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SELF-STUDY PACKAGE OF SPORTS RELATED INJURIES
FOR PHYSIOTHERAPY STUDENTS OF SATAKUNTA
UNIVERSITY OF APPLIED SCIENCES

Degree Programme in Physiotherapy
2019



Satakunnan ammattikorkeakoulu
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The purpose of this thesis was to create a self-study package for physiotherapy students in Satakunta University of Applied Science (SUAS). The request and idea for this thesis came from the physiotherapy teachers in the University. The topic of the self-study package was chosen based on two questionnaires. First one was sent to physiotherapy teachers and, based on the results from the first one, the second one to physiotherapy students.

Working on the self-study package started in the autumn of 2018. The questionnaire for the physiotherapy teachers included one question: Name max. five topics that would be the most beneficial to have self-study material on. Based on the results gotten from the teachers, a questionnaire was sent to the physiotherapy students. Students chose Sports injuries as the most interesting topic to have a self-study package on. The self-study package was put together based on the newest literature. The self-study package will be kept at the University and it will serve the students as a private source of information.

This self-study package is mainly meant for the students, to improve their know-how and skills regarding sports injuries. The main topics of this self-study package are definition and prevalence of sports injuries, and the most common sport injuries in various body parts. The self-study package provides students with information on sports injuries in general and gives a more detailed picture of the various sports injuries and their birth mechanisms.

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1 INTRODUCTION

In today's ever-changing world nothing stays the same. This applies also to the context of studying. It is becoming more and more independent. Student-centered learning and teaching play an important role in inspiring students' motivation and engagement in the learning process (Roucau 2016, 2-4). This approach encourages the students to take more of an active role. Responding to change requires a more student-centered approach to teaching and learning. This embraces flexible learning paths and recognizes competences gained outside of the formal curricula (Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) 2015.) Arranging teaching sums up to be a significant part of the expenses of Universities and Universities of Applied Sciences (Nieminen & Rajala, 2015, 354). As money is being cut off from schools, teachers don't get as many contact lessons with the students as they used to, and they have to cut down the contents of classes to fit in the most important ones. Therefore, studying is becoming more and more independent. In the future, the students will need more comprehensive self-studying material, especially in electronic form, to enhance their learning. Electric material is needed because of this Bring Your Own Device (BYOD) – era in Satakunta University of Applied Sciences (SUAS) and because electric material is easier to distribute to the students.

Changes in curricula will be reflected in the material and content of the teaching. As a student, you don't perceive what topics have been lost due to changes, but teachers do, and they make the adaptations due to these changes. That is why the authors wanted to find out, from the teachers' point of view, what important topics they found to be "missing" from the teaching due to these changes. Of course, this does not mean that new topics have not been included in the new curricula. From the student's point of view, the existence of such teaching material would be of great benefit in supporting teaching.

Taking this all into consideration, this thesis is originating from what the students want and/or need. Firstly, the authors wanted to find out how recent changes

have influenced curriculums and the contents of courses available. And secondly, present the students with the opportunity to enhance their learning by offering a new self-learning package, done to support their growth as individuals and as future physiotherapist. As mentioned before, the self-study package will be in electronic form.

Higher education aims to fulfill many purposes. Including preparing students for active participation in society, contributing to employability, supporting student's development on a personal and professional level as well as creating a broad advanced base of knowledge (Recommendation Rec 2007.) The Bologna Process, launched together with the Bologna Declaration 1999, is one of the main voluntary processes at European level. It is implemented in 48 states and these states define the European Higher Education Area (EHEA) (Website of EHEA.). The Standards and Guidelines for Quality Assurance in the European Higher Education Area, also known as the European Standards and Guidelines (ESG), are the basis for quality assurance (Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) 2015). Quality assurances are one of the main achievements of the Bologna Process and its follow-up structure (Website of EHEA). The Bologna Process has led to an increase in programmes taught in English, as well as an increase in the number of higher education institutions (Crosier & Parvera 2013, 31-32). This again increases international higher education structures and transparent quality assurance measures (Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) 2015).

Study programmes are the core of higher education institutions. They provide students with both academic knowledge and skills that can be applied to their careers in the future (Koblinsky, Hrapczynski & Clark 2015, 125.). The programmes should be designed so that they meet the objectives (learning outcomes) set for them and also, define the workload that is expected from the student and reflect the purposes of higher education set by the Council of Europe (Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) 2015, 8.). The Council has defined the following purposes to be fulfilled: a framework for quality assurance systems at European, national and institutional level, enabling the improvement of quality of higher education in EHEA, supporting mutual trust whilst facilitating recognition within and across national borders and providing information on quality assur-

ance in EHEA. (Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) 2015, 7.)

2 AIM AND OBJECTIVES OF THE THESIS

The aim of this thesis is to create a self-study package of sport related injuries for the physiotherapy students of Satakunta University of Applied Sciences.

The objectives for this thesis are to conduct two questionnaires. The first questionnaire is directed to the physiotherapy teachers in Satakunta University of Applied Sciences (SUAS). It is done to find out what areas of physiotherapy have been left out from the curricula. The second questionnaire is formed based on the answers from the first questionnaire. The second questionnaire is directed to the second- and third-year physiotherapy students. Based on the answers from this questionnaire we will conduct a self-learning package for the students.

3 FRAMEWORK OF UNIVERSITIES OF APPLIED SCIENCES

The qualification resulting from one's studies should be clearly specified and refer to the correct level of the National Qualifications Framework (NQF) for higher education and, to the Framework for Qualifications of the European Higher Education Area (EHEA) (Bologna Working Group 2005). The first cycle – Bachelor's degree level of the Qualifications Framework of EHEA – refers to 6th level of the European Union's European Qualifications Framework (EQF) (The European Recognition Manual for Higher Education Institutions 2016, 21). This includes the following qualifications: students demonstrates advanced knowledge and understanding in a field of study/work, involving a critical understanding of theories and principles (European Centre for the Development of Vocational Training, 2013, 72). Students are capable of applying their knowledge and understanding in a manner that indicates a profes-

sional approach to their work (European Centre for the Development of Vocational Training, 2013, 22). Advanced skills that demonstrate mastery and innovation, required to argument and to solve complex and unpredicted problems (European Centre for the Development of Vocational Training, 2013, 20). Students are capable of gathering and interpreting relevant data to inform judgments that include reflection on social, scientific and/or ethical issues. Students are also able to communicate information, ideas, problems and solutions to specialist and non-specialist audiences. In other words, the students have the necessary communication skills. (European Centre for the Development of Vocational Training, 2013, 23.) Students have developed learning skills that are necessary for them to continue undertaking further study with a higher degree of autonomy (European Centre for the Development of Vocational Training, 2013, 23). These qualifications are summarized in Table 1.

EQF level 6 qualifications	Knowledge	Skills	Proficiency
	<ul style="list-style-type: none"> - Advanced knowledge and understanding, in work and studying, including critical understanding of theories and principles. 	<ul style="list-style-type: none"> - Advanced skills that are required to give arguments and to solve complex and unpredicted problems. - Learning skills that are necessary to continue undertaking further education. 	<ul style="list-style-type: none"> - Ability to communicate information and ideas, problems and solutions to both specialist and non-specialist audiences. - Gathering and interpreting relevant data to inform judgments.

Table 1. European Qualifications Framework level 6 (bachelor's degree).

Bachelor's degree of Health Care is 210 ECTS, which means 3,5 years of full-time studies (Website of Opintopolku 2019). The degree programme in physiotherapy consists of basic studies, professional studies, elective studies, clinical placements and the final thesis and maturation examination. (Website of Opintopolku 2019.). In Finland, physiotherapy is taught in Finnish in 15 Universities of Applied Sciences (UAS), in English in one UAS and in Swedish in one UAS (Website of Suomen Fysioterapeutit 2017).

The basic mission of Universities of Applied Sciences (UAS) is to provide higher education for professional expert jobs based on the requirements of working life and its development and to support the professional growth of students. (Act of Universities of Applied Sciences 932/2014. section 4) Today the Finnish higher education system consists of two complementary sectors: Universities of Applied Sciences and universities. The entry requirement for the physiotherapy degree programme is a certificate from an upper secondary school or the matriculation certificate, a vocational qualification or corresponding foreign studies. (Website of Suomen Fysioterapeutit 2017.)

Physiotherapist offer services that develop, improve, maintain and restore people's functional ability throughout one's lifespan (Website of World Confederation for Physical Therapy). Physiotherapist are primarily concerned with impairments and disabilities, the promotion of mobility, functional ability, quality of life and movement through examination, evaluation, diagnosis and physical intervention (Goyal & Jandyal 2014, 806). The content of physiotherapy practice is wide. They treat people from all ages, with many medical problems or health-related conditions, injuries or illnesses that limit movement and performance of activities (activities of daily living, ADL & instrumental activities of daily living, IADL). (Goyal & Jandyal 2014, 807.)

Satakunta University of Applied Sciences (SUAS) offers two degree programmes for physiotherapy, one taught in Finnish (NFY) and the other taught in English (NPH) (Website of SAMK 2019). The Degree Programme in Physiotherapy opens opportunities to work within the field of rehabilitation in the private and public sector, e.g.

hospitals, physiotherapy clinics and rehabilitation centers (Goyal & Jandyal 2014, 807). The curriculums, in SUAS, went through a change in 2016-2017. In practice, this means that the second- and third- year physiotherapy students in SUAS have different curriculums. These changes are presented, in amounts of ECTS, in Table 2 and are referred from SUAS' study guide. (Website of SAMK 2019.)

