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The Reincarnation of Old School Personal Training: Body Building and Strength Training



Bachelor's Degree of Sports and Leisure Management Spring 2019





Abstract

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Title of the Publication: The Reincarnation of Old School Personal Training: Body Building and Strength

Training

Degree Title: Bachelor's Degree of Sports and Leisure Management

Keywords: Fitness, Bodybuilding, Strength, Personal training, Trends.

This thesis considered a hypothesis that the old school fitness, bodybuilding and strength personal training industry specifically, was better and that the old school teachings from the golden age of bodybuilding fitness should be brought back. This is a functional, practice-based thesis with qualitative methods, scientifically sound materials and instructions chosen for conducting a research. The research consisted of exploring 5 exercise examples: the back squat, front squat, bench press, deadlift and shoulder barbell press. Both the dangers of the modern-day performances, as well as the benefits of old school bodybuilding ways were compared with the support of scientific research. Most importantly, the safer and more effective old school ways were also visually demonstrated by using two volunteers, a man and a woman. Scientific knowledge was mainly gathered from more than 100 different scientific papers, reports, books and official online sources, all of which were written in between the early 1960s and today.

Following the research, a specific project was conducted to demonstrate the effectiveness of old school bodybuilding and strength fitness ways overall. A personal gym training program with the same two volunteers. The program did not only visually demonstrate the solutions to the specific exercise issues and todays trends in fitness, but it lasted up to one academic year and the goal was to achieve significant visual and strength results with an old school personal training approach.

In a conclusive discussion, the results of the comparison between the new and old ways of performing exercises were summarized and discussed. Moreover, the results of the personal training project, the visual improvement of the volunteers, their strength improvement and feedback were collected and evaluated. The results were successful. Both volunteers achieved significant progress, gaining visual and strength improvement. The strength differences were measured by using the same main exercises: Bench Press, Deadlift, Back Squat, Front Squat and Shoulder Press. Both volunteers achieved 15-35 kg strength improvement in all the disciplines. The visual improvement was also demonstrated by using high quality pictures. The old ways of performing the exercises affected the development positively. Through one academic year the volunteers had no health issues and no complaints about the training. Later, the knowledge and experience gained from the personal training project was constructed into an old school bodybuilding and strength training guidebook, demonstrating all the basics of gym training for mass and strength, including the essentials of nutrition, food supplements and equipment, as well as etiquette guidelines and safety.

The commissioning party which supported this thesis was Balance gym. It was used for the personal training project, guidebook visualization support, as well as the practical demonstration of old school exercises. The commissioned work consisted of taking the best practices of old school personal training programs in written form, gathered from coaching the volunteers through one academic year, as well as creating a marketing description of the gym in written form. Following completion of the thesis, the material was translated into Finnish, English and Russian and given to the gym to develop their business.

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1 Introduction

This thesis considered a hypothesis that the old school fitness, bodybuilding and strength personal training industry specifically, was better, and that the old school teachings from the golden age of bodybuilding fitness should be brought up again today. The thesis compared the examples of old and new ways of training in bodybuilding and strength personal training industry, demonstrated some of the modern issue examples and offered a different, old school point of view by collecting the scientific knowledge about modern bodybuilding coaching, as well as the old-school approaches. The thesis dove into the details of each time period, compared the examples of training from the past and today, how the industry has changed and developed through time, demonstrating the flaws and dangers, the industries' effect on people, their performance and health. Specifically, the approaches to bodybuilding and strength fitness have changed drastically through time with rapid industry development, existence of trends and their constant update.

Unfortunately, today's fitness and personal training industry, its trends and approaches can be dangerous for health. Exercises are being misconnected and performed incorrectly, unexperienced personal trainers lead their clients towards wrong directions, dieting and nutrition loses its initial, healthy purpose, performance enhancing drugs interfere with the purposes of healthy lifestyle if used incorrectly. Nowadays, it is so dangerous that it might be a forever mistake to train with unexperienced personal trainers, who's guidance in training and nutrition can be misleading. If injuries accrue, it might limit the possibilities in the gym, or even worse, in the daily routine for the rest of peoples' lives.

On the positive side of things, the fitness industry has developed drastically throughout the years. It developed a lot of good practices and has stepped up significantly, in comparison to the past. However, a lot of bad accumulated along with the industries' development. The industry became overwhelmed by itself and thus, developed a very dangerous side.

Since this was an evidence-based thesis and had a scientific approach, it helped the reader to step on the right direction of starting a bodybuilding fitness lifestyle, not allowing him/her to be misled by the modern corruption of the industry, its false trends and dangerous approaches.

2 Research methods

This was a functional, practice-based thesis with qualitative methods, scientifically sound materials and instructions chosen for conducting a research. Qualitative Research is based on exploration. It is used to gain an understanding of reasons, opinions, and motivations. It provides insight into the problem or helps to develop new ideas for potential quantitative research. Qualitative Research is also used to uncover new trends in and opinions, and dive deeper into the problem. Qualitative data collection methods can be unstructured or semi-structured. Some common methods include group discussions, individual interviews, participation and observations. The sizes of experiments and samples are usually small, and respondents are selected to only fulfil a given hypothesis. (Brod, Tesler, & Christensen, 2009; Green & Britten, 2011; Munhall, 2007; Newman, 2003)

The research for this thesis consisted of exploring 5 exercise examples: the back squat, front squat, bench press, deadlift and shoulder barbell press. Both the dangers of the modern-day techniques, as well as the benefits of old school performances of those exercises were compared with the support of scientific research. Most importantly, the safer and more effective old school ways were also visually demonstrated by using two volunteers, a man and a woman.

Following the research, a specific project was conducted to demonstrate the effectiveness of old school bodybuilding and strength fitness ways overall. A personal gym training program with the same two volunteers. The program did not only visually demonstrate the solutions to the specific exercise issues and to-days trends in fitness, but it lasted up to one academic year and the goal was to achieve significant visual and strength results with an old school personal training approach. The same exercises presented earlier were used to compare the before and after strength capabilities of the volunteers. However, this personal training project was only based on the old school training approach, without having a modern training trend control group. Since this thesis sided with an opinion that modern ways of training are dangerous, it was unethical to train the volunteers using trends.

In a conclusive discussion, the results of the comparison between the new and old ways of performing exercises were summarized and discussed. Moreover, the results of the personal training project, the visual improvement of the volunteers, their strength improvement and feedback were collected and evaluated.

The scientific knowledge was mainly gathered from more than 100 different scientific papers, reports, books and official online sources, all of which were written in between the early 1960s

and today. The scientific research was done on the topic of strength and bodybuilding, which meant that there were many different studies written on the topic of this knowledge. However, while many studies supported the issues presented in this thesis, many other studies were also contradictory. Moreover, the web nowadays is filled with studies which fail to conduct reliable experiments and develop the conclusions out of truthful information. Some studies blindly went against the point of view of this thesis. Some did not have enough time, support and resources to conduct long-term experiments to prove the effects of modern fitness issues. Thereafter, all topics of this thesis were controversial, there was a side that agreed with one opinion and another side that suggested otherwise. This thesis sided with one of the opinions with the help of scientific knowledge gathered.

3 Fitness industry today

Today the world of fitness and health are popular. There are many spheres of fitness and health industries nowadays, which can be explored through journals, magazines, social media, Instagram, YouTube, Fitness Federations and many other social media sources. More and more people are becoming passionate to do fitness and are desperately searching for guidance. The industry meanwhile is raising new fitness personal trainers, who are prepared to develop their own idea of personal training with their own opinions and approaches. All of them step on the path of having responsibility, becoming more innovative and having another unique approach to fitness, becoming the new, modern personal trainer. (Andreasson & Johansson, 2014)

With such rapid development, it was inevitable for the industry to become expensive. By 2017 Europe was the largest fitness market in the world with a total value of around 26.6bn euros, and the US fitness industry recorded revenues of 23.3bn euros that same year. (Cologne & Germany, 2017) Not only before the industry of strength and bodybuilding, for example, was simply for competition, today it means so much more. Bodybuilding has become a solution for physical fitness, health, self-image and confidence. Strength and bodybuilding became a rehabilitation method for many medical industries, as well as was used to help with many aging issues. It started to be obvious; fitness was here to stay. (Dobbins and Schwarzenegger 1998)

Unfortunately, money and popularity started to pressure the industry. It got overwhelmed by selling ideas and developing businesses. The initial idea of health, better lifestyle and self-confidence has faded, while the new approaches to sport, new ideas, trends, and innovations rushed into the industry. The modern-day industry attracts people who are blinded by the crave for a better life. With that said, the modern personal training industry lacks consistency, regulation and it can hide a dark side. (Melton, Katula, & Mustian, 2008)

Fitness companies developed, competition raised to the roof, it was a fitness industry war. Different fitness companies rushed to develop new equipment, exercises and gyms. Scientific research raced towards exploring and discovering new ways of developing equipment, physical approaches to training, supplementation, nutrition and pharmacology, where steroids, or performance enhancing drugs became a world-wide phenomenon. American congress performed an Anabolic Steroid Act in 1990 as an attempt to regulate the increasing levels of illicit traffic in steroids. (Denham, 2007) This Act identified anabolic steroids as a separate drug class and categorized them as controlled substances. Nowadays, although the world has studied the proper ways of consuming performance enhancing drugs, and the drugs are regulated through the legal and illegal categories, the danger shifted towards the unexperienced half of fitness enthusiasts. New labs

rapidly develop new, more effective substances, being under pressure of competition, while the stubbornness of young gym goers often leads to drug abuse. (Ritsch & Musshoff, 2000; NIDA, 2018)

Ironically, at the beginning of the bodybuilding "boom" ages ago, during the rapid development of the golden age of bodybuilding in 1930s-1960s, at the Muscle Beach in Venice California, for example, people rushed to do bodybuilding by themselves, and there was no such thing as a qualified personal trainer. (Ozyurtcu, 2014) People who were "coaching" at the time were the same fitness enthusiasts, who were more of advisors and were not even qualified, licensed, or certified as professionals. The overwhelming irony shows that the modern fitness industry has similarities to the old times, but for much less fortunate reasons. Before the injuries happened due to natural lack of experience. (Hyman & Feiger, 1986) But nowadays, same injuries happen due to misconceptions, lack of knowledge and loss of the experience. These issues are the same for bodybuilding and strength training industry as for any other. In fact, it dominantly concerns these industries, especially nowadays, due to such popularity and high risk of injury. (Siewe et al., 2011)

3.1 Trends

To start with, it was appropriate to give a definition of a trend. A trend is a general development or a change in a situation or in the way that people are behaving. (Thompson, 2018) An example can be anything: new style of clothes, new technology, accessories, new social behaviors and changes in fitness industry. It can be anything from a new exercise machine, a new supplement, or a new exercise that is claimed to be extremely effective for growing a certain muscle or burn fat in days. People hear about it, and they get interested, masses of people try it and it becomes "Trendy." Trends are the main reason of change, and they have a place to be in this world, they are innovative, helpful and push the industry forward, if they are healthy and effective, of course.

Trends can be also always created, evaluated and identified by almost anyone. (Vejlgaard, 2008) Thereafter, trends can come from personal trainers, as well as from newcomers and amateurs, who are working out themselves, creating their own vision by trial and error, finding what they prefer the most and later starting to advise other gym goers. That is why there are so many new trends nowadays. So many in fact, that there are world-wide surveys of fitness trends conducted every year. (Thompson, 2013, 2016, 2017, 2018)

Among all these trends, trends specifically in bodybuilding and strength training industry are quite popular, which can develop a negative side for its development. Through passing of time and

trend change, people lose the initial idea of the exercises, due to constant reuse and different, individual approaches from different athletes. The form starts to degenerate, and due to constantly changing advice from different fitness enthusiasts, people get lost and start doing the exercise more and more incorrectly without even knowing it. Obviously, newcomers have no knowledge in fitness, so how does one know which new developed trend is better, more effective and safer than the other? This is exactly why personal training industry can be risky and dangerous. Not many people have the knowledge about whatever they are being sold or taught nowadays.

From another perspective, for many athletes, new, trendy ways of performing exercises do not deal any harm, so why would the modern exercise trends be dangerous or unhealthy? To answer that question, a brief anatomical, motor-skeletal picture of the human body is required. A person's skeleton consists of bone, and it is a frame for the body. Ligaments attach bones to bones in places of contact called Joints. Ligaments are only slightly elastic and if overstretched, can be susceptible to wear and damage if misused. Tendons attach muscles to bodes, holding them together. Tendons get stronger by stretching, but if also overstretched, they can tear off the bone and thus, the muscle itself. (Curtis, 2009) This thesis supported the idea of long-term damage. "Overuse injuries" is a term that was used in the studies to explain the long-term health issues, which happen only after regularly performing the exercise for a significant amount of time. Overuse injuries result from repetitive microtrauma that leads to local tissue damage in the form of Cellular and Extracellular degeneration. (Wilder & Sethi, 2004; Siewe et al., 2011) In this case, unexperienced gym goers have no knowledge of long-term damage and are focused mainly on the present. This knowledge is essentially required, but most people are in search for what is most beneficial right now, and not what is the healthiest in the long run.

