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THE BENEFITS OF THE USE OF SALLI-SADDLE CHAIR ON
PELVIC GIRDLE PROBLEMS
- questionnaire

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The purpose of this thesis was to investigate the experience and effect of using a Salli Saddle chair among customers who have used the chair for over a year. The research purpose focused on investigating the reasons why the chosen samples are using a Salli Saddle chair. The gathered information should provide information on the reasons behind the individual's decisions. One focus of the thesis was finding out if there are benefits in using an ergonomic chair in prevention or reducing pain/symptoms in the pelvic girdle area. This thesis has been made in co-operation with SALLI Systems.

The research design was a structured online-based questionnaire. The participants were selected by using purposive sampling. The participants consisted of individuals who have registered themselves as Salli Saddle chair users and have six months later filled in a questionnaire about customer satisfactory. The questionnaire was received by 182 individuals from whom 68 participants answered to the questionnaire totalling a 37% response rate. The participants consisted of 65% males and 35% of females.

The theoretical part of the thesis provides theoretical background for supporting the use of ergonomic chair and chair intervention in the prevention of work related musculoskeletal disorders. The thesis will give an overview on the results gathered from the questionnaire.

The results indicate that it is beneficial to use a Salli Saddle chair in reducing pain/symptoms in the pelvic girdle region, as a preventative measure and for other reasons. Out of the participants 79,4% find using the Salli Saddle chair very or significantly beneficial. From the participants that had acquired the Salli Saddle chair for pain/symptoms in the pelvic girdle area 8 out of 23 individuals reported that the pain/symptoms had completely disappeared and that the chair has been very or significantly beneficial. Only one out of 68 participants felt that there has been no change in the pain/symptoms and that using the Saddle chair has not been beneficial at all. However majority of the participants perceive that they have benefited from the use of the Salli Saddle chair in decreasing their pain/symptoms of the pelvic girdle region.

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1 INTRODUCTION

In the current society sitting is a significant part of our daily activities often connected both to work and leisure time. People spend a significant portion of the day at their work place, thus it is important that the work environment should be appropriate. However this may not be the case, as the work environment may include several problems related to various issues such as ergonomic hazards caused by excessive force, awkward positions, repetitions, heavy lifting, forced inactivity or static postures. (Burton 2010, 78)

The static postures caused by sitting, such as with computer work, may be linked to work related musculoskeletal disorders. Changing posture will activate different muscles and cause variability while carrying out tasks. The variability to the posture can be achieved and maintained by adjustable chairs and tables. (WHO 2003, 7) Changing the work surface and chair are one of the most common modifications among individuals who suffer from musculoskeletal symptoms related to prolonged sitting (Van Niekerk, Louw & Hillier 2012, 2).

According to Burton (2010, 7) the conditions at a workplace account for over a third of back pain that workers experience. Preventing occupational hazards is an important issue that should not be overlooked. The WHO has created a Worker's health: global plan of action that has the primary goal of preventing occupational hazards, diseases and injuries. This plan of action includes introducing healthy work practices and work organizations to help prevent occupational hazards. The action also encourages both the workers and employers to take part in the development and establishment of a healthy workplace. (Workers' health: global plan of action 2008-2017. 2007, 6-7)

Based on recent researches the amount of sitting or sedentary time per day ranges from typically 7.7–10 hours per day to up to 9-11 hours (Matthews et al. 2008; Owen, Healy & Howard 2012, 3; Chau et al. 2013, 1). This is a considerably long time for anyone who does not have an appropriate chair. A solution for an appropriate chair would be

to choose a chair that can be adjusted according to each person and their anthropometric features. Salli Systems, the co-operating partner of this research have developed an ergonomic chair, the Salli Saddle chair, which simulates sitting on a saddle with its sitting position. The design of the chair creates a relaxed, natural and neutral posture for the back where the thighs slope downward. The chair helps create a sitting posture that is similar to standing and that feels natural. In addition the chairs with the Swing mechanism adjust to small movements and activate the posture muscles of the core making maintaining good posture active rather than passive. (Salli 2016) This research attempts to investigate the effectiveness of Salli Saddle chair among long time users and the possible benefits of the use. The investigation was carried out in the form of a questionnaire for the customers with a Salli Saddle chair.

2 PURPOSE AND AIM OF THE THESIS

The purpose of this thesis was to investigate the experience and effects of using a Salli Saddle chair among customers who have used the chair for over a year. The research purpose focused on investigating the reasons why the chosen samples are using a Salli Saddle chair. The gathered information should provide information on the reasons behind the individual's decisions.

The thesis focuses on finding out if there are benefits in using an ergonomic chair in prevention or reducing pain/symptoms in the pelvic girdle area. In this research the types of problems are classified generally as perceived pain/symptoms in pelvic girdle area. The classification is based on the participant's subjective evaluation. The results gathered from this questionnaire will provide Salli Systems with information concerning the use of their products. The results of this thesis provide an overview of the participants and give the company the possibility to develop their products in the future or for more targeted marketing strategies.

The theoretical background does not cover the specifics of a good posture or the specific work related musculoskeletal disorders. The total amount of sitting and how frequently the participants have breaks in their sitting will not be in the focus of this

thesis. The focus of sitting time will be on the total hours of sitting per day and hours sat on the Salli Saddle chair. The overall disadvantages of sitting are excluded due to not being the target of this research. The theory provides evidence of the benefits of chair intervention at a work environment and the hazards related to different occupations.

3 MECHANICAL OVERLOADING

Mechanical overload of muscles, tendons, joints, ligaments and bones may cause disorders or injuries. An important factor that influences the development of musculoskeletal disorders is duration of exposure. Mechanical overload can be divided in different categories; the level and direction of forces, duration of exposure, number of repetitive movements, and postural demands (WHO 2003, 3-4). Handling heavy loads is a risk factor for musculoskeletal disorders. However repeated manipulation or handling of objects, although light in weight or objects that produce low forces predisposes to musculoskeletal disorders. Typing for a long time falls under the above mentioned category as a risk factor for work-related musculoskeletal disorders or discomfort. (WHO 2003, 5; Robertson 2007, 135)

Muscular inactivity plays a role in the development of musculoskeletal disorders. In order to maintain the functional capacity of muscles, tendons and bones, activation is needed. In the absence of muscle activity deconditioning will develop which may lead to functional and structural deficits. As a consequence the muscle will not be able to provide the proper stability to the joints and ligaments. Changing posture will activate different muscles and cause variability while carrying out tasks. An example of varying postures in prolonged typing can include standing and or seated postures. Variability can also be maintained by adjustable chairs and tables. (WHO 2003, 7-30)

Based on a study conducted in Washington State between the years 2002-2010, 43% of compensable claims were associated to work-related non-traumatic musculoskeletal disorders of the back, upper extremity and knees. These claims included both State fund and self-insured workers' compensation claims to the extent of four or more lost

workdays. From all of the compensable claims the single body structure that accounted for 19.5% was back related injuries. Some sectors that have the highest risk or work related musculoskeletal disorders include: construction, transportation and utilities, health care, manufacturing, trade, agriculture and services. The results of the study show that there is a decrease in the incidence rate of work related musculoskeletal disorders in Washington State however the industries that include manual handling and forceful repetitive exertions still remain at the highest risk level. During the whole process the overall accepted claims rate decreased 7.3% per year. The interventions taken in the study for reducing back pain included eliminating awkward or heavy manual handling tasks through interventions like redesigning and modifications to the work station. (Anderson, Adams, Bonauto, Howard & Silverstein 2015, 1-33)

4 OCCUPATIONAL HAZARDS

Each profession has its own set of occupational hazards and threats to physical safety and health. An example of such hazards includes mechanical, electrical, and ergonomic hazards such as repetitive motion, awkward posture and excessive force. The link between an occupational disease or cumulative injury and the workplace exposure might remain unclear or unrecognisable in some cases such as in musculoskeletal disorders. One reason for not recognising workplace related injuries is due to the time it may take to become evident unlike traumatic injuries which are usually immediately recognised by both the victim and the observers. Hence there is an unreported amount and generally underestimated toll of what occupational diseases and cumulative injuries result in. (Burton 2010, 82-84)

