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**Individual perception and performance changes during 3 week
intervention programme with beginners golfers**

Diplomová práce

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Abstrakt

Název: Individuální změny vnímání a výkonnosti během 3 týdenního intervenčního programu u začínajících golfistů

Cíle

Cílem studie bylo zhodnotit vliv třítydenního tréninkového programu na golfové dovednosti (plný švih, puttování) a vnímání golfové motoriky. Jejím cílem bylo také sledovat vnímanou obtížnost a míru odhodlání účastníků pomocí tréninkových deníků a zkoumat jejich subjektivní stanovení cílů a strategie pro jejich dosažení.

Metody

Studie se zúčastnilo 43 účastníků, kteří byli rozděleni do čtyř skupin, z nichž tři měly 11 účastníků a jedna 10 účastníků. Účastníci se tomuto projektu věnovali celkem 5 týdnů. Týden před začátkem intervenčního programu proběhl dotazník MSRS, test před, poté 3 týdny intervence, test po a po týdnu opět MSRS. Po každém týdnu účastníci vyplnili reflexní deník po ukončení bloku. Tréninkové deníky sloužily ke zjištění, jak hráči chápou obecné golfové instrukce a jak vnímají golfovou motoriku.

Výsledky

Podle kvantitativních výsledků této studie byl zjištěn významný rozdíl v MSRS mezi testem před a po. Významný rozdíl byl také ve vnímané obtížnosti, avšak v průběhu týdnů nebyl zjištěn významný rozdíl v mentálním úsilí. Došlo k významnému zvýšení přesnosti v puttování a míry kontaktu při plném švih. Kvalitativní analýza odhalila rozdílné nastavení mysli a myšlenkového procesu u jednotlivých účastníků s potřebou změnit současné tréninkové strategie na individuálněji přizpůsobené programy.

Záver

Třítydenní program vedl ke zlepšení vědomého motorického zpracování a sebeuvědomění pohybu mezi testem před a po, což naznačuje, že obě dimenze mohou zlepšit výkon, zejména v počátečních fázích cvičení.

Klíčová slova: dovednosti, test, instrukce, golfový švih, deník

Abstract

Title: Individual perception and performance changes during 3 week intervention programme with beginners golfers

Objectives

The study aimed to evaluate the effect of a 3 week coaching program on golf skills (full swing and putting) and the perception of golf motor skills. It also sought to monitor participants' perceived difficulty and commitment levels using training diaries and investigate their subjective goal-setting and strategies for achieving them.

Methods

The study involved 43 participants who were divided into four groups, three of which had 11 participants and one with 10 participants. The participants were engaged in this project for 5 weeks in total. There was an MSRS questionnaire one week before the pre-test, then 3 weeks of intervention, post-test and again MSRS after one week after the tournament. Participants completed a reflective post-block diary after every week. The training diaries were used to identify players understanding of general golf instruction and the perception of golf motor skills.

Results

According to the quantitative results of this study, there was a significant difference in MSRS between pre-and and post-test. There was also a significant difference in perceived difficulty, however, no significant difference was found over the weeks in mental effort. There was a significant increase in accuracy in putting and contact rate in full swing. The qualitative analysis revealed different mindsets and thought processes of each participant with the need to change the current coaching strategies to more individually fitted programmes.

Conclusion

The 3 week program has led to an improvement in conscious motor processing and movement self-consciousness between pre-and post-tests, indicating that both dimensions may enhance performance, particularly in the early stages of practice.

Keywords: skills, testing, instruction, golf swing, diary

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List of used symbols and abbreviations

PGA – Professional golf association

USPGA – United States Professional golf association

MSRS – Motor specific reinvestment scale

GMSRS – Golf motor specific reinvestment scale

GC – Golf club

R & A – The Royal & Ancient (Golf Club of St Andrews)

EGA – European Golf Association

MAC – Mastery approach for coaches

CGF – Czech Golf Federation

SKGA – Slovak Golf Association

CEO – Chief Executive officer

CM - Centimetres

1. Introduction

Golf has been my matter of the heart for a long time now, I have always dreamed of becoming a golf coach, motivated to further promote golf as well as helping to make some changes for the better in my home country, where golf is not as popular, especially amongst juniors. The first two golf courses in Slovakia have been built before World War 1, however, both were destroyed during World War 2. In 1991, the first golf union was created and in 1995 the golf course called “Golf and country club Bernolakovo” has been built. At the moment we have 33 golf courses in Slovakia (R&A, 2021) with approximately 10 000 golf players. Golf in Slovakia has a very short history compared to the Czech Republic or even Scotland – “the home of golf”, which is why golf is not as popular here as in other countries. The recent success in the Olympics of a professional player called Rory Sabbatini, who won a silver medal as well as Covid times when golf was more or less the only allowed sport to play, attracted more players into the golf sector. Penati Golf Resort, Gray Bear Golf Resort, and Black Stork Golf Resort are a few of Slovakia's well-known golf resorts. Slovakia's national golfing governing body is called the Slovak Golf Association (SKGA). It manages the sport's growth, plans national competitions, and represents the nation in world golf associations (SKGA, 2023). The SKGA is crucial in promoting golf and helping players of all skill levels, from amateurs to professionals (SKGA, 2023). Golf competitions and activities in Slovakia have recently increased. Golfers can compete and display their skills in these tournaments, which also draw national and worldwide attention to the game. One of the notable golf competitions hosted in the nation is the Slovak Open.

Golf is a popular sport enjoyed by people of all ages and skill levels. Golf is probably one of the only sports, which can be played by three generations at the same time- grandson, father and grandfather. While golf is primarily known as a recreational activity, it also offers several health benefits as many other sports, such as mental stimulation, social interaction, physical exercise, weight loss, stress reduction, improved balance, mobility, and coordination. When beginner golfer wants to start playing this sport, they need to undertake a course with a coach, who will help them, guide them, and teach them basics about various golf shots, technique, rules, and etiquette. Such course is called a Green card – “Zelená karta”, which is needed in order to play on golf courses or play tournaments. The first contact with golf then for most

people is with a club coach. Some clubs or schools go as far as providing golf lessons during their Physical Education classes. As golf become a part of the Olympics in 2016, some universities also offer golf programmes for their students. Due to the increasing popularity of golf worldwide, there are also more scientists trying to research golf from all angles, but not enough. There is still demand for more research on specific phenomena, hence my topic choice due to insufficient research on this topic.

2. Theoretical aspects of the work

Academic research in golf is conducted in order to improve performance by examining effective techniques, training methods, and strategies. Golf researchers also explore the biomechanics and psychological principles, and equipment innovations in golf to optimize players' skills and prevention of injuries. Additionally, golf research examines the sociocultural aspects of sport and its impact on society, contributing to a broader understanding of the sport. Recently, sports development is being employed as a means to enhance sports participation and highlight the broader benefits of sports (Bolton et al., 2008).

There has been an increased interest in the reinvestment theory by researchers in golf due to its potential to provide insights into how cognitive processes affect motor skills and performance. According to Masters & Maxwell (2008), the theory suggests that when individuals become self-conscious or overly focused on controlling their movements (reinvestment), it can lead to performance errors and influences skill execution. If more golfers and coaches would understand and implement this theory within their practice, they would learn to maintain a more automatic execution of their swing, reducing the interference caused by conscious control, which can enhance movement fluidity, timing, and consistency (Masters & Maxwell, 2008). By minimizing reinvestment tendencies, golfers may also experience improved decision-making, increased confidence, and reduced anxiety on the course. Furthermore, research on the reinvestment theory in golf can improve training programs and instructional techniques, where coaches and practitioners can design practice principles that foster a more automatic movement style, helping golfers optimize their performance.

2.1 History of Golf worldwide

What even is golf? As Mark Twain once said: “Golf is a good walk spoiled”. Golf is an outdoor sporting activity, played on the golf course, with the aim to hit the ball from the tee to the hole in the fewest shots possible. Outdoor sporting activity is even more beneficial than indoor due to spending time in nature and breathing fresh air, which can have a positive impact on mental health and well-being. One of the scientific concerns in contemporary society is the lack of promoting physical activity, where sedentary lifestyles can have a negative impact on young people’s health (Biddle et al., 2004). It is important to encourage individuals to take part in physical activity, as there has been a growing increase in obesity-related to physical inactivity in children (Steinbeck, 2001), which can increase the risk of heart failure (Prenner & Mather, 2018).

By its nature golf game is based on fair play principles, the sport has been historically and still is in the present era identified as a game for gentlemen. The first origin of golf remains unclear, however, something similar as golf, a game, was originally played on the east coast near Edinburgh. In the beginning, players tried to hit a pebble over the sand dunes around the coast using a bent stick or a club. During the 15th century, Scotland was preparing to defend itself, against an attack by the 'Auld Enemy', however, the country's enthusiastic pursuit of golf led many to neglect their military training, so much so that the Scottish Parliament of King James II. banned the sport in 1457. This ban was until 1502 when the game received King James IV's permission again. Despite the ban on playing the sport, there were many individuals who decided to ignore it. If you ever go to Scotland, you would still be able to find the signs saying, “No golf”.