Moreover, in many cases, scientific research does not have that kind of power to acquire the correct knowledge about long-term health deterioration, due to the lack of time, incorrect agenda, the volume of research and the financial support. A "digital heaven" like Internet often is not reliable enough to support scientific proof as well. One study has already been published about the fact that most of the scientific research provides false and unreliable results. As the study states, a research finding is less likely to be true when the studies conducted are smaller, effect sizes are smaller, there is a greater number and lesser preselection of tested relationships, or there is greater flexibility in designs, definitions, outcomes and analytical modes, greater financial, personal, interest prejudice and when more teams are involved in a scientific field in a chase of statistical significance. (loannidis, 2005; Burke & Peeling, 2018; Lee, 2017)

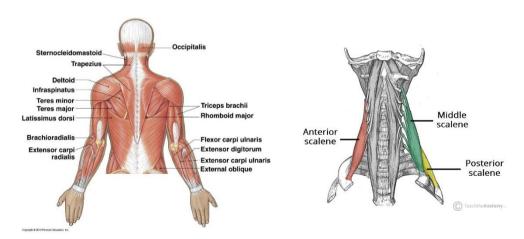
With all of that said, this thesis presented an alternative point of view towards the main body-building and strength training exercises, for the purpose of directing the reader towards the correct ways of training. The bodybuilding and strength training industry specifically was the focus of the discussion. This thesis picked the most important issues in the most important exercises, the ones that create the foundation of strength and bodybuilding and have short and long-term health risks.

4 Anatomy background

It was important to establish the anatomical structures of the main human body areas that take part in performing the exercises, which were discussed later. It did the job of establishing the basic anatomical structure of the muscles, bones, tendons and ligaments, which are under possible risks during the performance of the exercises. In this thesis the structure of the Back, Neck, Knee, Chest and Shoulders were discussed. Some parts of the human anatomy were discussed in more detail, while others not so much. This was done due to some muscular-skeletal areas playing a dominant part in the exercise, while others being secondary. It was also due to specificity of the exercise issues themselves. In come exercises, the issues lay in depth of the anatomical core, while as in others, only the surface muscle groups were the target of discussion.

4.1 Back

Only the basic muscle structure of the upper back muscles was needed later for the discussion. The lower back however was explored with much more detail, since the lower back region was the problematic point of the modern exercise issues. Specifically, those were the misconceptions about the stability of the Lumbar spine. Due to that, the focus on this issue was addressed.



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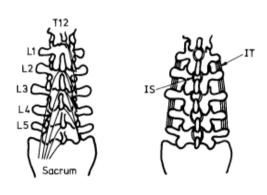
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To start with, the upper back muscle group covers all the area around the Thoracic part of the spine, from Vertebrae T1 to T12. The main purpose of the upper back muscles is to perform mainly shoulder extension, transverse shoulder abduction and scapular retraction. The basic structure starts with the Trapezius, Rhomboid Major, and Levator Scapulae muscles anchoring the Scapula and Clavicle to the spines of several vertebrae and the Occipital bone of the skull. Between the Latissimus Dorsi and the Trapezius, 3 small muscles are located under the Posterior

Deltoid muscles, which are the Infraspinatus, Teres Minor and Teres Major. (Brown et al., 2007; Curtis, 2009; Panjabi, Oxland, & Parks, 1991)

The neck is the more sensitive part of the Cervical spine. It covers the area from the Vertebrae C1 to C7, and they are significantly smaller in comparison to the Thoracic and Lumbar Vertebrae and the muscles around the area are much thinner. The neck muscle group is called the Scalene muscle group and mainly involves Anterior, Middle and Posterior muscles, which surround the Scalene Vertebrae. These muscles are imbedded under the upper Trapezius, Sternocleidomastoid and the Occipitalis.(Buford, Yoder, Heiss, & Chidley, 2013; Curtis, 2009; Harry, Bennett, & Guha, 1997)

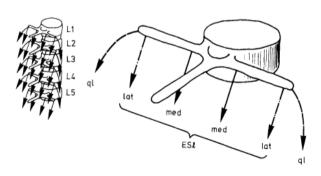
The lower back however, is meant to mainly perform upper body and lower body extensions, as well as core rotations and to a lesser extent, the External Oblique flexion. The lower back or the Lumbar spine, is the lower section of the spine and has six Vertebrae: L1, L2, L3, L4, L5 and S1. This construction is com-



Adapted by Bergmark (1989) from Bogduk and MacIntosch (1984)

pletely imbedded and surrounded by numerous different muscle parts and Fascia tissues. First, there are Multifidi muscles attached to the Vertebrae, starting from the Mammilar processes and inserted to the Spinous processes of the Vertebra two levels above. The muscle fibers between the Vertebrae and the Pelvis are stretching down to the left and right. Next are the Interspinal (IS) and the Intertransverse (IT) muscles, which operate between two adjacent Vertebrae, with their insertion and origin on the Transverse processes. Taking only these two muscle groups already, indeed they have small muscle force, but due to their short length, they give an increased stiffness and thus, extrinsic mechanical stability to the spine. (Bergmark, 1989; Curtis, 2009; Snijders, Pool-Goudzwaard, Mens, Stoeckart, & Vleeming, 2002; Kibler, Press, & Sciascia, 2006)

Next muscles of the Lumbar area are the Insertions of the local Erector Spinae and Quadratus Lumborum muscle fibers to the Lumbar Vertebrae, that originate at the Pelvis. Quadratus Lumborum fibers are inserted to the outermost part of the Transverse processes of L1 to L4. Then, the Lateral Fibers are inserted to the



Adapted by Bergmark (1989) from Bogduk (1980) and from the crosscut photographs from the investigation by Jonsson (1970)

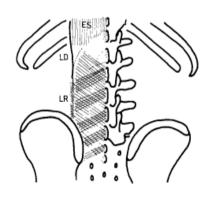
outermost part of the Transverse processes of L1 to L5. The Medial fibers are located closer to the spinal cords, which are inserted to the Accessory processes of L1 to L5. All of those fibers strongly stabilize the spine in a Lateral direction. (Bergmark, 1989; Curtis, 2009; Snijders et al., 2002; Kibler et al., 2006)

The muscles directed from the Thoracic cage to the Lumbar Vertebrae in the Multifidi muscle bridge are the next muscles to consider. Like the Spinalis muscles, they extend the upper Lumbar and the Thoracic spine. The muscles, which originate from the Thoracic cage and connect to the Pelvis, like the Thoracic fibers of the Erector Spinae muscle, they originate from the Erector Spinae Aponeurosis (ESA). The muscles are essentially parallel to the spine and their role is to extend the trunk and stabilize the spinal system in the Sagittal and Lateral directions. (Bergmark, 1989; Curtis, 2009; Snijders et al., 2002; Kibler et al., 2006)

The muscles like External Obliques, which originate from the lower eight ribs, and Internal Obliques, which start at the Lateral Raphe of the Thoracolumbar Fascia, apart from also giving stability, they have a global role of Bilateral action in the upper part like bending, flexion, unilateral action and rotation of the Thoracic cage. (Bergmark, 1989; Curtis, 2009; Snijders et al., 2002; Kibler et al., 2006)

Apart from numbers of other muscles taking part in creating stability, the Intraabdominal pressure plays a huge role in holding load. The Abdominal cavity mainly holds liquid and Viscous material, so it may be considered as a non-compressible fluid. None the less, the Intraabdominal pressure is maintained by activity in the muscles that surround the cavity, which are the Rectus Abdominis, the External and Internal Oblique abdominal muscles, the Transversus Abdominis, and finally, by the Diaphragm above and by the muscles of the Pelvis floor. The Intraabdominal pressure is also capable of flexing the Lumbar spine, which gives an ability of increased muscle reinforcement from local muscle action, meaning Multifidi and Interspinal muscles. (Bergmark, 1989; Curtis, 2009; Snijders et al., 2002; Kibler et al., 2006)

Finally, another important part of the Lumbar support is the Thoracolumbar Fascia itself. It consists of three layers: Anterior, Middle and Posterior. The anterior layer originates from the anterior surface of the Lumbar Transverse processes. The Middle layer starts from the tips of the same Lumbar processes. The Posterior layer arises from the middle and covers the back muscles. All that layer network forms a "Retinaculum" which surrounds the whole Erector Spinae. The main roles of the Fascia are firstly to



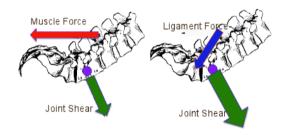
Adapted by Bergmark (1989) from Bogduk and MacIntosch (1984)

transfer the force from muscles to skeletal elements and transfer the forces specifically between the spine and Erector Spinae muscle. (Bergmark, 1989; Curtis, 2009; Snijders et al., 2002; Kibler et al., 2006)

All of that said, the levels of stability and strength of the Lumbar Spine are highly under-raided, when talked about huge pressure on the Lumbar spine during the correct form of the Squat. However, the stability of the lower back will not play a huge role if the athlete achieves very dangerous "Sheer forces" during the incorrect performance. The term "Sheer force" is a pair of opposing forces. In this case, one force pushes the lower back forward and another that pushes the upper back downwards. This bends the two parts of the lower back, pressing on the Interspinal disks, putting it in a risk of breakage, sprains, pulling, and other dangerous injuries. Exactly due to these reasons, the back is kept naturally straight and only slightly curved, with no overarching and no overcurving during dangerous performances. (Rahmani, Rambaud, Bourdin, & Mariot, 2009; Medica, Padulo, Laffaye, Chaouachi, & Chamari, 2014; Schwarzenegger et al., 1998)

Moment due to applied load Disc shear force (perpendicular to long axis of vertebrae) Disc compressive force (parallel to long axis of vertebrae)

Muscles engaged (active) versus load carried by ligaments

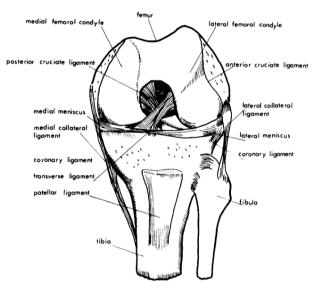


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4.2 Knee

The knee joint is where the Femur and Tibia bones meet. The Patella or the knee cap is made of bone and sits in front of the knee. The knee joint is a Synovial joint, which means that it is enclosed with a ligamental capsule and inside contains a Synovial fluid that lubricates the joint. To start with, the end of the Femur joins the Tibia to create the knee joint, and the Femur rests on what is called the Tibial Plateau. The knee cap rests in between the Femurs end, the Patellofemoral Groove, attached with two Patellar ligaments. The connecting surfaces of the Femur and Tibia are covered with a material called Articular Cartilage, which allows the two bones to slide against one another without friction damage and absorb shock impact.

The ligaments were the main topic of the discussion, and they attach the two bones together. The two of the first ones are on both sides of the knee joint: The Medial Collateral Ligament (MCL) and Lateral Collateral Ligament (LCL). There are also two main important ligaments inside the knee joint: Anterior Cruciate Ligament (ACL) and the Posterior Cruciate Ligament (PCL). MCL and LCL are preventing the knee from going too far in side-to-side directions. ACL and PCL control the back-and-forth motion of the knee. Two special types of ligaments are squeezed between the surfaces of the two bones, the Menisci, which spread the force of the weight over a larger area and they help the ligaments with the stability of the knee. That is all for the knee capsule. (Curtis, 2009; Seedhom & Hargreaves, 1979)

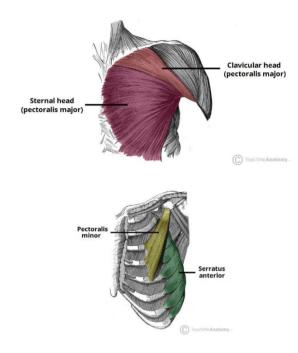


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The ligaments just connect bones to bones. Unlike other joints, the knee joint lacks a stable bony configuration. For example, the hip joint is a ball that sits in a deep socket. (Curtis, 2009; Gautier, Ganz, Krügel, Gill, & Ganz, 2000; Dienst, Gödde, Seil, Hammer, & Kohn, 2001) The ankle joint is quite like a structure of Mortise and Tenon, a very stiff construction of joining two woods that has been used for centuries by engineers and builders to build constructions. (Guhl, Parisien, & Boynton, 2004; Erdil, Kasal, & Eckelman, 2005) However, the knee joint has much shallower surface of connection with only the Menisci, and side ligaments supporting the force, says Orthopedic surgeon Randale Sechrest (2012). Thus, overstressing the knee joint with the sheer forces of the Tibia and Femur bones forcing against each other, can eventually lead to damage, tear, pain and pulling.