Musculoskeletal disorders (MSDs), repetitive strain injuries or cumulative trauma disorders are a form of physical injury that results from overloading during an extensive time period. The development of a MSD might require years of exposure to the hazard before any effects can be seen in the worker. MSD's are an apparent part of occupational diseases especially in fields where excessive force, awkward postures, and repetitive movements are involved. Such jobs may be heavy labour jobs or positions

with significant amount of computer work. In the developed countries women are exposed to more highly repetitive movements and awkward postures than men, thus women have a several times greater risk for MSD's. (Burton 2010, 84)

Musculoskeletal disorders or dysfunctions may present in the form of pain or muscle tension in the cervical, shoulder or lumbar regions. Different types of risk factors are associated with the formation of musculoskeletal disorders. Genetic predisposition, structural spinal deformities or disorders and female gender are considered as non-modifiable risks. All of the above mentioned factors cannot be modified in any way. However there are some modifiable risk factors associated with musculoskeletal disorders that can be controlled including: body alignment or posture, nature and duration of work task, demands of the job and physical loading or features of the work. (Van Niekerk, Louw & Hillier 2012, 2)

One major risk factor that is contributed as the cause for work related musculoskeletal disorders is excessive use of computer among the working age population. There is evidence that supports the high prevalence of musculoskeletal pain among computer users, with the shoulders and low back region being the most affected anatomical region. There was a significant association between individual factors such as work ergonomics including inappropriate posture and movements and musculoskeletal pain. Thus the preventive measures at the workplace should focus on the improvement of the work environment to make it ergonomically suitable for the workers. (Kaliniene, Ustinaviciene, Skemiene, Vaiciulis & Vasilavicius 2016, 10)

There are other cases that may cause a worker to adopt an inadequate posture. Inadequate postures may be adopted due to reflections from the screen that disturbs the working. By applying ergonomic, biomechanical and engineering principles adopting other postures may be prevented. Also by applying these principles can be an effective way to reduce the risks and occurrence of work related MSDs. (Nunes & Bush 2012, 10-25)

5 SITTING

In the current society sitting forms a substantial part of the daily life among the entire population. In the Western countries the average time adults spend sedentary is between 55% and 70% of their day. This corresponds to approximately 9-11 hours of sitting per day. Based on a multinational surveillance study conducted in 20 developed and developing countries the overall mean for reported sitting time was 5.8 hours per day including 49,493 adults aged 18-65 years. (Chau et al. 2013, 1) When compared to the national levels among the Finnish population 46% females and 51% of males sit a minimum of six hours per day (Vuori & Laukkanen 2010, 3108 - 3109). These figures indicate a similar pattern among the time spent sitting per day.

Due to the adverse health effects of prolonged sitting current recommendations from the Start Active, Stay Active and American College of Sports Medicine mention the importance of reducing the sitting time in all age groups (Davies, Burns, Jewell & McBride 2011, 13-14; Garber et al. 2011, 1334-1359). The recommendations are at this point rather broad when considering the time spent sitting as they do not clearly identify a possible unsafe or detrimental amount of time spent sitting during the day. These recommendations also do not specify what type of intensity level and activity should be used to break the sitting time and how frequently this should be done. (Owen, Healy & Howard 2012, 2)

5.1 Ergonomics of sitting

Changing the work surface and chair are one of the most common modifications among individuals who suffer from musculoskeletal symptoms related to prolonged sitting. According to studies the intervention should include changing the body alignment and posture of the worker by adjusting the chair according to their anthropometrics. The possible variety of adjustments available in the chair should include adjustability of the seat height and pan depth. If the dimensions of the chair are not personally adjusted according to each individual and their personal anthropometrics the consequence may be an impaired ability of the postural muscles to support the body. The impaired ability of the postural muscles to support the body may in the worst case lead to abnormal strain of the neuromuscular system, consequently causing pain. Hence it

is beneficial to use a proper chair in prevention of spinal pain. (Van Niekerk, Louw & Hillier 2012, 2)

Research shows that workers could benefit from a highly adjustable chair and office ergonomics training through affecting their ergonomic knowledge, postural behavior, health and productivity. The key focus in Amic et al. (2004) was the adjustable seat height, depth and the chairs gliding mechanism. When the user reclines the gliding mechanism allows the seat to glide forward. The height adjustability supports the different sized frames and allows comfortable floor contact with an open hip angle. (Amic et al. 2004, 2706-2707)

A randomized control trial was carried out in a garment factory to investigate if the change of the work chair will have an effect on participants having reported back and hip pain. The chair trial was carried out during a 4-month period. The results showed that changing the original chair to either a chair with adjustable height and a downward slope of approximately 15 degrees or a height adjustable chair with a flat seat pan decreased the lower back pain experienced by the participants. Thus the results indicated that it was beneficial to change the chair. (Wang et al. 2008, 256-258)

The curved seat pan allows a more open thigh-torso angle in a forward leaning posture, thus preserving the lumbar curvature. The groups that received the adjustable chair experienced less back and hip pain during the 4-month period when compared with the control group that did not receive either of the intervention chairs. Based on the findings men and individuals with a high BMI benefitted more from the flat seat in reducing back and hip pain. Women had a slightly better outcome with the curved chair. (Wang et al. 2008, 256-258)

The findings of the Wang et al. (2008, 260) study may to some extent be generalized to other jobs that require sitting combined with repetitive manipulation of tools or other materials. Research shows that workers with a highly adjustable chair with adjustable seat height, depth and the chairs gliding mechanism appear to be beneficial for the workers (Amic et al. 2004, 2706-2707). Similar results are provided by Van Niekerk, Louw & Hillier (2012, 2) who suggest that the use of a proper chair is beneficial in prevention of spinal pain. Based on these researches it could be deduced that having a

suitable and proper chair at the workplace is an important factor in maintaining the worker's health.

Due to the increased amount of sitting there has been focus on the type of chair that is used. One form of ergonomic seating is the saddle chair that aims for the optimal posture of the users. There is evidence that using the saddle chair is effective in reaching the optimal posture. The saddle chair has been claimed to be a better option for a conventional chair although this finding may be questionable due to lack of research on behalf of other than the developer of the chair. (Gadge & Innes 2007, 190)

Based on one research that compared the Bambach saddle chair with a normal office chair the results indicated that despite the chair that was used the overall body discomfort increased with time. The seats that were compared in the study were both adjustable in seat height, seat angle, backrest height, and backrest angle and they were all adjusted individually by each test subject. Though both seats showed increase in discomfort as the time increased the level of increase was slower with the saddle seat compared to the standard office chair. Based on the study the subjects felt a higher level of lower back discomfort when using the standard office chair. Though for the lower back the saddle seat was more comfortable other areas of increased discomfort included lower limbs. These increased levels of discomfort may be explained by the forward inclination of the saddle seat that may increase the pressure directed to the ischial tuberosities. (Gadge & Innes 2007, 191-199)

Another study compared the use of a commercially available ergonomic chair, 'Back App' in comparison with a standard adjustable, backless office chair with wheels in a typing task. The design of the 'Back App' incorporates a saddle- design and an unstable base of support. With these functions it attempts to reduce hip flexion. The available adjustments include height and degree of instability. The participant's task was to sit normally as they usually did while maintaining their balance. (O'Sullivan, McCarthy, White, O'Sullivan & Dankaerts 2012, 2-4)

The results indicated that the level of low back discomfort and overall body discomfort was low and did not differ significantly what type of chair was used. The emphasis of the results was that the pain-free participants sat in less lumbar flexion and displayed

less lumbar activation when sitting on a novel ergonomic chair compared to the standard backless office chair during a brief typing task. Prior to the study there has been no previous research that would have examined the effect of a dynamic saddle chair similar to the 'Back App' on lumbar posture or trunk muscle activity. (O'Sullivan, McCarthy, White, O'Sullivan & Dankaerts 2012, 6-7)

Based on a research conducted by Koskelo (2008) the results indicated that the Salli Saddle chair, MultiAdjuster, was perceived as the best chair model by most of the participants, including both genders. The research compared the distribution of pressure between the thighs, buttock and genitals in different types of saddle chairs: Salli MultiAdjuster, Salli Classic and Bambach. The chairs were adjusted according to each participant with the middle declination available and appropriate height according to each individual's measurements. (Koskelo 2008, 3)