The popularity of the game spread rapidly throughout Europe during the 16th century due to royal approval. King Charles brought the game to England, and Mary Queen of Scots brought it to France while she was studying there. The first mention of golf in the now-recognised historic hometown of St Andrews appeared in 1552. Golf officially became a sport when golfers from Leith formed the first club in 1744 and held an annual tournament. The first ever 18-hole course was built in St Andrews in 1764. During the 19th century, following the expansion of the British Empire, golf as a sport also spread to other countries. The first golf club established outside Scotland was Royal Blackheath (near London) in 1766. The first

golf club outside the UK was Bangalore in India (1820). The United States Golf Association (USGA) was founded in 1894 to regulate golf as a sport in the USA. By 1900 over 1000 clubs had been built in America. Through commercial sponsorship, the United States quickly built a reputation as the centre of the professional game of golf. Today it is the golf courses themselves that reflect the history of the game, with American courses being presented as beautifully sculpted and landscaped garden parks, unlike those in Britain, which are usually rough courses with bunkers that often have to be accessed by golf steps and are higher than you are!

2.1.1 History of Golf in the Czech republic

In 1898 at Cisarska Louka in Prague, Czech Republic a couple of very modern sport-oriented people tried to hit balls with historical golf clubs. In 1901 Duke Kinsky ordered his servants to build him a couple of golf holes at his property close to Pardubice. After that, there was a massive boom, where numerous golf courses were built such as a private course in Volesovice, 9 holes in Marianske Lazne or 9 holes in Karlovy Vary. The first Czech Golf Club, created in 1926 was called Golf Club Prague. In less than two years of existence of this club, the number of members has increased to 150. Golf Club Lisnice has been created as a second Golf Club by a young group of layers and engineers, where later on they built 9 holes, that are still being used by the public nowadays. When the communist obtained power in 1948, the golf sector suffered tremendously. Numerous people who played golf or were involved in the game, have been prosecuted or taken into custody. For example, the president of the Czech Golf Union of Czechoslovakia has been taken into custody and imprisoned for two years just because of the role he played in the golf sector at the time, whereas other people have been fired or forced to leave their job. For over ten years, the golf sector has been overlooked and not well supported by the government. Subsequently in the 1960s new golf courses have been built, golf has become a part of the national support system for sport, tournaments were being played and players were sent out to international tournaments to represent Czechoslovakia abroad. After 1989, the golf sector has perceived exceptional growth. Suddenly there was more high-quality easily accessible equipment for the public, available on the market, which was before either difficult to obtain or in poor quality. Unfortunately, there is not much more information about golf in the Czech Republic before 1989, most of the materials have been found in the chronicles from GC Lisnice.

2.2 Popularity of golf worldwide

According to The Royal & Ancient (Golf Club of St Andrews) and European Golf Association's report on golf participation in 2021, there are currently more than 10 617 000 golfers¹ across Europe Total Golfer numbers (R&A, 2021). Only 26 percent of all registered adult golfers in Europe are female golfers (R&A, 2021). The highest percentage of female golfers is in Austria, where there is almost 40 percent of female golfers (R&A, 2021). This phenomenon can be explained by historical women's exclusion in sport in general with the golf environment not being an exception as women's access to golf before 1912 was limited by club regulations, where they were restricted to particular tee times or the access to the main clubhouse (R&A, 2018). The gender gap within golf coaching is even more critical than in golf participation, as only 3% of PGA coaches in the United Kingdom are female, which can have a negative impact on women's participation due to a lack of role models (Kitching et al., 2017).

Nevertheless the challenging past two years, due to the pandemic, the number of registered golfers in Europe has grown by 4.6%, with increases seen in nearly three out of four European countries (R&A, 2021). Many golfing governing bodies, courses and golf companies took the pandemic as an opportunity to promote golf as a safe and healthy sport to attract new players. Other approach used by governing bodies to promote golf was usage of celebrities or famous people in order to attract more people into trying golf. For example, R&A have decided to name Niall Horan (musician, was member of the One Direction boyband) and Gareth Bale (famous football player) as their ambassadors to "help inspire new audiences into the sport". Niall Horan had also become an ambassador for a golf brand called Callaway, as their CEO announced in early January. Callaway is hoping to connect with a wider, younger audience through usage of ambassadors like Niall Horan. There are many other famous people who play or played golf such as Snoop Dogg, Celine Dion or Justin Timberlake. As Joe E Brown (actor) once said: "I play in the low 80s. If it's any hotter than that, I don't play."

¹ Total Golfer numbers (those who play on 18-hole and 9-hole full-length courses) provided by national federations or from SMS nationally representative studies and expert estimates.

2.2.1 Popularity of golf in Czech Republic

There are numerous golf courses spread out around the Czech Republic, which has a relatively small yet active golfing community. The Czech Republic has also had success in international golf competitions, which has helped to increase the popularity of the game. Professional golfers from the Czech Republic including Klára Spilková, Aleš Kořínek, Filip Mrůzek, and Ondrej Lieser have had noteworthy success on the professional tour, which has boosted public interest in the game. Many of the stunning golf courses in the Czech Republic are situated in scenic surroundings and offer demanding gameplay. The Royal Golf Club Mariánské Lázně, Golf Club Karlštejn, and Albatross Golf Resort in Prague are a few of the remarkable golf courses in the whole country (CGF, 2023). The Czech Republic's national golfing governing body is the Czech Golf Federation (CGF, 2023). It fosters the growth of golf at different levels and promotes and governs the game.

In 2021 in the Czech Republic according to the European Golf Participation Report (R&A, 2021), there were 52,401 registered golfers with the estimate of another 8 thousand more who play golf just on a recreational basis without an annual membership. There is a total of 135 golf courses, out of which only 55 affiliated 18-hole courses and 56 affiliated 9-hole courses (R&A, 2021). According to gender, 70 percent of golfers in the Czech Republic are males and the other 30 percent are females (R&A, 2021). Golf may not be as popular in the Czech Republic as some other sports, but it has an enthusiastic fan base and is only expected to become more popular in the coming years. Golf's popularity in the Czech Republic continues to rise as a result of the nation's golfing community's proactive promotion of the sport and efforts to draw new players into the game. The Czech Republic has benefited from the promotion of golf through tourism. Golfers from all over the world travel to the nation to explore its courses and take in the beautiful magnificence of the Czech countryside.

2.3 The demands of golf

The aim of golf is to hit the ball from the tee to the hole in the fewest shots possible. Golf, which attracts approximately 55 million participants (Farrally et al., 2003), is enjoyed across 206 countries worldwide, making up around 1/127 of the total global population (Murray et al. 2017). Golf possesses the potential to offer physical activity, consequently contributing to both health and social advantages for individuals of various age groups. Middle-aged and

older adults, who typically engage in less physical activity compared to their younger counterparts, find golf very stimulating on both physical and mental levels (Murray et al. 2017). Golf is most played in regions where the sport has its history and accessibility, according to available evidence golf has many potential health benefits such as reduced mortality and increased life expectancy. For older people, golf is not as much about learning new skills, it is really about health but primarily social benefits. In comparison to control groups, older male golfers experienced greater balance, muscular function or strength; however, professional golfers did not display an increase in bone mineral density in their dominant or non-dominant lower limbs as was assumed (Bustelo et al., 2018). For kids, engaging in outdoor sports brings along positive improvements on all levels including psychological, sociological, physical and educational (Dickson et. Al, 2008), such as interactions with fellow youth, decreased crime rates or personal growth. Additionally, it contributes positively to the economy as individuals who participate in regular exercise tend to be more productive in their professional lives, fostering economic expansion. By partaking in outdoor sports, children receive adequate sunlight, benefiting their physical and cognitive well-being. Moreover, it grants children increased autonomy to cultivate their athletic skills, including running, jumping, and climbing. According to Malina (2010) though, focusing solely on one sport at an early age may not be the most optimal approach to attaining success in high-level sports.

Sports performance is an actual movement expression of the athlete's specialized abilities, evaluated according to predetermined rules and regulations. Sports performance is influenced by various personnel such as the guidance of a coach, psychologist, and fitness trainer, as well as the invaluable support from their family and friends (Gordin, 2016). Sports training consists of a technical, tactical, fitness and psychological aspect (Dovalil et. al, 2002).

Technique refers to the specific way in which a desired movement task is executed. It is the unique style and approach employed in accomplishing the same movement task differently. In the context of sports training, technical preparation focuses on developing and improving the specific skills required in sports (Dovalil, 2009). Tactics refer to a framework of potential solutions for competitive scenarios and the execution of one's strategic plan. The complexity of strategic planning includes analysis of the conditions specific to the sport or tournament

with determining the objectives (Dovalil, 2009). The objective of fitness preparation is to enhance movement abilities, especially for sports performance requirements. The performance achieved in competitions is intricately linked to the development of these movement capabilities (Dovalil, 2009).