4.3 Chest

The Pectoral muscles were also described by demonstrating only the basic structures for the sake of future discussions to have clarity. Pectoral muscles perform the main following movements: Horizontal shoulder adduction, some degree of shoulder flexion and upper arm extension. The Pectoral muscles are consisted of two main muscles: The Pectoral Major muscles and the Pectoral Minor muscles. They connect the front of the chest with the bones of the shoulder and the upper arm. The Pectoral Major itself is at the surface and can also be divided into three parts: the upper, middle and lower. The middle and lower parts classify as the Sternal head, while the upper pectoral is the Clavicular head. The



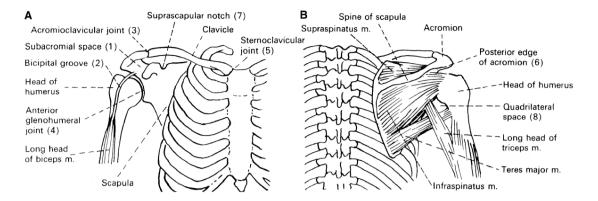
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Pectoral Minor muscles have their origins at the ribs, Sternum and Clavicle, and insert at the Scapula, which means that they are located under the Pectoral Major muscles.

All the parts of the Pectoral anatomical structure were evaluated in the description of the exercises, how they were used, the effects of different Pectoral muscle activation and other important aspects. (Akagi, Tohdoh, Hirayama, & Kobayashi, 2014; Curtis, 2009; Rehman & Robinson, 2005; Rocha Júnior, Gentil, Oliveira, & Do Carmo, 2007; Saeterbakken, van den Tillaar, & Fimland, 2011; Äärimaa, Rantanen, Heikkilä, Helttula, & Orava, 2004)

4.4 Shoulders

Shoulder joint is designed to perform many movements, that is why it is very mobile, has less bone structures and much more muscle, tendon and ligament dominant. The main movements that the shoulder joint is usually performing is lifting the arms in front, side and back, as well as full arm rotation and upward shoulder extensions. Lower is the anterior and posterior pictures of the shoulder joint, which identifies the different bones joints and the sites of pathologic processes that produce pain.



Retrieved from Goldstein (2004)

First, is the Subacromial space (1). It can be involved with issues like calcific tendinitis, rotator cuff tendinitis/impingement syndrome, and rotator cuff tear. Bicipital Groove (2) can be involved in bicipital tendinitis and biceps tendon subluxation and tear. Third is the Acromioclavicular joint (3), which can be involved with degenerative and infectious processes. Fourth is the Anterior Glenohumeral joint (4), it can be the site of glenohumeral arthritis, osteonecrosis, glenoid labial tears, and adhesive capsulitis. Fifth is the Sternoclavicular joint (5), which can be the site of pain due to infection, degenerative changes or trauma. Sixth is the Posterior edge of the acromion (6), which can contribute to rotator cuff tendinitis, calcific tendinitis, and rotator cuff tear. Second to last is the Suprascapular notch (7), which can be the site of suprascapular nerve entrapment. Lastly, there is the Quadrilateral space (8), which can be the site of axillary nerve entrapment. (Curtis, 2009; Goldstein, 2004; Peat, 1986; Terry & Chopp, 2000)

With all that complicated list aside, it is obvious that the shoulder joint is also one of the most dangerous parts to train if performing exercises incorrectly. If stretching all the tendons in an unnatural way, it can lead to overuse injuries, joint damage and many other health issues. However, with a perfect technique, the controversial exercises presented later are completely safe exercises. (Borsa, Laudner, & Sauers, 2008; McKean & Burkett, 2015; Saeterbakken & Fimland, 2013; Thigpen et al., 2010)

5 Exercises.

These exercises were of the most importance in this thesis. These exercises were the reason for this research to perform a personal training project and create a Guidebook later, in order to direct the readers towards correct ways of training. It was important to establish the old and the new techniques of the exercises, how they have changed due to constant trend change and dispel several myths. Moreover, with the anatomy knowledge already established, the reasons for the old school forms were justified.

The research for this thesis consisted of exploring 5 exercise examples: the back squat, front squat, bench press, deadlift and shoulder barbell press. After the controversial exercises were presented, most importantly, the safer and more effective old school ways were also visually demonstrated by using two volunteers, a man and a woman. During the personal training project and the Guidebook construction, these exercises were also used later, during the personal training project and after for demonstrating the strength differences before and after the personal training project.

5.1 Back squat

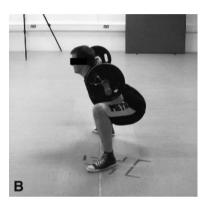
The back squat is a golden exercise. It targets all the main parts of the lower body if done correctly. (Cissik, 2000) The squat exercise in general is also highly susceptible to risk. Short-term and long-term injuries can happen if the exercise is not done correctly, or if not going along with the basic rules of safety. The squat is a full-body movement, but the main muscles that are being targeted in the back squat are Gluteus Maximus and Medius, Quadriceps, Hamstrings and to a lesser extent, the Calves. Core areas and joints that support the movement are the knee joints, the Lumbar spine, the hip joints and ankle joints. All of them experience pressure during a squat performance and any of those areas can damage if the form is performed incorrectly.

The issue with this trend is the fact that now there are many ways to perform the back squat. Nowadays, athletes started to find comfort in a specific style of squat, and it does not seem to change, nor does it force anyone to reconsider it. Today, normal rules of performing a squat are usually having your back upright, having a wide stance and spreading your knees outward during the performance.

However, one of the old school squat styles was forgotten during the rapid changes of the fitness industry. Fortunately, the research about this style still exists and was presented in this thesis.

The old research shows that the knees in a squat should never travel anywhere more forward than the toe level. (McKean, Dunn, & Burkett, 2010) In some cases research went even further and showed examples of squat performances where knees do not travel forward almost at all. (Swinton, Stewart, Lloyd, Keogh, & Agouris, 2012) It was stated that if knees go anywhere more forward, it is more likely to cause long-term knee health issues. Unlike the tendons, which connect muscles to bones and can become stronger and elastic, the ligaments connect bones to bones and are only slightly elastic. If the knee, as well as in any other joint will be overstretched, it might result in damage.

Nowadays, this kind of form can be still noticed during powerlifting competitions and holds a name of a powerlifting form. (Swinton, Stewart, Lloyd, Keogh, & Agouris, 2012; Escamilla et al., 2001) And while many powerlifters still do it, this idea is popular among the old school personal training industry also, which claims that this form should be used in any case, powerlifting or not.



Retrieved from Swinton (2012)

Why would it be so? It seemed that this idea took its origin in a

study about the biomechanical knee analysis. (Ariel, 1974) The study conducted an experiment with 12 study subjects. Subjects were squatting in their own style, and they were regularly recorded over a one academic year. The subjects with the greatest forward knee movement during a squat have been found to also have the greatest sheer force on the Tibiofemoral joint. The previously mentioned sheer force in this specific movement can happen with a pair of opposing

forces; one force pushes the Tibia bone forward and another that pulls the Femoris bone back. If those opposing forces become too high, it can result in knee pain, or if taken to the extreme, can result in ACL tears. However, a much more recent study went against this report. (Hartmann, Wirth, & Klusemann, 2013) It stated the unreliability of Ariel's study, claiming that the squat angle control was not properly stated or controlled by the experiment, and the fact that there was no description of the technique the volunteers have used.



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Another study conducted a closer research to the topic. (Fry, Smith, & Schilling, 2003) One experiment was conducted with a free squat and another with a restricted knee squat. In the first, the

knees were permitted to travel past the toes, but in the second, a wooden board was restricting the knee to travel over the toe level. The first conclusion of the study was indeed the fact that the knee sheer forces were greater in the unrestricted variation of the squat. Continuing from this statement, a restricted squat also caused the trainee to lean more forward, to maintain the barbell center of gravity, when as in the unrestricted squat, the trainee maintained a more straight, upright posture. For many fitness enthusiasts this would seem to be an unreasonable trade off. Most of the fitness enthusiasts would pick an option with less strain on the hips and lower back and more on the knees, like in an unrestricted squat. However, it was proven that during the squat with forward knee travel, there was significantly more sheer forces in the knees. (Fry, Smith, & Schilling, 2003)

Many fitness enthusiasts know about this controversial opinion but appose with a statement that the knees are more than capable of resisting the possible damage from the sheer forces. Indeed, there hasn't been a lot of yearly recordings about knee injuries during powerlifting competitions, when a lot of athletes perform lifts with huge forward knee travel. However, there has been done a study about Injuries and overuse syndromes in powerlifting, and it has conducted that during a squat workout, athletes mostly experience pain in legs and buttock, while during deadlifts, for example, the main area of pain distribution is the lower back. (Siewe et al., 2011)

5.2 Front squat

The purpose of the front squat to begin with is to mainly target quadriceps muscles, while the back squat is targeting gluteus and hamstrings more. (Cissik, 2000) Secondly, studies have shown that the front squat is capable of giving the same hypertrophy results as with the back squat, with the requirement of lesser weight, if performed correctly of course. (Beardsley, Cronin, Vigotsky, Schoenfeld, & Contreras, 2015) The front squat is an addition to the first trend, since the main premise is similar. Moreover, there was already a lot of research done on the comparison of front and back squats in general. (Gullett, Tillman, Gutierrez, & Chow, 2009; Russell & Phillips, 1989; Peeni, 2007) In some of those studies, it was said that the front squat is being ignored and overlooked by many, since a lot of athletes consider it not effective. This can happen due to many reasons. The most obvious one is the fact that it is much harder to perform a front squat with proper technique then a back squat. Due to that, many coaches avoid the exercise and only coaches with great weightlifting background can teach it. (Cissik, 2000) Obviously, if there are

comparison articles about the two forms, there must be a difference. However, due to the misconceptions about the purpose of the front squat, performing the front squat with an incorrect form stopped giving significant results, as well as became dangerous.

With the back squat, as well as the front squat, the issue with dangerous knee sheer forces and lower back load stayed the same, people trade hips and lower back strain for the knee sheer force. It leads to performers



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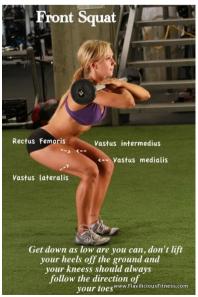
keeping their back upright, whether it is a front or a back squat. It does make the performance more comfortable, but less effective for the targeted muscles and much more dangerous for the knees. Leg position in most cases also stays wide, keeping the impact on the hamstrings and gluteus. All of that said, the form nowadays does not change almost at all, whether gym goers perform the back squat or the front squat. The athlete still has his back upright, causing the knees spread outward, travelling forward and experiencing huge sheer force. Gym goers must see the

obvious, the back squat and the front squat are different exercises that focus on different muscle groups and thus, should be performed differently, as the old school ways say.

There were two main types of squats performed before: The wide stance back squat with no knee travel, which was discussed earlier, and the narrow style front squat, also with no knee travel. It was suggested that the narrow stand front squat targets the quads most efficiently. Moreover, the research has shown that the front squat as an exercise is also causing less strain and sheer forces on the knee joints in general. (Gullett et al., 2009) The study conducted an experiment on the knee and muscle activation levels, with a combination of video and force data, as well as surface electromyographic data, collected from 15 healthy trained individuals, performing the two variations of the squat. With all of that said, it would be inappropriate to perform the front squat with the technique, which is meant for the



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back squat, when studies have shown huge issues with knee sheer forces, as well as differences in purposes of both variations of the squat. No one should forget about the fact that knee pressure issue correlates directly to the front squat and should also be performed at least with the knees stopping at the toe level. Luckily, by this day, the correct forms are still being performed by some fitness communities. The study about the "Effects of the Front Squat and Back Squat on Vertical Jump and Lower Body Power Index" showed the performance attempt of a closer stance with slight knee travel. (Peeni, 2007) The more recent demonstration and the technique that this thesis considered correct was performed by the leader of "Flavilicious Fitness" Flavia Del Monte in 2012 (Del Monte, F., 2012) Flavia Del Monte is a fitness enthusiast with a large following on social media. She was firstly a registered nurse with qualified knowledge about human anatomy, health, fitness, nutrition and other knowledge. Later the true qualification of a personal trainer and advisor was acquired with the "Essentials of Sport and Exercise Nutrition Certification at masters level nutrition course for elite training professionals.

5.3 Bench press

A third trend was related to the bench press. There are three bench press variations used in the bodybuilding industry for chest training: The flat bench press, the incline bench press and the decline bench press. Each one is dominantly affecting the middle chest, the upper chest and the lower chest, since the chest muscles have three parts, the upper, middle and lower. The bench press is another exercise that targets not only the chest muscles, but many other smaller supporting muscles like the Triceps. Furthermore, studies have also analyzed the activation of the deltoids during all three variations of the bench press and, logically, the inclination of the trunk in the incline bench, directly increases the activation of the shoulders, while the decline bench tends to decrease the shoulder activation. (Akagi et al., 2014; Barnett, Kippers, & Turner, 1995; Rocha Júnior et al., 2007; Saeterbakken et al., 2011)

Due to the angles that your arms and your body are positioned, and the differences between the travel of movement in all three variations, it so happens that the chest is the weakest on the incline and strongest on the decline bench, thus, the flat bench press strength levels are always in the middle between the other two. (Khan, Malik, & Arfin, 2017) The laws of physics showed that putting your body into a decline position gave the athlete more power, due to shorter travel, allowing to push through the so-called "sticking period" of the bench press. (van den Tillaar & Ettema, 2010) The sticking period is the hardest point in the movement, when lifters quite often struggle with bench pressing, getting stuck at some point of the bench press ascending. To help themselves, they uncontrollably lift their lower body, putting it in a decline position. Soon, lifters

found comfort in this form of bench pressing. The decline position, due to arching the back and having a huge leg thrust, gave them more power. Later this form started to be seen during many powerlifting competitions, but by this day is still being undermined and discussed.