The research included a subjective questionnaire of the participants feeling of the chair. Ranging from 0–10, (0) defined as the worst possible feeling and (10) as the best possible feeling. The sitting pressure measured the distribution of the participant's sitting pressure. A Tekscan Pressure Measuring Mat (manufacturer Tekscan Inc., USA), was used for measuring, the unit was Mercury millimeter (Hgmm). Based on the participants subjective sitting experience the Salli MultiAdjuster was perceived as the best chair model by both genders, women (8.7) and the men (8.8). The other chairs were ranked with (women 7.0, men 6.2) Salli Classic and the Bambach chair was given the weakest score (women 4.6, men 4.0). (Koskelo 2008, 4-5)

One reason that the Bambach saddle chair was ranked the most uncomfortable was due to the pressure on the genital area and thighs. The Salli Classic was perceived better because the pressure subjected more equally to the thighs. However males experienced pressure subjected to the male pubic bone area that was higher on the Salli Classic compared to the Salli MultiAdjuster chair causing some discomfort. According to the results the test persons found Salli MultiAdjuster chair the most comfortable for sitting. However a limitation of the study is that there was no mention of time that the participants sat in each chair or the duration of breaks in between changing the chair model. (Koskelo 2008, 5)

The results indicated that when sitting on a Salli MultiAdjuster chair that has a two-part seat, the pressure to the genitals remained low or negligible. Rather than if the Salli Classic model is used, with a solid one-part seat, for an extended period of time by women it may increase the humidity and temperature of the genital area and increase the infection risk. When sitting on a Salli MultiAdjuster chair with a divided seat, the genital area gets ventilated and the infection risk may decrease. (Koskelo 2008, 9-10)

5.2 The Salli Saddle chair

The Salli Saddle chair is currently the only saddle chair that has the seat in two separate parts. The development of the two-part seat was started in 2001 to find out a more anatomically and ergonomically safe chair for both genders. (Salli, 2016) The specific design and structure of the Salli Saddle chair attempts to provide a natural and healthy way of sitting that promotes a balanced, upright and straight position. The design of the seat guides the person to have a straight and relaxed position with the thighs at approximately a 45° angle downwards and forward at an angle. This specific design of the chair helps create an important hollow at the base of the spine for the benefit of the back. The main function of the of the two-part seat design is to allow an increase in air flow in the inner thigh and pelvic region. As a result of the gap the increased air flow cools the tissue around the genital area, hence reducing the temperature in that particular area, such as the male testes. (Pat. EP 1 367 922 B1, 2003, 2-3)

The idea of the divided saddle chair design is in decreasing the pressure in the genital area and removing the disorders it may cause. The pressure caused by prolonged sitting may feel uncomfortable, however there are no reference values on what is considered a harmful pressure for human beings in the gluteal area. Due to the lack of reference values, the harmfulness can only be determined based on the subjective experience of a sitting person and their feeling of discomfort. (Koskelo 2008, 2)

The Salli Saddle chair has several models. The models that will be focused on include the Salli; Swing, SwingFit, Twin, MultiAdjuster and Classic. The reason why these specific models are chosen is due to the different adjustments available. All of the adjustment combinations in these five models are different. By using the different

models it may be possible to detect the popularity of the models among the target group. The possible adjustments in the chairs include height, swing mechanism, fixed or adjustable width, and inclination mechanism with one or two-part seat. (Salli, 2016)

6 METHODS

The research design used in this research was a questionnaire. Due to the fact that a questionnaire is the most commonly used data collection method in the field of quantitative research this was the chosen method of this research (Vilkka 2005, 73; Vehkalahti 2008, 13). From the design perspective the aim of the questionnaire design was to reduce, if not prevent potential errors. This may be prevented by structuring the questions clearly thus increasing the participants willingness to answer correctly (de Leeuw, Hox & Dillman 2008, 7).

6.1 Research design

The reason why an electric questionnaire was used instead of a paper version was mainly due to privacy of the participants, by using the electric questionnaire the researcher has no way of connecting the responses to the individuals. However using an electric questionnaire can also increase the quality of the data collected. Using an electric questionnaire provides the researcher with the possibility to make answering mandatory thus decreasing the partial loss of data. (Ruskoaho et. al 2010, 281)

Based on reference literature there is a difference in the way participants answer to scales, whether numerical or verbal. The participants may assume that the middle range of the scale reflects to the average and the extremes represent the less frequent behavior or outcome. (de Leeuw, Hox & Dillman 2008, 25) Order is also significant as to in which order are the response alternatives presented to the participant. In a visual format, like a self-administered questionnaire, respondents think about the response alternatives in the order in which they are presented. In this case, a given alternative is more likely to be endorsed when presented first rather than last, resulting in

a primacy effect. (de Leeuw, Hox & Dillman 2008, 33) Thus it is beneficial to place the positive options first rather than the negative options.

The questionnaire was pre-tested with a small sample that was similar to the planned sample. The questionnaire was sent to 6 selected participants to be tested on and the participants were asked to give feedback and comment on the questionnaire. Based on the comments received from the pre-test minor adjustments were made to the visual outfit of the questionnaire. After the minor changes were made the final version of the questionnaire was ready to be sent to the participants.

6.2 Data collection

The questionnaire form was a structured questionnaire with one additional open ended question for gathering further details. The form was non-standardized, thus not every participant was asked the same questions in the same order with the same content (Vilkkä 2005, 73; Hirsjärvi, Remes & Sajavaara 2014, 193). In order to make the data analysis easier the majority of the questions were closed questions. The purpose of the open-ended question was to gather more detailed information concerning the possible reasons behind the purchase and use of the Salli Saddle chair. Using an open ended question also enabled the target population to express their opinion without the influence or manipulation of opinions of the researcher (Vehkalahti 2008, 11–25; Hirsjärvi, Remes & Sajavaara, 2014, 198 - 204). This factor was the reason why an open-ended question was added to the otherwise structured form. The open-ended question will provide the research with qualitative information on the reasons behind the use of the Salli Saddle chair.

The questionnaire was made with E-form tool, a web based questionnaire program that the students of Satakunta University of Applied Sciences have access to. The overall structure of the questionnaire was same with one question leading to a specific question based on the participants answer. The data was collected with a 7 to 8 point questionnaire, depending on the participant's answers.

Internet based questionnaires have higher levels of break-off compared to other modes of questionnaires. The definition of break-off is when a participant has started answering the questionnaire but for some reason decides not to continue. There may be several reasons for break-off which may be reduced by good design of the questionnaire. (de Leeuw, Hox & Dillman 2008, 41) Another reason that Internet questionnaires might have a higher rate of break-off may be due to distractions. Thus to keep the participant engaged in answering the questionnaire it is necessary that the questionnaire remains relatively short. When considering a possible time frame for an Internet questionnaire 10–15 minutes can already be considered a long time. (de Leeuw, Hox & Dillman 2008, 121) Due to the above mentioned reasons the questionnaire consisted of 7-8 questions to increase the possibility of the participants the fill in the whole form and to minimize break-off.

For the closed-ended questions it was made sure that all answer categories were mutually exclusive. This enables that the respondents would have only one response option available, the one that suits their situation, by using the electric questionnaire it was possible to control this factor. The challenge when planning the answering options was to decide how many options should be presented and whether categories should be labeled with words or numbers (de Leeuw, Hox & Dillman 2008, 151). In general, it has been found that increasing the number of categories in a rating scale up to at least seven improves the quality of measurement. When measuring attitudes as in this research, a five-point option series seems to be the best option (Taylor-Powell 1998, 7). Thus it was considered the best option for the scale. Beyond the five categories it was considered unnecessary to have more options. There is evidence that respondents give more consistent, hence reliable, ratings when all the categories are labeled with words, rather than just labeling the end points or using numbers (de Leeuw, Hox & Dillman 2008, 151).

A 5 step Likert scale was used to find out how beneficial the participant considered the use of a Salli Saddle chair to be. The options for the Likert scale included the range from very beneficial to not beneficial at all with a neutral option in the middle (Vehkalahti 2008, 35 -25). The neutral option of neither beneficial nor non-beneficial was included in the questionnaire because according to Vehkalahti usually if the neutral option is disregarded there is a higher possibility that the person will not answer the question at all (Vehkalahti 2008, 36 – 39; Hirsjärvi et al. 2014, 198 – 204). Also fewer

categories tend to be easier for respondents to use. For making the choices easier for the participants each option was labeled with words to enable to gather more variable information from the participants. The use of labels was carefully considered and the wording was planned accordingly.

