreases significantly with age. However, knowledge and experience increase and compensate for the decline in other areas of cognition. Furthermore, cognitive decline associated with normal aging is not extensive enough to decisively hinder the activities of daily

living (ADL). Definitions such as age-associated memory impairment or benign senescent forgetfulness have been used to describe the memory problems associated with advanced age however, their clinical content has remained unclear. (Kivipelto & Viitanen 2006.)

Broadly defined, memory is all of a human's mental and intellectual abilities, stored as lessons learned in different data structures and operational capacities. Memory is a dynamic system of networks, which is constantly in motion. Several areas of the brain are responsible for memory functions. These include entorhinal cortex, hippocampus, thalamus, basal ganglia, amygdala, cerebellum and cortical network of neurons. Individual nerve cells do not consciously know or remember anything, but memory is created when nerve cells have created connections by building complex networks. In these neuronal networks permanent routes, or so called memory traces are formed, in which the knowledge and skills acquired during the lifetime remain collected. (Erkinjuntti et al. 2009, 69-70.) The content of memory can be divided in to three parts; *episodic memory* includes biographical memories of things occurred in the past, *semantic memory* holds learned things, such as meaning of words and mathematical formulas and finally, *procedural memory,* which contains series of learned movements, such as riding a bicycle or typing. Information processing is a mechanism that includes three phases; encoding, storage and retrieval. (Juva 2015.)

Memory is essential in learning new things and in maintaining one's identity. It is not a single function but includes various different areas and time phases. Accordingly, so called memory problems are numerous and may be due to a variety of diseases or conditions. (Juva 2015.) Memory problems can be either progressive, leading to dementia, or transient. Transient memory disturbances may result from e.g. heavy alcohol use, polypharmacy, a tumor or an infection. (Stolt, Axelin & Suhonen (Eds.) 2013, 5 [Richards et al. 2003].) Mild memory difficulties are common in the normal aging process. For example, in later years learning new things may be slower and requires more repetition. Moreover, the ability to concentrate and do several things simultaneously may be weakened. Conversely, the ability to distinguish between essential and non-essential typically improves with age. (Juva 2015.)

3.3 Dementia

The term dementia (Latin de = off, away; mens = mind) dates back to the first century A.D., when the Roman historian of medicine, Cornelius Celsus, used it in his book De Medicina. Dementia is a chronic and often progressive syndrome induced by range of different diseases that affect memory. In this respect, dementia is actually a symptom, not a separate disease. The cause of dementia can be a progressive disease such as Alzheimer's disease (AD), permanent sequelae, e.g. brain injury, or a treatable illness like hypothyroidism. Dementia-causing memory disorders are called progressive memory diseases. (Erkinjuntti et al. 2015, 19-24.) AD is the most common dementia-causing memory disease, accounting for approximately 65-70% of all cases. Other memory diseases include, for example, cerebrovascular dementias (large and small artery disease, cerebral infarctions), Lewy body dementia, Parkinson's disease dementia and frontotemporal dementia (FTD). (Current Care Guidelines 2010.)

Although dementia chiefly affects older adults, it is not part of normal aging. In dementia memory, as well as other areas of information processing and capacity to perform daily activities, are impaired. (WHO 2012, 2.) Problems may occur with speech comprehension and production, dexterity, sensory perception and executive functions. It is typical that dementia patients forget learned skills. As the disease advances, it ultimately leads to patients' inability to take care of themselves. (Stolt et al. 2013, 6.) Dementia is also associated with behavioral symptoms such as anxiety, apathy, depression, aggression and delusional thoughts or hallucinations (Koponen 2010).

4 PHYSICAL ACTIVITY AND AGING

4.1 Physical activity, fitness and exercise

Caspersen, Powell & Christenson (1985) defined PA as:

> "Any bodily movement produced by skeletal muscles that results in energy expenditure. The energy expenditure can be measured in kilocalories. PA in daily life can be categorized into occupational, sports, conditioning, household, or other activities."

Intensity of PA can be categorized by using metabolic equivalents of task (MET). MET is a physiological expenditure for given activity. One MET equals quantity of metabolized oxygen while at rest. According to its intensity level, PA is commonly categorized into light (1.5-3.0 METs), moderate (3.0-6.0 METs) or vigorous (6.0+ METs). Waking behavior with energy consumption of ≤ 1.5 METs, while in reclined or sitting position, is considered sedentary. This includes sitting or lying when watching TV, sitting while using a computer, commuting or driving. (Voss, Carr, Clark & Weng 2014; Voss et al. 2014 [Jette, Sidney & Blumchen 1990].)

According to Caspersen, Powell & Christenson (1985) physical fitness refers to:

> "A set of attributes that are either health- or skill-related. The degree to which people have these attributes can be measured with specific tests."

Physical fitness level is commonly measured in terms of maximal oxygen uptake (VO2 max). VO2 max refers to oxygen uptake that is achieved when a person is exercising at maximal capacity, for example on a treadmill. VO2 max can be expressed as liters per minute (L/min) i.e. how many liters of oxygen the body can use in one minute. This value can be related to body weight which gives a more accurate measure of the individual's cardiorespiratory fitness level. (Kutinlahti 2015.)

Caspersen, Powell & Christenson (1985) describe exercise as: "A subset of PA that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness." Similarly, Bherer and colleagues construe exercise as PA

subcategory which is characterized by planning, structuring, and purposefulness towards improving particular physical skills or physical fitness. In research literature the terms exercise and PA are frequently used interchangeably. (Bherer et al. 2013.)

4.2 Effects of exercise on the functional capacity of older adults

Functional capacity is a multidimensional concept which is commonly divided into four domains; cognitive, physical, psychological and social. Broadly the term functional capacity refers to an individual's ability to cope with the essential tasks of everyday living. (National Institute for Health and Welfare 2015.) The aging process, increased morbidity and age-related lifestyle changes gradually weaken the functional capacity of older adults. The onset and pace of the decline as well as its impact on functional capacity, independent living and the quality of life vary significantly between individuals. A substantial part of the problem of reduced functional capacity is in some way associated with declining levels of PA and lack of exercise. (Martiskainen 2013.)

According to Bäckmand (2006), several studies have shown the beneficial effects of PA on older people's physical function. Kerr and colleagues argued that there seems to be a clear dose-response relationship between exercise and improved capacity to manage the ADLs. Moreover, active older adults have fewer chronic diseases and resulting impairments than their sedentary counterparts. Even if started later in life, exercise is effective in enhancing the overall physical health and decelerating the effects of aging on the body. (Kerr, Marshall, Patterson, Marinac, Natarajan, Rosenberg, Wasilenko & Crist 2013.) Furthermore, exercise has a positive effect on the psychological and social functioning resulting in improved mood and reduced anxiety and depression (Bäckmand 2006).

4.3 Effects of exercise on the aging brain

This chapter addresses the effects of physical exercise on the aging brain. The emphasis is on the direct effects of PA on cerebral chemistry, structure and function. The participants in the studies chosen for the literature review consisted of non-demented adults between 55 and 85 years of age.

A growing body of scientific knowledge seems to confirm that individuals may positively affect their brain health through their own choices. PA and other lifestyle factors such as education, hobbies, mental and social activity as well as healthy nutrition, are all important in maintaining cognitive abilities. (Williams & Kemper 2010; Portugal, Cevada, Monteiro-Junior, Guimarães, Cruz Rubini, Lattari, Blois & Deslandes 2013.) Prevention and/or effective treatment of the known risk factors; elevated blood pressure, high cholesterol, obesity and diabetes, might significantly reduce the prevalence of memory diseases. Furthermore, brain health can be enhanced by avoiding smoking and excessive use of alcohol. (Kivipelto, Solomon, Ahtiluoto, Ngandu, Lehtisalo, Antikainen, Bäckman, Hänninen, Jula, Laatikainen, Lindström, Mangialasche, Nissinen, Paajanen, Pajala, Peltonen, Rauramaa, Stigsdotter-Neely, Strandgerg, Tuomilehto & Soininen 2013; Exalto, Quesenberry, Barnes, Kivipelto, Biessels & Whitmer 2014.) Tolppanen and colleagues argued that PA may be particularly beneficial in the prevention of memory diseases as it effects an individual's overall wellbeing and particularly, cardiovascular health (Tolppanen et al 2015).

Researchers have studied the effects of PA on cognition of older adults for several decades (Hillman et al. 2008). Longitudinal studies have given indications that PA in midlife seems to be associated with decreased risk of dementia and AD later in life and that PA appears especially beneficial for individuals with higher genetic risk for cognitive decline (Rovio, Kåreholt, Helkala, Viitanen, Winblad, Tuomilehto, Soininen, Nissinen & Kivipelto 2005). Similar observations were made by Tolppanen and colleagues who concluded that maintaining high leisure-time PA (LTPA) from mid- to late life, was linked to lower risk of dementia (Tolppanen et al. 2015).