European Credit Transfer System (ECTS) refers to a credit system that is awarded on the basis of learning outcomes and student workload (European Commission 2018, 60). ECTS are designed to make moving between countries easier for students. (Website of European Commission 2015). One ECTS, depending on the country, equals on average between 25 and 30 hours of work and one should get around 60 ECTS' per academic year (Website of European Commission 2015). In Finland, one ECTS means roughly 27 hours of work (Website of University of Jyväskylä 2019). These 27 hours includes the contact lessons and the independent studies of each course.

2nd year students' basic studies conduct from: orientation studying physiotherapy worth of 8,01 ECTS. Professional studies, on the other hand, conduct from: Physiotherapy in rehabilitation field (9 ECTS), Client centered physiotherapy (14 ECTS), Language studies (3 ECTS), Instructing and adapting physical activity (12 ECTS), Basic knowledge in physiotherapy (14 ECTS), Basic skills of physiotherapy (20 ECTS), Physiotherapeutic approach to functional and physical capacity (11 ECTS), Chronic pain and musculoskeletal disorders (15 ECTS), Physiotherapy in aging (5 ECTS), Promotion of work well-being and functional capacity in variety of ages (15 ECTS) and Development of professionalism in physiotherapy (8 ECTS). (Website of SAMK 2019.)

3rd year students' basic studies conduct from: Professional growth, interaction and communication competence worth of 15 ECTS. Professional studies conduct from: Development of professionalism in physiotherapy (15 ECTS), Instructing and adapting physical activity (15 ECTS), Human functions and development (25 ECTS), Physiotherapeutic approach to functional and physical capacity (15 ECTS), Health promotion and occupational physiotherapy (10 ECTS) and Physiotherapist's therapy skills I, II and III (all worth 15 ECTS). (Website of SAMK 2019.)

	NPH16/NFY16	NPH17/NFY17
Basic studies	15,00/25,00 ECTS	8,01/8,00 ECTS
Professional studies	125,00/115,00 ECTS	132/132,01 ECTS
Elective studies	10,00/10,00 ECTS	10,00/10,00 ECTS
Work placement	45,00/45,00 ECTS	45,00/45,00 ECTS
Bachelor's thesis and maturity test	15,01/15,01 ECTS	15,01/15,01 ECTS

Table 2. Changes in the curriculums of second- and third-year physiotherapy students in SUAS. (Referred from SAMK's study guide 2019)

4 THESIS PROCESS & METHOD

Quantitative research focuses on measuring the variable, usage of statistical methods and observation of the relationship between different variables. This research method can be used in variety of study designs. The aim of quantitative research is to assess statistical significance. The main problem with quantitative research is that, the researcher can't be sure of how honest the answers are, and how seriously the part-takers have taken the research. Typical quantitative method is a survey study where the data is collected with forms or questionnaires. (Kankkunen & Vehviläinen-Julkunen 2017, 55-64.)

Research design refers to the plan to collect information to address one's research question. It covers the set of procedures that are used to collect one's data and how the data will be analyzed. The research plan identifies what type of design you are using. (Jenkins-Smith et al. 2017, 16.) For this thesis the authors used the quantitative research method. Measurement error in this thesis was prevented by asking questions that are clear enough for the respondents to be capable and willing to answer correctly (de Leeuw, Hox & Dillman 2008, 7).

Survey research is a method for collecting information about a population of interest. The two key features of survey research are questionnaires and sampling. Questionnaire means a predefined series of questions used to collect information from individuals. Sampling is a technique used to subgroup the population to answer the survey questions. (Website of Research Connections, 2016.)

The reason why electronic questionnaire was chosen instead of a paper one was simply to gather data easier and to protect the privacy of the respondent. There are some problems concerning an electronic questionnaire. Ruskoaho et. al. 2010 displays the differences between electronic and paper questionnaires. In this article, they state that some questions being mandatory in electronic questionnaires might negatively affect the amount of data received. The respondent might discontinue answering if he/she doesn't want to answer the question in hand or doesn't understand why he/she is not able to just go to the next question you're going to present (Ruskoaho et. al. 2010). Therefore, you have to be precise when coming up with the questions. Also, internet users tend to read more quickly, be more impatient and scan through the text rather than reading it carefully (de Leeuw, Hox & Dillman 2008, 276). Therefore, questions were kept short and concise to reduce the number of fallouts and termination before completion, which is easier to do in an electronic questionnaire (de Leeuw, Hox & Dillman 2008, 171).

In this thesis the authors conducted two different questionnaires. The first one was sent to physiotherapy teachers of the Satakunta University of Applied Sciences. This was done to find out what areas of physiotherapy have been "left out" of the curricula that they felt the students might need in the future. Based on the results from the first questionnaire the authors formed the second one. The second one was sent to the second- and third-year physiotherapy student of the Satakunta University of Applied Sciences. These questionnaires can be found as Appendices 1 & 2.

The thesis process started in late September 2018 with picking the subject and doing initial theory research. Writing the thesis started in October 2018. Questionnaire for teachers was sent out in January 2019, and the one for students was sent out late January/early February 2019. A reminder about the latter questionnaire was sent out mid-April.

Then started the analyzing and writing out the results. This step started in mid-August and lasted until September/early October 2019. Simultaneously the making of the study package started. Final version of thesis and presentation will be November 2019. Thesis process is presented in Figure 1.

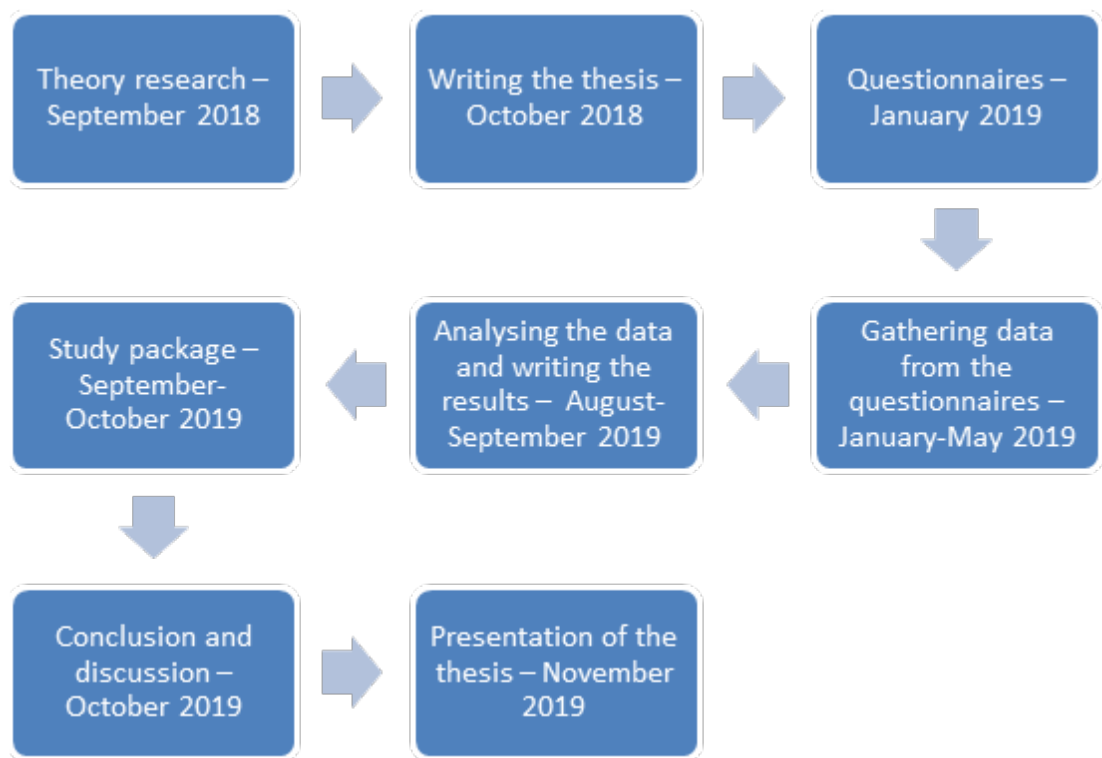


Figure 1. Thesis process

5 THE QUESTIONNAIRES

All the participants were informed that the answers were dealt with anonymously, only used for this thesis and that all the answers will be considered in the analysis. A covert letter was sent to the participants for them to have a deeper understanding on what they're expected to do and why. For more detailed information on the covert letters please see Appendices 3 and 4. Both questionnaires and their covert letters were sent to the participants via email. The participants in the first question-

naire were given 4 weeks' time to answer the questionnaire, and the participants of the second questionnaire were given 12 weeks' time to answer.

The reason electronic questionnaire was chosen instead of a paper one was simply to gather data easier and to protect the privacy of the respondent (Ruskaho et al. 2010, 280-281). Electronic questionnaires have their down sides as well. For instance, internet users tend to read more quickly, be more impatient and scan through the text rather than reading it carefully (de Leeuw, Hox & Dillman 2008, 276). Therefore, questions were kept short and concise to reduce the number of fallouts and termination before completion, which is easier to do in an electronic questionnaire (de Leeuw, Hox & Dillman 2008, 171).

The first questionnaire was sent in January 2019 to 15 teachers and 6 answers were received, totaling a 40% response rate. Each answer included 1-5, as the directions of the questionnaire suggested, topics teachers felt would be helpful and/or useful to have more self-study material on. The first questionnaire included only one open-ended question and directions for answering the question. In electronic questionnaires, open-ended questions are promising since it's, in comparison to handwriting, easier to type in a longer response (de Leeuw, Hox & Dillman 2008, 278). Even though answering open-ended questions could increase respondents' burden, the authors felt as having only one open-ended question wouldn't decrease the amount of data gotten from the questionnaire (de Leeuw, How & Dillman 2008, 278). For more details and for the layout of the questionnaire please see Appendix 1.