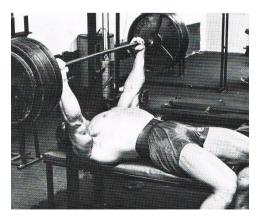
The issue started to worsen with modern, unexperienced fitness enthusiasts misconnecting the idea more and more. The form for many athletes became so absurd, the glutes started to lift from the bench, pushing their whole body up with their legs, shifting all the force on the shoulder and neck region, giving them more and more power to lift, but becoming more and more dangerous for the spinal



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cord of the body. The issue behind the over-arched back is the fact that the body is holding on only two main points of support: The legs and the shoulders. As soon as the position becomes excessive, however, Cervical spine section, the very sensitive part of the upper spine, is put under danger. "With this position the athlete is also getting the sheer forces in the lower back that offset the vertebra." (Smith, Henoch, Israetel, 2015) The forces from the leg drive and pressure on the upper back, shoulders and neck work in the opposite directions. If the weight gets significantly higher, the worst-case scenario, it might lead to spine, or neck injuries, which can lead even to more drastic health consequences later. By this day there is little research done on excessive bench press arching, since it is quite a new trend. However, the same sheer forces happen much more often in many other exercises. An example could be given by showing any other exercise, which involves lower back activation, where the sheer forces act the same way, but in reverse, for example, if not maintaining a straight back during a squat or deadlift. (Hayashi, Katsuhira, Matsudaira, & Maruyama, 2016; Leyland, 2007; Potvin, Norman, & McGill, 1991)

In case of the bench press, there is nothing wrong with a slight arch however, and by many it is considered healthy, due to the safe position of the shoulders, since a slight arch will put the shoulder blades back and isolate the shoulders from any unnecessary movement, thus, protecting them from unneeded forces. The sheer force in the lower back, which was mentioned earlier activates only when lifting the glutes from the bench with a leg drive. If the glutes stay anchored to



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the bench, it is a relatively safe position. (Smith, Henoch, Israetel, 2015) However, some books and studies went even further and suggested lifting and flexing the knees, not having legs as the

lower point of contact at all. (Rahmani, Rambaud, Bourdin, & Mariot, 2009; Medica, Padulo, Laffaye, Chaouachi, & Chamari, 2014; Schwarzenegger et al., 1998)

Coming back to the variations of the benches in bodybuilding industry, the incline, the flat and the decline benches. A question was asked right away, why is no one using a decline bench instead? It was proven that the decline bench is safer than any other bench, since it moves stress off the shoulders and places it more on the lower pecks. It was also proven that one rep max on the decline bench press was 1.25 times the athlete's body weight, compared to 1.07 on the incline bench press. (Glass & Armstrong, 1997) An answer for this question is the fact that the biggest benefit of the decline bench is just an increased muscle activation at the bottom portion of the Pectoral muscles, but that is mostly a superficial muscular area. It might make sense for bodybuilders, but athletes, who are focused on improving their overall sports performance, have better ways to spend their training time. (Saeterbakken et al., 2011) Coming back to the direction of the thesis, specifically, strength and bodybuilding, where all three benches make sense and are required for better muscle growth. Bodybuilding and strength training have a high health risk factor, thereafter, the form must be performed according to the healthiest angles and positions possible. Additionally, science has stated that it is recommended for professional coaches to include all three of the bench press variations. (Barnett et al., 1995)

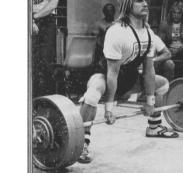
5.4 Deadlift.

Deadlift in general is an exercise where the athlete is lifting the weight from the ground by grabbing the bar and simultaneously performing hip and knee extensions. The main targeted areas of activation are quite the same as in the squat exercise: Gluteus Maximus and Medius, Hamstrings and to a lesser extent, Quadriceps and Calves. However, in this specific exercise, the upper back is being activated significantly more. (O'Reilly, Whelan, Ward, Delahunt, & Caulfield, 2017)

There are many basic errors that most amateur athletes do when they perform the deadlift, including lower back rounding, fast hip drive, improper posture and excessive lockout. Science has conducted that many of those errors are natural for the human body. For example, there will always be some degree of lower back curvature during heavy lifts. Moreover, surprisingly, the rounded back posture seems to be a stronger position according to the research. The rounded back allows the hips to be closer to the bar, which reduces the force requirement that the Gluteus muscles and Hamstrings need to overcome. (Contreras, 2014) However, even though it seems to be a stronger position, at the expense of safety, the back curvature is quite unreasonable and should be kept to minimum. It can happen for many reasons. For example, the Hamstrings might

not be stretched enough, or the Gluteus muscles are too weak and due to that, the curvature of the back compensates the force requirement. A fast hip drive most commonly happens when the athletes intuitively attempt to lift the weight with a squat performance, using only the legs, rather than with a correct deadlift technique, which is the simultaneous lift of the upper and lower bodies. Finishing the performance with an excessive lock out and flexing the lower back often happens due to excitement of the athletes and them wanting to keep going with the movement even further. However, if the lock out gets too excessive, the same sheer forces mentioned earlier can accrue due to the vertical load on the spine. Which comes to other issues of movement travel, many athletes tend to drop the weight on the negative phase of the movement after achieving the full lock out, siding with an opinion that deadlift is a concentric only lift, which means that only the lift itself gives the effect. Moreover, according to US Olympic weightlifting coach Jim Schmitz, the reason Olympic lifters drop the weight is because as more and more weight was being added to bars, it became difficult to lower the bar to the ground. This behavior was then copied by amateur lifters who drop the weight, even when the weight isn't heavy enough to deserve it. However, if constantly training the lowering of the weight, the muscles will be capable of lowering any kind of weight. (Belcher, 2017; Bird & Barrington-Higgs, 2010; Cholewicki, Mcgill, & Norman, 2006; Rafael, Escamilla et al., 2002; Schmitz, n.d.)





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To more interesting topics, there is a significant amount of controversy in between the different variations of the deadlifts. There are three main types of deadlifts: Conventional deadlift, Sumo deadlift and the Romanian deadlift. Romanian deadlift is a separate type and has a specific meaning oriented on stretching the Hamstrings, Lumbar and Gluteus muscles. Specifically, the confusion is laying in between the Sumo deadlift and Conventional deadlift, since they are the main weightlifting disciplines and the bodybuilding and strength training exercise. (Belcher, 2017; Bird & Barrington-Higgs, 2010; Cholewicki et al., 2006; Rafael, Escamilla et al., 2002)

The Conventional deadlift is being performed with the legs positioned parallel and arms grabbing the bar outside of the legs, while the Sumo deadlift is being performed with a much wider stance

and the arms grabbing the bar inside the legs. As science has shown, the biomechanics and muscle activation patterns for both variations are quite similar, with the main differences being only the fact that Sumo deadlifts are more impactful on the Quadriceps muscles, while the Conventional deadlifts are more oriented on the spinal erectors. The main reasons for these differences are the fact that in the Conventional deadlift setup, the athlete must have a more hip-dominant posture, while in the Sumo deadlift hips go lower and the back has a more upright posture. With all of that said, athletes often confuse which style is better for strength and mass development, should they drop the weight after lifting it, as well as whether they should perform the deadlift exercise during the leg workouts, or back workouts. (Belcher, 2017; Bird & Barrington-Higgs, 2010; Cholewicki et al., 2006; Rafael, Escamilla et al., 2002)

This thesis sided with one of the classical, old school opinions that there is no specific preference in performing which style of deadlift. The only way to find out which variation is better for the athlete is giving a thought about possible muscle group activation priorities and trying both techniques. However, since the leg workouts usually bring a lot of Quadriceps muscle development already, the Sumo deadlifts can be a good addition for developing the Hamstrings.

Which comes to the noisy weight dropping, while it is mainly considered a matter of etiquette, and whether lowering the weight is more effective is not necessarily proven, but more controversial according to science (Bishop, Debeliso, Sevene, & Adams, 2014), the old school methods suggest controlling the negative phase of the movement, like the athlete should do in any other exercise. Lowering the weight in a controlled manner increases the time under tension, which is beneficial for building muscle mass. (Seals, 2017) The findings of the study conducted that the amount of the sympathetic neural activation created during isometric exercise in humans is determined significantly by the size of the active muscle mass. However, due to that, the weight lowering makes the recovery from the exercise more difficult. With that said, performing the deadlift with already challenging squats can be very demanding for the body. In comparison to the back workout, when it can be the only heavy, strength training exercise. In addition to that, the back muscles are under huge development during the deadlift performance. Especially Latissimus Dorsi and Erector Spinae are very important in the deadlift as engaging them properly will allow to potentially lift more weight and they have a vital role in keeping the upper back tight. The primary function of the Latissimus Dorsi is adduction of the arm and extension of the arm towards the back. That tension keeps the back tight by keeping the shoulder blades locked into position. Moreover, the Erector Spinae muscles are in charge of bending the back backwards, keeping a straight neutral position. (Belcher, 2017; Bird & Barrington-Higgs, 2010; Cholewicki et al., 2006; Rafael, Escamilla et al., 2002) To demonstrate both techniques, the Sumo deadlift was

used for the woman during the personal training project, and the conventional deadlift was used for the man.

5.5 Shoulder barbell press

Shoulder overhead barbell press is a combination of shoulder flexion and extension. It is a basic, multi-joint barbell movement and a general strength training exercise with a huge range of motion, with nearly 180 degrees of shoulder flexion. However, this thesis considered an issue with this exercise. The shoulder overhead barbell press is quite Anterior Deltoid dominant, meaning that it focuses mostly on the Anterior Deltoid development. One study has compared four shoulder press variations, and it has proven that dumbbell presses are better than barbell presses in developing Medial Deltoids more. Moreover, the Posterior Deltoid muscles hardly get any attention from the barbell shoulder presses. (Saeterbakken & Fimland, 2013)

In this thesis, another old school approach to shoulder press was considered, which is the barbell shoulder press behind head. While modern day fitness enthusiasts claim that the behind head shoulder press is dangerous for shoulder health, one study has concluded that for totally healthy individuals, who have normal trunk stability and good shoulder movement range, the shoulder press behind head is a totally safe exercise. (McKean & Burkett, 2015) The only aspect to consider is that there are several main rules to maintain a healthy behind head shoulder press perfor-

mance. The same study was evaluating the shoulder range of movement and the spine position. In order to achieve the healthy shoulder movement range, the elbows must travel strictly up and down, not allowing for the shoulder tendons stretch diagonally to the front and back. Moreover, the spine must have a natural curve, giving the shoulders an ability to slightly shift back, putting them in a safe position



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and opening the way for the barbell to travel passed the head. This technique is more efficient for the side and rear deltoid development according to the old school approach. If performed correctly and carefully, this exercise can be combined with other variations of shoulder presses for ultimate shoulder improvement. (Borsa et al., 2008; McKean & Burkett, 2015; Saeterbakken & Fimland, 2013; Thigpen et al., 2010)

6 Demonstration.

In this part it was necessary to demonstrate the forms and techniques, which the thesis considered to be correct. The correct forms were based on more safe and accurate guidelines, which supported the old school believers and theories. The gym did not provide the perfect environment for the demonstration, due to a lot of equipment in the gym being in the background. However, the practical advantages of having a lot of equipment and the working environment were excellent. The pictures were taken with a high-quality camera and from different angles, demonstrating the preparation phases, the set up, and the performance itself.

6.1 Back squat

The athlete starts by going under the bar and placing it in the gap between the upper Trapezius and Posterior Deltoids. Pressing with the legs, the athlete normally takes the bar out of the rack, supporting the bar by holding it on the left and right side with his/her hands and makes a couple of steps back to get space to perform the movement. The back must be straight, extended and flexed in order to stabilize the bar in between the Trapezius and the Posterior Deltoids, while your head should be directed up. It is highly not recommended to direct your head down, since the athlete has weight pressuring the upper spine and resonating into the neck





Vertebrae. Coming back to the performance, after taking few steps back, the athlete takes a wide stance to achieve a wide stance, which is focusing on the Gluteus muscles and Hamstrings.