Kelly, Loughrey, Lawlor, Robertson, Walsh & Brennan (2014) pointed out that although data from epidemiological, cross-sectional and neuroimaging studies appears to prove that individuals with higher fitness levels have significantly decreased dementia risk, evidence from randomized controlled trials (RCT) has been partially conflicting. Several intervention studies have found that exercise significantly benefits brain health, while others have failed to find a connection between improved fitness and cognition. Contradictory results can however, be partly explained by differences in research designs and among other factors, the short duration of interventions and low adherence rates, as well as the variety of test batteries used in measuring the different aspects of cognition. Similar arguments were made by researchers who conducted a meta-analysis of 18 intervention studies, published between 1966 and 2001,

and concluded that methodological factors have likely contributed to the ambiguity of the results. These factors included widely varying age distribution, baseline general health and fitness level of the participants. (Colcombe & Kramer 2003.)

A systematic literature review analysis of RCTs from years 1966 to 2009 revealed that aerobic exercise training resulted in modest enhancements in neurocognitive functioning of older adults, including executive functions, attention and processing speed and memory. However, no improvements were evident in working memory. (Smith, Blumenthal, Hoffman, Cooper, Strauman, Welsh-Bohmer, Browndyke & Sherwood 2010.) An important point that cannot be ignored when evaluating the positive results of the studies is the chance of reverse causality. For example, with inquiries to the connection between midlife PA and preserved cognition later in life, it must be acknowledged that neurodegenerative diseases such as AD have a long preclinical phase, and thus study participants in a prodromal stage of a memory disease might be disinclined to exercise. (Etgen, Sander, Huntgeburth, Poppert, Frösti & Bickel 2010; Ahlskog, Geda, Gradd-Radford & Petersen 2011.)

PA has general health benefits, such as the prevention of obesity and numerous illnesses including cardiovascular diseases and some cancers (Rolland, van Kan & Vellas 2010; Tolppanen et al. 2015). Moreover, PA improves mental health by alleviating symptoms of anxiety, depression and stress (Kramer, Colcombe, McAuley, Scalf & Erickson 2005). With advancements in technology such as neuroimaging, the researchers have been able observe that PA causes evident changes in the brain structure and function. Higher levels of fitness among older adults seems to be associated with greater GM and WM volume. Other PA-induced changes in the brain include increased cerebral blood volume and elevated concentrations of neurochemicals associated with neuronal proliferation and survival. Each of these aforementioned changes have independently been connected with better cognitive functioning. (Hillman et al. 2008.)

Although the benefits of PA can be seen across a wide variety of cognitive domains, the largest effect has been observed in executive processes, which include tasks such as planning, scheduling and problem-solving (Colcombe & Kramer 2003). These findings are encouraging considering that the brain regions which support these higher order cognitive skills are particularly sensitive to age-related deterioration (Kramer et al. 2005; Hillman et al. 2008).

Several mechanisms behind the cognitive benefits of exercise have been suggested. These mechanisms could be categorized as direct and indirect. Indirect mechanism include general health gains of exercise such as lower cholesterol and risk of hypertension, which lower the prospect of a stroke and associated cognitive decline. Additionally, exercise supports cerebrovascular integrity, which leads to increased metabolic resources to respond to task demands. Exercise is also known to prevent stress by decreasing cortisol levels, thus lessening its negative effects on brain plasticity. (Portugal et al. 2013; Sofi, Valecci, Bacci, Abbate, Gensini, Casini & Macchi 2010.)

The more direct mechanisms include the structural changes induced by exercise, which include maintenance of cerebral volume that has been observed in numerous animal and human studies. Colcombe and collegues observed significant brain volume increase in older adults that participated in a 6-month aerobic program three times per week. Greatest volume changes were detected in areas of the brain known to exhibit significant age-related atrophy and consequent cognitive decline, including WM tracts which enable communication between the brain hemispheres. (Colcombe, Kramer, Erickson, Scalf, McAuley, Cohen, Webb, Jerome, Marquez & Elavsky 2004.) Another study showed that a one-year walking intervention among older adults resulted in improved WM integrity in frontal and temporal lobes, as well as improved short-term memory (Voss, Heo, Prakash, Erickson, Alves, Chaddock, Szabo, Mailey, Wojcicki, White, Gothe, McAuley, Sutton & Kramer 2012).

A one-year aerobic exercise training intervention was effective at increasing the size of the hippocampus by 2% and thus reversing the age-related volume loss among aged participants of a RCT. Furthermore, the intervention group showed improved spatial memory. The members of the control group on the contrary, exhibited normal age-related volume loss (1-2% annually). According to the researchers, these findings support the fact the brain regions important for cognitive function remain modifiable until late adulthood. (Erickson, Voss, Prakash, Basak, Szabo, Chaddock, Kim, Heo, Alves, White, Wojcicki, Mailey, Vieira, Martin, Pence, Woods, McAuley & Kramer 2011.) Additionally, exercise seems to provide protection against the age-related vascular changes in the brain; decreased vessel number and increased tortuosity. According to the research by Bullit et al. (2009), elderly study subjects that reported high levels of aerobic activity, showed lower values of cerebral blood vessel tortuosity and higher number of small-caliber vessels visualized by MR angiography.

Exercise-induced structural changes have been linked to better cognitive functions, as seen in functional magnetic resonance imaging (fMRI). fMRI measures brain activity by detecting changes in the cerebral blood flow. Following a 6-month walking intervention, the participants with higher aerobic fitness exhibited increased activity in the middle frontal gyrus and superior parietal cortex, which are areas related to attentional control. Simultaneous decreases in activation were observed in the anterior cingulate cortex, an area responsible for filtering out excess information. The latter observation appears logical considering the fact that if the middle frontal gyrus and superior parietal cortex work more efficiently, there is no need to filter so much information. These patterns of activation seen in fMRI, related to significant improvements on a selective-attention task. (Colcombe et al. 2004.)

The proposed mechanisms behind the brain structure changes involve brain-derived neurotropic factor (BDNF), insulin-like growth factor (IGF-1) and other nerve growth factors. These growth factors increase synapses, dendritic spines, cell bodies and capillaries resulting in neuronal proliferation and survival, effects which have been consistently observed in the dentate gyrus of the hippocampus. BNDF, known to be upregulated by exercise, works as a mediator of synaptic efficacy and neuronal connectivity. BDNF is also necessary for long-term potentiation which is crucial for long-term memory formation. Aerobic training has been associated with increased levels of BDNF, and consequent neurogenesis, neuronal survival, synaptic development and plasticity. Studies on clinical populations have revealed that levels of circulating BDNF and IGF-1, are decreased in patients with AD. (Ahlskog et al. 2011.) BDNF can be found in all areas of the brain, but particularly abundantly in the hippocampus. Exercise appears to have an especially strong effect on the dentate gyrus region of hippocampus, also known to be the first areas to atrophy in diseases like AD. (Leckie et al. 2012.)

While the relationship between PA and cognition has gained much interest, the effects of sedentary behavior on general health and cognition require more research. According to estimates, the time spent on exercising accounts for approximately 2-5% of waking hours, as opposed to > 50% people normally spend sedentary. Furthermore, less than half of the adult population engages in regular exercise and thus, avoiding sedentary behavior could have an equal or even greater impact on brain health. (Voss et al. 2014.) A recent Icelandic study revealed that objectively measured sedentary behavior was associated with greater WM atrophy, whilst more GM and WM were linked to more PA (Arnadottir, Koster, Van Domelen, Brychta, Caserotti, Eiriksdottir, Sverrisdottir, Sigurdsson, Johansson, Chen, Gudnason, Harris,

Launer, & Sveinsson 2015). Sedentary behavior has been found as an independent risk factor for obesity and numerous chronic illnesses, including depression, type 2 diabetes and cardiovascular disease. Sedentary behavior has also been associated with inflammation and resultant higher risk of cognitive decline. (Voss et al. 2014; Voss et al. 2014 [Schmidt et al. 2001].) According to research, metabolic health is compromised if too much time is spent sedentary regardless of the amount of PA. Particularly prolonged periods of inactivity may have detrimental effects on health and therefore breaking up sedentary time is recommended. (Owen, Healy, Matthews & Dunstan 2010.)