The second questionnaire was sent in late January/early February 2019. A reminder about the latter questionnaire was sent out mid-April. The second questionnaire was sent to 82 participants from whom 43 participants answered to the questionnaire, totaling a 52,4% response rate. This questionnaire included the introduction text, which was in English and in Finnish, and three questions. All of the three questions were also in both languages. This was done to include also the non-Finnish speakers in the process. The first two questions were about the recipient's background and the third question was to choose 3 of the 11 topics given. The 11 topics in the second questionnaire were based on the first questionnaire. The other questions of this question-

naire for the students were made to see class's involvement in this process and the gender distribution of the participants. For more details about this questionnaire, please see Appendix 2.

6 RESULTS

All the responses were considered in the analysis of data and dealt with anonymously, as the participants were informed in the informative emails. The participants were sent an informative email beforehand. The informative email included information on why the questionnaire was done and other basic information about the thesis the answers were used for. For more details about the email please see Appendices 3 and 4.

The results were analyzed by using Excel/Tixel. Tixel is an easy-to-use, add-in software for Excel developed in Tampere University. Please note that the software is only available for Microsoft. Tixel was used to create graphics of the results more easily, making the interpretation of the results easier and more comfortable for the reader. Visuals have been used, for decades, to explain phenomenon by combining data with aesthetics, e.g. shape and/or color (Krause, 2016). Visuals are used because that enables learning and comprehension and makes understanding the data analyze easier for the reader.

The first questionnaire was devoted for the physiotherapy teachers of Satakunta University of Applied Sciences (SUAS). This questionnaire included only one question and directions for answering the question. The introduction gave information on why the questionnaire was done, informed the recipients that the answers were dealt with anonymously and only used for this thesis. The questionnaire can be found as an Appendix 1. This questionnaire was sent to 15 teachers and 6 answers were received, totaling a 40% response rate. Each answer included from 1 to 5 topics that teachers felt would be important and/or useful for the students to have more self-study material on. These answers were used as a base for creating the oth-

er questionnaire that was devoted to physiotherapy students in SUAS. The second questionnaire will be presented later. The answers from the first questionnaire are summarized in Table 3.

Stress management	Nutritional supplement for training people
Sports-related nutrition	Clinical reasoning in musculoskeletal (MSK) cases
Pelvic floor dysfunctions	Maternity physiotherapy
Sports-related physiotherapy	Theories and methods related to guidance
Fitness-enthusiast related doping	Exercising and physiotherapy for a client with osteoporosis
Functional anatomy	

Table 3. Answers gotten from the physiotherapy teachers of Satakunta University of Applied Sciences

The second questionnaire was devoted to the physiotherapy students of Satakunta University of Applied Sciences (SUAS). This questionnaire included the introduction text, which was in English and in Finnish, and three questions. In this questionnaire all the questions as well as all the alternative answers were in English and in Finnish. The first two were background information about the recipients and the third question was to choose 3 of the 11 topics given. The 11 topics in the second questionnaire were based on the first questionnaire. For more details about this questionnaire, please see Appendix 2.

The second questionnaire was sent to 82 participants, from whom 43 participants answered to the questionnaire totaling a 52,4% response rate. The demographics of the participants were 33% males, 14 individuals and 28 females, 65%. One individual preferred not to mention their gender. The distribution of participant's by gender is demonstrated in Figure 2.

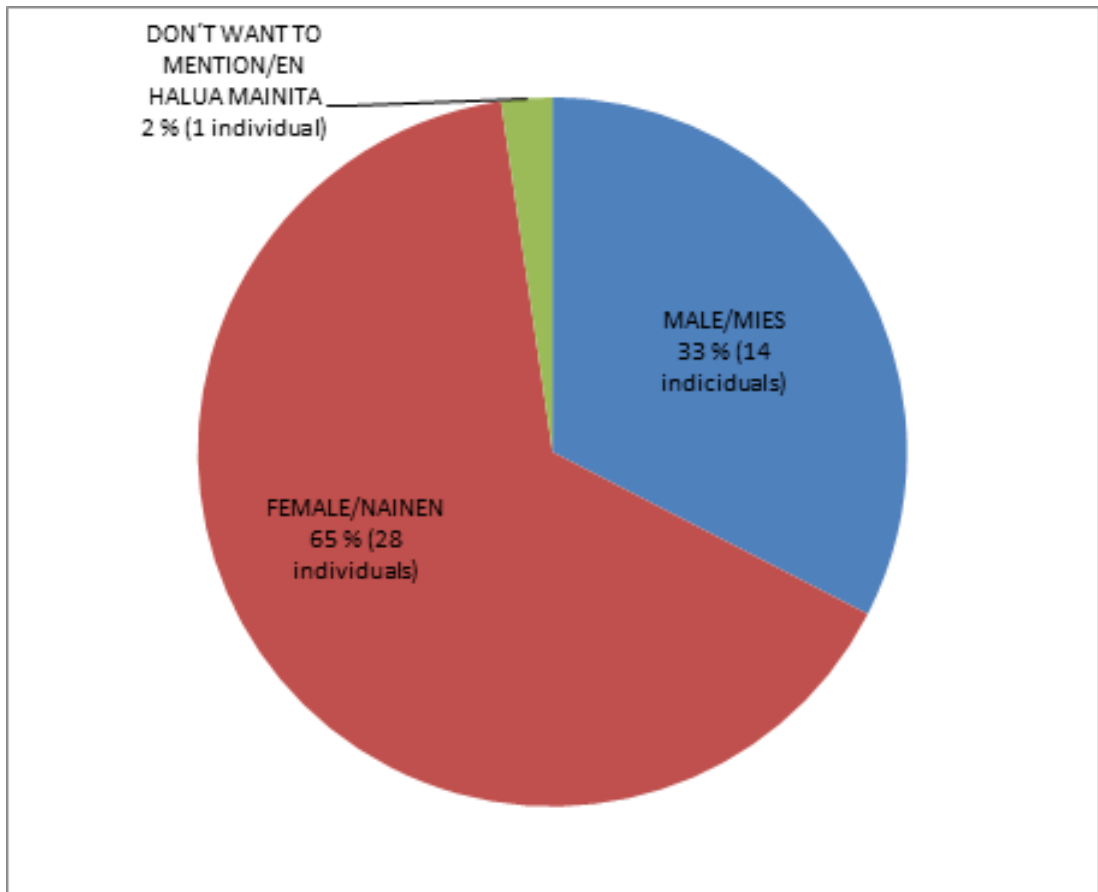


Figure 2. Distribution of participants by gender. N=43

The highest response rate came from 3rd year physiotherapy students with the response rate of 60,5%. 2nd years groups response rate being 39,5%. In this “3rd year students” refers to the students that started their physiotherapy studies in SUAS in 2016 and “2nd year students” refers to the students that started their studies in 2017. This sub-grouping was done to conclude each class’s involvement in the thesis process and to get a more comprehensive view of the participants. The distribution of participants by class is demonstrated in Figure 3.

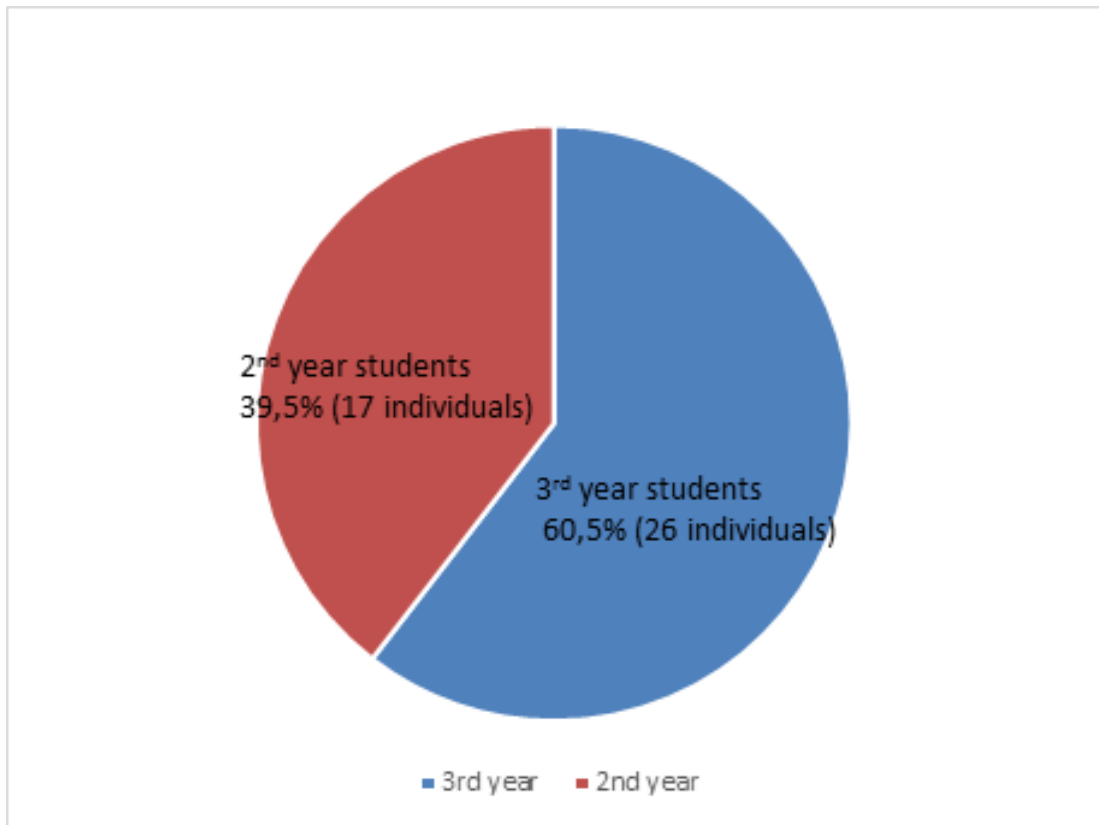


Figure 3. Distribution of participants by class. N=43

As stated before, the alternatives were based on the first questionnaire. The topics in hand were the following; stress management, nutritional supplement for people who train, sports-related nutrition, clinical reasoning in MSK cases, pelvic floor dysfunctions, maternity physiotherapy, sports-related physiotherapy, theories and methods related to guidance, fitness-enthusiast related doping, exercising and physiotherapy for a client with osteoporosis & functional anatomy. The participants were asked to pick three of the eleven topics that they found most interesting to have self-study material on. All the answers were considered in the analyzation of the data. Scoring for each topic is demonstrated in Figure 4. The average amount of answers per participant was 2,9.