The athlete starts the movement by extending his Gluteus muscles way back, leaning with the upper body forward, thus neutralizing the center of gravity. The goal of the movement is to achieve no sheer forces on the knees and exercise the lower back. The athlete continues the movement by squatting until reaching the lowest point of the movement which is the 90-degree angle in his/her legs. This will directly target the Gluteus muscles and stretch the Hamstrings. The

second part of the movement starts with a huge leg extension thrust, lifting the bar up and achieving the starting standing position. (Swinton et al., 2012; Escamilla et al., 2001)



6.2 Front squat

The athlete starts by approaching the bar from the front and laying it in the gap on top of the Collarbone and between the Anterior Deltoids. The athlete applies a cross over grip, grabbing the bar on the right with the left hand and on the left with the right hand. The elbows are being lifted with a cross over position to squeeze and stabilize the bar in between the Collarbone and Anterior Deltoids. The lower back should be straight, and the Trapezius muscles flexed, as well as the head must be directed up. Specifically, in this exercise it is vitally important due to the barbell being in front of the body. The athlete takes the bar out of the rack, takes a couple of steps back and applies a very nar-





row stance. Similar form is used as in the back squat, which is the extension of the Gluteus muscles way back and leaning forward with the upper body, thus achieving the neutral center of gravity. The athlete descends by squatting and achieving the same 90-degree angle, which will directly

target the quadriceps muscles. As well as with the back squat, in order to lift the bar, the athlete performs a powerful leg thrust, extending his/her legs and reaching the top end standing position. (Peeni, 2007; Del Monte, 2012)



6.3 Bench press

The athlete starts by laying down on the bench and adjusting his position. The Gluteus muscles must be anchored to the bench as the lower point of contact and the legs should be placed evenly on the floor with normal pressure against it. The grip must be wide to target the Pectoral muscles and only to a lesser extent the Triceps muscles. The athlete must grab the bar by digging it into the base of his/her hand, driving the pinky into the bar to prevent grip fatigue. As soon as the grip is applied and established, right beforehand, the athlete flexes his back and shoulders to put the shoulder blades to the back in order to isolate them from any kind of





movement. The arch should be small, to the point when only a hand can go through in between the bench and the lower back of the athlete. The performance starts by taking the bar of the rack. Aligning it with the middle Pectoral area and slowly descending the bar, touching the chest with the middle of the barbell and afterwards applying huge arm thrust to lift the bar up. The elbows are not being extended fully until full lock out to prevent the pressure from the weight going straight to the shoulders and endangering the elbows. (Brown & Kimball, 1983; Medica et al., 2014; Schwarzenegger et al., 1998)



6.4 Deadlift

The two variations of the deadlifts differ in several points. The Conventional deadlift is being performed with the legs positioned parallel and arms grabbing the bar outside of the legs, while the Sumo deadlift is being performed with a much wider stance and the arms grabbing the bar inside the legs.

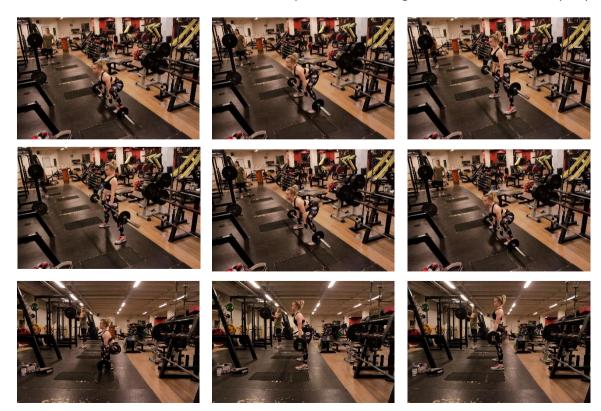




6.4.1 Sumo

The athlete starts by approaching the bar in a way that his/her shins will be a couple of cm behind the bar. The athlete takes a sumo stance by moving the legs as far laterally as possible, while still having the heels aligned with the knees. The feet can be slightly flared. To get the hands down towards the bar the athlete must extend the hips back and squat in order to reach and grab the bar. The grip width must be applied directly down from the shoulders, meaning in a shoulder width, just inside the shins. The grip types can vary and usually a matter of preference. The most common one is the alternate grip, or over/under grip, which allows to move much more weight. However, in order to prevent muscle imbalances, switching the grip occasionally can be a good idea. The double overhand grip is the safest of the grip types and commonly used on lower weights, since the grip strength is limited in this case. Coming back to the grip itself, the athlete must dig the bar into the base of his/her hand, driving the pinky into the bar to prevent grip fatigue.

Once the setup is completed, the athlete must pack his/her Latissimus Dorsi muscles, pulling the lower back into a neutral position and creating a stretch in the Hamstrings. This position will be maintained through the rest of the lift. Without dropping the hips down, the athlete must lift the bar with explosive power, leading with the chest on the way up. The bar must move in a straight line right up against the athlete's shins. During the performance, the athlete must be able to hold three main isometric contractions in the Lumbar spine, shoulder blades and the shoulders. To finish the lift, the athlete must drive his/her hips forward, locking out the knees and the hips by



squeezing the Gluteus muscles and lock out the shoulders by lifting the chest up. The athlete must not overdo the lockout by leaning the torso excessively backwards, hyperextending the lower back, shrugging the shoulders, or flexing the Biceps muscles. Lowering the weight down is done by setting the hips back first and carefully putting the weight on the ground. The athlete must let the plates come to a full reset before starting the next rep without slamming the weight against the floor. (Belcher, 2017; Bird & Barrington-Higgs, 2010; Bishop et al., 2014; Rafael, Escamilla et al., 2002; O'Reilly et al., 2017)

6.4.2 Conventional

The athlete starts by approaching the bar in a way that his/her shins will be a couple of cm behind the bar. The athlete takes a slightly closer stance than the shoulder width. The feet should be directed forward. To get the hands down towards the bar the athlete must extend the hips back and squat in order to reach and grab the bar. The grip width must be applied directly down from the shoulders, meaning in a shoulder width, just outside the shins. The grip types can also vary depending on the preference. The athlete must grab the bar by digging it into the base of his/her hand, driving the pinky into the bar to prevent grip fatigue.

Once the setup is completed, the athlete must pack his/her Latissimus Dorsi muscles, pulling the lower back into a neutral position and creating a stretch in the Hamstrings. This position will be maintained through the rest of the lift. Without dropping the hips down, the athlete must lift the



bar with explosive power, leading with the chest on the way up. The bar must move in a straight line right up against the athlete's shins. During the performance, the athlete must be able to hold three main isometric contractions in the Lumbar spine, shoulder blades and the shoulders. To finish the lift, the athlete must drive his/her hips forward, locking out the knees and the hips by squeezing the gluteus muscles and lock out the shoulders by lifting the chest up. The athlete must not overdo the lockout by leaning the torso excessively backwards, hyperextending the lower back, shrugging the shoulders, or flexing the biceps muscles. Lowering the weight down is done by setting the hips back first and carefully putting the weight on the ground. The athlete must let the plates come to a full reset before starting the next rep without banging the weight against the floor. (Belcher, 2017; Bird & Barrington-Higgs, 2010; Bishop et al., 2014; Rafael, Escamilla et al., 2002; O'Reilly et al., 2017)

6.5 Shoulder barbell press

This variation of the shoulder press is performed seated as on the old school photos, thus the usage of a chair is required. The athlete must set up the bar in a squat rack, putting the bar around the level of the middle chest, if he/she is standing. He/she must put the chair slightly in front of the squat rack and sit down, evenly setting up the feet. The bar must be leveled with the top of the athlete's head, if he is sitting. The athlete must grab the bar with a wide grip so that the hands will be vertically leveled with the elbows. He/she must push the bar against the squat rack pillars by extending the arms and dive under the bar with a naturally curved Lumbar spine. After diving under, the athlete must slowly



hyperextend the Lumbar backwards moving the bar off the rack with the whole upper body and placing it straight above the back of the head. The athlete must slightly shift the shoulders backwards by flexing the Latissimus Dorsi and Trapezius muscles. With a naturally curved lumbar spine, shoulder blade support against the back of the chair and flexed Latissimus Dorsi, the athlete starts the movement by lowering the bar down, maintaining a strongly vertical movement of the elbows. The athlete must reach the connection of the bar with the upper Trapezius muscles. After reaching the lowest point of the movement, the athlete must lift the bar with a powerful shoulder

thrust with the same vertical manner, to reach the initial, top end of the movement. (McKean & Burkett, 2015; Peat, 1986; Saeterbakken & Fimland, 2013; Thigpen et al., 2010)



7 Old School Personal Training Project

With some of the controversial aspects of modern bodybuilding industry established, there were multiple reasons to perform an old school the personal training project. Firstly, a gym and volunteers were needed for the project. Two volunteers of different sex were recruited, and a commissioning party agreement was signed with Balance gym. The goal was to lead an old school, personal training program through one academic year, with old forms, techniques and with an old school diet, which could practically and visually demonstrate the correct ways of training. It was also planned to achieve significant visual and strength results. The visual demonstration was later shown, and the strength results were measured before and after the project, using the same exercises presented earlier. Multiple topics from the scientific knowledge about gym training and fitness lifestyle were researched for the personal training project and an ultimate bodybuilding and strength training guidebook construction. All the topics from the researched theory were provided bellow.

7.1 Basics of bodybuilding and strength training

All comes down to the basics. Skeleton consists of bone and it is a frame for the body. Ligaments attach bones to bones in places of contact called Joints. Ligaments are only slightly elastic and if overstretched, can be susceptible to wear and damage if misused. Tendons attach muscles to bones, holding them together. Tendons get stronger by stretching and if overstretched, they can tear off the bone and thus, the muscle itself. Muscles perform the movement by contracting. They suffer an impact from a lifted weight and experience Micro Traumas. Muscles get bigger during the recovery of micro traumas. Only with correct and constant weight progression, increasing the impact consistently through training, the strength and mass development can be achieved. Through time, people found main ways to train the most efficient way, creating constant weight and impact progression for different, specific results: 1): Increasing weights, making them bigger than on previous workouts and lifting them with more effort, 2): increasing the number of repetitions without changing reps or sets, 3): increasing the number of sets without increasing the number of reps and weights, 4): increasing the number of exercises on the muscle group. However, muscle building and fat loss progress will eventually hit a plateau if the athlete will keep doing the same routine and the only way to make consistent progress is by switching up the routine. That is called muscle confusion. (Curtis, 2009; Chromiak, n.d.; Kraemer, 2003; Pinchas, 2006; Schwarzenegger et al., 1998)

Safety

Training must be a long, smooth process. There is no magic pill for a quick progress or development that will allow the athlete to get staggering results in days. The fastest results that professional, old school athletes have ever achieved were counted in years. The body must be ready and in a proper health condition to be ready for everything that is attempted at the gym. Before starting an exercise program, the athlete must know if there are any limitations for his health, concerning gym training. The possible actions for the athlete before starting a gym training program are stated in the guidebook using scientific backup about basic health, safety and medical treatment in relation towards physical activity. (Munhall, 2007; Pinchas, 2006; Schwarzenegger et al., 1998; Witherspoon, 2013)

Goal setting

While the volunteers of the personal training project had their own goals and expectations from the training, the basic science about main classifications of goals was established in the guidebook. According to theory, there are almost limitless goals to set, depending on the athletes' own perfect perception. Setting goals is important for everyone, who wants to improve in something, in this case, in gym training. However, there are three main categories of goals established: Result based goals, Performance based goals and Process based goals. Result based goals can be winning any kind of competition, for example. Performance based goals can be described as improving a curtain amount through an arraigned period. Process based goals can be described as improving the performance, for example, the form of the exercise. (Partnership, 2010; Schwarzenegger et al., 1998)

Order

Chronological order of the exercises during one workout has a very important role in training. It is not just doing random exercises for two hours. Manipulating the workout for a specific development of the body will depend on the outcome of the goal. A proper order of exercises affects the muscle fatigue, sends specific signals to the brain and the nervous system, affecting the outcome, whether it would be strength or hypertrophy. (Kraemer, 2003; Schwarzenegger et al., 1998; Pinchas, 2006; Chromiak, n.d.)