The research results on how effective exercise is in the prevention of cognitive impairment or dementia varies between studies. According to meta-analysis by Sofi et al. (2010), high levels of PA had a significant protective effect (-38%) against cognitive decline. Likewise, low-to-moderate levels of PA provided considerably lower risk (-35%) of cognitive deterioration. Rovio et al. (2005) concluded, that people who engaged in LTPA at least twice per week in midlife had a 50% lower risk of dementia and a 60% lower risk of AD, compared to sedentary individuals. These results were even more pronounced among the carriers of APOE ε4 allele, which is known to increase the risk of AD by 1.5 to 4 times. Moreover, Tolppanen et al. (2015) argued, that higher levels of LTPA in midlife has particularly strong protective effect among overweight persons. In a pioneering Finnish 2-year multi-intervention RCT (FINGER-study), the researchers examined the effects of diet, exercise, cognitive training and vascular risk monitoring on cognition of at-risk (CAIDE Dementia Risk Score > 6: Kivipelto et al. 2013) elderly population. The results indicated a 25% to 150% improvement in overall cognition and executive functioning and processing speed respectively. According to the researchers these results seem to prove the positive effect of multidomain interventions in preventing cognitive decline in older adults with increased dementia risk (Ngandu et al. 2015).

Current research does not yet provided enough scientific evidence to design detailed exercise instructions or programs to achieve cognitive benefits. In research, aerobic exercise has been used as a primary intervention. However, strength training has also been found to have positive effects on cognition. (Portugal et al. 2013; Vuori 2015, 30.) The official Finnish PA recommendation provides a useful starting point for creating an exercise program. The UKK-institute has modified instructions for the working age population and for people over 65 years of age. The recommendation for seniors emphasizes the importance of balance, flexibility and muscle strength in maintaining functional ability. (UKK Institute, 2015a; UKK Institute 2015b.)

According to Vuori (2015, 30-31), PA that requires and develops sensory functions, reasoning, decision-making, social interaction and a variety physical skills, is the most beneficial for brain health. Examples of this type of PA include yardwork, hiking in nature, golf and group exercise. Similar conclusions were made by Smith and colleagues, who suggested that combining aerobic exercise with strength training improves neurocognitive function to a greater degree than aerobic activity alone (Smith et al. 2010). Although neurocognitive benefits begin to accrue in a relatively short time, longer term exercise regimens are likely to be more beneficial than brief training programs. Moreover, it is more beneficial to engage in PA at least 30 minutes at a time as short bouts of exercise (< 30 minutes) seem to have less impact on cognitive function. (Colcombe et al. 2003.)

5 PHASES OF THE PROJECT

Each project has a life cycle which is comprised of a series of activities necessary to fulfill the goals and objectives of the project. Projects are divided into phases that follow one another, and can partially overlap. A project always starts with an identified need or an idea. Projects vary greatly in size and complexity however, most projects are divided into four basic phases; initiation, planning, developing or execution, and closure. (Ruuska 2007, 33-35; Kettunen 2009, 43-44.) This section of the thesis describes phases of the product development project. A detailed project schedule is attached in APPENDIX 2.

5.1 Identification of the need

According to Viramo & Sulkava (Erkinjuntti et al. 2015, 35-37) approximately 14 500 Finnish people are diagnosed with a memory disease each year. Moreover, three out of four people in need of round the clock care have a memory disorder. In response to the growing need to counteract the dementia epidemic, the National Memory and the KASTE programs have included promotion of brain health and prevention of memory disorders in their primary objectives (National Memory Program 2012-2020; Tuorila & Ruokolainen 2012). As one strategy to reach these objectives, SenioriKaste has raised brain health awareness among older adults through written material. In the spring of 2015, SenioriKaste published a nutrition guide which gives older adults guidance on healthy dietary choices for promotion of brain health (SenioriKaste 2015). The goal of the exercise guide was to continue addressing the same topic from the perspective of PA (SenioriKaste 2016).

5.2 Initiation and planning phase

Contact between the thesis author and the client organization was made through the Centria UAS thesis topic bank. The thesis topic bank is a tool through which organizations offer research and project based topic proposals for UAS students. Preliminary planning of the collaboration between the thesis author and SenioriKaste began in April 2015 in a meeting where Program Worker Anu Riutta-Huopana shared the objectives of the project and the client organization’s expectations for the finished product. At this early stage the plan was to include

in the guide a section regarding mental exercises such as crossword puzzles, however, it was decided that for clarity reasons the theme of the guide would be limited to PA. In June 2015, the project core team held a meeting where the preliminary schedule and project organization plan was set.

The initiation phase included a search for relevant literature regarding the impact of exercise on the aging brain. Prospective studies and other literature was searched from several Finnish and international electronic databases including Cinahl, JBI Complete, OVID, Sage Premier and Science Direct. Search words “brain health”, “cognition”, “dementia”, “exercise”, “physical activity”, “older adults” and “seniors” were used in various combinations. Additional studies were identified from searching reference lists. Database searches were limited to full text articles primarily from years 2005-2015. Two older articles were chosen due to their importance to the subject: one meta-analytic study from 2003 and one neuroimaging study from 2004. A total of 14 original research articles, four meta-analyses and 15 special articles were chosen for closer review. Furthermore, Kokkola city public library and Centria UAS library collections were searched for books and other publications on the topics of brain health, exercise and memory diseases.

The project was officially launched in August 2015 in a joint planning meeting between SenioriKaste Program Manager Liisa Ahonen, exercise instructor Anne Raatikainen and the members of the project core team. In the meeting, the participants defined the goals of the project, decided on the division of responsibilities and shared ideas regarding the content of the guide. The unified objective of the developers was to create a guide that would be thought-provoking, encouraging and void of any patronizing expressions. A preliminary budget and schedule for the project were also drawn in the launch meeting. The goal was to publish the guide by January 2016 so that it could be distributed at various public events targeted at seniors that were planned for the spring.

5.3 Developing phase

The content of the guide was developed between September and December 2015. The objective for the content of the guide was to convey an empowering message that would motivate older adults to take care of their health by staying physically active and by avoiding

sedentary behaviors. To ensure a high quality of the finished product, the developers used Finnish Centre for Health Promotion quality criteria as a guideline. According to the criteria, health promotion material should:

1. Have a specific health/wellness goal
2. Have a clearly defined target audience
3. Provide an appropriate amount of reliable information on factors affecting health
4. Provide information about the means to obtain changes in life circumstances and behavior in a clear and understandable manner
5. Empower and motivate individuals/groups into positive decisions regarding health
6. Serve the needs of the target group and respect their culture
7. Arouse interest and trust, and create a positive feeling

(Parkkunen et al. 2001, 10; Rouvinen-Wilenius 2007, 9.)

Exercise instructor Anne Raatikainen designed a simple, but versatile exercise routine for improvement of balance and muscle strength, which is suitable for a wide user base regardless of previous physical condition. Additionally, the guide includes warm-up and stretching exercises that can be performed, for example, before and after a walk. Exercises were illustrated with photographs and written instructions on how to properly execute the movements. The guide's photographs were taken by photographer Henri Keski-Sikkilä. The people in the photos were local physically active older adults who volunteered as models for the guide. A variety of photographs were used to increase visual interest and effectiveness of the message.

By the client's request an exercise habit test was included in the guide. The test allows the readers to examine their own PA and consider whether there is room for improvement. The statements in the test were based on the national PA recommendations. Test scoring was illustrated in the form of traffic lights. If the readers score enough for a green light they are encouraged to continue their active lifestyle. If the readers receive a yellow light, they are asked to think what kind of improvements they could make in their exercise habits. Red light earners are challenged to consider how they could add more activity to their everyday life and to contact their home municipality for PA counseling.

Henrik Forslund from advertising agency Henrix Ltd. designed the guide's layout with Freehand 9.0 graphic design software. With the exception of the color scheme, the layout of the guide followed a similar format used in the previously published nutrition guide. The existence of the nutrition guide was in many ways beneficial during the drafting stage, however, it also set some restrictions to creativity. The quality criteria guidelines regarding the product design were taken into consideration throughout the layout process, however, not all could be followed due to space limitations. According to the guidelines, images should ideally be placed in the same location for example, in the right or the left edge of a page (Parkkunen et al. 2001, 15-18). With A5 (14,85 * 21 cm) size pages this was too difficult to implement because the page number of the guide was limited to 12 pages and several photos on a single page spread were needed to demonstrate the exercise instructions. The lack of space also limited the ability to include all references used in creating the guide. At the request of the client organization and with the approval of Centria UAS, the only reference in the guide is this thesis project report.

To improve the readability and comprehensibility of the content, sentences were kept short and structurally simple. For the same reason, chapters were separated by titles. Furthermore, a clear and simple typeface was chosen; Trebuchet MS in font size 10 in the text, and Berkeley Black size 20, in the titles. The text was proofread by members of the project team, as well as representatives from the target group, and corrections were made according to the feedback. In addition, the content of the guide was evaluated by memory specialist Liisa Mäkelä from the Central Ostrobothnia Dementia Association.

Once the preliminary draft of the guide was ready, it was evaluated by representatives of the target group. The feedback from the target group was obtained by using a semi-structured questionnaire. The questionnaire was adapted from another questionnaire that was previously used in a similar product development project (Kasvio 2011). Survey details and results are discussed in Chapter 6.1.