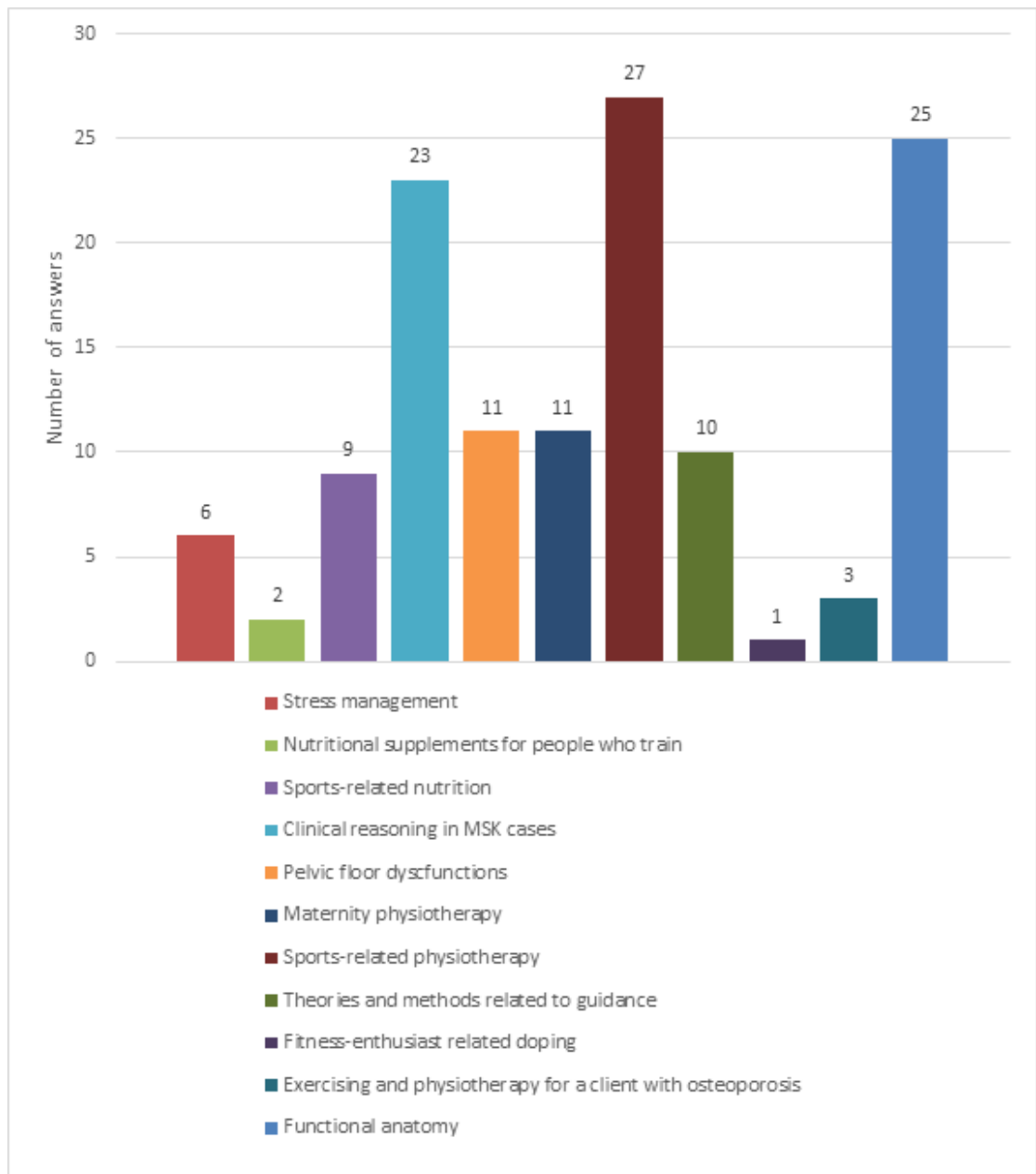


Figure 4. Scoring of each topic, N=128.

7 CONCLUSION

As studying is becoming more independent there is a bigger need for a variety of self-studying material. Based on the results gotten from the questionnaires, the authors will make an electronic self-study package of sport related injuries for the physiotherapy students of Satakunta University of Applied Sciences. This was done

to enhance the student's possibilities for self-studying, and self-development as professionals. An electronic version was made for it to be accessible in this BYOD – era in SUAS, and to make dispensing the study-package easier for the teachers.

8 SELF-STUDY PACKAGE: SPORTS RELATED INJURIES

Assembly of the self-study package was started by exploring the material of the subject. Searching for newest written and online material. The variety on the subject was wide and useful material was found. Due to the wide variety of the subject matter, critical reasoning and thinking had to be used. For material search we used online research service Finna, which is provided for students by library of Satakunta university of applied science. Research was done on studies and magazines from the field of sports injuries. For the study package layout, we chose Power Point –presentation because it's compatible with most computer-based programs and it's simple and easy user interface.

The table of content was based on the following topics: Firstly, sport injury definition and classification, injuries caused by physical activity, prevalence of sport injuries and types of sport injuries. Secondly, most common sport injuries on the upper and lower limbs, spinal injuries, head injuries and loss of consciousness. And thirdly, sports injuries care and recovery of soft tissue injuries, ligament injuries, muscle injuries, tendon injuries and skeletal injuries. The final product can be found as an Appendix 5.

8.1 Definition and classification of sports injury

Sports injury is a physical injury that occurs during physical activity to the body that prevents the body from fully functioning and requires recovery time to heal. It usually affects the musculoskeletal system - bones, muscles, tendons and cartilage. (Hautala & Ruuhinen 2011, 6.)

Sports injuries can be roughly divided into two categories. Acute Injuries, meaning rapid tissue damages. Acute injuries are classified as joint injuries, muscle injuries and fractures. Overuse injuries mean micro-damage on tissue resulting from excessive and unilateral loading and too short recovery time. Overuse injuries include e.g. shin splint, stress fractures and some back problems. (Website of Terveurheilija 2019A.) Table 4. illustrates the classification on sport injuries.

Site	Acute injuries	Overuse injuries
Bone	Fracture Periosteal contusion	Stress fracture 'Bone strain', 'stress reaction' Osteitis, periostitis apophysitis
Articular cartilage	Osteochondral/chondral fractures Minor osteochondral injury	Chondryopathy (e.g. softening, fibrillation, fissuring, chondromlacia)
Joint	Dislocation Subluxation	Synovitis Osteoarthritis
Ligament	Sprain/tear (grades I-III)	Inflammation
Muscle	Strain/tear (grades I-III) Contusion Cramp Acute compartment syndrome	Chronic compartment syndrome Delayed onset muscle soreness Focal tissue thickening/fibrosis
Tendon	Tear (complete or partial)	Tendinopathy (includes paratenonitis, tenosynovitis, tendinosis, tendinitis)
Bursa	Traumatic bursitis	Bursitis
Nerve	Neuropraxia	Entrapment, minor nerve injury/irritation, adverse

		neural tension
Skin	Laceration Abrasion Puncture wound	Blister Callus

Table 4. Classification of sporting injuries. (Website of Physiopedia 2019A)

Sport injuries can be divided into skeletal and soft-tissue injuries. Skeletal injuries include fractures and soft-tissues injuries include muscle, tendon and ligament injuries. Different types of tissue have a different biomechanical feature and their adaptation to exercise varies. (Engebretsen, Laprade, McCrory & Meeuwisse 2012, 3.)

Sports injuries can be described as a damage to the soft tissue that comes from a result of exercise or sports. Sports injuries can be divided into overuse and acute injuries, depending of the onset of the symptoms and the mechanism of the injury. Overuse injuries develop over time and acute injuries rapidly and have a clearer reason. Biomechanical terms can be used to describe the differences in acute injuries and overuse injuries. Static and dynamic muscle action produces internal resistance (stress) on the loaded muscles, which prevents tissue deformation (strain). Tissues have capacity and capability to tolerate stress and deformation differently, and when the tolerance level is exceeded, injuries occur. Acute injuries happen when loading is enough to cause irreversible deformation to the tissue, whereas overuse injuries occurs as a result of repeated overload, either at the load itself or due to insufficient recovery time between loads. In sports with a high risk of falling and speed, acute injuries are more common (e.g. downhill skiing) and team sports where there is a lot of contact between players (e.g. football and ice-hockey). Overuse injuries account for a large proportion of injuries in aerobic sports that require long training periods with a monotonous routine (e.g. cycling, skiing or long-distance running). But overuse injuries also occur in technical sports, where the same movement is repeated several times (e.g. weightlifting, tennis, high jumping and javelin throwing). (Engebretsen, et al. 2012, 1-2.)