Etiquette and equipment

Etiquette guidelines and the subject about what equipment to use were an additional theoretical information for the project and the guidebook reader, since it is not exactly science, but guide-

lines of behavior. All of them were applied during the personal training project and in the guide-book this section covered all the basic behavioral pin points and the usage of different equipment. For example, the main weightlifting equipment like the belt, straps and wraps were discussed, as well as the etiquette behavior like putting the weights back, or the awareness of personal space. These aspects relied much on social understanding, but the official sources were used to construct the appropriate information. (Martin et al., 2007; Partnership, 2010; Schwarzenegger et al., 1998)

7.2 Periodization methods

Periodization is a strategy for varying a training program over time to achieve a desired result. The overall program is referred to as a "macrocycle", which typically lasts from several months to one year. Within each macrocycle there are two or more training blocks called "mesocycles," each of which lasts from a couple of weeks to several months and focuses on a specific goal (e.g., muscle growth, strength, power, etc.). Each mesocycle is further divided into micro cycles that can span a single workout or last up to a couple of weeks. The difference between Periodization and normal variation of workouts is the fact that periodization is strategic and progressive, while simply changing workouts has no logical progression behind it. (Fleck, 2011)

While there are more types, two main types of periodization modeling were considered in this thesis: Linear and Non-linear (also called undulating). Linear periodization is more traditional from of the two, where the program consists of normal increase of strength, intensity and volume. The linear periodization training plan has multiple mesocycles. For example, if the program has 4 mesocycles, the first one would focus on the hypertrophy and endurance, which is low-to-moderate weight and high volume. The goal of this phase is to build lean mass and muscular endurance. The second is basic strength, which uses heavy weights and moderate volume to build strength. Next is the power phase and it involves very heavy loads and low volume. And finally, there is a transition period, which is cutting way back on training intensity and volume, or engaging in "Active rest", thus pursuing low-intensity sports or recreational activities to allow the body to recover before beginning the next macrocycle. (De Lima et al., 2012; Kraemer, 2003; Buford, Rossi, Smith, & Warren, 2007)

Non-linear periodization is a method of changing types of workout, the loads and volume almost on a daily basics. For example, Monday would be Strength/Power focused with heavy weight,

Wednesday is Endurance focused with low weight and Friday would be Hypertrophy focused with moderate weight. (De Lima et al., 2012; Kraemer, 2003; Buford et al., 2007)

A linear periodization method of training was chosen for the project, where the program for the volunteers consisted of normal increase of strength, intensity and volume. It is recommended for a workout in general to not go over 1.5 hours, or sometimes not even over 1 hour. Theory also suggests going to the gym only 3-4 times per week to achieve enough recovery. This kind of slow schedule should be done for around one-year period. Later, when gym goers reach advanced levels, the training should be increased to achieve more progress. (Adams & Kirkby, 1998; Chen et al., 2011; De Lima et al., 2012; Hammond, Kuck, 1992; Kraemer, 2003; Petibois, Cazorla, Poortmans, & Déléris, 2002; Schwarzenegger et al., 1998; Simão et al., 2010; Buford et al., 2007)

7.2.1 Interval training methods

Interval training is a type of training that involves a series of low-to high-intensity workouts with an addition of rest or relief periods. The high-intensity periods are below anaerobic exercise, but intense enough to cause lactate to form, while the recovery periods involve activity of lower intensity. Varying the intensiveness of the workout and the levels of effort exercises the heart muscle, which provides an anaerobic workout, giving the athlete more endurance type capabilities. The simplest way to explain interval training, is that it is basically an organization of an intense and versatile cardio-vascular workout. It is popular among many sports but mainly used by runners. (Fowler, 1992; MacInnis & Gibala, 2017; Stevens, 1997)

No doubt that cardio training is useful and improves many aspects of the athletes' health. However, there is a misconception about cardio that it is the best way to burn fat, while this is not true. Not only during the weight training session, the athlete burns a lot of calories, after a long endurance workout, the muscles are depleted of glycogen, the metabolism is increased, and the muscle recovery continues to burn much more calories during resting. Weightlifting was the main role for body transformation chosen for the personal training project, while cardio was an addition to exercising at the beginning and at the end of the workout. (Greer, Sirithienthad, Moffatt, Marcello, & Panton, 2015; Melby, Scholl, Edwards, & Bullough, 1993; Potvin et al., 1991; Schuenke, Mikat, & McBride, 2002; Barnes, Hopkins, McGuigan, & Kilding, 2013)

7.3 Workout types and planning

Split workout - training muscles separately by groups, dedicating different days for different muscle groups. For example: Monday – Chest/Triceps, Tuesday – Back/Biceps, Wednesday – Legs, Thursday – shoulders. This style is more used by experienced gym goers, who simply cannot give an intense workout for every single muscle at once. This style is mainly preferred, since it is allowing the athlete to target one specific muscle group and focus on it, decreasing the overall volume of the whole workout and increasing the intensity on a specific muscle. Thus, through a short period of time, the athlete achieves great development through focused and quicker recovery. Moreover, this allows athletes to achieve better strength development, due to having an opportunity to work out larger muscle groups first with heavier resistance, and then having a better effect on smaller substitute muscle groups. (Kraemer, 2003; Schwarzenegger et al., 1998; Lis, 2012)

Circuit workout - the athlete is performing different exercises on different muscle groups in a specific order through the whole workout, achieving the whole-body development. The circuit itself is consisted of several exercises per muscle group and is being repeated from 3-8 times per workout. For example: bench press, barbell rows, squats, shoulder press, dumbbell chest press, T Bar, leg extensions, shoulder raises, and so on. It is mainly recommended for beginners to start with a circuit workout and only after getting enough experience, move to the split style. The full body workouts are tending to be more effective for the beginner, virgin muscles. This kind of workout allows the athlete to work through all the main muscle groups and gives a significant athletic effect. Overall, it also increases body metabolism, thus, combining it with a cardio workout can be a very effective way to lose excessive body fat. However, for a professional body-builder this kind of workout is useless from a perspective of muscle mass and strength building. (Schwarzenegger et al., 1998; Lis, 2012)

Hyper workout - A long, continuous workout oriented on one or two muscle groups and performed with high intensity and volume, slowly lowering the weight through the workout. This kind of training can take up to 4 to 6 hours, and in these cases, lunch break is being arranged. This kind of training can help to overcome the wall in muscle mass development, which a lot of professional athletes hit. It can increase the muscle size up to 1.5, but it can be a very demanding challenge on the heart and cardio-vascular system. The body cannot support the recovery after this kind of training and sometimes, the athlete needs up to 1-2 days of passive rest. This kind of training is used by professional bodybuilders once in 2-4 months and not recommended for beginners. (Schwarzenegger et al., 1998; Lis, 2012)

For the volunteers, the split workout type was used for a better isolated muscle group development. The volunteers were trained personally, the coach was visiting the gym for every workout, showing the exercises, setting repetitions and sets for every exercise, spotting and recording the progress in written form. Whenever the coach was not present, he was writing programs for the volunteers, slightly decreasing the difficulty of the training, or changing the periodization macrocycle to trade a bit of efficiency for safety. Next time the coach was present, the difficulty was increased, or the macrocycle changed in order to overall not lose progress. The volunteers went to the gym four times a week, training all the main muscle groups: Chest/Triceps, Back/Biceps, Legs and Shoulders and each workout was 1 - 1,5 hours long.

7.4 Sets

There are specific, different numbers of sets and repetitions. All of them are being adjusted, depending on the workout progression circumstances and picked according to the athletes' own experience and the desirable goals. In order to properly train all the muscle groups, one must try different sets for different muscle development purposes. 1-5 Repetitions are mainly oriented on strength, muscle mass and do not affect endurance. 6-12 Repetitions balance the strength, mass and endurance. 13-20 Repetitions mainly oriented on endurance, with slight improvement in muscle mass and only have limited effect on strength. 20+ Repetitions are meant for aerobic exercises with high speeds. (Chromiak, n.d.; Kraemer, 2003; Schwarzenegger et al., 1998) An athlete can perform those sets in different styles and variations. They are as follows:

Single sets include Stair sets and Strip sets. Stair sets are progressive sets, which start from the warm up weights and continue to the working weights. In between the sets, there can be a rest pause for several seconds to several minutes. Strip sets are performed straight after achieving full muscle shutdown from sets with big weights and are only performed with low weights, mainly 20% from 1RM (one rep max). (Chromiak, n.d.; Kraemer, 2003; Schwarzenegger et al., 1998)

Normal sets include Drop sets and Decreasing sets. Drop sets are done one by one, without rest, with lowering the weight in about a half after each set on maximum reps, and performing another set right after the previous one, also on maximum reps and with a pumping manor. Decreasing sets - the athlete does 10 repetitions on a maximum weight possible and then lowering the weight to the point when the athlete can perform another maximum of 10 reps after the exhaustion of the muscles from the previous set. This is being repeated for five to six sets. (Chromiak, n.d.; Kraemer, 2003; Schwarzenegger et al., 1998)

Multiple sets include Supersets, Triplets, Kombi sets, Jump sets and Giant sets. Supersets are performed with two different exercises on the opposite muscle groups, for example, biceps and triceps with a small rest of 30 to 60 seconds. Triplets are used for big muscle groups. A combination of three different exercises for one muscle group and in a one, big superset is being used, with small rest of 30 to 60 seconds. Kombi sets are done in a combination of two exercises, one by one, without rest and on one muscle group only. Jump sets are for the agonist and antagonist muscles, done one after the other, without rest, for example chest and back, or biceps and triceps. Giant sets are combining four to five different exercises on one muscle group. All of them are being performed without rest or small rest of 30 seconds. (Chromiak, n.d.; Kraemer, 2003; Schwarzenegger et al., 1998)

The resting in between sets also differs depending on the set itself. Mostly in bodybuilding, the normal resting between sets was set in between 2-5 minutes for efficient muscle recovery, but that is not always the case. (Chromiak, n.d.; Kraemer, 2003; Schwarzenegger et al., 1998)

7.5 Reps

First, there are normal reps, accepted in the world of bodybuilding and are being performed with multiple different speeds. Fast speeds are being performed without rest in any point of the movement continuously. Moderate speeds - with resting at the lowest point of the movement, not more than 1 second. Slow speeds - with rest more than 1 second. Very slow speeds - with rest of 10-12 seconds. (Doan et al., 2002; Dumont, 2007; Hackney, Engels, & Gretebeck, 2008; Kennedy, 2008; Schwarzenegger et al., 1998)

There are many different other types of repetitions to consider. However, the repetitions presented lower are oriented for more specific purposes. A choice of the type and the number of reps also depends on the skill and experience of the athlete, as well as the preferred goals. There are several types of reps:

Partial reps - performed only on 1/2 or 1/4 of the whole movement. Those types of reps are good for strength and mass development and are used mainly to extend the set after the exhaustion of the muscle, making it easier to perform more repetitions with shorter range.

Negative reps - emphatic part of the movement is the negative phase and has the most stretch in the muscle. The descending of the movement is made slower, as well as the stretch of the muscle is also achieved at the lowest point of the movement. These types of repetitions are also called

"Eccentric" and are the alternative for stretching exercises, allowing more effective strength development, since the muscles are stronger during the eccentric contractions. Negative reps also improve the blood circulation, as well as provide better health of the muscle and the blood vesicles, due to long, stretched muscles. While the eccentric exercises allow to work with heavier weights and require the help of a spotter, the research has shown that it is safer and better for muscle health, due to faster recovery, and with systematic eccentric repetitions, will cause no pain issues.

Dirty reps - the movement is being performed with transferring the part of the weight load from the main muscles, on the supporting muscles, which should not be initiated for the support of the weight. It allows the athlete to work with much bigger weights, and while many consider it cheating, many athletes use this kind of approach to arrange an excessive load on the body, activating the other supporting muscles in the core to still achieve efficient results.

Forced reps - combination of Negative reps and the idea of Drop sets, meaning high intensity training reps where the help of a spotter is minimal and should start only after the athlete is already not capable to perform a clean rep without help. The spotter makes the weight lighter by helping. After a complete shutdown of the muscle, the muscle still has a lot of strength. The athlete must perform another set of reps with lower weights, thus, achieving that needed amount. Conclusively, a muscle shutdown does not mean the complete incapability of the muscle.

Stair reps - each repetition is divided into minimum 3 parts and every part is being performed one by one, several times. For example, several times, the upper part, middle and lower part, until the weight will go from the highest point of the movement to the lowest point.

Stop reps - performed by stopping the weight in the middle of the movement for a couple of seconds, thus, dividing the movement into two parts, where the static hold of the weight is being maintained.

Added reps - the athlete is resting on the lowest point of the movement with the weight for a couple of seconds, giving himself an opportunity for one or two more reps. Or the athlete puts the bar back and gives himself 10-15 second rest and performs 2 to 3 more reps afterwards.

Slow reps - the exercise is being performed slowly, with maintaining perfect form and fully controlling the trajectory of the movement. They are much safer than any other repetition variation. They are impacting the tendons and joints very carefully, allowing to progress with future exercises with more safety, heavier weights and with no complications. Moreover, longer presence under the weight improves the mind-muscle connection.

Super slow reps - slower variation of the slow reps, with an intentional continuous flection of the muscles through the whole movement and specifically, at the edge points of the movement. (Doan et al., 2002; Dumont, 2007; Hackney, Engels, & Gretebeck, 2008; Kennedy, 2008; Schwarzenegger et al., 1998)

7.6 Weight

The selection of the weight for the specific exercise mainly revolves around a term called one rep maximum (1-RM) One rep maximum is the amount of weight that the athlete can lift only once, completely himself. Knowing that amount, the athlete should not constantly perform this weight. On the contrary, from this specific weight number, the athlete must calculate the lower weights that are meant for better muscle growth and which can be performed with at least 6-12 repetitions. The science suggests that for the best muscle growth, the amount of weight must be at least 60% from 1-RM to 85% from 1-RM. For beginner lifters the 1-RM weight can be only determined by trial and error. Due to that, beginners must be very careful in determining the 1-RM weight. Moreover, the 1-RM must be checked only occasionally to not overstress the body. The strength training and muscle building is mainly happening during working with 60%-85% weights on multiple sets and reps, which ultimately raises the 1-RM weight. (Chromiak, n.d.; Kraemer, 2003; Schwarzenegger et al., 1998)

8 Nutrition

Diet guidelines for the volunteers were old school and very basic, since this was not the focus of our discussion, but for an ultimate result the diet planning and regulations were also applied. The main theoretical guidelines for micronutrient consumption, as well as meal scheduling, calorie intake and hydration were established in this section, while in the guidebook itself, main aspects were pointed out for easier understanding. All the nutrition aspects were applied individually to both volunteers, depending on their personal goals and desires.