5.4 Closure phase

The closure phase of the project began in Mid-December 2015 with a meeting between the members of the project core team. In the meeting, the results of the survey were reviewed and final adjustments to the content of the guide were made. After the approval of the product by

the SenioriKaste program manager, the first 1500 copies of the guide were printed. Copyright of the exercise guide was transferred from the author to the SenioriKaste program with a written agreement (APPENDIX 7). With the transfer of the copyright the responsibility for the future use or maintenance of the guide was passed to the SenioriKaste program. The author gained valuable experience and approved study credits from creating the guide and acknowledged that no monetary compensation was offered from the work or the transfer of the copyright.

In January 2016, the project core team held one last joint meeting to evaluate the overall success of the project. The team members compared the final product to the project objectives. Moreover, the team members shared their personal thoughts and challenges regarding the product development. For the project manager, post-project activities included two public lectures, a radio interview and writing of the project report.

6 EVALUATION OF THE PROJECT

Evaluation is a process that measures what and how has been achieved by critically examining the activity or the product in question and by identifying the areas of strength and weakness. Moreover, the evaluation process includes reflecting on what could have been done to improve the work performance or the final product. (Parkkunen et al. 2001, 4.) Evaluation of a project is always to some extent a matter of opinion. Accuracy of the schedule and cost estimate are easy to measure, however, the content and quality of the end result are more difficult to evaluate. Moreover, certain matters such as the effectiveness of the product or intervention may not be immediately evident. (Parkkunen et al. 2001, 4; Ruuska 2007, 277.) The project core team; Yli-Kotila, Riutta-Huopana and the project manager, evaluated the success of the project in terms of budget and schedule performance, and in terms of collaboration fluency within the project organization. The final product was evaluated comparing it to the health promotion material quality criteria (Parkkunen et al. 2001; Rouvinen-Wilenius 2007.) A questionnaire survey helped to understand the target group's perceptions of the product and to modify it to better respond to their needs.

6.1 Survey among the target group

With pretesting, it is possible to find out how well the produced material responds to the needs of the target group. Although the methods of data collection can vary, in simple terms pretesting means asking questions about the product. Pretesting should be conducted as early as possible however, in such a way that the tested product corresponds as closely as possible to the final product. Moreover, pretesting is most effective when conducted in the product's actual environment of use. (Parkkunen et al. 2001, 19 [Rouvinen 1999].)

The purpose of the survey was to collect opinions of the target group regarding the content and design of the guide, as well as suggestions for improvement. A semi-structured questionnaire was used in the data collection. It was adapted from another questionnaire which was previously validated in a similar product development project (Kasvio 2011). The permission to use and modify the original questionnaire was obtained from its author by email. The modifications included removing questions that were not relevant to the current survey. In

addition, some words and sentence structures were changed to suit the purposes of the current inquiry. The questionnaire and English translation can be found in APPENDIX 5.

The questionnaire method was chosen for a number of reasons. Firstly, questionnaires are comparatively easy to administer and secondly, they can be used to gather a broad amount of data at low cost. Thirdly, questionnaires are self-administered and thus possible interviewer bias or variability can be avoided. (Sivo, Saunders, Chang & Jiang 2006.) Lastly, using a questionnaire allowed the respondents time to get familiar with the guide and try out the exercise routines in the privacy of their own homes.

The survey was conducted between November 20th and December 7th 2015. The research permit was issued by Hannele Tikkakoski-Alvarez, Kokkola city Director of Nursing Care (APPENDIX 1). In total 20 questionnaires were distributed to men and women over 60 years of age. Upon the client organization's request, eight questionnaires were delivered to the members of Kokkola city Elderly Council by Margit Yli-Kotila, and 12 questionnaires were distributed to the walk-in clients of seniors' health clinic Daalia by the clinic staff. The clients of the clinic who received the questionnaires were visiting the clinic for their annual flu vaccine.

Participation in the survey was strictly voluntary and anonymous. The participants were not asked to state their age or gender as it was not considered relevant to the survey. The questionnaires were accompanied by a cover letter (APPENDIX 4), a draft version of the guide and a prepaid return envelope. The cover letter included information about the background and purpose of the survey and the contact information of the project manager. 14 participants returned the questionnaires which provided a response rate of 70%. The returned questionnaires were only used for the evaluation of the product and they were destroyed upon completion of the project. Survey results are presented in table 1 (TABLE 1).

TABLE 1. Survey results (n=14)

		YES		NO	
		n	***%***	***n***	***%***
1.	Have you familiarized yourself with Brain Healthy Exercise Guide?	13	93	1	7
2.	a) Have you performed the included chair exercises?	11	79	3	21
	b) Have you performed the included warm-up exercises?	9	64	5	36
	c) Have you performed the included stretching exercises?	11	79	3	21
3.	Will you use the guide to support your exercise regimen?	10	71	4	29
Your opinion on the layout of the guide					
4.	Is the layout of the guide neat and clear?	14	100	0	0
5.	a) Does the guide contain enough pictures?	14	100	0	0
	b) If you answered yes, do you think that the guide contains too many pictures?	1	7	13	93
Your opinion on the contents of the guide					
6.	Do you find the guide interesting?	13	93	1	7
7.	Does the name of the guide describe its contents well?	13	93	-	-
8.	a) Is the text of the guide easy to understand?	14	100	0	0
	b) If you answered no, which portion/s needs clarification?				
9.	a) Does the guide include enough information?	13	93	-	7
	b) If you answered no, what kind of information would you like to added to the guide?				
10.	a) Does the guide contain too much information?	1	7	12	86
	b) If you answered yes, what information is covered in too much detail?				
11.	Do you have any development suggestions for the makers of the guide? *“Mukaan voisi ottaa vatsa ja selkälihas liikkeet”* *“You could add abdominal and back muscle exercises.”* *“Ei ole on tosi hyvin tuotu kaikki asiat esille.”* *”No, I don’t. All things are brought out very well.”* *“Opas 60+. Itse olen 67 ja tunnen itseni tyttöseksi oppaan jumppamummon rinnalla. Vähän nuorempi ”mannekiini” voisi herättää huomion että minunkin 60+ hiukan lisää olisi hyvä kiinnittää jo tässä vaiheessa liikunnan merkitykseen huomiota. Kuvien täti on jo ikäihminen!”* *Guide 60+. I myself am 67 and I feel like a girlie compared to the exercise granny. A little younger "mannequin" could arouse the attention so that myself 60+, should pay*				

(Table 1 continued)

	a little more attention to the importance of PA. The lady in the pictures is already an elderly person!" *"Oppaan sisältöä ei voi "markkinoida" ehdottomana, on muitakin tapoja johon kuuluu päivittäinen "älyllinen" voimistelu."* *"The contents of this guide cannot be "marketed" as absolute, there are other ways which include daily " mental gymnastics."* *"Ei! Selkeä ohjekirjanen! Helposti toteutettavat liikkeet!"* *"No! A clear instruction booklet! Exercises are easy to implement!"* *"Ei mitään erityistä, lykkyä tykö jatkossa."* *"Nothing special to add, good luck in the future."* *"Mielestäni opas on selkeä ja ulkoasultaan lukemaan houkutteleva. Kielikorvaani häiritsee sivulla…kun alat liikkumaan, mielestäni pitäisi olla…kun alat liikkua. Tämä lienee saivartelua. Kiitos hyvästä oppaasta!"* *"I think that the guide is clear and the design invites you to read. The sentence on page 11 is bothering me…when you start to exercise, I think it should read…when you start exercising. But this is probably quibbling. Thank you for a good guide!"* *"Oppaassa on paljon hyvää, mm. psykologisesti on hyvä, että kuvaesimerkeissä on tasapuolisesti miehiä ja naisia. Ja ylipäätänsä kuvat ovat havainnollisia ja niitä on riittävästi – pitkiä tekstejä ei jaksettaisi lukea! Oppaan laajuus on myös sopiva. Useimmilla ikäihmisillä, niin minullakin, on suurin huoli juuri muistisairaudesta. Kirjasen otsikko herättää siksi myönteisen kiinnostuksen."* *"The guide contains a lot of positive things. For example, it is psychologically good to have equally many men and women in the photos. And overall the photos are explanatory and there are enough of them – we wouldn't have energy to read long texts! The length of the guide is also good. For most older adults, myself included, the greatest worry is a memory disease. That is why the title of the booklet raises a positive interest."* *"Tämä on todella hyvä opas. Ei ole mitään muutettavaa."* *"This guide is really good. Nothing to change."*

Table 1 summarizes the survey results. The results reveal that 13 respondents (93%) had familiarized themselves with the guide. Likewise, the majority had performed the physical exercises and 10 respondents stated that they would use the guide to support their exercise regimen in the future. All respondents were pleased with the guide's layout and considered that the guide contains enough pictures. One respondent felt that there are too many photos in the guide. 13 respondents found the guide interesting and all considered the text easy to

understand. Likewise, 13 participants thought that the guide included enough information, while one participant did not answer the question. No one had suggestions for additional information that should be included in the guide. In contrast, one respondent felt that the guide already contains too much information and one respondent left question 10 a) unanswered.