Sports injuries can be also subdivided into different types of injuries to help to understand the prevention, treatment, and rehabilitation of different inju-

ries. Injuries can be categorized by birth or origin - external energy injuries or trauma or overload injuries. By injury anatomy - soft tissue injuries, skeletal injuries and nerve injuries. Depending on the time of injury - acute disability 0-48-72 h, subacute / semi-acute disability 48-72 h - 3 weeks, chronic or permanent disability. And by sport - running and jumping injuries e.g. track and field, skiing, ball games and throwing and impact injuries e.g. javelin throwing, volleyball, tennis. (Renström, et al. 2002, 15.)

In addition to the mechanism of injury, sports injuries can also be classified according to their severity, i.e. the degree of disability. Injuries can be classified into three different categories: mild, moderate and severe sports injuries. Mild sports injuries cause minor pain and minimal or no swelling to the athlete and do not prevent the athlete from practicing. In mild sports injuries, the affected area is not touch sensitive and does not show changes on the surface. Moderate sports injuries cause mild injuries more pain and swelling. These injuries limit athletic performance. The injured area is always touch sensitive. Slight dislocations are also part of moderate sports injuries. Severe sports injuries cause increased pain and swelling. Severe sports injuries affect not only athletic performance but also normal daily non-athletic routines. The injured spot is usually very sensitive to touch. Typical severe sports injuries include joint dislocations. (Walker 2012, 18.)

8.2 Injuries caused by sporting activity

The ability of the body to respond to physical training load with specific predictable adaptation is a basic principle of training. When loading exceeds what athlete is used to do, that will cause the tissue to adapt to new loading. For example, training provides a stimulus that causes muscles to increase the production of contractile proteins, muscle fibers become larger and more numerous, and muscle fibers are specifically adapted to whether training primarily requires endurance or maximal strength. This principle applies to all tissue types. The tendons, skeleton, cartilage and ligaments adapt respectively. The tissue tolerates more and becomes even stronger. However, if the tissues ability to adapt to training load is exceeded, injuries will occur. When training load increases the risk of overuse injury increases. Increase

in frequency of training session, increase in training intensity or duration in individual training session could cause injuries. Usually intensity, frequency and duration of training increases all at the same time, e.g. in the beginning of the season or in the training camp, that means that tissue is not able to adapt to the increased load in the training. (Engebretsen, et al. 2012, 2-3.)

In a study made by Haikonen (2017) are illustrated sports injuries and accidents among the population (Table 5). Most injuries sustained in sports injuries are sprains, dislocations and muscle injuries (62%). More than one fifth suffered bruising or wounds. Fractures were reported in 8% and in two cases out of 100 a concussion occurred. (Haikonen, et al. 2017, 19-20.)

Injury	Proportion of sports injuries
Sprain, strain, dislocation or muscle injury	62%
Bruise, contusion or wound	22%
Fracture	8%
Concussion	2%
Other injury	6%

Table 5. Typical injuries in sports accidents, 2017. (Haikonen, et al. 2017, 21)

Sudden injuries, i.e. acute injuries, injuries that result in, among other things, bone fractures, sprains of ligaments and tears in the muscles or tendons, and bruises. A sudden accident usually results in pain, swelling, tenderness, weakness and inability to load the injured part of the body. Chronic or stress injury refers to the gradual onset of tissue damage, often referred to as overload injury. Typical examples of stress injuries are various types of inflammation (including bursitis and tendinitis) and stress fractures. Despite the different types of birth mechanism, the symptoms of chronic injury are similar to those of acute injury: pain, swelling, tenderness and weakness. In addition, it may be difficult to load the symptomatic part of the body. (Walker 2012, 18.)

8.3 Prevalence of sports injuries

More than 430,000 injuries occur yearly in Finland alone. Many injuries could be prevented. Almost half of injuries sustained in sports injuries are due to sprains or strains. The most frequently injured body parts are ankle (26% of all sports injuries), knee (17%) and back (9%). (Website of Terveurheilija 2019A.) Physical injury-related physical injury accidents accounted for nearly 420,000 in the age group of 20 to 74. Over 330,000 people were suffered in sports injuries. Physical injuries were significantly lower in the elderly than in the young. 42% of sports injuries occurred in women and 58% in men (Figure 5.). Historical trends in the number of physical injuries among women and men seem to indicate, in the light of victim studies, a slight narrowing of the gender gap in the number of physical injuries. According to the first victim survey (1980), women in the population aged 15-74 accounted for about 30% of physical injuries and 70% for men, compared to 38% for women and 62% for men in 2009. It should be noted that the data from 2017 victim survey exclude 15-19-year old, so the results are not fully comparable. (Haikonen, et al. 2017, 19.

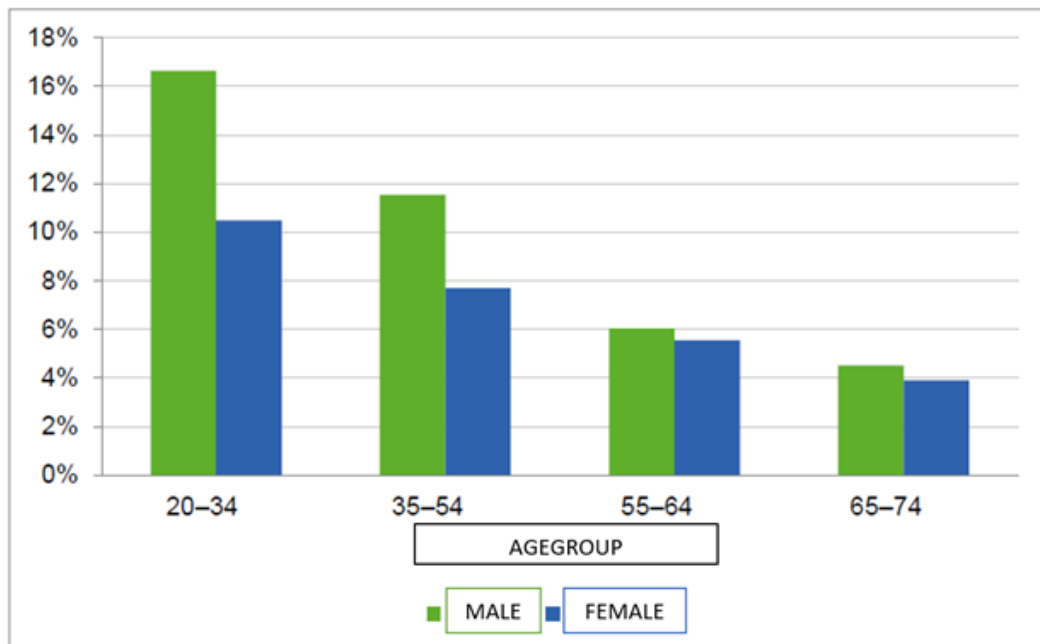


Figure 5. Percentage of males and females experiencing physical injuries in age groups, 2017. (Haikonen, et al. 2017, 19.)

The most common sports injuries occurred in jogging, walking, Nordic walking, etc. (16% of sports injuries happened in these fitness types of exercise). Gym training, gymnastics and weightlifting covered 14% and football 14% of all injuries. These forms of exercise can be estimated to happen at population level, about 180,000 sports injuries. In Cycling, floorball and cross-country skiing / skiing happen also a large number of sports injuries (Table 6). Walking and jogging are common forms of physical activity in the population and this explains their high proportion of disabilities. (Haikonen, et al. 2017, 19-20.)

Sports	Proportion of sports injuries
Fitness (e.gg walking, jogging, nordic walking)	16%
Gym training and weightlifting	14%
Football	14%
Cycling	9%
Floorball	8%
Cross-country skiing, skiing, snowboarding	6%
Ice-hockey, bandy, ringette	4%
Hiking, orienteering	3%
Volleyball	3%
Animal sports (e.g. horse riding, dog racing)	3%
Martial art	2%
Other sports	18%

Table 6. Sports with the highest number of accidents reported, 2017. (Haikonen, et al. 2017, 20.)

8.4 Most common sports injuries

The most common sports injuries are sprains in the groin, shin splint, neck injury, lower back injury, muscle sprain, fractures, rotator cuff injuries, tennis elbow, ankle sprain, “runners’ knee”, Achilles tendon injury and ligament injuries on the knee (Hautala & Ruuhinen 2011, 6). In the chapters 8.4.1-8.4.9 the most common upper

and lower limb, spinal, head/loss of consciousness, soft tissue, ligament, muscle, tendon and skeletal injuries will be presented.

8.4.1 Upper limb injuries

The shoulder is quite prone to injury and pain as a result of sports and exercise. Several acute injuries and pain-related conditions are known in the shoulder region. (Orava 2012, 45.) Typical shoulder injuries include ruptures of the rotator cuff, surrounding the shoulder joint and damages on clavicle and scapula ligaments. Exertion is often behind the inflammation of rotator cuff and biceps tendon symptoms. The thrower's hand is a shoulder injury that can be found in sports with high-level shoulder movements such as volleyball or tennis. The cornerstone of treatment for less severe symptoms is the restoration of shoulder mobility and muscle strength through exercise. (Website of the Terveystalo 2019A.)

A typical pain symptom on the inside of the elbow is often referred as golfer's elbow and pain symptom on the exterior side of the elbow is referred as tennis elbow. Inflammation of the articular capsule on elbow is often caused by strain, trauma or mechanical abrasion. The symptoms are swelling and pain in the elbow. Athletes that perform throwing movements may have a so-called thrower's elbow symptom on the back or inside of the forearm. The symptom is caused by twist in the joint when thrown. The most common injuries are ruptures on the outer and inner ligaments between the humerus and ulnar bone. These injuries are usually caused by accidents e.g. falls and sport. (Website of Terveystalo 2019B.)