Moreover, the food supplements were also established later in the section. This thesis discusses only the main, basic and most popular food supplements like whey protein powders and creatine. It will not go into discussions about steroids or any other supplements which are under a category of performance enhancing drugs due to wide knowledge and lack of qualification for these kinds of discussions.

8.1 Protein

Protein is being considered as the king of all micronutrients and it is necessary for muscle growth. Protein is the main building block for muscle tissue and can also be used as a fuel source. Due to such importance, athletes consume food with high protein amount, from 1,4 to 1,8 g of protein per 1 kg of body weight, which is from 0,6 to 0,8 g per pound of body weight per day, which is about 40% of total calories consumed during the day. Nowadays however, the amount of consumed protein per pound of bodyweight is also considered individual. The excessive consumed protein which the body does not require for recovery will later be turned into fat inside the liver, which will later be an excessive fat in the body. (Bohé, Aili Low, Wolfe, & Rennie, 2001; Fowler, 1992; Genton, Melzer, & Pichard, 2010; Hermann, n.d; Kleiner, 1997; Volek, 2004; Pinchas, 2006)

8.2 Carbohydrates

Carbohydrates are used by the body as the primary source of energy. They are being stored in the body as glycogen and the longer the athlete works out, the more glycogen is being consumed. With at least 500 to 600 grams of carbohydrate per day, which is about 70% of the whole daily calorie intake, your muscles will stay packed with glycogen. 500 to 600 grams per day is around

3.6 grams per pound of body weight per day (8 g/kg). There are many types of carbohydrates and all of them differ by their chemical chain. In fitness nutrition carbohydrates divide into simple and complex carbohydrates. Simple if they are sugars like monosaccharides and disaccharides, and complex if they are polysaccharides or oligosaccharides. Simple carbohydrates should be limited, consumed mainly after the workout and with small dosages through the rest of the day. Complex carbohydrates should be consumed even less, due to their complex chemical chain and slow processing. (Fowler, 1992; Genton et al., 2010; Kleiner, 1997; Mann et al., 2007; Volek, 2004; Pinchas, 2006)

8.3 Fats

Fats are necessary for the human body and are the most energy dense micronutrients. However, in many cases, extra consumed fat can be excessively stored in the body, due to its high calorie rate. Due to that, only 20-30% of the remaining calories per day can be fats. Moreover, an athlete must make sure that he/she consumes the right kind of fats. Fats divide on Trans Unsaturated, Cis Unsaturated and Saturated. They differ in their chemical structure that will affect the capabilities of your body to process the fatty acids. The healthiest fats among all are cis unsaturated fats. They are mostly found in natural products like avocado, coconut and nuts. Those fats are comfortable to process as well as simply used as energy resource. Studies have shown that replacing trans fats and saturated fats with cis unsaturated fats in a diet will also reduce the risk of cardiovascular disease. (Fowler, 1992; Genton et al., 2010; Hooper, Martin, Abdelhamid, & Smith, 2015; Kleiner, 1997; Salter, 2013; Volek, 2004; Pinchas, 2006)

8.4 Calories

Calories are energy. They are used all the time and everywhere when walking, sleeping and breathing. The normal consumption of calories for an average 140-pound person is 2,800 calories per day to maintain a normal daily life, while the average daily consumption of a 200-pound person is 4,000 calories. For athletes however, the calorie consumption can vary, depending on the goal. There are two main directions of body change due to dieting: The Cut and the Bulk. The cut is when the body is getting less calories than it burns, so it loses fat and it can lose muscle. The cut has restricted micronutrients and a calorie deficit. The bulk works vice versa, the body consumes more calories than it burns, thus gaining weight, fat and muscle. Bulking can be also divided into Lean bulk and Dirty bulk. Lean bulk has restricted types of micronutrients, aiming to gain lean

mass, but with a calorie surplus. The Dirty bulk has no restrictions, has a calorie surplus and the most dangerous, due to risks of high calorie diet affecting the cardio-vascular system. All those styles of calorie dieting can be used to achieve different physiques and other developments in strength, as well as visual appearance. (Fowler, 1992; Genton et al., 2010; Kleiner, 1997; Volek, 2004)

8.5 Hydration

Water intake during the day is essential for good body performance, more importantly, for a fitness lifestyle and especially during a workout. There is a high risk of bad performance due to dehydration, for example, loss of strength and even loss of an ability to be physically active. In one hour of continuous dehydration, the strength levels can decrease by shocking 48%, as well as the possibility of body overheating can also increase.

A healthy daily water intake was for quite a while considered to be around 3 liters, but nowadays the number is highly individual, depending on the body size, types of diets, lifestyle and the amount of training. The bigger the athlete is, the more water the body needs. The higher the intensity, the more water is needed, and so on.

However, since there must be a lot of water consumed during the day, many athletes tend to drink water way too fast during a workout, due to exhaustion. As with consumption of any other product, consuming too much of it is a high impact on the heart and liver. Any consumption must be limited, scheduled, consistent and regulated for better processing. If the athlete takes too much fluid, then the body can't get rid of the excess through sweating or urination, as well as sodium levels can become too low. It is recommended to drink 0.5 to 0.7 liters of water one to two hours before your workout. 15 minutes before you begin, drink between 0.2 and 0.4 liters of water. During your workout, drink another 0.2 liters every 15 minutes. (Hew-Butler et al., 2015; Appel et al., 2005)

8.6 Vitamins

Vitamins and minerals play an important role in sport performance. The most common and important ones for consumption are Iron, vitamin B1, B2, B3, B6, Folate and B12, Calcium, vitamin D, A, C and E. Iron is a mineral that the athlete, and any person in general, needs to carry oxygen throughout the body and to the muscles when doing sports. The iron is mostly found in animal

products like meat, poultry and fish. A person may need more iron if he/she is a vegetarian, or an endurance athlete, who regularly does intense exercise. Different types of vitamin B mainly transform food into energy that a person needs, make proteins to build and repair the muscles and make red blood cells which give oxygen to the muscles. Vegetables and fruit have folate, while grain products have vitamin B1, B2, B3, as well as folate. Milk has vitamins B2 and B12, and different kinds of meat have vitamin B2, B3, B6, B12 and folate as well. Vegetarians and older adults over the age of 50 may be at risk for low vitamin B12. Calcium is a nutrient that helps to build and maintain strong bones, while vitamin D is a nutrient that helps the body to absorb the calcium. Both can be found in milk, orange juice, soy, rice, tofu, fish, anchovies, almonds and other. Vitamins A, C, and E are "antioxidant" vitamins. Antioxidant help reduce muscle damage and speed up the recovery after an intense workout. A well-balanced eating plan with a variety of vegetables, fruits and nuts will provide the person with vitamins A, C and E. (Dam, 1978; Genton et al., 2010; Kleiner, 1997; Volek, 2004)

8.7 Meal intake

Balanced consumption of meals before the workout and after will fill the body with energy and amino acids, as well as affect positively on muscle growth. Timing of the meal intake during the day drastically effects the ways of body metabolism and development. Science has shown that the most efficient amount of meal intake is five to six times per day, since the anabolic affect after food consumption lasts only for 3-4 hours. Where to arrange a workout time in between meal intakes is also quite individual, some athletes prefer having three to four meals before the workout, to get enough energy and calories for better performance, while others prefer having a breakfast and straight after going to the gym. (Fowler, 1992; Genton et al., 2010; Kleiner, 1997; Volek, 2004)

8.8 Whey protein powders

Whey protein powders are the first and the most popular supplement on the list. They are strictly made from concentrated milk protein. Whey protein contains an incredible range of essential amino acids, which are absorbed quickly, since it is a quick digestive protein. The main variations of whey proteins are Isolate and Concentrate. Whey protein Isolate has more protein concentration, from 90-95% and has little fat or lactose. Whey protein Concentrate has slightly less protein concentration and it can vary from 25% to 89% and has more fat and lactose. It should not be

misconnected as a replacement of food, that is why it is called a supplement. It helps mainly in bulking stages of development, when there is a high consumption of food. If the athlete needs a fast source of protein right away, a protein shake can work as a good source of amino acids post workout, since the protein synthesis and metabolism is better after the workout. (Marshall, 2004; Ha & Zemel, 2003)

8.9 Creatine

Creatine is the second most popular supplement. Creatine is naturally found in the body. Some individuals have higher levels of creatine, some have lower. It is found in variety of foods that we consume. Put simply, creatine oversees faster regeneration of Adenosine Triphosphate, which is the main energy source for our muscles. In the end, creatine supplementation increases body mass and improves performance in high-intensity, short-duration exercise tasks. There are generally three ways for taking creatine: It can be loaded by first taking around 20g per day for 5-7 days and after the first 5-7 days, ingesting 3-5 grams a day to maintain the elevated creatine stores. Second, 3-5 grams of creatine can be consumed every day right from the start. Finally, cycling creatine consumption on and off for a few weeks at a time.

Research shows that both ways 1 and 2 provide the same effect in terms of raising muscle creatine content. However, the loading protocol does it faster. Therefore, a loading phase might be best, since it provides faster ergogenic effects. The third option (cycling creatine) doesn't appear to have any superiority over other two methods and has the same results. Conclusively, the choice is up to the athlete. One of the most important aspects of taking creatine is the fact that it is highly recommended to consume creatine with carbohydrates, since muscle creatine levels are elevated to a much greater extent when creatine is taken with carbohydrates or with carbohydrates and protein than when taken alone. (Branch, 2003; Kreider et al., 1999; Kleiner, 1997; Kreider et al., 2017)

9 The volunteers

Two volunteers were chosen for the demonstration in this thesis, a man and a woman. The reason why it was made that way is the fact that diversity in this thesis would be more than beneficial and recommended for quality, diverse results. Showing the old school methods on both sexes demonstrated that this old school approach is effective no matter the sex, as well as this research in general did not depend on sex. Coming back to the roots of bodybuilding, there were many controversies during the rise of the bodybuilding industry about female fitness appropriation, considering whether bodybuilding and strength are suitable for women. Many women themselves were misled by being convinced that as soon as they would pick up the barbell, they will suddenly become manly and masculine. Of course, it is not true. Females have the same muscular skeletal system as men, but the hormonal concentration is different. Bodies of men and women in bodybuilding work similarly, but same workouts will bring different visual results. Males become bigger and masculine, while females become slimmer and feminine. Thus, the essentials of muscle building and diet are basically the same for both sexes, and the rest comes naturally with body developments according to sex. Nowadays however, the research on female fitness and bodybuilding still lacks in many ways. Due to that, this thesis also considered the female side of bodybuilding. (Lemmer, Martel, Hurlbut, & Hurley, 2007; Schwarzenegger et al., 1998)

Both volunteers were in different physical shapes, through their lives they have been doing random, minor physical activity, but never did it regularly or professionally. They had desire and passion for it, but no opportunity. As soon as the training started, both have given their consent for training under the coaches' guidance and both have signed a consent form.

The woman

At the beginning of the project, she was 56 kilograms, being a bit over 156 cm tall. She was 19 years old. She did not drink alcohol, energy drinks at all, did not smoke, had decent diet and overall took care of herself well. She did not have any allergies, health conditions nor severe dysmorphias like scoliosis, which made it safer for vertical load during training. The only small issue was low blood pressure, but not below abnormal. The main control strength capabilities at the beginning of training were: The bench press 1-RM - 30. Squat 1-RM - 30. Shoulder press 1-RM - 25. Deadlift (sumo) 1-RM - 40.

The man.

The man was 24 years old at the beginning of the project. He was quite tall, being over 180 cm and weighing around 100 kg. The more alarming issue was a visible Scoliosis, with the left shoulder being 1 cm higher than the right one, which made it dangerous during vertical loads like squats. With regular training however, it was more than achievable to fix this issue, especially through a one academic year. Other than that, the volunteer also had no allergies, nor food restrictions. The main control strength capabilities at the beginning of training were: The bench press 1-RM - 60. Squat 1-RM - 70. Shoulder press 1-RM - 50. Deadlift (conventional) 1-RM - 80.

10 The gym

A detailed analysis of the gym was required to demonstrate the variety of machine equipment that was used during the personal training project. Moe importantly, the part of the commissioned work was to develop a gym description in written form and orient it on marketing and advertisement. Many studies to which this thesis referred to, had some issues with establishing the details of their research methods, as was stated before. Due to that, a detailed gym description was required for this thesis to avoid these issues.

It was appropriate to start with the overall brief description of the gym and where everything was located. The gym was called Balance, it was in Finland, in the town called Kajaani, on Kauppakatu 30 street, underground, right under a super market, on the main square of the city. The overall underground location brought the benefit of cold, stone walls. With good air-conditioning system, the gym was constantly cool, bringing comfort at a hot summer day, but still being warm in winter.