6.3 Participants

The method used to select the participant was purposive sampling. The reason behind using purposive sampling was to be able to target a specific group. With the chosen sampling method it was possible to target the group of Salli customers that have had the chair in use for over a year. By selecting a participant group who have used the chair for over a year will give a more reliable background in answering the questionnaire about the effectiveness of the use Salli Saddle chair. This decision supports the purpose of investigating the experience and effect of using a Salli Saddle chair.

The participants consisted of a pre-selected group that had purchased the Salli Saddle chair between the times of 28.10.2011–30.1.2014. In addition participants had to have registered the chair on the Salli Systems webpage to receive a longer guarantee and answered to a customer satisfaction questionnaire six months after the purchase. Thus the company already had a pre-selected group with contact information whom to send the questionnaire. For privacy reasons mentioned in the Salli Systems guarantee and for enabling the anonymity of the participants the email (Appendix 1) containing the introduction and link to the questionnaire was sent to the participants by a Salli Systems worker. The purpose of the questionnaire was shortly described to the participants in the introduction letter as a method to motivate the participants to answer the questionnaire (Ruskoaho et. al 2010, 282). The questionnaire was available for a pre-determined time frame of two weeks 19.09.2016-30.09.2016, after which it was closed. All of the participants were sent an email as a reminder to answer after one week, 26.09.2016 with an added thank you for those who had already answered (Appendix 2). The full questionnaire can be found in (Appendix 3).

7 THESIS PROCESS

The process started in May 2015 when the possible topics for a thesis were considered. Co-operating with a company was the goal from the beginning and luckily the option of working with Salli Systems was provided. The steps of the thesis process can be seen in Figure 1. The first contact with the company was in May 2015, from there the co-operation started. Finding the theoretical background and planning the questionnaire were the next processes. The questionnaire was sent to the participants in September 2016 and results were gathered over a two week period.

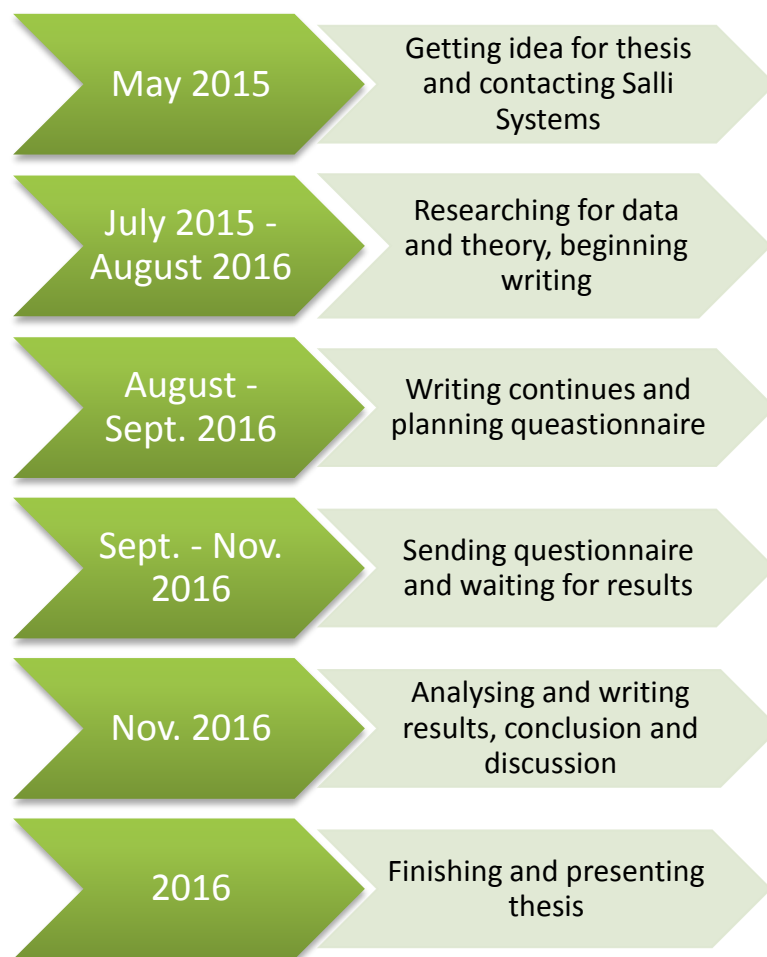


Figure 1. Thesis process

From September 2016 onwards the questionnaire results and discussion was written and finalised. The final result of this thesis is to provide Salli Systems feedback from the customers that have used the Salli Saddle chair for at least a year and to investigate the possible benefits of using the chair.

8 RESULTS

The questionnaire was sent in total to 196 participants from whom 14 did not receive the email containing the questionnaire link. From the 182 individuals who received the email, 68 participants answered to the questionnaire totalling a 37% response rate. The demographics of the participants were 65% males, 44 individuals and 24 females, 35%. The highest frequency of participants was males under the age of 40 with 19 responses. The distribution of participant's age and gender are demonstrated in Figure 2. When including both genders the age groups were distributed in the following way under 40 year olds with 34%, 40-50 with 30% and over 50 with 36% of the participants.

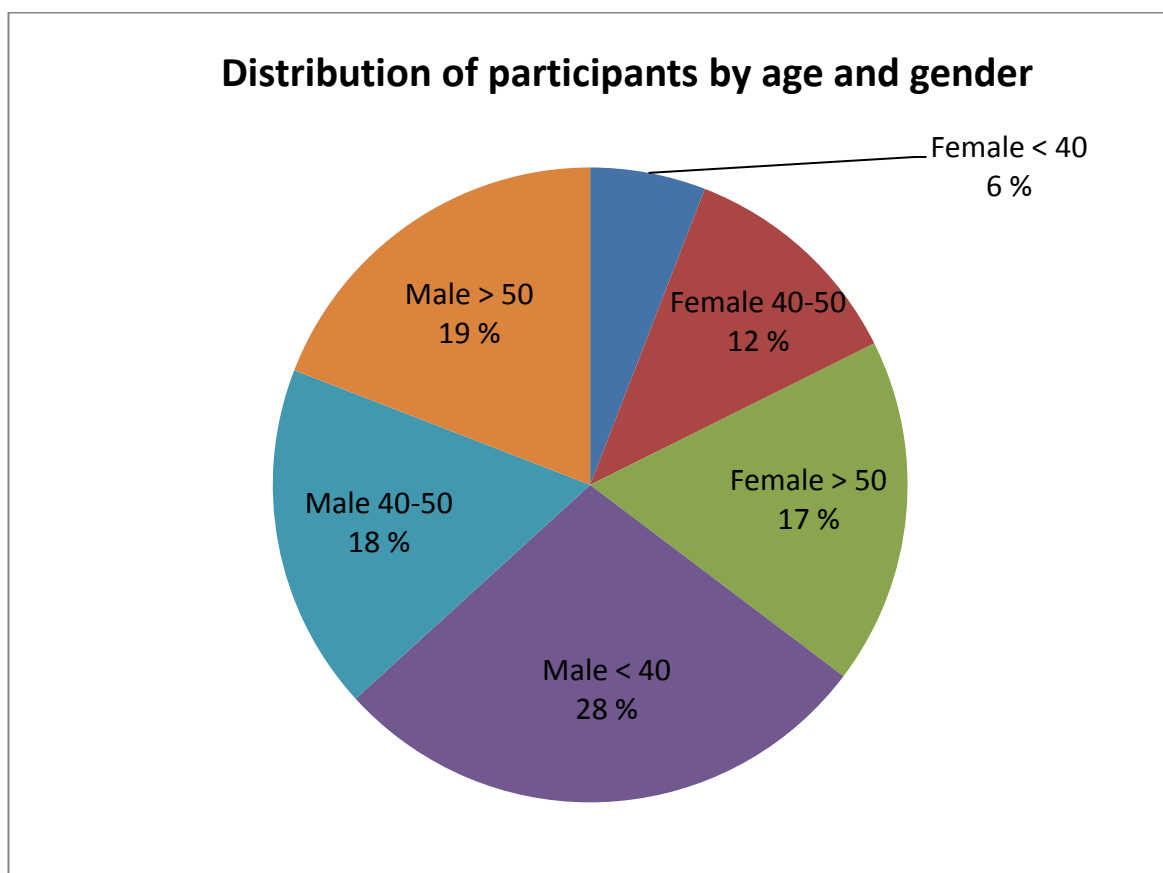


Figure 2. Distribution of participants by age and gender

Figure 3 indicates the time that individuals have owned the Salli Saddle chair in years. All of the participants have had the chair for over a year which corresponds to the targeted population of the research. Majority (41%) of the participants have owned the

chair for 2-3 years. Over half of the participants (53%) have used their Saddle chair for over 3 years.