8.4.2 Lower limb injuries

The tendon and ligament structures that make our hip move may come symptomatic after abnormal strain. A typical hip injury is a fracture on the neck of the femoral bone, which most commonly occurs to elderly person as a result of a fall. Hip osteoarthritis symptoms are a condition that is becoming more common from a result of

age or injury. The cornerstone of treatment for less severe symptoms is the restoration of hip mobility and muscle strength through exercise. (Website of Terveystalo 2019C.)

Knee joint is a large joint that supports body weight. Therefore, knee ailments often cause a significant decrease in physical performance. Typical knee injuries include various degrees of ruptures of the ligaments that support the knee as a result on severe twisting of the knee joint. Injuries are often the result of, for example, intense sports such as soccer or downhill skiing. Tendon and ligament structures that move the knee may also be symptomatic from abnormal strain. (Website of the Terveystalo 2019D.)

Typical ankle injuries include damages to the ligaments and tendons that move the ankle and fractures of the fibula and tibial bone head. Injuries often occur as a result of tripping or falling or, for example, in ball sports. The cause of foot pain is often the result of misalignment caused by abnormal loading, such as dislocated bones and osteoarthritis. (Website of Terveystalo 2019E.) Studies show that up to 70% of those who suffer ankle sprains will suffer from repetitive sprains, and go on to suffer chronic ankle instability (CAI) (up to 74%, according to one study (Mckay 2001, 103-108). Pasanen's research results in her doctoral dissertation show that lower limb injuries, especially non-contact knee and ankle injuries, are unfortunately common among female players (Pasanen 2009, 8).

8.4.3 Spinal injuries

Muscle sprain and stretch injuries often occur in the lower back, in the lumbar spine and sacrum. Back sprain injuries often occur when the muscles or tendons stretch to the extreme. Symptoms include pain, muscle tightness and reduced back mobility. Back muscles are usually healed with adequate rest. Failure to properly treat muscle rupture can result in chronic back pain and muscle tightness, which can lead to muscle and tendon deterioration. Immediate pain can be alleviated by resting on backside on a flat surface with knees hooked. In addition, ice packs and anti-inflammatory drugs can help to relieve pain. After a cold treatment to relieve an acute inflamma-

tion, a slight local heat treatment can alleviate muscle pain. The healing time for spinal muscular spastic injuries varies greatly depending on the severity of the sprain, the location of the injury, and the athlete's condition. (Walker 2012, 144.)

Sudden, abnormal motion or continuous and repetitive movement can overload the spinal ligaments, causing them to tear or rupture. Spinal ligament injuries occur in many different types and cause not only pain but also different degrees of movement restriction. Typical symptoms of spinal cord injury are pain and muscle tension. Bending forward and rising from a bent position are usually painful. There may also be tenderness in the back and an inflammatory reaction. The athlete should return to training only after the injury has healed to avoid further damage to the ligament and prolongation of the injury. Immediate treatment is RICE and rest and the use of anti-inflammatory drugs. For the treatment of mild to moderate back injury, the athlete will usually need a few days' rest. The faster you return to sports, the better you will be to avoid movement restrictions and muscle weakness in your back. However, back-loading and back-muscle strength training should be avoided until the injury is completely healed (Walker 2012, 145.)

Lumbar vertebrae integrate to each other with a facet joint. In facet joints, the upper joint branch of the individual vertebrae integrates with the upper vertebra and the lower joint branch with the lower vertebra. The area between the articulated lobes is the weakest point of the vertebral bone structure. Overload injuries can lead to fracture of the area between the joints of the vertebra. The vertebra of the lower lumbar vertebrae is the most typical area where a fracture may occur in the back. Spinal vertebrae fractures (spondylolysis) are common injuries in athletes. Injuries are caused by overloading and over-stretching the back. Injuries are typical for a young, growing athlete during a period of rapid growth. Typical symptoms of lumbar vertebrae fractures are low back pain that spreads to both sides of the back. In addition to pain, the symptoms include muscle spasms and tightness of the back and hamstrings, which cause changes in posture. If the vertebral displacement resulting from a stress fracture is ignored, the situation may worsen and eventually lead to the end of a sports career. Damaged bone requires enough time for new bone formation and healing. In extreme cases where stress fractures do not heal, surgical treatment may be required. Immediate treatment for spinal stress fractures is rest and avoiding excessive back

loading. Cold packs, pain medicines and anti-inflammatory medicines can reduce inflammation and pain. At a later stage, heat treatment can improve blood circulation. The healing process for fractures takes about six weeks or sometimes longer, depending on the severity of the injury. After this step, mobility and strengthening exercises should be started, however, avoiding overloading the back. (Walker 2012, 149.)

8.4.4 Head injuries / loss of consciousness

Head injuries are the most serious injuries in any sport. Head injuries include concussion due to a sudden impact and injuries that damage the brain tissue as well as intracranial hemorrhages and bone fractures. The most common types of head injuries appear in contact sports such as boxing, American football and ice-hockey. (Walker 2012, 72.) Head injuries occur in almost all sports but most in contact sports (Renström, et al. 2002, 431).

There are two types of status of unconscious. Unconsciousness caused by a head impact, which can occur in the event of a rollover or collision, and unconsciousness caused by circulatory failure in athletes during e.g. in long runs sports (Renström, et al. 2002, 431).

Symptomatic skull injuries should always be considered serious, whether they are unconscious or not, as they may have life-threatening consequences. The longer the loss of consciousness is, the more severe the injury. Unconsciousness causes memory loss. The easiest way to find out if an injured person has been unconscious is to interview him / her about the events during accident, and before and after the accident. (Renström, et al. 2002, 431.) It usually takes 7-14 days for adults to recover from a concussion, and longer for younger athletes. The injured athlete should not be allowed to play sports on the day of the injury (Website of Terveurheilija 2019B).

The SCAT5 is a standardized, concussion screening instrument for the acute assessment of athletes with a potential concussion. The SCAT5 is a clinically suitable tool

for clinicians to capture the spectrum of clinical signs and symptoms, cognitive dysfunction, and neurological deficits that often accompany a concussion. (Hänninen 2017, 27-28.) The SCAT5 is used by healthcare professionals in the evaluation of individuals, 13 years old or older, who are suspected of having sustained a sports-related concussion (SRC) (Echemendia, R. et al. 2017, 848-850).

8.4.5 Soft tissue injuries

Soft tissue includes tendons, ligaments, muscles, nerves, fascia, fat, fibrous tissues, blood vessels and synovial membranes. (Website of the Sports Medicine Australia 2017). Soft tissue injuries (STI) are when trauma or overuse occur to ligaments, tendons or muscles. Sudden unexpected or uncontrolled movement like rolling over ankle or stepping awkwardly are the causes of most soft tissue injuries. Excessive overuse and chronically fatigued structures, like tendons and muscles can also cause soft tissue damage. Most common soft tissue injuries are ankle sprain, back strain, calf strain, golfer's and tennis elbow and hamstring strain. Once soft tissue is injured, immediate pain and immediate or delayed swelling will occur in the damaged area. Healing process can be affected by excessive swelling. As a result, from swelling or trauma, stiffness is very common. After 24-48 hours bruises can also develop. In more severe soft tissue injury cases on ligaments, tendons and muscles, person may experience instability, especially on the hip, knee and ankle, in joints that are weight-bearing joints. (Website of Physiotherapy Clinics 2019.)

The following process is designed to treat soft tissue injuries. These injuries include sprains, tears, and bruises in the muscles, tendons, ligaments and joints. 1. First Aid: The first three minutes: The first three minutes after an injury are crucial. At this stage, an initial assessment of the quality of the injury is made, and the necessary steps are taken to minimize the injury and prevent further injury. This is a priority when treating a sports injury. The sooner an injury treatment is started, the better the chance for an injured athlete is to recover fully. 2. Treatment for the next three days: The best early care for soft tissue injuries is "RICE and rest". Look for more information in chapter 8.5. (Walker 2012, 49-57.)

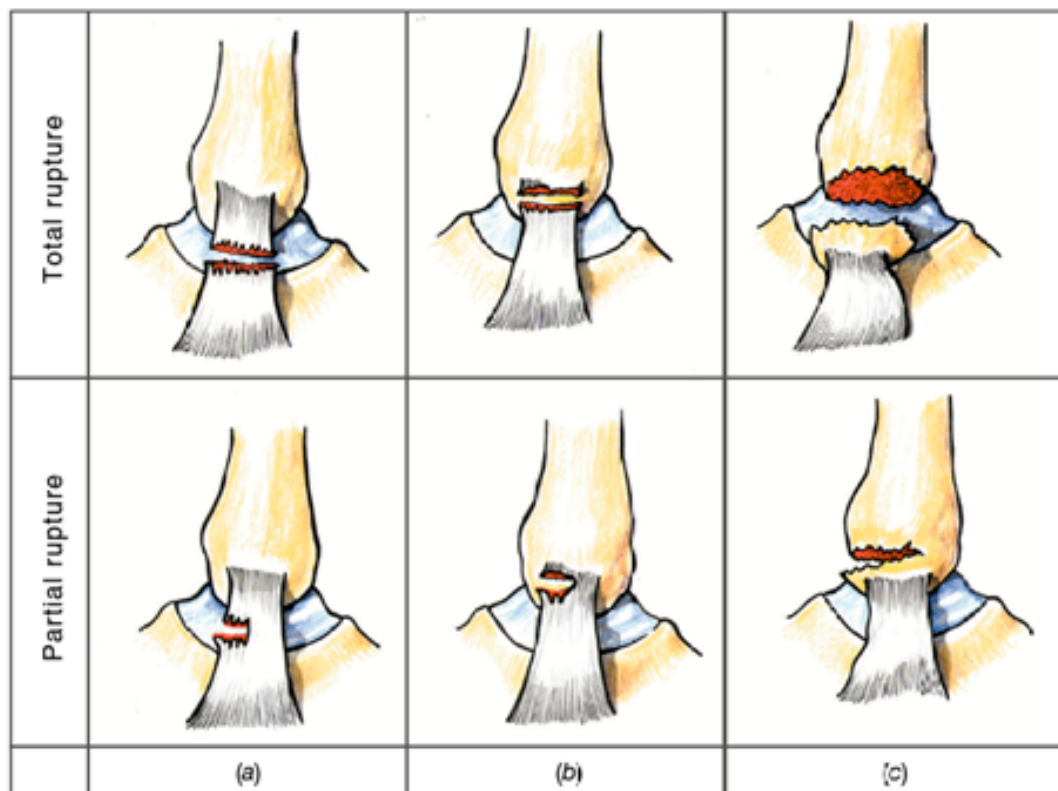
Rehabilitation of soft tissue injuries for the next three weeks: Tear or damage is repaired by scar tissue. Untreated scar tissue is the cause of new injuries, usually months later, when the injury is thought to have completely healed. When scar tissue is formed around the area of injury, it is never as strong as the original tissue. It also tends to tighten and distort surrounding tissues. This implies a reduction in the length of the soft tissue and consequently a decrease in mobility. Second, there is a weak spot in the soft tissue, which can lead to further or new injuries. Scar tissue formation results in reduced strength and power output. (Walker 2012, 49-57.)