Answers to the open question were mainly positive and the majority of respondents expressed satisfaction with the guide. One respondent suggested that the guide should contain abdominal and back muscle movements. However, the project core team concluded that if performed properly, the chair exercise routine does strengthen these parts of the body as well. One respondent felt that the 89-year old chair gymnastics model was too old. The developers however, wanted to convey a message that it is possible to stay active and enjoy exercise even at a very advanced age thus no action was taken in this regard. One participant pointed out a grammatical error which was corrected in the final version of the guide.

When conducting a questionnaire survey and examining the results its disadvantages should be taken into account. One of the things to consider is the respondents' attitude to the questionnaire, for example, how seriously they take the survey; are the answers honest and carefully considered. Other unfavorable aspect of a questionnaire survey is that misunderstanding of the response options cannot be controlled. Furthermore, the respondents' familiarity with the survey topic cannot be examined. (Hiltunen 2008.)

6.2 Working team's evaluation of the project

The project closure meeting was held at the end of January 2016. In the meeting, the project was evaluated from several perspectives. The members of the core team felt that the collaboration had been fluent and effective and all the tasks were completed within the planned timeframe. Close communication within the project organization and frequent project status monitoring were considered the main contributing factors of successful schedule. Supervisors Yli-Kotila and Riutta-Huopana gave written feedback on the work of the project manager (APPENDIX 6).

In the project launch meeting an estimated project budget was drafted. The initial budget was later revised after receiving labor cost estimates from the photographer and the layout

designer. The revised budget was exceeded by € 373.50 due to additional layout and printing costs. The original plan was to reduce costs by printing the drafts of the guide for the survey using office printers. However, after careful consideration it was decided that the draft guides should be printed professionally in order to guarantee their quality. Moreover, the developers believed that a close resemblance to the final product would likely result in more reliable feedback from the target group.

Extra advertising agency costs accrued from editing the text and layout on several occasions. Furthermore, the background color was substituted from the originally planned combination of two colors to monochrome after noticing that the two-tone color impaired the guide's readability. Using custom photography was an expense that could have been avoided by using stock photos. The rationale behind the decision to obtain custom photographs was the desire to make it easier for the representatives of the target group to identify with the people in the guide. In addition, custom photography increased creative freedom, for example, when designing the exercise routines.

Quality is a relative concept and the evaluation criteria for quality depend on the situation and the pursued objectives. Product quality can be assessed on the basis of how it corresponds to the set objectives. (Ruuska 2007, 234.) The project core team concluded that the product corresponds to the pursued objectives and complies well with the quality criteria for health promotion material. However, as pointed out by Parkkunen et al. (2001, 22), observing the quality criteria merely enables the creation of good health material, but does not guarantee its effectiveness on a personal level. This depends to a great extent on the recipient's life situation, experiences and emotional state. Nevertheless, positive feedback from the target group appeared to reinforce the view that the objectives for the project were largely achieved.

6.3 Project ethics

According to the Finnish Advisory Board on Research Integrity (2012), conducting ethically qualified and responsible research requires using methods which are based on established practices of the scientific community. In accordance with responsible conduct of research, accurate and detailed documenting should be implemented. This includes enclosing

information about the goals and financial resources of the project as well as respecting other researchers' work by using proper manner of referencing.

In this project, good scientific practice was observed by enclosing information regarding the project's background, objectives and costs. The work of original authors was respected by paying special attention to the accuracy of citations. According to Kananen, thesis literature should be chosen with discernment and the number of scientific articles should be sufficient enough for forming reliable conclusions. Furthermore, all interpretations should be based only on the material. (Kananen 2010, 144-145.) The research literature used in this thesis was derived from respected and well-known databases. Moreover, the amount of scientific literature used in this project was extensive enough to justify trustworthy conclusions.

According to Jämsä & Manninen (2000, 13-14), products in the social and health care field must comply with ethical guidelines and international and national objectives. The development of the guide was in accordance with the objectives of the National Memory Program (2012-2020), the National Development Program for Social Welfare and Health Care (KASTE 2012-2015), the Quality Recommendation to Guarantee a Good Quality of Life and Improved Services for Older Persons (2014) and the primary goal of Finnish Government's elderly policy which is to support the quality of life and independent living of the older persons through preventive and rehabilitative activities (OECD Policies/Finland 2013).

This thesis project had as its objective to provide the target group with information and guidance to foster their health, thus following principle of beneficence. Moreover, although this thesis was commissioned, the project's objectives were based on the needs of the target group, not the needs of the client organization. Social and health care products must be developed taking into account the special characteristics and requirements of the target group (Jämsä & Manninen 2000, 13-14). The target group's opinions were valued by carrying out a survey in order to develop the product to better meet their needs. Participation in the questionnaire survey was anonymous, voluntary and strictly confidential. The questionnaires were distributed with a cover letter that included information about the background and purposes of the survey. The results of the survey were reported honestly and the collected data was stored securely and disposed of after the completion of the project. The photographs for the guide were taken with a written permission of the subjects. By obtaining informed consent the subjects' autonomy was respected (APPENDIX 8).

6.4 Validity

In simple terms validity of a study means that the right things are being investigated. Validity can be divided into several sub-categories of which the most commonly used are the concepts of external and internal validity. External validity refers to the generalizability of the results, which is especially important in quantitative research where the object of study is a sample. In this case, it is essential that the sample corresponds exactly to the population at large. If the research is targeted at the entire population external validity is not relevant. Internal validity refers to the use of the correct measures and methods, i.e. the study measures what it was supposed to instead of some other variables which may hinder accurate conclusions. Internal validity can be difficult to verify, therefore careful documentation and justification are important. To increase internal validity, the use of previously used and tested measures is recommended. (Kananen 2010, 128-132.)

The purpose of the survey in this project was to collect the target group's opinions on the product. The objective was to find out how well the guide responds to the needs of the target group. In order to increase the external validity, the questionnaires were distributed only to the representatives of the target group; people 60 years of age and over. The survey results were intended for internal use only, i.e. to direct the development process. The results were not meant for making any generalizations and therefore a relatively small sample size was considered sufficient. The questionnaire method was chosen for several reasons but most importantly because it allowed the respondents enough time to familiarize themselves with the guide and try the exercises in their own homes. Moreover, with the use of a questionnaire, the respondents remained anonymous to the recipient, and as they are self-administered, possible interviewer bias or variability was avoided. Finally, the questionnaire offered a relatively simple and quick way to collect the needed data. The data collection from the target group was conducted using a previously validated questionnaire that was modified to fit the purpose of this survey. The original questionnaire had been tested and previously used in a similar project (Kasvio 2011). The permission to use and modify the questionnaire was obtained by email from its developer. Using a previously tested measure increased the internal validity of this survey.

7 DISCUSSION

Progressive memory diseases cause a significant public health and economic burden in our country. It is estimated that nearly 400 000 Finns suffer from memory problems severe enough to hinder their daily lives. Approximately three out of four people in need of round the clock care suffer from a memory disorder. These facts have enormous implications at the individual and the societal level. (Viramo & Sulkava in Erkinjuntti et al. 2015, 35-37.) At present there is no known cure for progressive memory diseases and therefore the most effective treatment is prevention. Individuals can affect the well-being of their brain and postpone or prevent the onset of progressive memory diseases with lifestyle choices such as a healthy diet and exercise. (Ngandu et al. 2015; Rolland et al. 2010.)

Lifestyle choices have short term and long term effects on brain and memory performance. By avoiding the risk factors and strengthening the protective factors, it is possible to make the brain more resistant against the elements that predispose it to memory diseases. The emergence of AD and cerebrovascular dementias in particular, can be influenced by healthy and active lifestyle choices. It is, however, important to remember that healthy lifestyles cannot completely prevent dementia but the emergence of a memory disease is influenced by different determinants, their interactions, as well as a variety of lifestyle and genetic factors. Nevertheless, healthy lifestyle choices can increase the number of healthy years and potentially delay the onset of dementia. (Härmä & Granö 2011, 82–83.)

The role of PA in the prevention of cognitive decline has been the target of interest of scientific research for several decades. According to the current understanding PA has beneficial effect on the known risk factors for memory diseases including high blood pressure and obesity. Moreover, PA appears to protect against cognitive decline by enhancing the chemistry, function and structure of the brain, even later in life. Taking into account the increasing number of memory diseases and the promising evidence from scientific studies, it seems justified to recommend exercise for the promotion of brain health. (Hillman et al. 2008; Tolppanen et al. 2015.)

The purpose of this thesis project was to create an exercise guide for Northern Finland's SenioriKaste program that features exercise as a preventive method for memory diseases.