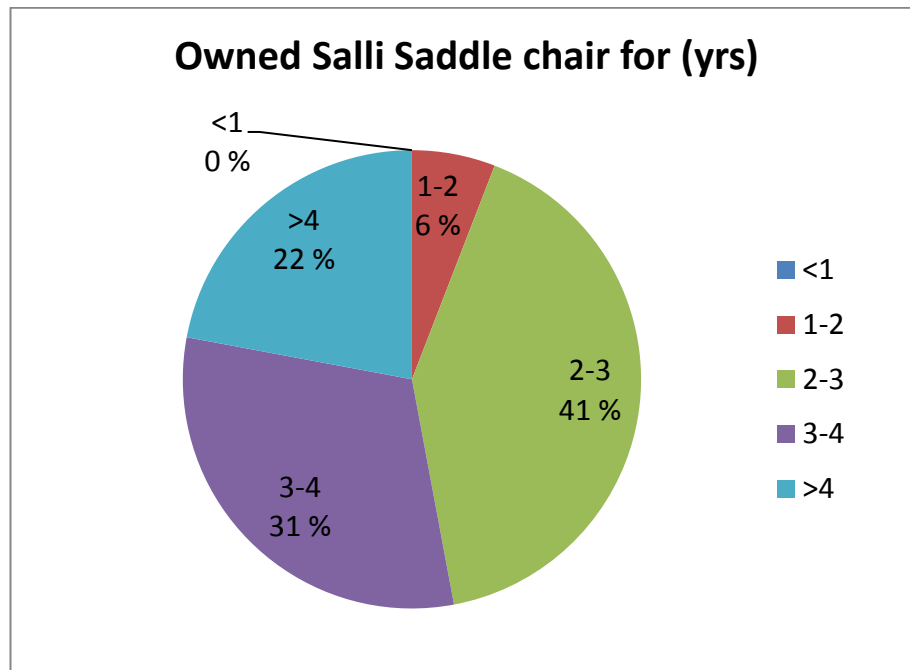


Figure 3. Participant owned Salli Saddle chair in years

MultiAdjuster was the most popular model among men 27% compared to the SwingFit preferred by 42% of women. The uncertain answer was 25% among females and 9% among males. The overall distribution of Salli Saddle chair models is presented in Figure 4. The SwingFit was the most popular model with 28% among all participants and MultiAdjuster with 25%.

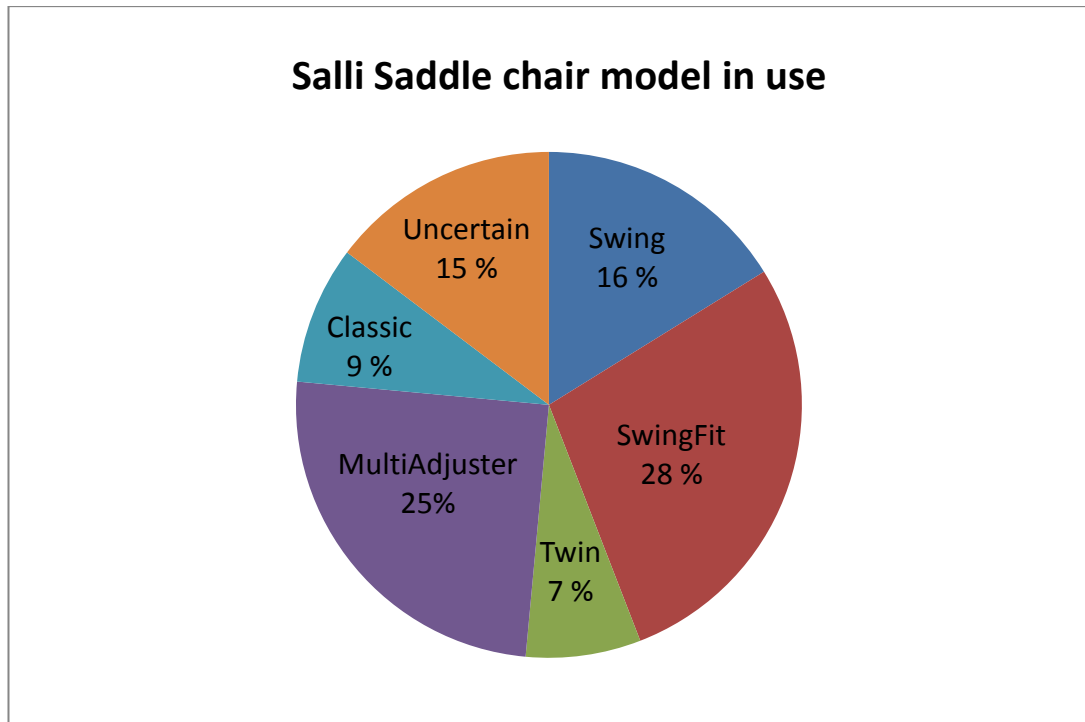


Figure 4. Distribution of Salli Saddle chair model

The relationship of how many hours the participants sit on the Salli Saddle chair per day grouped by the age groups is demonstrated in Figure 5. The highest frequency of sitting among under 40 year olds are divided equally between <2 and 2-4 hours per day. The 40-50 year olds have a tie between <2 and 6-8 hours per day sitting on their Salli. The over 50 year olds majority sit <2 hours on Salli. There are 3 individuals who sit on the Saddle chair for over 8 hours per day.

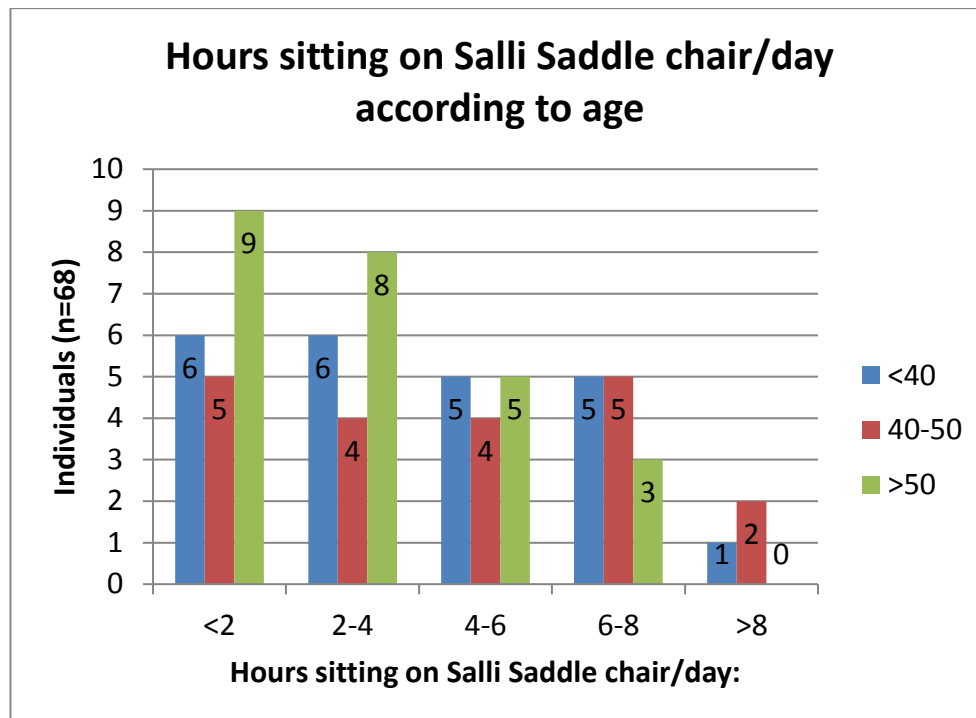


Figure 5. Hours sitting on Salli Saddle chair/day according to age

Figure 6. Shows the distribution of overall sitting hours per day, grouped by age. 13.2% of the participants sit less than 4 hours per day, 23.5% sit between 4-6 hours. The majority of participants, 32.4%, sit 6-8 hours per day. 26.5% sit for the longest time, 8-12 hours per day.