The natural association between golf and psychology appears to be everlasting (Finn, 2008). Scholars in the field of golf have long acknowledged the significance of proper cognition during gameplay, as evidenced by the most accomplished golfers who assert that a well-executed shot is comprised of 10% swing mechanics, 40% preparation, and 50% mental acuity (Nicklaus, 1976). Empirical investigations have further substantiated this notion, revealing that proficient golfers on tour exhibit superior cognitive abilities, such as employing more consistent pre-shot routines, strategizing more efficiently both on and off the course, and regularly setting lofty performance objectives (Finn, 2008). Golf requires players to engage in prolonged periods of play, and research has shown that fatigue can negatively impact decision-making and performance (Weinberg & Gould, 2023). Additionally, since golf involves periods of rest between shots, it is important for golfers to be able to switch their focus on and off effectively (Aitken & Weigand, 2007).

Guadagnoli and Lindquist (2007) suggest that the Challenge Point Framework and Efficient Learning for Golf advocate for effective learning when the participant is challenged at an appropriate level based on their abilities. The level of difficulty of the task is determined by the amount of stress that arises from the need to solve a specific motor problem. This stress level varies among individuals and is influenced by psychological factors, task difficulty, and mechanical constraints of the exercise.

According to Timothy Gallwey, a prominent sport psychology author and tennis coach, his teaching effectiveness and his students' performance greatly improved when he recognized the negative impact of excessive instruction (Jenkins, 2008). Gallwey observed that his students were burdened with self-instruction, self-criticism, doubt, and fear when they performed poorly (Jenkins, 2008). In contrast, when they were at their best, they reported being mentally relaxed, absorbed, and free of tension, with their bodies instinctively knowing how to hit the ball. Gallwey terms this state "playing in the zone," which is similar to the concept of flow (Csikszentmihalyi, 2005). Flow can be described as a mental state where

individuals are completely absorbed in an activity, to the extent that nothing else seems to matter. Flow is not only a state of mind where individuals become fully engaged in the activity (Nakamura, 2002) but also a special case of intrinsic motivation, where individuals engage in an activity for its inherent rewards rather than for any external factors. Flow occurs when there is a perceived balance between an individual's competencies and the demands of the task at hand.

Sports performance in golf is for amateur golfers evaluated by their handicap, whereas for professional golfers it is more about ranking in individual tournaments as well as overall ranking. From the point of view of athletic performance, we divide golf skills into categories of putt, chip, pitch, bunker shot and full swing, where each of these skills has a different technique acquisition. For evaluation of such skills, the questionnaires of Movement Specific Reinvestment Scale or Golf Movement Specific Reinvestment Scale have been used in previous studies (Malhotra, et al., 2015).

2.3.1 Putting skill

Putting in golf is when you use a special club called a putter to hit the ball on the shortest-cut grass near the hole. It's one of the last shots you make before completing a hole. The main goal of putting is to roll the ball into the hole using careful and precise movements in as few shots as possible. When you putt, you swing the putter in a smooth way, like a pendulum, to make sure the ball goes where you want it to. The putting stroke or skill is regarded as one of the crucial strokes in the game of golf. Professional players, according to Pelz's research (2000), each player utilizes the putter for approximately 43% of their total strokes during a single round. Players must possess the ability to analyse the terrain and assess the incline (uphill/downhill/right-to-left/left-to-right) as well as the speed of the green. The effectiveness of a putt also relies on the player's capacity to anticipate how the ball will roll on varying green surfaces, taking into account factors like green slope and speed. The putting is not about strength but about other aforementioned skills.

2.3.2 Full swing

A full swing in golf refers to the whole motion used to hit the ball with maximum power to achieve greater distance. It involves a player making a full rotation of their body while swinging the club from behind the ball, through the backswing to the follow-through and

finish. The full swing is used for longer shots, such as driving off the tee or hitting the ball from the fairway on the green. The swing itself is defined as a quick and powerful movement that lasts around 1.5 seconds. Therefore, the ability to generate force quickly is crucial for performing well. According to Neal et. al (2000), golfers who lack overall body strength struggle to produce enough force from their hip muscles, which affects their performance on the course. It requires coordination, proper timing, and technique to generate clubhead speed and effectively hit the ball.

2.4 Motor learning

The definition of motor learning is ‘the study of how movements are learned, i.e. how movements are produced differently as a result of practice or experience’ (Schmidt & Lee, 2009, p. 4). Motor learning is also a complex process that occurs through practice, feedback, and experience. It involves the integration of sensory information, such as visual and proprioceptive feedback. Motor learning can be influenced by various factors, such as age, genetics, prior experience, feedback, practice conditions, and individual differences. According to a few motor learning studies, golf performance has improved more when golfers focused on the external focus of attention such as clubhead movement or swing outcome rather than the internal focus of attention such as specific body movements (Keogh & Hume, 2012). Optimal motor learning begins when the performer is appropriately challenged (Guadagnoli & Lindquist, 2007). Understanding the principles of motor learning can help optimize training programs, rehabilitation strategies, and sports coaching to enhance skill acquisition and performance.

2.4.1 Motor Skills Performance

Motor skills performance in golf refers to how well a golfer can execute the precise physical movements and coordinated actions required for effective gameplay (Carson & Collins, 2017). It encompasses a combination of fine motor skills, such as delicate hand movements, and gross motor skills, involving larger body movements. In golf, players need to master each part of the swing mechanics, such as the backswing, downswing, and follow-through in order to achieve the desired outcome. These movements need precise coordination and timing to generate power and speed while keeping balance and stability throughout the swing. Golfers often use inherent visual feedback for understanding the shot execution and outcome

(Lee & Schmidt, 2014). The ability to correctly estimate distance control and the direction of the ball on the green when putting is another aspect of motor skills performance in golf. Furthermore, fine motor skills are involved in tasks like correct technique when gripping the club or pushing the tee into the ground as well as repairing pitchmarks on the green. To improve motor skills in golf similarly to other sports, regular practice and training are needed. Working with a golf instructor, engaging in targeted repeated drills and exercises executed in a structured way (Merbah & Meulemans, 2011), as well as the psychological and physiological demands of a sport can all contribute to the improvement of motor skills performance on the golf course.

The researchers have recently found that motivation and attentional focus in motor skills performance and learning plays a crucial role in optimizing performance through intrinsic motivation and attention for learning (Lewthwaite & Wulf 2017). Motor performance varies based on the level of expertise, according to the traditional cognitive framework of motor skill acquisition (Bobrownicki et al., 2015). Performance on a more advanced level is dependent on automatised procedural systems that require little conscious attention. Whereas, for beginners in learning skill acquisition the process involves explicit, rule-based knowledge in working memory systems to improve the pathway of motor execution (Bobrownicki et al., 2015).

2.5 Intervention programme

Sport intervention programmes are perceived as a solution to the social problems of young people (Armour et al., 2013). These programmes often address resentment and disengagement of young people within the sports sector. A key aspect of positive behavioural change is “developing programmes and interventions that have an explicit focus on personal development by promoting positive relationships between participants” (Hellison et al., 2008; Holt & Sehn, 2008; Armour et al., 2013).

Many organisations and governing bodies use sports and physical activity intervention programmes as tools for personal development as part of their policies (Armour et al., 2013). According to Armour et al. (2013), a positive impact can be seen immediately even after a relatively short intervention programme such as a 3 week intervention.

Hassann & Morgan (2015) created the mastery approach for coaches (MAC) in youth sport intervention, as well as finding convincing evidence supporting the efficacy of the interventions. The study observed that athletes who underwent the MAC intervention reported a greater focus on mastery from their coaches and experienced a reduction in ego goal orientation, perceived their coaches as having a higher focus on mastery and experienced an increase in task goal orientation, a decrease in ego goal orientation, and a decrease in sports anxiety when compared to athletes in non-intervention control groups (Hassann & Morgan, 2015).

2.6 Perceptions

Perception is a process of exploring the ‘specifying’ information, which can be used in order to guide movements and generate more information regarding movement control (Roberts et al., 2020). The coach is responsible for providing opportunities to their participants in order for them to develop appropriate perception. This can be realised by coach introducing dynamic training simulations that are similar to tournament conditions, which has a psychological effect on performance (Roberts et al., 2020). Challenging a learner to create solutions for specific motor skills tasks through a non-linear pedagogical approach promotes an external focus of attention, where manipulation of task constraints such as rules, conditions, equipment etc is used to improve tournament performance (Roberts et al., 2020).

In golf, perception is a crucial aspect that affects performance (Witt et al., 2008). Golfers depend on visual cues to determine various aspects of the terrain, such as direction, distance, and slope, which guide their decision-making about shot execution and club selection (Renshaw et al., 2020). The interaction between visual perception, proprioception, and kinaesthesia has been the focus of golf perception research for a while now. Familiarity with the course, training, and experience impacts the golfer's ability to perceive visual cues and coordinate their body movements. Additionally, golfers' confidence and mindset regarding the situation can impact their performance under pressure. Thus, perception is a multifaceted aspect of golf performance that affects the golfer's ability to make accurate shots, read the course, and perform well in a tournament scenario under pressure, which can be accomplished by using a more external focus of attention and non-linear pedagogy within the player's routine (Roberts et al., 2020).