The gym had a stunning interior design. It was 1400 square meters and was evenly divided into two main sections: the free weight section and the machine section. The gym also provided personal training, martial art activities, massage services, sauna and sold mainly fitness supplements and different merchandise. There was also a testing room in the gym. In this room clients could check in-body fat percentage, body mass index, blood pressure, sugar levels, weight of the bones, amount of muscle and many other things.

10.1 Machine content

The machine section had only aerobic treadmills, compressed air machines and all the cable weight machines. The main brands of the machines were HUR and PRECOR. The free weight section had all the free weight machines, barbell section, dumbbell section, kettlebell section, body weight equipment, and racks with barbells for weightlifting. The main brands of the machines were PRECOR and Technogym. The detailed amounts of machines and equipment that were used during the personal training project were presented in Appendix #1. Apart from the main equipment, there was other gym equipment in numerous amounts. For example, rubber bands and different wraps that were of no need to calculate. Which came to the plate weight, all the plates were divided into 1.25, 2.5, 5, 10, 15, 20, 25, 50 kg and the total number of plates was around 300 units. All the benches, bars and chares could have been moved and adjusted to the client's liking. There was a lot of supplementary equipment like wooden planks, plastic foams for comfort

and many other things that made that gym adjustable for everyone and a good working environment.

11 Conclusive discussion.

Which came to the controversial exercise trends presented above, obviously, the research has several perspectives on the matter. Many old school athletes were not performing the exercises the way that this thesis promoted. However, the best what this thesis could have done was to side with one of the strong opinions, which many scientific papers and reports agree with. The back squat is supposed to be performed with no knee travel, as well as the front squat. The bench press is supposed to be performed only with a slight arch. While there are different types of deadlifts, lowering the weight slowly in both variations is beneficial for muscle growth and more appropriate behavior. Finally, the shoulder press behind head should be revisited and according to the research is a completely safe exercise, which focuses on a better development of side and posterior Deltoids. These specific performances, that were demonstrated according to the safest guidelines, were possible to perform, and the volunteers were performing those exercises every single day through the duration of one academic year and received only positive outcomes without any complications. (Swinton, 2012; Del Monte, F., 2012; Schwarzenegger et al., 1998; Seals, 2017; McKean & Burkett, 2015)

There were many other exercise issues that this thesis could have taken under consideration, for example, one arm dumbbell row, or Posterior Deltoid fly. However, what was of the most importance is that those specific exercises are the main disciplines of the sport by this day, which contain very high risks of injuries, as well as do not provide much development if done incorrectly. Other exercises that ended up under the influence of the fitness modernization do not have a high injury possibility, as well as do not drastically lose their purpose, if performed with not so perfect technique.

11.1 Project results

The results of the project were positive. Both volunteers achieved amazing progress strengthwise, visually, health-wise, gained self-confidence, knowledge and the desire to continue training. Moreover, the volunteers have not experienced any health issues. On the contrary, due to performing exercises the way the thesis has shown, and working out by an old school program with proper dieting and weekly scheduling, the volunteers have gained strength in muscle groups that many athletes do not, as well as stopped experiencing stress and pain in some other muscle groups, for example, the lower back. The theoretical and visual results for both volunteers were presented below.

11.1.1 The woman

The woman has achieved astonishing results. From the starting point, the main strength disciplines have risen. The bench press 1-RM has improved from 30 kilograms to 50. Squat 1-RM has risen from 30 kilograms to 55. Shoulder press is now 40 kilograms, compared to the previous 25. Deadlift 1-RM went up from 40 to 65 kilograms. The Front Squat went up from 25 to 45 kilograms. She gained a very strong core but maintained a feminine V-shaped figure with a very successful shoulder and hip development. The squat technique used helped the development of the lower back and hamstrings, implementing a "Good Morning" exercise effect, thus supporting the Deadlift improvement. The old school approach of focusing on lower and upper bodies, while giving less attention to the External obliques gave a V-shape to the body and made a visual effect of a smaller waist.





The back muscles ended up being much leaner, as well as the front Abdominal muscles. The bicep muscles have improved significantly in size, and the shoulders have gained a more spherical structure. The thighs and hips gained a lot of muscle, creating thick Quadriceps muscles. The body







overall became much leaner and more structured, which overall makes the project a success. The woman's own desires were to lose weight and gain muscle, according to the feminine bikini model standard, which meant in her case to focus on the lower and upper bodies.

11.1.2 The man.

The man's development was more successful on the strength side, rather than on the visual. None the less, muscle growth was achieved, and he gained much more visual appeal in comparison to the beginning photos. The main goal with him was to first establish the spinal structure before moving towards vertical load strength development. During first 4 months, the spine was straightened with constant stretching, pulling and proper back training. Only after, the volunteer started exercising the main disciplines, which were presented by the thesis. Through next 5 months, the man managed to perfect the squat and the bench press form and achieve strength improvement. The bench press raised from 60 to 95 kilograms on 1-RM. The back squat has improved significantly, but due to spinal curvature complications, the coach was restricted in heavy vertical squat loads. It improved from 70 to 85 kilograms. Shoulder press strength increased from 50 to 70 kilograms. Deadlift has improved from 80 to 100 kilograms. The front squat is now 60 kilograms, compared to the beginning 40.





The focus for the man was firstly the bench press, and only then the other disciplines. It was mainly done due to the volunteer's own desires, as well as due to complications with the spinal curvature. Overall, visual appeal was increased, and the main goal was achieved, which was the focus of this project. Moreover, his body gained masculine characteristics. Shoulders became wider, bicep muscles increased in size. Chest muscles overgrew the belly and mental confidence encouraged the volunteer to stand with pride and more upright, straight posture. This makes the project a success, since even with some spine health complications and issues with consistent training because of work schedule, the old school training approach managed to improve the person drastically.







11.2 Guidebook constructing

With all the results and knowledge collected after the personal training project, an ultimate old school bodybuilding and strength training guidebook in written form was constructed. According to theory, a good guidebook must have at least three main aspects: primary goal for the guide, area of expertise, and target audience. All three of them were established. The goal was to remind and direct the readers towards the correct ways of old school bodybuilding and strength training, the area of expertise was bodybuilding and strength fitness, and the target audience was everyone, who have the passion and desire to live a healthy lifestyle.

After the main three aspects were established, a specific step by step "guide for the guide" was analyzed and the main points are as follows: 1) Plan what information to include in the guide. 2) Prepare the research. 3) Decide on the structure. 4) Make a rough plan. 5) Use plain language. 6) Break up the content.

With all of that knowledge taken into consideration, the bodybuilding and strength training guide-book must have been a consumer-friendly written tutorial, which consisted of demonstrating all the basics of gym training for mass and strength, fitness lifestyle planning, periodization, basics of interval training, workout types, sets and reps, essentials of nutrition, supplementation and equipment, as well as etiquette guidelines and most importantly, safety Moreover It also had to provide a workout example with visual support and examples of exercises. (Marshall & Petersen, 1995; Molenaar et al., 2016; Newman, 2003; Pinchas, 2006)

11.3 Summary

This concluded the thesis research. While the fitness industry is a wide subject of discussion, with many opinions and beliefs, an ability to be flexible towards different points of view should be encouraged. That was exactly the aim of this thesis, opening a different perspective on bodybuilding and strength training fitness, which was forgotten due to vast modernisation and overwhelming industry development. This thesis has brought up the theories and beliefs from the early stages of bodybuilding fitness development, and while in many cases, the different opinions contradict each other, with the support from numerous studies, an open opinion towards different possibilities should be always maintained, since not only the fitness industry should blindly follow the scientific research, but it also has to gain practical experience as well.

However, the drastic modernisation, industrialisation and development cannot be stopped and in should not be. The bodybuilding and strength fitness would not be where it is today, if it was not for such development. The only goal that this thesis has attempted to achieve, is to direct the industry towards better goals, with different approaches and more knowledge, and it managed to do that successfully.

12 Assessment of the authors learning.

The author learned a lot during making of this thesis and overall during the last year of studying in the university that was related to conducting this bachelor's research. The author was also the coach of the personal training project, and as any qualified personal trainer, not only he has to gain the knowledge of theory, but practical experience is even more important. The author was taking this project very personally, since he himself was trained among old school bodybuilders and was coached by an old school, world-class bodybuilder. Thereafter, the author was motivated to constantly work on this project, almost on day to day basis. Gym training, in general, taught the author the rules of discipline, time management and flexibility towards lifestyle problem solving. Moreover, gym training and specifically bodybuilding builds immense levels of confidence and the desire of being more successful in the future life. Usually, in order to be successful in life, a person must be productive every day. The author wanted to be constantly active and productive towards his life and the lives of the volunteers, and he felt uncomfortable if the time of the day was wasted. The idea of graduation from the university slightly earlier than usual gave the author the motivation to finish the project and start on planning his future life earlier. Most importantly, this personal training project taught the author the fact that if a coach cannot encourage, force and convince his clients, he is not a coach. Successfully, these quality characteristics that coach has developed were passed on towards the volunteers, and by the end of the project, they felt obligated to take care of themselves with much more effort.

Overall this research experiment taught the author to approach problem solving from different angles. The research most often cannot happen without any research limitations. For example, in case of this thesis, there were issues with scheduling and timing for the volunteers, as well as minor health issues. However, many researchers hit a problem, loose their motivation and give up, while the author has realized that what-ever he tries to solve can fail, before letting it fail, he learned to use his imagination for approaching different problems from different angles.

Specifically, which comes to personal training, exactly the practical part gave the most of new experience to the coach. Firstly, he learned to play the game extremely safely. While the coach himself was often not hesitant to push his body towards limits and often put it under risks of injury, with the volunteers he felt significant responsibility for his actions. Surprisingly however, the coach thought that the extremely safe approach would not bring significant results, while it was not true in the end. As a future coach, who will work in a gym environment later, however, there might be a negative connection between the clients wanting results fast, and the coach

applying safe approaches. Specifically, in this case, the volunteers knew what they had been signing up for and expected results in one year. The coach was confident in achieving that goal, since at the beginning of training, the progress tends to be quicker. However, more of practical experience will be required in the future.

Other aspect of personal training that the coach has learned is flexibility of the exercises and workouts towards the volunteers. Even though the coach himself has been trained by world-class, old school bodybuilders, and from basic environment involvement has learned a lot, many details of an old school approach were still unknown for the coach. This project revealed many of them, since the volunteers were quite different and required different approaches. Sometimes they required less intensity, sometimes more. Sometimes they tried too hard and required cool down, recovery exercises. Sometimes they needed stretching exercises but adapted towards their levels of flexibility. And most importantly, all those examples had to be applied with the main goal in mind to not lose time, effort and progress speed overall.

The author learned very vital aspects of academic writing. Not only after the project he felt much more cultured and capable of having a very productive written discussion, delivering his points very precisely and with an accent, the author also gained significant amount of new vocabulary. Since the authors mother tongue is not English, these aspects of knowledge can prove to be very useful for him in the long run. The previous reports and papers done by the author, after the conclusion of this project, seemed to him very inappropriate and far from what it was supposed to be by the rules of academic writing.

The author learned a lot about gym management. Before, the author was completing his practical training in the same gym, where the personal training project was performed. He was spending almost every day there himself, training. An addition of a personal training program four times a week made the author even more immersed into the gym lifestyle. Constant communication with the main staff of the gym revealed many small details about gym maintenance. The gym environment, etiquette, flexibility and tolerance brought mixed thoughts and feelings towards the coach and the volunteers, but in total, it brought a lot of experience.

The theoretical part of the thesis research gave significant knowledge to the author. The author knew the correct ways of old school training as a coach, since he mostly acquired the practical experience from his coaches, but many theoretical explanations for these ways were still unknown for the author at the beginning of the project. After he had dove into the research, many small details and working systems were revealed for the author and were applied for the personal training project.

The theoretical thesis research encouraged the author to read more. While the author has been reading before quite a lot, lately, learning became easier and more entertaining through watching videos and movies, instead of reading black and white text. However, a lot of knowledge cannot be delivered through visuals, since the visual aspect and the knowledge aspect need to co-exist, but the basic text can cover so much more with significantly more detail.

This concludes the main aspects of the authors learning. There are many more small learning details however, and this project allowed the author to learn almost from every single different angle possible, making this project a success from every single aspect.

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Gym department Balance kuntokeskus: https://www.balance-sport.fi/

Detailed list of gym equipment used during the personal training project

Cable weight Equipment

Cable rack Narrow grip row Lat pulldown Leg press Leg curl Leg extension Chest fly/rear deltoid fly Lower back extension

Aerobic treadmills

Ski treadmill	
Normal treadmill	

Other Equipment

Weightlifting belts
Skipping ropes

Free weight Equipment

Flat bench press
Incline bench press
Decline bench press
Chest press
Leg press
Hack squat laying
Hack squat standing
Calf raise seated
Calf raise standing
Gluteus/hamstring leg ex- tension
Weight lifting rack
One arm row
Low row
Lat pulldown
Supported T bar row
Free T bar row
Shoulder press
Big gymnastics wrack
Dip/pullup weight sup- ported
Free dip/pullup rack
Low abdominal rack
Preacher bicep curl rack
Dumbbells