The objective of the developers was to include in the guide up-to-date information on the effects of PA on brain health as well as practical exercise instructions. The objective of the guide was to promote brain health among older adults by encouraging regular PA and by avoiding sedentary behaviors. The overall objective of the guide was to support older adults in maintaining their functional ability and independence. The objectives were achieved to the extent that the guide was published in the planned timeframe with this information and instruction, and the reception has been very positive. The realization of the overall objective of the guide is difficult to assess because the target group was not studied in this thesis however, it served as a motivation for the product development process.

The product development process was both challenging and rewarding. The first challenge was to search through the vast amount of available literature on the subject of PA and brain health. Even as the literature search was limited to only those studies with senior subjects, the volume of relevant research was extensive. Yet, having a wealth of information assisted in making reliable conclusions even after it was noted quite early that conflicting study results exist as well. However, with closer examination, it became clear that a large part of the inconsistencies likely resulted from the differences between study designs. The demonstration of the effects of exercise on human cognition is not straightforward. Animal studies can be conducted under strictly controlled conditions, but with the people, the influence of cofounding factors that may benefit cognition, such as social and intellectual activity, cannot be ignored. Fortunately, the research community is aware of these instabilities and recently many high-quality studies, for example, the FINGER and CAIDE studies, have been published. Moreover, despite some conflicting results, the study findings are largely encouraging.

The second challenge was that after going through an extensive amount of scientific literature, the gained knowledge needed to be delivered in such a way that neither over nor underestimated the reader of the guide. Without the help of the other members of the project organization, especially representatives of the SenioriKaste, it would have been a difficult task. SenioriKaste representatives and exercise instructor Anne Raatikainen patiently read through various text versions and gave guidance on both the content and the grammar. The knowledge and assistance of the working team was essential given the fact that the target audience of the guide, 60 years of age and older, is very wide. Given the opportunity to do the project again, I would consider conducting a small scale survey among the representatives of the target group before the product planning phase. It might have been useful to find out, for example, what

kind of exercise instructions seniors prefer. Moreover, it could have been beneficial to conduct a project risk analysis before starting the product development process.

The third challenging but also very rewarding part of the process was managing the project itself. However, it was assuring to have so many experienced professionals sharing the responsibility for the final product. As for my professional growth, I gained valuable experience from the cooperation between the individuals that contributed to the project. Moreover, it was extremely edifying to work with all the inspiring seniors that were involved in making the guide and generously volunteered their time for the benefit of others.

Throughout the thesis process, I kept a diary, not only to document the different phases of the product development, but also to reflect my thoughts related to the project. To help me stay organized, I collected all the research articles, notes from books, pages of my diary and all the other documents related to the project into a large folder. According to Vilkka & Airaksinen, in project type thesis, the scientific nature of activities is demonstrated with the accuracy of the documentation. Project activities and decisions must be transparent and the final report must answer the questions; what was done, why and how? (Vilkka & Airaksinen 2003, 81-82.) Keeping the diary and documenting all the activities was an essential part of the product development process. In addition, accurate documentation is indispensable in writing a project report which contains a complete record of the work that has been carried out.

Judging from the demand for the guide, there was an obvious need for this type of product. Although a wealth of information and exercise instructions can be found on the Internet, many seniors do not have access or skills to obtain online resources. The target group in the 40 municipalities of the Northern Finland's SenioriKaste program have received the guide when it was distributed by program workers. The guide has been used, for example, in patient education in seniors' health clinics, home nursing services and in memory clinics. It has also been used in different venues such as nursing homes and in training events for health care workers. The feedback from the field has been encouraging and in particular the chair exercise routine has been well-liked.

As Professor Miia Kivipelto points out, the brain is not just the most important control center of our bodies, it is also the home of our memories, creativity and emotions (Erkinjuntti et al. 2009, 21). I have worked as a care aide in a nursing home where we had a special care unit for

people suffering from memory diseases. In my work I was able to witness firsthand the devastating effects of these disorders and the distress they cause not only to the individual with the memory disease, but to their loved ones as well. When I first thought of writing my thesis, my desire was that the result of my work would have some value in the everyday lives of individuals. The knowledge that my efforts have benefitted the target group and the people working among older adults, brings me great pleasure, and I am grateful to the SenioriKaste program for giving me the opportunity to be part of a project that I myself consider important.

The exact significance of this project to the nursing profession is difficult to measure. However, taking into consideration the rapid aging of our population and the growing incidence of memory diseases, effective preventive measures are increasing in value. Current research seems to prove that we can significantly reduce the prevalence of memory diseases. For example, approximately one-third of AD cases are attributable to modifiable factors, which offers opportunities for prevention (Norton, Matthews, Barnes, Yaffe & Brayne 2014). According to Rolland and colleagues, clinical research has shown that PA offers an effective, affordable and low-risk nonpharmacological intervention for preventing cognitive decline (Rolland et al. 2010). As future research it would be useful to find out the long-term benefits of the project such as the extent to which the guide has been effective in motivating the target group to increase PA in everyday life. Moreover, it would be useful to explore the different ways that the professionals working with older adults have used the guide and their personal experiences and opinions on the product.

8 CONCLUSIONS

The purpose of this thesis was to create an exercise guide for the SenioriKaste program which would include accurate and up-to-date information on the effects of PA on brain health as well as practical exercise instructions. This thesis was conducted as a product development project. The guide was developed in collaboration with Liisa Ahonen, SenioriKaste Program Manager, Margit Yli-Kotila, SenioriKaste Regional Manager and Anu Riutta-Huopana, Program Worker. The project employed four outside partners; photographer Henri Keski-Sikkilä, layout designer Henrik Forslund, exercise instructor Anne Raatikainen and memory specialist Liisa Mäkelä. The thesis author acted as the project manager and was in charge of project controlling and documenting as well as conducting a literature review. Moreover, the thesis author was responsible for carrying out a questionnaire survey among the target group. Centria UAS senior lecturer Marjo Tilus-Sandelin served as the thesis instructor.

The project was launched in the summer 2015 by setting the project's goals and objectives, conducting the literature review and writing of the thesis plan. The thesis plan was approved and the thesis contract signed in the fall 2015. Research articles on the effects of PA on cognition and the aging brain, and other relevant background material, formed the theoretical framework of the thesis as well as the knowledge base of the exercise guide. The vast majority of scientific articles used in this thesis project were published during the last five years. Literature on project management was utilized to guide the project planning and implementation. The content of the guide was developed between September and October 2015. To ensure the high quality of the guide, the developers used the Finnish Centre for Health Promotion quality criteria as a guideline. Before the guide was finalized it was evaluated by representatives of the target group. A semi-structured questionnaire was utilized to collect feedback which was used to modify the guide to better meet the needs of the target group.

The result of the project was a 12-page guide titled "Brain Healthy Exercise –Guide 60+" (Finn. "Aivoterveellinen liikunta –Opas 60+"). The guide contains up-to-date information on the impact of PA on general and brain health as well as exercise instructions for independent exercise training. The project team's objective was to convey an encouraging and empowering message that would motivate older adults to take care of their health by staying physically active and by avoiding sedentary behaviors. The overall objective was to support older adults in maintaining

their functional capacity and facilitate independent living for as long as possible. Although memory diseases are becoming increasingly common as our population ages, the guide reminds older adults that PA is an effective way to prevent memory disorders. The guide has been well-received and thus far 11 500 copies have been printed and distributed throughout the SenioriKaste program area and in different seminars and public events. The guide is also accessible through the Internet and is available in Finnish and Swedish languages (SenioriKaste 2016). After the project closing the copyright of the product was transferred to the SenioriKaste program with a written agreement (APPENDIX 7). As the owner of the copyright, the responsibility for the future use or maintenance of the guide, belongs to the SenioriKaste program.

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KOKKOLAN KAUPUNKI **VIRANHALTIJAPÄÄTÖS**

Koulutusasiat
Hoitotyön johtaja 20.11.2015 1 §

ASIA Sampson Elina , tutkimusluvan myöntäminen 20.11.2015

PERUSTELUT Myönnetään tutkimuslupa aiheesta : Aivoterveellinen liikunta-opas oppaan testaus kohderyhmälle. Tutkimuksen kohderyhmänä ovat terveyspiste Daalian asiakkaat. Hyväksytty tutkimussuunnitelma on hakemuksen liitteenä.