Fitness training for the next three months: As part of the rehabilitation phase, the athlete must do exercises that help to speed up the recovery phase. The purpose of this rehabilitation phase is to regain the features lost as a result of the injury. The focus is on restoring mobility, strength, power, endurance, balance and coordination. (Walker 2012, 49-57.) In order to speed up the healing process and get rid of scar tissue as much as possible, two important treatment steps must be started. The first is the treatment method used by physiotherapists to increase blood circulation in the area of injury. The goal is to increase the amount of oxygen and nutrients in the damaged tissue. A physiotherapist can help by stimulating the injured area. More commonly used are ultrasound, TENS and thermal treatments. Another treatment to reduce scar tissue formation is deep tissue sports massage. Ultrasound and thermal treatment help the injured area, they do not reduce scar tissue. Only manual manipulation, or massage, does this. (Walker 2012, 49-57.)

8.4.6 Ligament injuries

Ligaments are made of collagen tissue that connects bone to another. Ligaments consist of collagen fibers, proteoglycans and cells. Primary function of ligament is to stabilize the joints and to serve an important role in functions that require proprioception. Ligaments connect to bone directly or indirectly. (Engebretsen, et al. 2012, 3-4.) Joint stability depends on active and passive structures. Functional muscles actively support the joint and ligaments support passively. The ligaments must be perfectly healthy for the joint to function properly. (Peterson & Renström 1987, 16.)

Typical cause of ligament injury is typically an acute trauma. Mechanism of injury is a sudden overload on the ligament, where the ligament is stretched into an extreme position. For example, (Picture 1.) inversion trauma in the ankle may cause the lateral ligament to rupture. Ruptures can be found in the midsubstance part of the ligament or at the bone-ligament junction. Avulsion fractures can sometime happen, this means that the ligament pulls a piece of the bone with it when trauma occurs. Different factors determine the location of the rupture, age is one factor. Children often have avulsion fractures while midsubstance ruptures can be found in adults. For middle-aged patients the weak point is bone-ligament junction and for elderly most common are avulsion fractures, especially if the skeleton is osteoporotic. Overuse injuries in the ligaments are not common, and symptomatic inflammatory conditions are rare. Still overuse injuries can occur if the ligament is gradually stretched, therefore causing microtrauma in the tissue. (Engebretsen, et al. 2012, 5.)



Picture 1. Various types of ligament injuries. (Engebretsen 2012, 6)

The goal of physiotherapeutic rehabilitation is to improve the stability and proprioception of the injured joint through active muscular exercises (strengthening and

stretching movements, balance exercises) and the elimination of swelling and pain through physical therapy. (Renström, et al. 2002, 91.)

8.4.7 Muscle injuries

The musculoskeletal system contains about 350 muscles, which account for about 40-50% of body weight. There are three types of muscle tissue: skeletal, cardiac and smooth muscle. (Renström, et al. 2002, 93.) Muscle injuries account for a large proportion of an athlete's injuries, but on average have a low degree of disability. The training interruption caused by muscle injuries is usually short, but there are exceptions. Typical muscle injuries include muscle spasms, varying degrees of muscle tears, muscle hemorrhage, and muscle tendon injuries. (Renström, et al. 2002, 93.) Skeletal muscle injuries stand for a great part of all traumas in sports medicine, with an incidence varying from 10% to 55% of all sustained injuries. They should be treated with necessary precaution since a failed treatment can postpone an athlete's return to the field with weeks or even months and cause re-occurrence of the injury. (Web site of Physiopedia 2019.)

In muscle cramping or in muscle spasms, a muscle or muscle group is compulsively tense, causing pain and limiting movement. Usually, convulsions are surprising during or after intense exertion. Continued exercise despite spasms can result in muscle fiber ruptures. Muscle cramps are most commonly found in the hamstring, adductor and in the calf muscles (m. Soleus and m. Gastrocnemius), especially for ball players, runners and racket players. Typical convulsion injuries for cyclists and triathletes include cramps in back extensor muscles, and in contact sports, the thigh muscles due to impact on them. (Renström, et al. 2002, 97.)

Muscle strains can be categorised into 3 grades based on the severity. Grade I (Mild), small number of muscle fibres are affected by mild strain. Active and passive range on motion and muscle strength have not decreased. Tenderness and pain occur next day of the incident. Grade II (Moderate), nearly half of muscle fibres are torn

due to moderate strain. Substantial and acute pain together with minor decrease in muscle strength and swelling can be seen. Muscle contraction produces pain. Grade III (Severe), strains represent complete rupture of the muscle. This means that the muscle belly is torn in two parts or the tendon is separated from the muscle. Severe pain and swelling and a complete loss of performance are typical for severe strains. Severe strains can be seen most frequently in musculotendinous junctions. (Website of Physiopedia 2019B.)

8.4.8 Tendon injuries

Tendons are made of connective tissue that attaches muscle to bone. Their primary function is to transfer force from the muscles into the skeletal system and therefore are important for joint stabilizing. Another important role is related to elasticity of the tendon, this allows stored short loading energy quickly to be released, example in jumping. (Engebretsen, et al. 2012, 8.) Tendons are located between muscles and bone and are white and bright in color, their elastic form gives them strength to transmit huge mechanical forces. A muscle has two tendons, one distally and one proximally. The point where the tendon is attached to the muscle is also known as musculotendinous junction (MTJ) and where the tendon is attached to the bone is known as osteotendinous junction (OTJ). The purpose of the tendon is to transmit forces generated from the muscle to the bone to cause movement. Depending on the role of the muscle, tendons have different sizes and shapes. Shorter and wider tendons can be found in muscles that generate lot of power and forces and long and thin tendons can be found in muscles that generate fine delicate movements. (Website of the physio-pedia 2019B.)

Tendons can be injured in many ways, as overuse injuries and acute injuries. Tendons tend to be superficial and for that reason they are vulnerable for penetrating stab or a cut. Acute tendon ruptures happen if tendons ability to tolerate force is exceeded. When eccentric force generation is used, these types of tendon ruptures usually occur. Tendon ruptures can be total or partial and often they occur in the midtendon substance. Most common acute tendon injuries are in athletes between 30-50 years of age in explosive sport. Tendons tissue type is often affected by over-

use injuries. Many different terms are used to describe overuse injuries: bursitis/ hemobursitis (bursal inflammation, possibly with bleeding), periostitis (periosteal inflammation), tenoperiostitis (inflammation of tendon insertions and origins), tenosynovitis (tendon sheath inflammation) and tendinitis (tendon inflammation). (Engelbrechtsen, et al. 2012, 9-10.)

8.4.9 Skeletal injuries

Stress fractures are a special group in Sports and exercise. Continuous running, jumping, or torsional stress initially causes a small microscopic fracture of the bone, which attempts to heal. When you do not take a break from exercising, the fracture area enlarges, creating a true fissure, which can later become a fracture line as the exercise continues and even cause a complete fracture of the bone. Fatigue fracture is an easily occurring 'fracture of the bone'. The bone itself is normal but not accustomed to abnormal loading, as in athletes. "Insufficiency fracture", in turn, means "stress fracture" of an osteoporotic or osteomalacia-weakened bone without acute trauma. Stress fractures occur in many bones, both in the lower limbs, upper limbs, and body area. (Orava S. 2012, 9.)

Treatment of a fracture is a break from the load at which the symptoms appear. Break from running and other sport depends on the location of the fracture, the bone and the nature of the fracture. Mostly break refers to being absent from running and jumping, but refers to any rhythmic, twisting, whipping or vibrating repetitive movement. A support belt or a support vest or a custom-made support corset is used to treat a torso, such as a lumbar spine. A long-term athlete can also get help with lower limb orthosis. Shock absorbing heels and insoles can also be used. The principle of treating a fracture is to maintain good blood circulation in the fracture area. In addition, cold and heat treatment can stimulate blood circulation as well as pulsating ultrasound therapy. Studies have not shown similar benefits in drug treatment. (Orava 2012, 9-14.)