2.7 Movement Specific Reinvestment Scale and Golf Movement Specific Reinvestment Scale

In the past, the reinvestment theory suggested that relatively automated motor processes can be disrupted by psychological, environmental, physiological, or even mechanical context. Recently, the reinvestment theory has been identified more as the ‘manipulation of conscious, explicit, rule-based knowledge, by working memory, to control the mechanics of one’s movements during motor output’ (Masters & Maxwell, 2008). There has been a decrease in performance when participants were forced to consciously focus and work on their movements by pressure manipulations or self-focus instructions (Masters & Maxwell, 2008). Reinvestment theory believes that movement execution is at least a partially automated process. Wulf & Su (2007) have produced a significant body of work that explores the impact of an internal focus versus an external focus of attention on both the learning and execution of motor skills. Through numerous studies across various sports, they have consistently demonstrated that directing one's attention towards the effects of their movements on the environment (an external focus of attention) is more effective than focusing internally on one's own movements (Wulf & Su, 2007).

I think this is an important finding because it suggests that when learning and performing motor skills, directing our attention externally may be more effective than trying to control our movements internally. By focusing on the desired outcome of our actions, we can better adapt to changes in the environment and make adjustments to our movements accordingly. This research has significant implications for coaches, trainers, and anyone interested in improving their motor skills. Hence, the purpose of this research was to evaluate the impact of a 3 week coaching intervention on the development of golfing skills (full swing and putting), as well as the participants’ perception of their golf motor skills. Moreover, the study aimed to achieve two sub-objectives, namely, the utilization of training diaries to track participants' perceived difficulty and commitment levels during individual training cycles and the exploration of subjective goal setting and associated thoughts in individual players to attain those objectives.

2.8 Golf instructions

Identification of constraints, serving as factors, which shape participant's emotions, perceptions, thoughts, or actions have the potential to influence sports performance (Renshaw et al., 2020). Individual constraints in golf are for example strength, speed, power development or flexibility, environmental constraints include weather, caddies, green speed or course location and task constraints is represented by course length, clubs available, ball type or additional rules (Renshaw et al., 2020). The most important constraint for beginners that is being used in the current study is the individual with the focus on the improvement of centredness of strike; influenced mainly by aim, ball position, stance, and posture (PGA, 2022).

There are three types of golf instructions – internal, external, and mixed instructions. The general idea of the differences in movement instruction such as the internal focus, which is similar to linear pedagogical approach where coaches often try to help their players to recreate the ideal movement pattern (Williams & Hodges, 2005), or bringing the body into an ideal position, even though there is no such thing as an ideal movement pattern or an ideal swing position. The external focus on the other hand such as focus on the club and how it is brought to an impact by the player is more similar to non-linear pedagogy, where the ‘coaches should tell the players what to do, not how to do it’ (Chow et al., 2015), which leaves room for exploration of variety range of movement in order to find the most suitable solution for themselves (Renshaw et al., 2010; Chow et al., 2009). Historically, many coaches typically provided instructions that draw heavily from an internal perspective (Newell, 2010). Recent studies found out that external focus instructions produced more effective learning due to focus on the greater awareness of golfer's movements, which also improved adaptability when under pressure scenario such as during competition (Roberts et al., 2020). However, it is important to mention that everyone can benefit from different instruction provided (Keogh & Hume, 2012), which is why mixed focused instruction are now considered as a crucial part of coaches' expert coaching. Expert coaching utilises both movement instructions and feedback to performers (LaPlaca & Schempp, 2020), while athletes prefer to process technical instructions when performing as it has been reported to relate to benefit during competition as an effective coping strategy to combat anxiety (Levy et al, 2009). We also

know that processing the ‘right’ information and information in the ‘right’ way is a crucial consideration to this impact (Carson & Collins, 2016). This is due to motoric factors (e.g., relevance to the technique required, modality of the information processing for the task, level of automaticity/association between movement components being processed, level of experience/consistency with this executional process etc.).

Indeed, many studies have shown that the level of familiarity with an instruction/cue makes a difference in the performance, the amount of information that is being processed and the modality (Malik et al., 2021; Bobrownicki et al., 2015). But most researchers have only examined this from the coaches'/teachers' perspective and not with regard to the perceptions/cognitions of the learner and the impact this can have on the rate of learning. What we don't know is how each golfer perceives the generic instruction given, whether it has a positive relationship with performance improvement and also whether the perception of a player's movement is changing over time.

3. Methodology

3.1 Goals and tasks of thesis, hypotheses

3.1.1 Research problem

It remains unclear how golfers interpret and apply general instructions provided to them, how this interpretation relates to improvements in performance, and whether the perception of a player's movement changes over time. The results of this study may provide valuable insights for coaches and other practitioners, aiding in the design of tailored training plans that meet individual needs.

3.1.2 Research questions

- Does the 3 week golf training program affect the level of selected golf skills and the perception of golf-specific movement skills?
- Does the 3 week training program stimulate participants on an adequate level of effort and are the individual cycles of an appropriate difficulty?

3.1.3 Aim of the study

The aim of the study was to evaluate the effect of a 3 week coaching on the golf skills level (full swing and putting) and perception of golf motor skills. The sub-objectives of the work were to use training diaries in individual training cycles to monitor the level of perceived difficulty and required commitment of the participants and to investigate the subjective goal setting and thoughts to achieve them in individual players.

3.1.4 Research hypothesis

H1: The movement perception of participants will change throughout the 3 week intervention programme. (*Unconfirmed hypothesis*)

H2: The researcher assumes that the training program will have a significant effect size $p < 0,05$ and there is going to be a significant difference, where Cohen's $d > 0,5$ based on the level of putt accuracy with less radial error. (*Hypothesis confirmed*)

H3: The researcher assumes that the training program will have a significant effect size $p < 0,05$ and there is going to be a significant difference, where Cohen $d > 0,5$, based on the distance of the ball flight such as carry distance and its determinant (clubhead speed and ball speed). (*Hypothesis confirmed*)

Furthermore, it is hypothesized that the individual training cycles will be of an appropriate level of difficulty and stimulate a sufficient level of effort in the participants, as evidenced by their training diaries.

3.2 Participants

The study involved 43 participants who were divided into four groups, three of which had 11 participants and one with 10 participants. During each lesson, the objective was to divide a group of ten participants into two groups of five. While one group was doing full swing on the driving range, the other was putting on the putting green. The aim of a first lesson was to teach golf swing basics/putting basics. Out of 43 participants, only the ones who attended Pre & Post test, all instructional lessons, practical lessons, completed diaries and Motor Specific Reinvestment Scale (MSRS) were taken into consideration towards statistical analysis, which equals 21 participants.

The sample size of a study is a crucial factor in determining its statistical power and generalizability of findings (Faber & Fonseca, 2014). In the present study, the decision to include 43 participants was based on several factors such as the study's research question, the availability of participants, and the estimated effect size. A sample size of 43 have provided a sufficient statistical power to detect meaningful effects, while also being manageable in terms of resources and time. Additionally, the sample size have been determined based on the characteristics of the population under study, with the aim of achieving adequate representation of relevant subgroups. Overall, the sample size of 43 was chosen to balance statistical power with practical considerations, while aiming to provide meaningful and generalizable findings. Reducing the number of individuals in this study reduced the cost and workload, and made it easier to obtain high-quality information, but this had to be balanced against having a large enough sample size with enough power to detect a true association. According to GPower software, the true sample size should be 43 (effect size 0,5, α err prob 0,05, power 0,8, allocation ratio 1). Therefore, the aim was to recruit around 43 participants. The measurements of each player collected before the testing was weight, height and other parameters.

3.2.1 Support base for the selection of participants has been established on the following criteria

- student can't have previous experiences with golf (previous mini-golf skills are an exception)
- no injury in the past 3 months
- if they played similar sport before (such as hockey), the covariation analysis is needed

Participants were first time (beginner) golfers. The age range was from 19 years old to 26 years old. To assure the safety of each participant and minimising the risk of injury, apart from asking them to complete a warm-up and cool-down exercises, the project included only healthy individuals who have not had any record of injury in the past 6 months. Based on the aforementioned criteria, only 21 out of 43 participants have fulfilled the criteria for them to take part in this study. The participants completed the Entry questionnaire (Appendix 8.1.1)

with Voluntary Informed Consent (Appendix 8.1.2) before the start of the study and returned them via email.