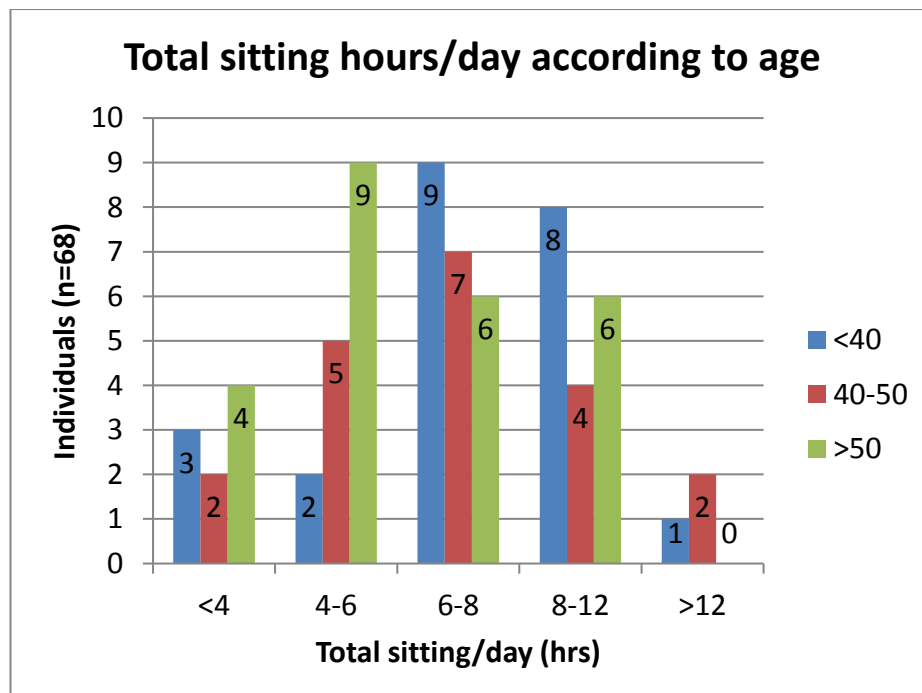


Figure 6. Total sitting hours per day according to age group.

Figure 7. demonstrates how beneficial the participants perceive using the Salli Saddle chair and the reasons of use. 79.4% of all participants find the Salli Saddle chair very or significantly beneficial. Where one individual does not consider the Salli Saddle chair to be beneficial at all for pain/symptoms in the pelvic girdle region. The answers were distributed in a following manner 34% have the Salli Saddle chair due to pain/symptoms in the pelvic girdle region. The majority, 44% of the participants use the chair as a preventative measure. The rest of the participants, 22% mention other reason behind the choice.

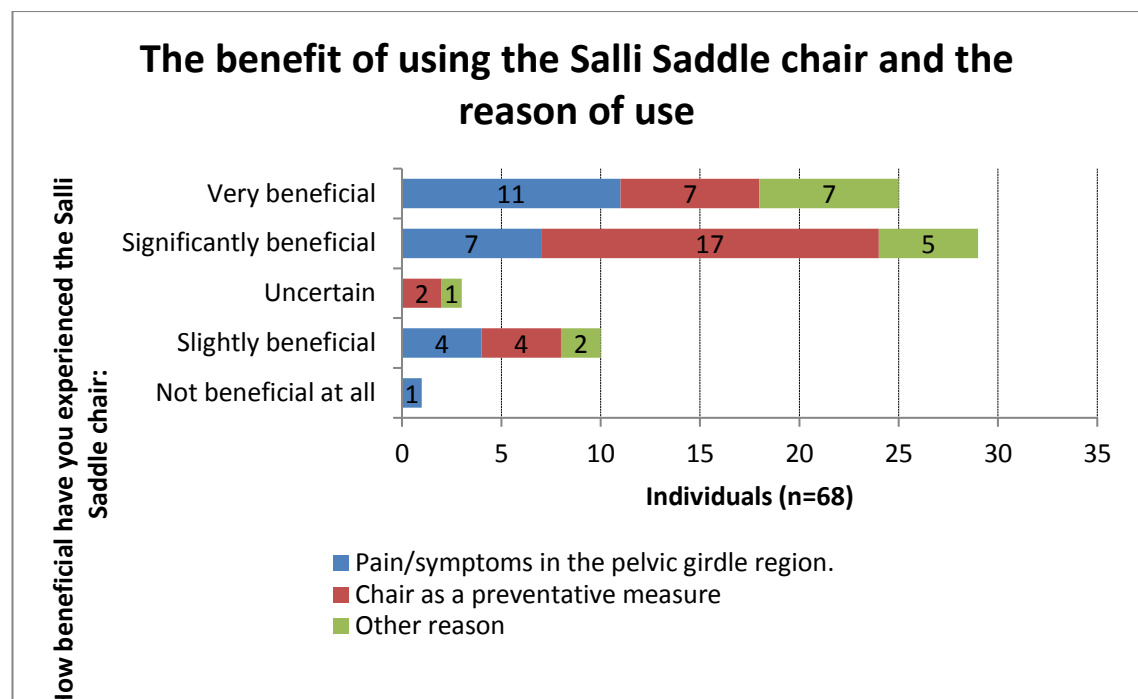


Figure 7. The benefit of using the Salli Saddle chair and the reason of use

The relationship between the pain/symptoms and the perception of benefits of the Salli Saddle chair among individuals who have acquired the chair for pain/symptoms in the pelvic girdle region is demonstrated in Figure 8. From the participants that had acquired the Salli Saddle chair for pain/symptoms in the pelvic girdle area 8 individuals out of 23 reported that the pain/symptoms had completely disappeared and that the chair has been very or significantly beneficial. Only one participant felt that there has been no change in the pain/symptoms and that using the Saddle chair has not been beneficial at all.

Effect of Salli Saddle chair on pain/symptoms in pelvic girdle region

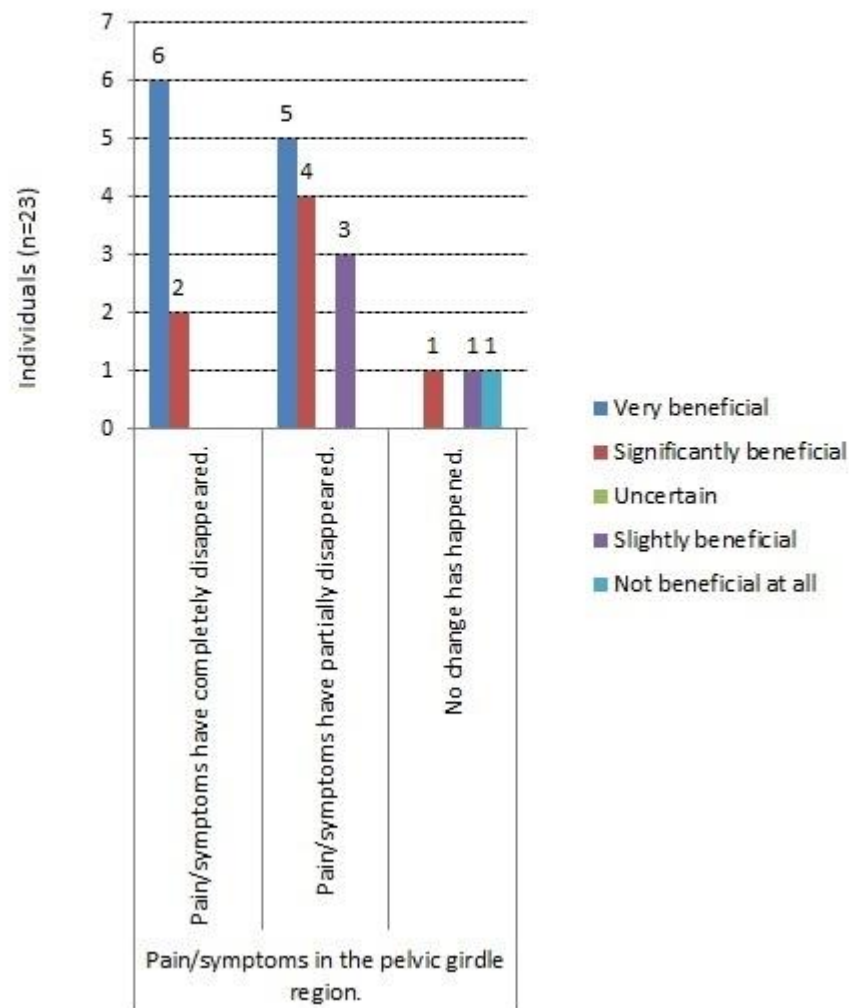


Figure 8. Effect of Salli Saddle chair on pain/symptoms in pelvic girdle.