8.5 Cold, compression, elevation (KKK) / (PRICE)

The best initial treatment for soft tissue injuries is the "KKK" and rest "treatment program. This includes (K) kylmä, (K) koho, (K) kompressio and rest, or same in english is called PRICE which stands for protection, rest, ice, compression and elevation. When "KKK and rest" are used immediately after injury, it has been found to significantly reduce recovery time. "KKK and Rest" is the first and perhaps most important step in the rehabilitation of an injury and forms the basis for healing the injury. When a soft tissue injury occurs, an inflammatory reaction occurs in the injured area. Inflammation causes swelling, which puts pressure on the nerve endings and causes more pain. The "KKK and Rest" program helps ease this inflammatory, swelling and pain reaction. The treatment helps to limit tissue damage and aids in the healing process. (Walker 2012 49-51.) When "KKK and rest" is used after the soft tissue injury occur, it helps to limit the formation of scar tissue (Walker 2012, 52).

Rest, it is important to keep the injured area as stationary as possible. The affected area should be supported with a splint. This helps to reduce blood flow to the injured area and prevents further damage. Cold. This is the most important area. The use of ice is usually the most helpful in reducing inflammation, bleeding, swelling and pain. Use ice immediately after injury. Compression has two functions. First, it helps to reduce bleeding and swelling around the affected area and, secondly, it supports the affected area. Elevation. Whenever possible, lift the injured area above the heart. This will help to reduce bleeding and swelling. (Walker 2012, 49-51.)

9 DISCUSSION

The physiotherapy students of SUAS decided on wanting self-study material in sports physiotherapy. Furthermore, the authors limited the subject to sport related injuries due to sports physiotherapy being too wide of a subject for a thesis. The results confirm that there are subjects that have been left out due to current changes and verifies that there is a need for a variety of self-studying material for physiother-

apy students. Therefore, these types of “projects” are important in the future since providing the students with more comprehensive self-studying material will enhance their learning. Electric material is needed because of this Bring Your Own Device (BYOD) – era in Satakunta University of Applied Sciences (SUAS) and because electric material is easier to distribute to the students. After all, this thesis and the learning package that came out of it, is based on the student’s needs.

Thesis process started in autumn 2018 and carried out until autumn 2019. In 2018 schedule was made, but the authors were not able to stick to it due to personal reasons and overlapping schedules. The thesis process is presented in Figure 1. The authors divided the thesis process into two parts. The other one focused more in the questionnaires and the analyzation of data, and the other one focused more on making of study package. Of course, the authors worked on both parts together, but this was the rough cut.

9.1 Limitations

Regarding the study design, the authors felt like the first questionnaire, that was dedicated for the teachers, should have been more precise. As in, the authors should have made the directions for answering the research question clearer and asked for more precise subjects that had been left out of the curricula, rather than wide subjects.

Quantitative research already has its own limitations. The main problem being the fact that, the researcher can’t be sure of how honest the answers are, and how seriously the part-takers have taken the research. The authors tried to limit this by asking clear questions so that answerers are capable and willing to answer correctly. There were also some limitations that occurred throughout the process. The small number of participants (1st questionnaire: 6 participants and 2nd questionnaire: 43 participants) hindered the credibility of the results. Having a bigger number of participants would have given the authors more of a comprehensive view of what is desired and made the research more credible.

9.2 Recommendations for future research

In the future a more detailed research on the subject could be done to gather a more comprehensive idea of what students want. Overall, there should be more detailed information about injury- and sport-specific care and rehabilitation. E.g. how to treat an inflamed tendon. These types of “projects” will be important in the future since providing the students with more comprehensive self-studying material will enhance their learning. Strewing information throughout the courses hinders students learning experience. Therefore, coherent study material that combines information from various courses is needed.

KIHU – Research Institute for Olympic Sports – works to promote Finnish top-level sport through advanced, innovative and ethically responsible applied research, development and expertise activities (Website of KIHU). KIHU, together with Jyväskylä UAS and University of Jyväskylä, work on further developing a project called Training Room. The aim of Training room is to develop preventive health care and rehabilitation, as well as preliminary and restoring methods for exercise and standards of activity (Website of Training Room). Training Room includes some guidelines on the rehabilitation of soft tissue injuries. So, this could be used as a source of material for another research focusing on a more specific subject and/or an overview of treatment guidelines for specific sports injuries.

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Kysely opettajille

Nimeä **max. viisi** aihetta, joiden **itseopiskelumateriaalista** opiskelijat eniten hyötyisivät. Vastausten perusteella lähetämme jatkokyselyn toisen ja kolmannen vuoden fysioterapiaopiskelijoille. Opinnäytetyön tarkoituksena on rakentaa SAMK:n fysioterapiaopiskelijoille itseopiskelupaketti valitusta aiheesta. Kyselyn vastaukset käsitellään anonyymisti ja niitä käytetään vain tätä opinnäytetyötä varten.

Answer here:

Questionnaire for physiotherapy students in SAMK/Kysely SAMK:n fysioterapiaopiskelijoille

In this thesis, through questionnaire, we wanted to find out which topics of physiotherapy have been diminished, and those whose hours have decreased due to changes in curricula. Based on the answers from this questionnaire we will conduct a self-study package for the physiotherapy students in SAMK. All of the answers will be dealt with anonymously and used only for this thesis.

Note! We have the research permission from SAMK to do this questionnaire.

Opinnäytetyössä selvitetään kyselyn avulla fysioterapia- opetuksen aiheita, joita on opetussuunnitelmissa tapahtuvien muutoksien vuoksi jäänyt kokonaan pois sekä niitä, joiden tuntimäärät ovat vähentyneet. Vastausten perusteella rakennamme itseopiskelupaketin SAMK:n fysioterapiaopsieklijoille. Kyselyn vastaukset käsitellään anonymisti ja niitä käytetään vain tätä opinnäytetyötä varten.

Huom! Meillä on SAMK:n tutkimuslupa tämän kyselyn tekemiseen.

Basic information/Perustiedot

Class/Vuosikurssi:

- PH16
- FY16
- PH17
- FY17

Gender/Sukupuoli:

- MALE/MIES
- FEMALE/NAINEN
- DON'T WANT TO MENTION/EN HALUA MAINITA

TOPICS TO CHOOSE FROM:

Choose 3 of the topics that seem the most interesting to you/Valitse 3 aihetta, jotka vaikuttavat sinusta mielenkiintoisemmalta.

- STRESS MANAGEMENT/STRESSIN HALLINTA
- NUTRITIONAL SUPPLEMENT FOR PEOPLE WHO TRAIN/KUNTOILIJAN LISÄRAVINTEET
- SPORTS-RELATED NUTRITION/URHEILURAVITSEMUS
- CLINICAL REASONING IN MSK CASES/KLIININEN PÄÄTTELY TULE-TAPAUKSISSA
- PELVIC FLOOR DYSFUNCTIONS/LANTIONPOHJAN TOIMINTAHÄIRIÖT
- MATERNITY PHYSIOTHERAPY/ÄITIYSFYSIOTERAPIA
- SPORTS-RELATED PHYSIOTHERAPY/URHEILUFYSIOTERAPIA
- THEORIES AND METHODS RELATED TO GUIDANCE/OHJAUKSEEN LIITTYVÄT TEORIAT JA MATERIAALIT
- FITNESS-ENTHUSIAST RELATED DOPING/KUNTOILIJAN DOPING
- EXERCISING AND PHYSIOTHERAPY FOR A CLIENT WITH OSTEOPOROSIS/OSTEOPOROOSIA SAIRASTAVAN LIIKUNTA JA FYSIOTERAPIA
- FUNCTIONAL ANATOMY/TOIMINNALLINEN ANATOMIA

Hyvät opettajat,

Olemme 3. vuoden fysioterapiaopiskelijat Serita Lång ja Jussi Vahtio. Lähestymme teitä sähköpostilla opinnäytetyötämme koskien. Opinnäytetyömme aihe on selvittää kyselyjen avulla fysioterapia -opetuksen aiheita, joita on jäänyt kokonaan pois tai joiden tuntimäärät ovat vähentyneet opetussuunnitelmien muutosten takia. Teille, opettajille suunnatun kyselyn vastausten perusteella lähetämme uuden kyselyn toisen ja kolmannen vuoden fysioterapiaopiskelijoille. Saatujen vastausten perusteella tarkoituksemme on rakentaa itseopiskelupaketti vastausten perusteella valitusta aiheesta Satakunnan Ammattikorkeakoulun fysioterapiaopiskelijoille.

Toivomme että käytätte aikaanne ja vastaatte tähän kyselyyn.

<http://elomake.samk.fi/lomakkeet/8851/lomakkeet.html>

Hyvät opiskelijat,

Olemme 3. vuoden fysioterapiaopiskelijat Serita Lång ja Jussi Vaahtio. Lähestymme teitä sähköpostilla opinnäytetyötämme koskien. Opinnäytetyömme aihe on selvittää kyselyjen avulla fysioterapia -opetuksen aiheita, joita mielestänne olisi tarpeellista hallita, mutta niitä ei ole käsitelty opintojen aikana. Teille suunnatun kyselyn vastausten perusteella rakennamme itseopiskelumateriaalia tuleville ja nykyisille SAMK:n fysioterapiaopiskelijoille.

Toivomme että käytätte aikaanne ja vastaatte tähän kyselyyn.

Dear students,

We are 3rd year physiotherapy students Serita Lång and Jussi Vaahtio. We approach you by email regarding our thesis. The purpose of our thesis is to find out, through surveys, the topics of physiotherapy, which you consider essential to know, but have not been included in the studies. Based on your answers, we intend to build a self-study package for new and current physiotherapy students at Satakunta University of Applied Sciences.

We hope that you have time and answer this questionnaire.

Ystävällisin terveisin, Best regards

Serita Lång and Jussi Vaahtio

Linkki kyselyyn alla, link to the survey below.

<https://elomake.samk.fi/lomakkeet/8850/>