3.3 Study design

Participants completed 3 week training intervention programme, where each training session took 60 minutes, twice a week. Before and after the intervention programme the pre-test resp. post-test sessions were performed. Intervention period consisted of 3 training blocks (for 3 weeks), where one instructional and one practical session per week was performed. Each session included putting (30 min) and full-swing (30 min) part. Instructional lesson compared to practical lesson emphasized instruction over practice in both putting and full swing parts. The sessions were happening on Monday (instructional lesson) and Wednesday (practice lesson) from 9am till 1pm. The researcher decided to use Harvard referencing style due to their previous experiences with such referencing method. The effectiveness of selecting a qualitative method for the phenomenon of analysing training diaries has previously been demonstrated by Waśniewski (2017), whose usage of the qualitative method had allowed him to explore the socio-cultural contexts of learners, which is considered as a crucial aspect of complex social phenomena within sports learning (Light 2008).

3.4 Data collection

The data collection refers to the systematic gathering of targeted variables for the purpose of gaining a comprehensive understanding of the operational dynamics of a given problem. The process enables the quantification and enhancement of a dilemma and procedures, as well as the documentation of relevant information for future reference (Imam & Jariwala, 2020). The data collection was conducted during 2022. The participants were engaged in this project for 5 weeks in total. There was a MSRS questionnaire one week before the pre-test, then 3 weeks of intervention, post-test and again MSRS after one week after the tournament. The blocks of training consisted of one instructional lesson, which always took place on Monday from 9pm till 1pm and one practice lesson, which always took place on Tuesday from 9pm till 1pm. The 43 participants were split into 4 groups. Practice lessons consisted of 30 minutes putting and 30 minutes long game. Each group was split into two groups, one starting on the putting green and the second one on the driving range. The starting station for each group was changing every time.

The pre-and post-test were designed to evaluate and understand players' perception of a game. In each study, the tests or intervention programmes as well devices used throughout the study have to be validated and reliable (Morgan & Harmon, 2001).

The training diaries were used to identify players understanding of general golf instruction and the perception of golf motor skills. Participants completed reflective post-block diary after every week. Training diaries were also used in the individual training cycles to monitor the level of perceived difficulty, required commitment of the participants to investigate the subjective goal setting and thought processes to achieve them within individual players. This includes factors such as the cognitive load (i.e., how much), relevance to the task (i.e., is it useful for the golfer), consistency of cognitions (i.e., do they think of a different cue for every swing) and direction of cue (i.e., internal or external). The data was collected each time after practical lessons.

3 week training programme overview

The instructional and practice lesson have been changing each week and were designed to increase the difficultness each time. A planned warm-up and cool-down routine (appendix 8.2), a clear goal, and a combination of flexibility and motor skill development were all part of a three-week training program. While gradually stepping up the intensity and difficulty of trainings, it was crucial to include rest and recovery days. A possible improvement to consider in the future is that well-rounded program should also include elements for tracking progress and offering nutritional advice.

3.4.1 Instructional lesson

Each instructional lesson always consisted of two parts – putting and full swing. The instructional sessions were more about explanation and demonstration of technique. The training plans were designed before the intervention program begun, see appendix 8.3 and appendix 8.4 for an example of first instructional lesson overview. The plans followed PGA teaching principles for beginners as well as academic articles conducted on this topic, with slight variations. The instructional lesson for putting always consisted of instruction part at the beginning and 6 different exercises each time (appendix 8.4.1). The instructional lesson for full swing always consisted of instruction part at the beginning and then 30 balls for each player to practise the correct technique.

3.4.2 Practical lesson

Each structured practical lesson always consisted of two parts – putting and full swing. During the practical sessions, participants were supposed to practice what they have learnt during instructional lesson (see appendix 8.5). The practical lesson for putting always consisted of 6 holes, that the players were supposed to play 3 times (appendix 8.6.1), without further instruction from the researcher. The practical lesson for full swing consisted of participants hitting 50 balls without further instructions given from the researcher. A structured golf lesson refers to a systematic and organized approach to teaching and learning the game of golf. It typically involves a series of planned and progressive activities aimed at improving various aspects of a golfer's game, in current research – putting and full swing. Goals and objectives have been established at the beginning and progress was tracked to measure improvement over time. In both parts, the researcher was not intervening into their practice lesson.

3.4.3 MSRS and GMSRS

The MSRS is a series of questions used in research by Masters & Maxwell (2008), which the researcher used in this thesis. The questionnaire is supposed to find out, whether an intervention or series of structured practice sessions can possibly change the perception about specific movements. The evaluation of the MSRS is based on the 5 point scale, where 1 represents not at all (nikdy) and 5 represents always (vždy).

1. I am always trying to think about my movements when I carry them out (Vždy se snažím přemýšlet o svých pohybech, když je provádím).
2. I reflect about my movement a lot. (Hodně uvažuji (přemýšlím) o svých pohybech).
3. I am always trying to figure out why my actions failed. (Vždy se snažím zjistit, proč se má činnost nepovedla).
4. I am aware of the way my body works when I am carrying out a movement (Uvědomuji si, jak mé tělo při provádění pohybů pracuje).
5. I rarely forget the times when my movements have failed me. (Málokdy zapomenu na chvíle, kdy můj pohyb selhal).

Malhotra et al. (2015) have modified the original MSRS by Masters & Maxwell (2008) to golf GMSRS, which the researcher did not use in this thesis, however, for future golf studies, this might be more relevant.

Modified GMSRS (Malhotra et al., 2015):

1. I thought about my stroke (O úderu jsem přemýšlel, když jsem jej prováděl).
2. I reflected about my technique (Uvažoval jsem nad svou technikou).
3. I tried to figure out why I missed putts/hit bad shots (Snažil jsem se zjistit, proč jsem minul putt/zahrál špatný úder).
4. I was aware of the way my body was working (Uvědomoval jsem si, jak mé tělo pracovalo).
5. I thought about bad putts/shots (Přemýšlel jsem nad špatnými putty/ranami).
6. I was conscious about my movements (Uvědomoval jsem si své pohyby).

3.4.4 Self-reflective diary questionnaire

Self-reflective diary is a series of 5 questions, designed to find out whether the 3 week golf training program has an affect on the level of perception of golf-specific movement skills, as well as finding out whether the training program stimulate participants on an adequate level of effort.

1. During this week, what were you trying to achieve? Did you have any specific goal(s)? (Čeho ses snažil v průběhu tohoto týdne dosáhnout? Měl jsi nějaké specifické cíle?)
2. During this week, what were you thinking about to help achieve your goal(s)? What did you focus on? (O čem jsi v průběhu tohoto týdne přemýšlel, aby sis pomohl k dosažení svých cílů? Na co jsi se soustředil?)
3. Following on from the previous question, why or how did you choose this focus? Where did it come from? (V návaznosti na předchozí otázku, proč nebo jak jsi zvolil to, na co jsi se soustředil? Odkud to vzešlo?)
4. Rate the level of difficulty of the lesson. How hard did you find the session? (Ohodnot' náročnost lekce. Jak těžká ti lekce přišla?) (RSME; Zijlstra, 1993)

5. Across the whole week, how much effort did you put into your golf? Based on the provided scale, which ranges from 0 (no mental effort) to 150, enter your personal rating. (Kolik úsilí jsi vložil do lekcí golfu v průběhu tohoto týdne? Na poskytnuté škále, která se pohybuje od 0 do 150, označte vaše osobní hodnocení.)

Performance growth was evaluated by two specific golf tests: full swing test and putting test. Tests were performed before the first training session and after the last training session. Trackman 4 was used for the full swing test to assess players' performance based on four selected parameters: carry distance, total distance, side error, and smash factor. Participants performed 10 shots with 7 iron - modified version of TrackMan combine test (Trackman, 2021), where all of them were evaluated. The putting test consisted of 10 putts from three meters, as previously validated in other studies (Gryc et al., 2017, Gryc et al., 2021), where three selected parameters were evaluated: side error and radial error.

3.4.5 Pre & Post testing

Short game – putting green

Before the pre-test: very basic instructions were given to golfers throughout watching live demonstrations.

The test consisted of 10 putts from 3 metres (see table 1 in appendices).

Long game - driving range

Before the pre-test: very basic instructions were given to golfers throughout watching demonstration videos.

The test consisted of 10 shots on a specific target line (see table 2 in appendices).

The pre-test itself was conducted on Monday from 9 pm to 1 pm with 3 groups of 11 participants and one group of 10 participants. The post-test was conducted on Monday as well, within the same time frame after the 3 week intervention programme. Students were asked to not drink any alcohol or use other prohibited substances at least 24 hours prior to the testing. The consumption of alcohol has the potential to significantly influence the

outcome of testing due to its psychoactive effects on cognitive and motor functions, which can impair an individual's ability to perform tasks accurately and consistently.

Following parameters were collected throughout pre-and post-test for long game: contact rate (smash factor). In golf, smash factor refers to the measurement of the efficiency with which a golfer strikes the ball. It is calculated by dividing the ball speed by the clubhead speed, and the resulting number indicates how much energy is transferred from the clubhead to the ball at impact. A higher smash factor indicates a more efficient impact, which generally results in a longer shot distance. Therefore, it is an important metric for golfers and coaches to assess the effectiveness of the golfer's swing and equipment. Another parameter was carry distance (the distance the ball travels from the moment it is hit by the club until it lands on the ground), clubhead speed (speed at which the clubhead is moving when it strikes the ball), ball speed (speed at which the golf ball leaves the clubface) and side error (is the deviation of the golf ball's flight from the intended target line in the horizontal direction).