The participants who answered to question 6 as "Other reason" for the use of Salli Saddle chair answered the open-ended question thus giving them a possibility to express their opinion. The exact answers of the participants are presented in (Appendix 4). From the individuals who answered to the open-ended question 70% perceived using the chair as very beneficial. Only one individual was uncertain of the benefits of the Salli Saddle chair from the individuals with other reasons for use.

9 CONCLUSION

Based on the results it can be concluded that sitting on a Salli Saddle chair instead of a conventional chair can be very to significantly beneficial as way to ease pain/symptoms in pelvic girdle region, as a preventative measure or for other reasons. Out of all participants 79.4% find the Salli Saddle chair very or significantly beneficial.

The results indicate that 44% of the participants use the chair as a preventative measure. Participants who use the Salli Saddle chair due to pain/symptoms in the pelvic girdle region form 34% of the participants. Hence it can be suggested that if an individual is experiencing pain/symptoms in the pelvic girdle region it is beneficial for them to use the Salli Saddle chair as an intervention. Based on the results the use of the Salli Saddle chair can be recommended as a preventative measure for avoiding work related musculoskeletal disorders.

10 DISCUSSION

Based on previous studies there is evidence that the most effective way to reduce self-reported musculoskeletal pain or discomfort was through a chair intervention that involved an adjustable chair (Van Niekerk, Louw & Hillier 2012, 3). In this thesis the focus of questionnaire was targeted to the effects of the Salli Saddle chair in relation to possible pelvic girdle problems experienced by the participants. The advantage of the Salli Saddle chair is that it has several adjustments to ensure the chair is correctly adjusted according to the individual's anthropometrics.

Based on the theoretical background it can be deduced that among workers who sit for prolonged times the chair intervention is a beneficial step in attempt to improve musculoskeletal pain or discomfort (Van Niekerk, Louw & Hillier 2012, 4). The chair intervention method may be used as a method to decrease the severity, intensity and frequency of musculoskeletal pain among workers. The results of this thesis also point to that direction as 79.4% perceive the use of Salli Saddle chair very or significantly beneficial.

The different models taken in to consideration in this thesis all have different combination of adjustments, varying from height, swing mechanism, fixed or adjustable width to inclination mechanism. The SwingFit with Swing mechanism and adjustable width was the most popular model with 28% among all participants. A close second was the MultiAdjuster with inclination mechanism and width adjustment among 25% of the participants. The MultiAdjuster was perceived to be the most comfortable chair in a study conducted by Koskelo (2008). The common functions of these chairs are that they provide an unstable moving base for the sitter. These both are very beneficial qualities of the Saddle chairs. Since an unstable base will constantly be changing the posture and activating different muscles thus causing variability while carrying out tasks (WHO 2003, 7).

In a research conducted by Amic et al. (2004), the average sitting time per day among the group with average age of 47.5 years was 5 to 6 hours per day. In this study the chair intervention was combined with a short training session. The results indicated that the chair-with-training group had a decreased level of symptoms during the day compared to the control of training only groups. The difference between the groups was statistically significant. (Amic et al. 2004, 2708-2710) The average sitting hours of the participants cannot be calculated in detail as the type of data that was collected had a wide range. Thus the calculations would not provide accurate information. However 58.9% of the participants sit for over six hours per day. Which is higher than the national levels among the Finnish population, 46% females and 51% of males sit for a minimum of six hours per day (Vuori & Laukkanen 2010, 3108 - 3109). The users of Salli Saddle chair sit for a longer time than the national average. Hence one possible reason for the use of the Salli Saddle chair could be the longer time used for sitting per day.

Due to the explosive increase of internet based data collection methods the answering rate of the population has drastically decreased (Ruskoaho et. al 2010, 283). This could be a direct reason for the low 37% response rate of the participants. Another reason or limitation in using an electronic questionnaire or for a low response rate may be the coverage of the questionnaire. There may be a problem due to lack of reading email or that the questionnaire may be recognised as spam-mail (Ruskoaho et. al 2010, 281).

This was evident in the beginning as the amount of received emails decreased from 196 to 182 due to not reaching these 14 individuals via email.

The strength of this research was that the results clearly indicate that the use of Salli Saddle chair is beneficial for both preventative measures and in decreasing existing pain/symptoms of the pelvic girdle region. This conclusion was gathered from the 68 participants of this research. One aspect related to the response rate of 37% cannot be discarded. There is no way of knowing why the 63% that did not answer the questionnaire. Whether it is because of not being interested in sharing their experience or that they may not find using the Salli Saddle chair as beneficial for them. Another reason could have been that if the individuals perceive that they have not used their Salli Saddle chair actively enough to express their opinion about the effects of using the chair. These aspects have been considered and thought of. However from the answers received from this questionnaire 79.4% have a clear opinion that they perceive the use of Salli Saddle chair as very or significantly beneficial.

The initially planned target population was considered to be 40-50 year old females. The reason for this was due to the fact that women have a higher risk of work related musculoskeletal disorders (Burton 2010, 84). Other risk factors for increased presence of work related MSD's among females can be linked with strong hormonal changes during pregnancy and menopause, due to increased fluid retention and other physiological conditions or attribution of differences in muscular strength, anthropometry, or hormonal issues. However increasing age is a risk factor with both sexes. (Nunes & Bush 2012, 5) Thus due to the increasing risk related to age both genders were taken into consideration. Based on the gathered results it is a positive sign that the older range of over 50 year old are using the Saddle chair as the largest single group with 36% of all of the participants. The other age groups were distributed as following under 40 with 34% and 40-50 with 30%.

However the reason why both females and males were taken into the analysis was due to the distribution of the responses. In this research females represented the minority with 35%. By taking both genders into consideration the results can be more generalizable on the general public. Thus it was considered more beneficial to include all of the answers in the results for a more accurate representation of the sample group. In-

cluding all of the answers in the research also increases the reliability of the data represented. Another method used to increase the reliability and validity of the research included the process of pre-testing the questionnaire. The validity of the research was increased with the use of an online-based questionnaire that demanded the participants to answer all questions with only one option.

A limitation in the research design was the use of ranges as answering options. This limitation was discovered in the process of analysing the results. Due to this it was not possible to conduct specific calculations of the hours the participants sat on the Salli Saddle chair in comparison to total time spent sitting. To avoid this issue the answers for time should have been open-ended questions enabling the participants to select the more accurate and appropriate time suitable for them. However if an open-ended question would have been used there could have been a higher degree of variance between the individuals separate answers. The greater degree of variability within the answers could have made the results less reliable.

When analysing the qualitative answers received from the other reason question the common trend was back related issues. For clarification of the discussion some of the answers are translated in to English based on the original answer. The qualitative results gathered in this research indicated that individuals use the Salli Saddle chair for purposes such as: "Nerve pain in the coccyx," "Broken neck does not stand being still," "Painful feet, lowered lateral arch of the foot, rheumatoid arthritis," "CP-disability, The chair helps with body control, stretches the limbs at home at wor," "Due to previous back problems, " and "Previous was a Salli, prolapsed S1/L5 11/2011." Not all of the qualitative answers were selected to the results due to the answers being inconsistent with the question such as the reason for using the Salli Saddle chair being "At home by the sewing table."