PÄÄTÖS Hyväksytään

TÄYTÄÄNTÖÖNPANO

20.11.2015

Tikkakoski-Alvarez Hannele
Hoitotyön johtaja

Sosiaali- ja terveyslautakunta

PROJECT SCHEDULE

2015

APRIL

10.4. Meeting
Participants: Anu Riutta-Huopana & Elina Sampson
Topic: Preliminary planning of the project

JUNE

1.6. Planning meeting
Participants: Margit Yli-Kotila, Anu Riutta-Huopana & Elina Sampson
Topics: Preliminary schedule and project organization plan

JULY

Search of related material

Literature review

Finding a photographer

AUGUST

4.8. Project launch meeting
Participants: Liisa Ahonen, Margit Yli-Kotila, Anu Riutta-Huopana, Anne Raatikainen & Elina Sampson
Topics: Project goals, schedule and budget plan

Thesis plan

SEPTEMBER-OCTOBER

4.9. Planning meeting
Participants: Margit Yli-Kotila, Anu Riutta-Huopana, Anne Raatikainen & Elina Sampson
Topics: Photoshoot, photography permit, exercise instructions, budget revision

17.9. Meeting with Anne Raatikainen
Topics: Exercise instructions, planning of the photoshoot

28.9. Photoshoot at Donnerska School; senior men's exercise group

1.10. Photoshoot at Anna's

Thesis contract

Developing the contents of the guide

NOVEMBER

6.11. Meeting with thesis instructor Marjo Tilus-Sandelin
Topic: Editing the survey questionnaire

14.11. Meeting with Henrik Forslund
Topic: Guide layout

19.-20.11. Research application applied + approved

20.11. 12 questionnaires to senior's health clinic Daalia

24.11. 8 questionnaires to City of Kokkola Elderly Council

23.11. Kokkola newspaper interview at Anna's

DECEMBER

14.12. Meeting
Participants: Margit Yli-Kotila, Anu Riutta-Huopana & Elina Sampson
Topic: Questionnaire survey results

Last touches to the contents of the guide

Final approval of the guide

2016

JANUARY

13.1. First 1500 pcs of the guide ordered from the printing house

25.1. Meeting
Participants: Margit Yli-Kotila, Anu Riutta-Huopana & Elina Sampson
Topic: Evaluation and closing of the project

FEBRUARY-JULY

18.1. Brain Healthy Exercise – lecture at senior event Kokkola City Hall
YLE Radio Interview

5.4. Brain Healthy Exercise – lecture at regional home care seminar

Writing of the project report

APPENDIX 3

PROJECT BUDGET

Estimated budget 4.8.2015	VAT (24%) incl.
Layout design	€ 300,00
Printing:	
2000 pcs	€ 800,00
Photography	€ 300,00
Other expenses	€ 100,00
ESTIMATED TOTAL	**€ 1500,00**

Revised budget 4.9.2015	VAT (24%) incl.
Layout design	€ 502,20
Printing:	
2000 pcs	€ 800,00
Freight	€ 20,00
Photography	€ 490,00
Other expenses:	
Postage fees	€ 24,00
REVISED TOTAL	**€ 1836,20**

Final budget 25.1.2016	VAT (24%) incl.
Layout design	€ 809,10
Printing:	
Preliminary drafts (25 pcs)	€ 65,72
Freight	€ 7,44
1500 pcs	€ 793,60
Freight	€ 19,84
Photography	€ 490,00
Other expenses:	
Postage fees	€ 24,00
EXPENSES TOTAL	**€ 2209,70**

Arvoisa vastaanottaja,

Olen sairaanhoidon opiskelija Centria-ammattikorkeakoulusta. Teen opinnäytetyötä, jonka aiheena on tuottaa ”Aivoterveellinen liikunta”-opas SenioriKaste-hankkeeseen. Opinnäytetyö tehdään yhteistyössä SenioriKaste-hankkeen työntekijöiden ja ulkopuolisten asiantuntijoiden kanssa. Opinnäytetyön tekemiseen on hankittu asianmukaiset luvat ja sen toteuttamista valvovat Centria-ammattikorkeakoulun asettamat ohjaajat.

SenioriKaste-hankkeen yhtenä tavoitteena on aivoterveyden edistäminen. Tämän tavoitteen pohjalta on syntynyt tarve oppaalle, johon kootaan kohderyhmälle (60 + vuotiaat) sekä ajantasaista tutkittua tietoa, että suosituksiin perustuvia käytännön ohjeita fyysisien kunnon parantamiseen ja ylläpitoon. Opas sisältää liikunnanohjaajan laatimat lämmittely- ja venytysharjoitukset sekä tuolijumpan. Oppaan tarkoituksena on innostaa kohderyhmää vaalimaan aivoterveyttä ja ehkäisemään muistisairauksia liikunnan avulla.

Pyydän ystävällisesti, että tutustutte ”Aivoterveellinen liikunta”-oppaan esivedokseen ja mahdollisuuksienne mukaan toteutatte myös käytännön harjoitukset sekä vastaatte liitteenä olevaan kyselyyn. Palautteenne on ensiarvoisen tärkeää, sillä vastausten perusteella pystymme muokkaamaan opasta paremmin kohderyhmän tarpeita vastaaviksi. Kyselyyn vastaaminen on vapaaehtoista ja ehdottoman luottamuksellista. Kyselyyn vastataan nimettömänä ja vastauslomakkeet hävitetään asianmukaisesti niiden käsittelyn jälkeen.

Kysely palautetaan opinnäytetyön tekijälle ennakkoon maksetussa vastauskuoressa.

Ottakaa rohkeasti yhteyttä minuun, jos teillä on jotakin kysyttävää liittyen tähän kyselyyn.

Kiitän teitä etukäteen yhteistyöstä!

Ystävällisin terveisin,
Elina Sampson
Sähköposti: XXXXX
Puhelin: XXXXX

Dear recipient,

I am a nursing student from Centria University of Applied Sciences. I am making a Brain Healthy Exercise Guide as my thesis for SenioriKaste program. The thesis is created in collaboration with the SenioriKaste program employees and outside experts. The permits for the thesis have been acquired from appropriate authorities and its implementation is monitored by supervisors appointed by Centria UAS.

One of the objectives of SenioriKaste program is the promotion of brain health. From this objective, a need has arisen to develop a guide which compiles up-to-date scientific, research-based information, and practical recommendations-based exercise advices to help the target group (60 + years) to improve and maintain physical fitness. The guide includes warm-up, stretching and chair exercises developed by a fitness instructor. Purpose of the guide is to encourage the target group to foster a brain healthy lifestyle and to prevent memory disorders through PA.

I kindly request that you familiarize yourself with "Brain Healthy Exercise Guide" and according to your possibilities, perform the exercises before responding to the attached questionnaire. Your feedback is of paramount importance as with the help of your answers we are able to modify the guide to better meet the needs of the target group. Answering the questionnaire is voluntary and strictly confidential. The questionnaire will be answered anonymously and answer sheets will be properly disposed of after analysis.

The questionnaire is returned to the author of the thesis with pre-paid reply envelope by ___ / ___ 2015.

Please feel free to contact me if you have any questions regarding this survey.

I thank you in advance for your cooperation!

With kind regards,
Elina Sampson
E-mail: XXXXX
Phone: XXXXX

Tämä on muokattu versio alkuperäisestä kysymyslomakkeesta. Alkuperäisessä lomakkeessa käytettiin väljempää asettelua ja tilaa oli varattu myös avointen kysymysten vastauksille.

Kyselylomake sisältää ”kyllä” ja ”ei/en” kysymyksiä, joihin vastataan ympyröimällä mielestänne oikea vaihtoehto. Avoimiin kysymyksiin voitte vastata omin sanoin.

Kyselylomake	**Päivä ___/___ 2015**	
1.	Oletteko tutustunut ”Aivoterveellinen liikunta”-oppaaseen?	Kyllä En
2.	a) Oletteko tehnyt oppaan sisältämän tuolijumpan? b) Oletteko tehnyt oppaan sisältämät lämmittelyliikkeet? c) Oletteko tehnyt oppaan sisältämät venyttelyliikkeet?	Kyllä En Kyllä En Kyllä En
3.	Aiotteko käyttää opasta oman liikuntaharjoittelun tukena?	Kyllä En
Arvionne ”Aivoterveellinen liikunta”-oppaan ulkoasusta		
4.	Onko oppaan ulkoasu siisti ja selkeä?	Kyllä Ei
5.	a) Onko oppaassa käytetty riittävästi kuvia? b) Jos vastasitte kyllä niin, onko kuvia liikaa?	Kyllä Ei Kyllä Ei
Arvionne ”Aivoterveellinen liikunta”-oppaan sisällöstä		
6.	Onko opas mielestänne kiinnostava?	Kyllä Ei
7.	Sopiiko oppaalle annettu nimi kuvaamaan oppaan sisältöä?	Kyllä Ei
8.	a) Onko oppaan teksti helposti ymmärrettävää? b) Jos vastasitte ei niin, mitkä kohdat kaipaavat selkiyttämistä?	Kyllä Ei
9.	a) Sisältääkö opas riittävästi tietoa? b) Jos vastasitte ei niin, mitä tietoa haluaisitte lisättävän tähän oppaaseen?	Kyllä Ei
10.	a) Sisältääkö opas liikaa tietoa? b) Jos vastasitte kyllä niin, mistä on liikaa tietoa?	Kyllä Ei
11.	Onko teillä kehittämisehdotuksia tämän oppaan tekijöille?	