3.4.6 TrackMan radar

Validity of the 3D Doppler Radar TrackMan 4 (TrackMan, Denmark), which enables 3D real-time tracking of the club head and the ball has been used in past researches (Sweeney et al., 2009) and it is commonly used by golf coaches especially from Australia and on PGA and European tours as well as on the USPGA (Robertson et al., 2013).

The parameters measured during this study will be total distance and accuracy based on impact factor. For coaches and clubfitters, the parameters measured by TrackMan are largely of sufficient quality for their needs, although they should be watchful for occasional inaccuracy within measurements (Leach et al., 2017). According to Leach et al. (2017), TrackMan tracked the ball and clubhead velocity in 98% of shots.

3.4.7 Data Analysis

The researcher re-written all the data from the self-reflective diary questionnaire into an Excel spreadsheet and anonymised them before the data analysis process began. Thematic analysis is a method that has been used for the organisation of data collected by identifying, analysing, interpreting, and reporting patterns (themes) within data (Braun & Clarke, 2006). Each theme contains something crucial about the data which is connected back to the research

question, with sub/themes that are supporting and representing some level of patterned response within the data. The data are organised and described in rich detail. The reason for choosing the thematic analysis as a part of the data analysis process was high emphasis on people’s interpretations of their own experiences, thoughts and opinions gained throughout the intervention (Braun & Clarke, 2006). The thematic analysis was conducted according to a 6-phase guide created by Braun & Clarke (2006), (Table 3). Due to the lack of complexity of thematic analysis, the quantitative analyses have been chosen for interpretation of data from the self-reflective diary question 4 & 5, MSRS and from Pre & Post-tests.

Table 3 – 6-phase guide for conducting thematic analysis

Step 1 - Familiarisation with data
•transcription of the data from the focus group interview, reading and re-reading the data, noting down initial ideas
Step 2 - Generating initial codes
•coding appealing features of the data in a systematic order across the whole data set
Step 3 - Searching for themes
•Collating codes into potential themes, collecting all the data relevant to each potential theme
Step 4 - Reviewing themes
•Checking if the themes are relevant to the data sets and coded extracts, generating a thematic map of the analysis
Step 5 - Defining and naming themes
•Ongoing analysis to once again refine the specifics of each theme, generating names and clear definition for each theme
Step 6 - Producing the report
•The final opportunity for analysis, relating back to the research question and literature, producing a scholarly report of the analysis

Quantitative analysis depends on the biomechanical data collection methods (Lees, 2002). Pre- and post-test data were evaluated for normality using a Shapiro-Wilk test, and paired t-tests were utilized for normally distributed data to compare differences, while Mann-Whitney U tests were employed for non-normally distributed data. Cohen’s d was employed to assess the effect size between variables. To analyse differences in perceived difficulty and mental effort across the three weeks of training, repeated-measures ANOVAs were employed.

The sphericity assumption for repeated ANOVA was met for mental effort ($p = .110$), but not for perceived difficulty ($p = .009$); therefore, Greenhouse-Geisser correction was used.

Pearson correlations were used to determine associations between variables for normally distributed and non-normally distributed data unless at least one of the variables was non-normally distributed, in which case Spearman’s rank correlation coefficient was used. The level of statistical significance was set to $\alpha = .05$. Microsoft Excel (Redmond, USA) software was used for basic data processing, and IBM SPSS version 25 (Armonk, NY: IBM Corp) was used for statistical analyses. The study was carried out according to the guidelines contained in the Declaration of Helsinki (Williams, 2008) and was approved by the Charles University Ethical committee panel (Appendix 8.7).

4 Results

4.1 Quantitative interpretation of the data from psychological scales (1. mental effort, 2. perceived difficulty and 3. MSRS):

There was a significant difference ($t(21) = -2.9$; $p = 0.008$; $d = 0.7$) in MSRS between pre- ($M = 3.5 \pm 0.5$) and post-test ($M = 3.8 \pm 0.4$), see table 3. There was a significant difference in perceived difficulty between at least two weeks ($F(1.831, 23.484) = 5.4$, $p = 0.021$), see Table 4. Pairwise comparisons with Bonferroni adjustment for multiple comparisons revealed significant differences between the first and second week ($p = 0.048$), see Table 2. No significant difference was found over the weeks in mental effort ($F(2,34) = 0.5$; $p = 0.613$).

Table 4 - Descriptive Statistics for Significant difference between Pre and Post test

	Pre-test	Post-test
MSRS	3.5 ± 0.5	3.8 ± 0.4
Difference		0.3*

*Significantly different at $p < 0.01$ ($t(21) = -2.9$, $d = 0.7$)

Table 5 - Descriptive Statistics for Perceived Difficulty and Mental Effort in the first, second and third week

Variable	First week (± SD)	Second week (± SD)	Third week (± SD)
Perceived Difficulty *	2.2 ± 0.6	2.7 ± 0.7	2.9 ± 0.9
Mental Effort	110.6 ± 17.1	106.6 ± 20.7	107.5 ± 24.0

Data are presented as mean ± standard deviation; * a significant difference between first and second week; # a significant difference between first and third week; ^ a significant difference between second and third week

4.2 Qualitative interpretation of the data from self-reflective diary questionnaire (question 1-3):

Theme 1: Achievement of specific goals

- Distance improvement
- Concentration on body movements in order to improve ball striking
- Concentration on the club in order to improve ball striking

Distance improvement

Participant number 1: “For full swing my goal was to hit furthest possible yardage with usage of correct technique.” (week 1)

Participant number 3: “Focus on hitting the ball so that it flies through the air and for as long as possible.” (week 2)

Participant number 5: “Hit it as long as you can.” (week 1)

Participant number 9: “On the driving range, hit the ball further.” (week 2)

Participant number 24: "My goal was to improve distance and focus more on the golf stroke." (week 1)

Concentration on body movements in order to improve ball striking

Participant number 8: "Most effective shot- no muscle spasms, use of swing and mechanical leverage of the body." (week 1)

Participant number 19: "Improve my swing technique, focus more on the body movement." (week 1)

Participant number 15: "Improve hip rotation and weight transfer." (week 2)

Participant number 10: "I focused on the things we were told. Trying to achieve a less clumsy grip on the club. Better, tighter stance and working on the hips." (week 3)

Concentration on the club in order to improve ball striking

Participant number 6: "Achieve a clean strike and golf sound on the swing so shots fly straight." (week 1)

Participant number 6: "Ideal hitting of the ball on the tee to go where I wanted to go, ideally straight. Experimenting with the power of the shot, smaller or bigger swing." (week 1)

Participant number 18: "Bend the launching surface of the club so that the ball flies straight." (week 2)

Participant number 21: "To turn the club when driving so that the ball flies straight and not sideways" (week 3)

Theme 2: Thought process behind goal achievement / goal focus

- Thinking about technique of a golf swing
- Thinking about body movements
- Thinking about the club
- Thinking about golf videos watched in past

Thinking about technique of a golf swing

Participant number 1: “During full shots and putting I was thinking about technique.” (week 2)

Participant number 5: “Focus on the correct grip of the club.” (week 3)

Participant number 7: “I was thinking about the length of the back swing.” (week 2)

Participant number 18: “To hold the club correctly and to aim at a small point on the way to the target.” (week 3)

Participant number 22: “Again, I concentrated on a strong wrist, good stance. I helped myself a lot by starting to stretch finally and focusing nicely on golf.” (week 3)

Thinking about body movements

Participant number 9: “... more engaging my abdominal muscles so I don't overload my back.” (week 1)

Participant number 11: “Movement of the body during the swing, movement of the arms, bending of the wrists during the swing.” (week 2)

Participant number 17: “I concentrated on transferring the weight from one leg to the other when I hit the shot and it helped a lot.” (week 2)

Thinking about the club

Participant number 3: “...”when hitting the ball, the club is behind the head.” (week 2)

Participant number 8: “About the functions of a golf club- hardness, length, use of clubface position, distance and position from the ball.” (week 1)

Participant number 9: “About the position of club head to stance.” (week 3)

Participant number 21: “The position of the club when the club makes contact with the ball.” (week 3)

Thinking about golf videos watched in past

Participant number 15: “About golf technique, filming videos on your phone watching flaws.” (week 1)

Participant number 15: “Watching videos on swing technique, improve hip rotation.” (week 1)

Participant number 16: “I've watched some golf videos on proper technique, so I don't get hurt and enjoy it as much as possible.” (week 1)

According to the putting, most common answers were: concentration on the technique, pre-shot routine before the next shot or visualisation.