Some of the above mentioned qualitative answers would fit the first option of pain/symptoms in the pelvic girdle region but were instead interpreted more fit for the other option by the participants. This may be due to the participant interpreting the options in a different manner as intended by the researcher. The lack of an explanation for the physiological term "pelvic girdle region" may be considered as limitation of this research. It may be possible that the individuals who answered as the reasons being other were not familiar with the definition of pelvic girdle. By briefly explaining the

term pelvic girdle some of the participants might have chosen differently. Nevertheless the qualitative answers gained from the questionnaire provide a more detailed picture of the reasons for using a Salli Saddle chair.

As it is important to reduce the sitting time of individuals but there are no recommendations on what a detrimental sitting time would be per day further research would be needed. The existing information does not specify what type of intensity level and activity should be used to break the sitting time and how frequently this should be done. (Owen, Healy & Howard 2012, 2) Thus it would be beneficial for future research to focus in gathering more specific data regarding the breaks taken during the day and the time each individual sits each day on a general level.

There is a reasonable limited amount of research conducted on the benefits of using a saddle chair in the prevention of musculoskeletal disorders. The already existing researches focus on pressure measurement distributed to the gluteal area in comparison to the participants subjective feeling of discomfort (Koskelo 2008). However there is no specific research that would measure the exact posture while sitting on a saddle chair. Further research could be conducted on the activation of the deep postural muscles while sitting on a saddle chair. This type of measuring would need specific equipment to be able to accurately measure the level of muscle activation. More information could be gathered on how the specific model of the chair relates to the chair being beneficial for each individual.

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APPENDIX 1

Hei,

olet hankkinut Salli Satulatuolin 28.10.2011–30.1.2014 välisenä aikana, rekisteröinyt sen sivuil-
lamme pidemmän takuun saamiseksi ja vastannut tyytyväisyyskyselyyn puoli vuotta rekisteröin-
nin jälkeen.

Olisitko halukas vastaamaan Satakunnan ammattikorkeakoulun fysioterapian koulutusohjelmaan
opinnäytetyötä tekevän opiskelijan kyselytutkimukseen? Vastaaminen ei vie kauaa, ja vastata voit
suoraan Niinin viestissä olevasta linkistä; Niinin viesti löytyy allekirjoitukseni alta. Kiitos avus-
tasi!

Terveisin

Hei,

Kyselyn tarkoituksena on selvittää Salli Satulatuolin käyttökokemuksia ja vaikuttavuutta. Kysely
on osa Satakunnan ammattikorkeakoulun fysioterapian koulutusohjelman opinnäytetyötä, joka
tehdään yhteistyössä Salli Systemsin kanssa.

Kysely on suunnattu henkilöille joilla on käytössä Salli Satulatuoli. Osoiterekisteri on koostuu asi-
akkaista jotka ovat ostaneet Salli Satulatuolin ja vastanneet puoli vuotta myöhemmin tyytyväi-
syyskyselyyn. Kyseisiä osoitteita ei missään vaiheessa luovuteta eteenpäin eikä kyselytutkimuksen
toteuttajalle välitetä osoitteita eteenpäin.

Kyselyyn vastaaminen on vapaaehtoista ja vastaaminen tapahtuu nimettömänä, eikä vastaajaa
voida yhdistää annettuihin vastauksiin. Kyselyn täyttäminen vie noin viisi minuuttia.

Vastaamalla kyselyyn autatte kehittämään Salli Satulatuolia.

Toivon, että vastaatte viimeistään 30.09.2016 mennessä.

Ohessa linkki sähköiseen kyselytutkimukseen:
<https://elomake.samk.fi/lomakkeet/5832/lomake.html>

Ystävällisin terveisin,
Niini Huovinen
NPH13SP
SAMK

APPENDIX 2

Hei,

kiitos kaikille vastanneille! Jos et ole vielä vastannut oman viestini alla olevaan kyselyyn, niin aikaa on perjantaihin saakka.

Etukäteen avustasi kiitäen

Hei,

olet hankkinut Salli Satulatuolin 28.10.2011–30.1.2014 välisenä aikana, rekisteröinyt sen sivuillemme pidemmän takuun saamiseksi ja vastannut tyytyväisyyskyselyyn puoli vuotta rekisteröinnin jälkeen.

Olisitko halukas vastaamaan Satakunnan ammattikorkeakoulun fysioterapian koulutusohjelmaan opinnäytetyötä tekevän opiskelijan kyselytutkimukseen? Vastaaminen ei vie kauaa, ja vastata voit suoraan Niinin viestissä olevasta linkistä; Niinin viesti löytyy allekirjoitukseni alta. Kiitos avustasi!

Terveisin



? KYSELY

Salli Satulatuoli kyselytutkimus

Kyselyyn vastaaminen on vapaaehtoista ja vastaaminen tapahtuu nimettömänä, eikä vastaajaa voida yhdistää annettuihin vastauksiin. Kyselyn täyttäminen vie noin viisi minuuttia.

Taustatiedot

Kuulun ryhmään

- Nainen alle 40
- Nainen 40-50
- Nainen yli 50
- Mies alle 40
- Mies 40-50
- Mies yli 50

Seuraava >>

Sivu 1 / 7

Järjestelmän Eduix E-lomake 3.1, www.e-lomake.fi

Salli Satulatuoli

Salli Satulatuolini malli on

- Swing - swing-mekanismi, kiinteä leveys
- SwingFit - swing-mekanismi, leveyden säätö
- Twin - kiinteä leveys, kallistussäätö
- MultiAdjuster - leveyden säätö, kallistussäätö
- Classic - kiinteä leveys, kallistussäätö
- En osaa sanoa

Kuinka kauan olet omistanut Salli Satulatuolin?

- Alle vuoden
- 1-2 vuotta
- 2-3 vuotta
- 3-4 vuotta
- yli 4 vuotta

Kuinka monta tuntia päivässä käytät Salli Satulatuolia?

- Alle 2 tuntia
- 2-4 tuntia
- 4-6 tuntia
- 6-8 tuntia
- Yli 8 tuntia

Kun huomioit kaiken istumisen, montako tuntia päivässä istut?

- Alle 4 tuntia
- 4-6 tuntia
- 6-8 tuntia
- 8-12 tuntia
- Yli 12 tuntia

Satulatuolin hankinta

Mikä oli syy Salli Satulatuolin hankintaan?

- Kipu/oireet lanerangan alueella.
- Tuoli ennaltaehkäisevänä toimenpiteenä.
- Muu syy.

Hankinnan syy

Onko Salli Satulatuolin hankinnan jälkeen kipu/oireet vähentyneet?

- Kipu/oireet ovat kadonneet kokonaan.
- Kipu/oireet ovat kadonneet osittain.
- Tilanne ei ole muuttunut.

Satulatuolin hyöty

Kuinka hyödylliseksi olet kokenut Salli Satulatuolin käytön?

- Erittäin hyödylliseksi
- Huomattavan hyödylliseksi
- En osaa sanoa
- Vain hieman hyödylliseksi
- En ollenkaan hyödylliseksi

Salli Satulatuoli kyselytutkimus

Kyselyyn vastaaminen on vapaaehtoista ja vastaaminen tapahtuu nimettömänä, eikä vastaajaa voida yhdistää annettuihin vastauksiin. Kyselyn täyttäminen vie noin viisi minuuttia.

Oletko tyytyväinen antamiisi arvoihin? Tämän sivun jälkeen tapahtuu tallennus, etkä enää voi tällä lomakkeella muuttaa arvoja.

Tietojen lähetyk

<< Edellinen Valmis

APPENDIX 4

Answers for the “Other reason” behind the use of the Salli Saddle chair:

”Hermokipu häntäluun kohdalla”

”Selkäongelmien aikaisempien selkäongelmien takia”

”Murtunut niska ei kestä paikallaanoloa.”

”Sain pahoja niska- ja pääkipuja tehdessäni huonossa asennossa vuosia istumatöitä”

”Rintarangan oikoryhtivaivaan”

”Muut selkävaivat, ryhti parempi.”

”Kipuilevat jalkapohjat, laskeutunut jalan poikittaiskaari, reuma.”

”CP-vamma.Tuoli auttaa kehon hallinnassa, venyttää hieman raajojani kotona ja töi,”

”Siihen on tottunut! Ei pysty löhöömään siinä”

”ed.kin oli Salli, prolapsi S1/L5 11/2011”