Kiitos vastauksistanne!

Palautattehan kyselylomakkeen postimerkillä varustetussa vastauskuoressa viimeistään ___/___ 2015 mennessä.

This is a modified version of the original questionnaire which had a more generous layout. Original questionnaire form also included space to answer the open questions.

The questionnaire includes a "yes" and "no" questions which will be answered by circling the most suitable option. Open-ended questions can be answered with your own words.

Questionnaire	**Date: _____/_____2015**	
1.	Have you familiarized yourself with Brain Healthy Exercise Guide?	Yes No
2.	a) Have you performed the included chair exercises? b) Have you performed the included warm-up exercises? c) Have you performed the included stretching exercises?	Yes No Yes No Yes No
3.	Will you use the guide to support your exercise regimen?	Yes No
Your opinion on the layout of the guide		
4.	Is the layout of the guide neat and clear?	Yes No
5.	a) Does the guide contain enough pictures? b) If you answered yes, are too many pictures in your opinion?	Yes No Yes No
Your opinion on the contents of the guide		
6.	Do you find the guide interesting?	Yes No
7.	Does the name of the guide describe its contents well?	Yes No
8.	a) Is the text of the guide easy to understand? b) If you answered no, which portion/s needs clarification?	Yes No
9.	a) Does the guide include enough information? b) If you answered no, what kind of information would you like to see added to the guide?	Yes No
10.	a) Does the guide include too much information? b) If you answered yes, what information is covered in too much detail?	Yes No
11.	Do you have any development suggestions for the makers of the guide?	

Thank you for your answers!

Please return the questionnaire in the prepaid return envelope by ___/___ 2015.

SenioriKaste

Palaute

6.4.2016

Toimeksiantajan palaute opinnäytetyöstä "Brain healthy exercise – guide for seniors"

Sairaanhoitajaopiskelija Ellna Sampsonin opinnäytetyön tehtävänä oli luoda liikuntaopas SenioriKaste-hankkeelle, jonka pääpaino on liikunnan merkitys muistisairauksien ehkäisyssä. Oppaaseen oli tarkoitus koota käytännön liikuntaohjeita ja ajantasaista tietoa liikunnan vaikutuksista aivojen terveyteen. Opinnäytetyön tavoitteena oli edistää ikääntyneiden (60+) aivoterveyttä liikunnan avulla.

Kehittämisprosessin aikana opiskelija osoitti olevansa luotettava yhteistyökumppani. Oppaan työstäminen eteni suunnitellun aikataulun mukaisesti ja yhteistyö opiskelijan kanssa sujui erinomaisesti. Kehittämisprosessin aikana opiskelija osoitti selkeästi sisäistäneensä opinnäytetyön aiheen. Opiskelijan pitämät yleisöluennot aivoterveellisestä liikunnasta olivat selkeät, vakuuttavia ja laadukkaita luentoja. Aivoterveellinen liikuntaopas on herättänyt kiinnostusta kansalaisten keskuudessa ja tähän mennessä sitä on painettu 2000 kappaletta Pohjois-Suomen alueelle.

SenioriKaste

Margit Yli-Kotila, projektipäällikkö

Anu Riutta-Huopana, projektityöntekijä

KASTE

TEKIJÄNOIKEUDEN LUOVUTUSSOPIMUS

1 SOPIMUSOSAPUOLET

SenioriKaste-hanke, PL 43, 67101 Kokkola (jäljempänä "Luovutuksensaaja")

Elina Sampson, tekijänoikeuden luovuttajana (jäljempänä "Tekijä")

2 SOPIMUKSEN KOHDE

Seuraava keskeneräinen tai valmis teos (jäljempänä Teos): Aivoterveellinen liikunta - opas 60+, joka on tarkemmin määritelty tämän sopimuksen liitteessä 1. Teos sisältää siihen liittyvän suunnittelu- ja kehitystyön yhteydessä syntyneen materiaalin.

LUOVUTUKSEN LAAJUUS:

☒ Oikeuksien kokonaisluovutus.

Sopimuksen mukainen oikeuksien kokonaisluovutus käsittää kaikki Teokseen liittyvät oikeudet, kuten omistus, tekijän- ja mallioikeudet ja muut immateriaalioikeudet (kokonaisluovutus), mukaan lukien rajoittamattoman, maailmanlaajuisen yksinoikeuden julkaista ja muutenkin käyttää Teosta niin, että Teoksesta voidaan valmistaa kappaleita muuttamattomana tai muutettuna, ja niin, että Teosta voidaan saattaa yleisön saataville missä tahansa muodossa ja millä tahansa tavalla kuten levittämällä, näyttämällä julkisesti ja muilla tavoin, sekä oikeuden luovuttaa Teokseen liittyvät oikeudet edelleen.

3 KORVAUS

Teoksen luominen liittyy Tekijän opiskeluun ja ulkopuolisen yrityksen kanssa tehtävään projektiin, josta Tekijä saa korvauksena luovuttamistaan oikeuksista arvokasta kokemusta, yrityksen tarjoamaa tukea ja resursseja sekä opintoviikkoja hyväksytystä opintosuorituksesta. Tästä johtuen Tekijä ymmärtää ja hyväksyy, että oikeuksien luovuttamisesta ei makseta Tekijälle rahallista palkkiota tai korvausta.

4 SOPIMUKSEN VOIMAANTULO

Tämä sopimus tulee voimaan osapuolten allekirjoituksilla.

5 TEKIJÄN VAKUUTUS

Tekijä vakuuttaa, että Teos on hänen oman luomistyönsä tulos, ja että Teosta tai osaakaan siitä ei ole kopioitu internetistä tai muusta lähteestä.

6 SOPIMUSASIAKIRJAT JA SOPIMUSEHDOT

Tätä sopimusta on tehty 2 samansisältöistä kappaletta, yksi kullekin sopijapuolelle. Tämä sopimusasiakirja liitteineen sisältää tyhjentävästi osapuolten välisen koko sopimuksen.

Liitteet:

Liite 1. Kuvaus tällä sopimuksella luovutettavien tekijänoikeuksien kohteena olevasta teoksesta.

☒ Tekijä on tutustunut Tekijänoikeuksien luovutussopimuksen yleisiin sopimusehtoihin, jotka hän hyväksyy itseään sitoviksi.

7 ALLEKIRJOITUKSET

Kokkola 14 / 4 2016

SeniorikasteHanke-hankkeen puolesta

Hankejohtaja Ilkka Ahonen

Kokkola 14 / 4 2016

Tekijä:

Elina Sampson
Sairaanhoitajaopiskelija
Centria ammattikorkeakoulu

LIITE 1. [14.4.] 2016 tehtyyn Tekijänoikeuden luovutussopimukseen

Teoksen kuvaus:

Aivoterveellinen liikunta – opas 60+ on 12-sivuinen teos joka käsittelee liikunnan roolia aivoterveyden ylläpitäjänä ja muistisairauksien ennaltaehkäisijänä. Teos sisältää tietoa liikunnan terveysvaikutuksista sekä käytännön liikuntaohjeita. Oppaassa on mukana testi jonka avulla käyttäjä voi arvioida omia liikuntatottumuksiaan. Opas luotiin Pohjois-Suomen SenioriKaste-hankkeelle opinnäytetyönä ja sen tekemisessä oli mukana hankkeen edustajia sekä ulkopuolisia ammattilaisia.

KOKKOLAN KAUPUNKI
KARLEBY STAD

SenioriKaste

KASTE

Kuvaus- ja julkaisulupa

Tämä kuvaus- ja julkaisulupa liittyy kuvamateriaalin tuottamiseen SenioriKasteen ja Kokkolan kaupungin viestintä- ja markkinointitarkoituksiin.

SenioriKaste ja Kokkolan kaupunki saa käyttää valokuvia omassa painetussa materiaalissa (esim. esitteet, toimintakertomukset) sekä viestinnässään sähköisessä mediassa (hankkeen ja kaupungin ylläpitämät www-sivut www.kokkola.fi, intranet, Facebook ja vastaavat, kaupungin itse hallinnoimat sivut).

Kuvia ei luovuteta kolmannen osapuolen käyttöön.

Henkilö/t esitetään kuvissa myönteisissä tilanteissa eikä henkilön nimeä julkaista kuvien yhteydessä. Kuvauksesta ei makseta korvausta.

Suostun esiintymään kuvissa ja suostun, että kuvia saa julkaista SenioriKasteen ja Kokkolan kaupungin aineistossa.

ALLEKIRJOITUS:

_____
Paikka ja aika

_____
Allekirjoitus

_____
Nimenselvennys

_____
Puhelinnumero

_____
Sähköposti