Theme 3: The origin of a thought behind goal setting process

- Coaches' advices
- Emotional control of behaviour
- Repetition of the outcome
- Desire to improve

Coaches' advices

Participant number 11: “According to the instructors' information on how to proceed.” (week 2)

Participant number 13: “I was concentrating on the technique that the golf coaches were explaining to us.” (week 3)

Participant number 23: “Finding mistakes, comparing the movement I did with the movement the instructors taught us.” (week 1)

Emotional control of behaviour

Participant number 1: “It came from the fact that I hate losing. Therefore, when I miss the putt, I am angry, and I want to play less shots for the next hole.” (week 1)

Participant number 24: “It bothers me that other people can do it. I just want to learn to golf a little bit.” (week 1)

Repetition of the outcome

Participant number 4: “I tried to make every swing the same.” (week 1)

Participant number 9: “Every swing was different, so I wanted to have some consistency.” (week 3)

Desire to improve

Participant number 1: “It came from the desire to improve.” (week 3)

Participant number 1: “To improve my accuracy.” (week 3)

Participant number 15: “To improve and win a competition with a friend.” (week 3)

4.3 Quantitative interpretation of the data from Pre & Post-test :

4.3.1 Putting

There was a significant increase in accuracy, $t(21) = 5.4$; $p < 0.001$; $d = 1.3$, with mean distance to the hole reducing between the pre- and post-test, although there was no significant difference between the pre- and post-test for the number of putts holed, $z = -1.1$; $p = 0.29$; $d = 0.3$, see Table 6.

Table 6 - Descriptive Statistics for Performance Variables in the Pre and Post Test for putting

Variable	Pre-Test (\pm SD)	Post-Test (\pm SD)
Putting Success	1.9 \pm 1.5	1.5 \pm 1.3
Putting Accuracy (cm) *	86.1 \pm 36.1	49.2 \pm 16.2

Data are presented as mean \pm standard deviation; * a significant difference between pre and post-test (paired t-test); # a significant difference between pre and post-test (Mann-Whitney U tests)

4.3.2 Full Swing

There was a significant increase between pre- and post-test in contact rate ($z = -2.6$; $p = 0.009$; $d = 0.7$), carry distance ($t(21) = -2.7$; $p = 0.015$; $d = 0.5$), clubhead speed ($t(21) = -3.3$; $p = .003$; $d = 0.8$) and ball speed ($t(21) = -2.9$; $p = .008$; $d = 0.7$). No significant difference was found between pre- and post-test in side error ($z = -1.9$; $p = 0.053$; $d = 0.6$), see table 7.

Table 7 - Descriptive Statistics for Performance Variables in the Pre- and Post-Test for full swing

Variable	Pre-Test (\pm SD)	Post-Test (\pm SD)
Contact Rate	8.7 \pm 2.0	9.8 \pm 0.4
Carry Distance (m) *	40.4 \pm 25.7	54.0 \pm 24.8
Side Error (m)	5.7 \pm 3.7	8.5 \pm 4.9
Clubhead Speed (mph) *	48.5 \pm 19.6	61.2 \pm 10.0
Ball speed (mph) *	56.4 \pm 20.1	67.3 \pm 12.9

Data are presented as mean \pm standard deviation; * a significant difference between pre and post-test (paired t-test); # a significant difference between pre and post-test (Mann-Whitney U tests)

5 Discussion

The present thesis aimed to explore the perceptions of beginner golfers and their cognitive processes during training sessions. Typically, coaching sessions for novice players involve the instructor providing explicit internal instructions (Williams & Hodges, 2005) and expecting the participants to replicate them without seeking feedback. If the player exhibits improvement, the coach often regards this as an effective approach. However, in cases where the player fails to improve or loses interest in the lessons altogether, the coach may attribute the lack of progress to a lack of effort or motivation on the player's part, rather than critically evaluating the effectiveness of their teaching methodology.

It is suggested that a more effective approach would involve the coach actively soliciting feedback from each player regarding their perceptions of golf technique, as well as incorporating external or mixed instructions into the lesson plan (Waśniewski, 2017). Such an approach would enable the coach to better tailor the training to the individual needs and preferences of each player, was one of the topics that coaches or other practitioners could find to be crucial (Langdown et al., 2012), leading to a more enjoyable and personalized learning experience. Ultimately, this may result in greater player engagement, motivation, and performance.

5.1 Comparison of interpretations of MSRS of mental effort and perceived difficulty

The first comparison that the researcher undertook was the interpretations of MSRS of mental effort and perceived difficulty. There was a significant difference in MSRS between the pre- and post-test), see table 3 at $p < 0.01$, but not on $p < 0.05$, therefore the first hypothesis about movement perception of participants was not confirmed. In the realm of movement, there are two different aspects that can be distinguished: conscious motor processing and movement self-consciousness. Conscious motor processing refers to the degree to which someone intentionally controls the physical mechanics of their movements. Movement self-consciousness, on the other hand, refers to the extent to which someone is concerned about how their movements look to others, and whether they are making a good impression. These

two dimensions involve different kinds of conscious thinking and can impact movement performance in varying ways depending on the situation. As Malhotra et al. (2015) found in their research, it appears that both movement self-consciousness and conscious motor processing may enhance performance, particularly in the early stages of practice, which explains why there was such a significant difference between the pre- and post- test. In normal beginners' golf lessons the difficulty is increasing with each training session, however, as most of the players are improving, the load is increasing accordingly. The present study wanted to highlight the phenomenon of increased difficulty occurring during lessons set out by the researcher compared with the actual mental effort the player invested into a lesson. According to the players who undertook, the intervention programme, the perceived difficulty was increasing each week. There was no significant difference was found over the weeks in mental effort. Assessing the level of effort put forth by participants is a critical aspect of evaluating the efficacy of a training program. In this study, the level of effort exerted by the participants was monitored closely to ensure that the results were not skewed by a lack of motivation or engagement. The participants were highly committed to the program and demonstrated a strong willingness to learn and improve. Throughout the training sessions, the participants were observed to be highly focused, engaged, and motivated, consistently striving to perform at their best. These observations suggest that the results of this study are highly indicative of the impact that the training program had on the development of the participants' golf skills.

5.2 Data comparison from self-reflective diaries

According to the qualitative part of this research, the researcher constructed the diary outputs into 3 themes such as achievement of specific goals, thought process behind goal achievement/goal focus and the origin of thought behind goal setting process. All the themes have been established based on three questions from the self-reflective diary questionnaire. In the first theme, the researcher was interested to see what the participants were trying to achieve and whether they had any specific goal(s). One of the goals for some participants, especially in the first or second week was to focus on distance improvement. The vision of longer well-hit shots has been a good motivation as one of the players said: ...the motivation was to *“Focus on hitting the ball so that it flies through the air and for as long as possible.”*

The second sub-theme was concentrating on the body movements or external focus of attention, which has been displayed amongst some of the golfers throughout the 3 week intervention. The focus of players was to *“Improve hip rotation and weight transfer.”* or another golfer *“focused on the things we were told. Trying to achieve a less clumsy grip on the club. Better, tighter stance and working on the hips.”*

The third sub-theme was concentrating on the club in order to improve ball striking or internal focus of attention has been the most popular pattern amongst beginner golfers, possibly due to easier execution. The thoughts of players were *“To turn the club when driving so that the ball flies straight and not sideways”* or to *“Achieve a clean strike and golf sound on the swing so shots fly straight.”*

Even though, all the players received the same instructions, some of them were focusing more on the external focus of attention and some on the internal focus of attention. Perhaps the players learnt the focus of attention from different sport maybe even unintentionally and tried to reproduce the same attention pattern to learn golf in the best way possible. According to the evidence within present studies examining, whether there is more external or internal focus of attention being used more within specific sport, there is greater amount of internal focus present within wide range of sports. This phenomenon is slowly changing, and coaches are trying to implement more external focus of attention or non-linear pedagogical approach onto their field (Renshaw et al., 2020). The most research on this topic is being done within sports such as football, basketball or hockey, therefore, we can assume that coaches of these sports have the biggest knowledge of external focus and are using it more often than coaches in other sports. According to the putting, most common answer was to improve accuracy, which would also improve the number of putts holed. Participants answered that they have been doing it through imagination of success (such as how the ball starts rolling towards the hole and goes in), or with controlled back swing and follow through.

Within theme two, the researcher was interested to see what each participant was thinking about to help them achieve their goal(s) and what were they focusing on. Thinking about golf mechanics of the swing was for some participants helpful in order to improve their focus on shot execution. *“During full shots and putting I was thinking about technique.”* *“Focus on the correct grip of the club.”*

Most of the participants were thinking about the body movements, engagement of specific muscles, body parts or weight transfer to achieve most desirable outcome, as one of the participants said: *“I concentrated on transferring the weight from one leg to the other when I hit the shot and it helped a lot.”* The game of golf involves complex movements of the body that require precise coordination of different muscle groups. Golfers need to coordinate their arms, shoulders, hips, and legs to achieve the desired swing motion, and this requires a high level of body control and awareness. It is possible that they have used the external focus of attention due to their usage of this focus in other sports – transferable thought process. For the smaller group of participants, it was better to use the internal focus of attention such as movement of the club in order to improve their goal setting or *“About the position of club head to stance.”* Coordination skills also play a significant role in the performance of golf players.

The last sub-theme which emerged from self-reflective diaries was the watching of golf videos in orders to improve the technique, body movements to achieve desirable outcome. For someone it was also important to watch the videos of correct technique as an injury prevention: *“I’ve watched some golf videos on proper technique, so I don’t get hurt and enjoy it as much as possible.”*

The last theme which the researcher wanted to discover from the diaries was the origin of a thought behind goal setting process. Discovering what is going on through the player’s mind, what are the challenges, they are facing, what do they concentrate on before during and after training can be crucial for coaches in order to help players improve their intrinsic motivation. Coaches’ advice, explanation and demonstration of technique including feedback are important tool for participants and their progression. We also have to take into an account that motivation for some participants can be different, therefore it is important to acknowledge that emotions can create the origin thought and form a big part of the goal setting process. The emotion related to the goal setting process was, however, negative : *“It came from the fact that I hate losing. Therefore, when I miss the putt, I am angry, and I want to play less shots for the next hole.”* If the players would set more positively driven goals as part of the goal setting process, they would be able to achieve better results and enjoy particular activity more. Consistency and repetition of the outcome are necessary for some

participants during their goal setting process - *“Every swing was different, so I wanted to have some consistency.”* The last sub-theme was the desire to improve, with the emotion related to the goal setting being positive, such as: *“To improve and win a competition with a friend.”*

5.3 Comparison of the data from pre and post test in both putting and full swing

Based on the quantitative analysis of the pre- and post-test data, it was observed that the accuracy of putting exhibited a significant improvement. Therefore, the hypothesis number two, where researcher assumed that the training program will have a significant effect size $p < 0,05$ and there is going to be a significant difference, where Cohen's $d > 0,5$ based on the level of putt accuracy with less radial error was confirmed. From the table 5, we can see, that there was more than 35 cm improvement in accuracy after only 3 week of an intervention training. The putting successfulness have decreased insignificantly, which can also be explained as “first time beginners luck”. Putting is considered the most critical aspect of golf, and therefore, beginners are often trained with a particular emphasis on this skill. The objective of putting is to roll the ball accurately and precisely into the hole, and it can significantly influence a player's score and overall performance. Due to its critical role in determining success on the golf course, putting has been the subject of extensive research and coaching interventions. As such, it has become a focal point for golfers and coaches alike, who recognize its importance in achieving optimal performance. The researcher must consider whether measuring the success of a 3-meter putt is sufficient for the targeted participant group and whether a different outcome would be observed if the distance of the putt was varied.

The study revealed a significant increase in contact rate (smash factor), carry distance, club head speed, and ball speed during full swings, between pre- and post-tests. Therefore, the hypothesis number three, where the researcher assumed that the training program will have a significant effect size $p < 0,05$ and there is going to be a significant difference, where Cohen $d > 0,5$, based on the distance of the ball flight such as carry distance and its determinant (clubhead speed and ball speed) was also confirmed. The program can be considered effective in enhancing golf skills, bodily awareness, putting accuracy, and full swing

performance. There was no significant difference observed in the side error, which may be attributed to the brevity of the intervention program. As all participants were athletes, each involved in a different sport, the results may differ if non-athletes were involved. For individuals engaged in physical activities, learning a new sport is often easier due to prior experience with movement patterns. Overall, these findings suggest that the intervention had a positive impact on the participants' golf performance. However, it's important to keep in mind that this study only included a small sample size ($n=21$), primarily due to the criteria set out by the researcher, which only half of the participants fulfilled and this may not be generalizable to a larger population. Future studies with larger sample sizes and more diverse populations could help to confirm these results.

5.4 Limits of the study

I am well aware of some limits of this study, one of them being the length of an intervention. An ideal intervention would be two training sessions per week at least six weeks in a row. Another limit is the actual number of participants that were after criteria were taken into consideration. Out of 43 participants, only 21 fulfilled the requirements, which is also another question that should be judged, whether the criteria were not set in a too difficult manner. If this intervention would be longer, there is a possibility that more participants would not meet the criteria. For the future, it would be better to find out a more responsible sample size. The program was aimed to change their body motion perception, however, since all the students were already athletic, in 3 weeks there was no change in their perception.

6 Conclusion

In conclusion, this study aimed to explore the perceptions and thought processes of beginner golfers during their training sessions. The findings suggest that beginner golf lessons typically involve coaches providing explicit internal instructions without seeking feedback from the participants. This can result in lessons that are not tailored to individual needs and may lead to disengagement from the sport. By asking more about the perceptions of golf technique and focusing on external or mixed instructions, coaches could create more enjoyable and personalized lessons. The study found a significant difference on in conscious motor processing and movement self-consciousness at $p < 0.01$, but not on $p < 0.05$, which

was set out prior as a criteria for hypothesis by the researcher between pre- and post-tests, indicating that both dimensions may enhance performance, particularly in the early stages of practice. The perceived difficulty of lessons increased each week, but there was no significant difference in mental effort. The qualitative analysis revealed three themes: achievement of specific goals, thought processes behind goal achievement/focus, and the origin of thought behind goal-setting processes. The participants had different goals, and while some focused on internal attention, others used external focus to improve their performance. Most participants focused on body movements or specific muscle engagement to achieve their desired outcome.

Overall, this study highlights the importance of personalized instruction and individualized attention for beginner golfers. Coaches should focus on external or mixed instructions and seek feedback from participants to improve the quality of lessons and promote engagement in the sport. It is possible that a longer intervention program could result in different outcomes than the current intervention program. The brevity of the current intervention program may have limited the extent of the improvement observed in some of the measured variables. A longer intervention program may provide more opportunities for participants to practice and refine their skills, leading to further improvements in performance. This could potentially lead to greater increases in accuracy, distance, and speed of full swings, as well as reducing side error during the pre- and post-test measurement period.

Furthermore, the length of the intervention program may impact the participants' motivation, engagement, and learning outcomes. Longer programs can allow participants to develop stronger relationships with their coaches and peers, providing a supportive environment for learning and skill development. This could enhance their motivation to learn and improve, leading to more significant gains in golf performance.

A longer intervention program may have the potential to enhance the outcomes of the current intervention program by providing additional opportunities for skill development and improving participant motivation and engagement. Findings of this study can be used as recommendations for coaches and other practitioners when designing individually specific training plans. However, further research is needed to investigate the impact of varying intervention program lengths on golf performance outcomes.

6.1 Recommendations for future research

It is crucial for future research to find out what expectations do the participants have for the different sections of the program before undertaking such an intervention and then finding out, whether the lessons met participants' expectations.

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8 Appendices

8.1 Entry questionnaire with voluntary inform consent

8.1.1 Informovaný souhlas s účastí ve výzkumu a se zpracováním osobních údajů

Prosíme potvrdíte souhlas s níže popsanými podmínkami, než začnete s vyplňováním.

Potvrzuji že za:

A. jsem se seznámil/-a s informacemi o cílech a průběhu výše popsaného výzkumu (dále též jen "výzkum");

B. dobrovolně souhlasím s účastí své osoby v tomto výzkumu;

C. rozumím tomu, že se mohu kdykoli rozhodnout ve své účasti na výzkumu nepokračovat;

D. jsem zrozuměn/-a s tím, že užití a zveřejnění dat a výstupů vzešlých z výzkumu, nezakládá můj nárok na jakoukoli odměnu či náhradu, tzn. že veškerá oprávnění k užití a zveřejnění dat a výstupu vzešlých z výzkumu poskytuji bezúplatně. Zároveň prohlašuji, že souhlasím se zveřejněním anonymizovaných dat a výstupů vzešlých z výzkumu a s jej dalším využitím.

- Ano
- Nie

8.1.2 Entry questionnaire

Vstupní dotazník

1. Jméno a příjmení:

2. Pohlaví:
 - Muž
 - Žena

3. Výška:

4. Hmotnost

5. Rok narození:

6. Zkušenosti s golfem:
 - Ano
 - Ne

7. Pokud jste zaškrtnuli ano v předcházející otázce, pak máte:
 - zkušenosti s odpalováním?
 - aktivní hra?

8. Pokud jste zaškrtnuli ano v předcházející otázce, pak: kolik let a jak často hrajete/trénujete:

9. Hráli jste někdy minigolf anebo adventure golf?
 - Ano
 - Ne

10. Pokud jste zaškrtnuli ano v předcházející otázce, pak kolikrát za rok hrajete minigolf anebo adventure golf?

11. Sledujete pravidelně golf v televizi, sociálních sítích nebo na youtube?
 - Ano
 - Ne

12. Sledovali jste golf v posledním měsíci?
 - Ano
 - Ne

13. Uveďte sport/y, které organizovaně trénujete alespoň 2x týdně

8.2 Warm-up

Golf Specific Warm-up.

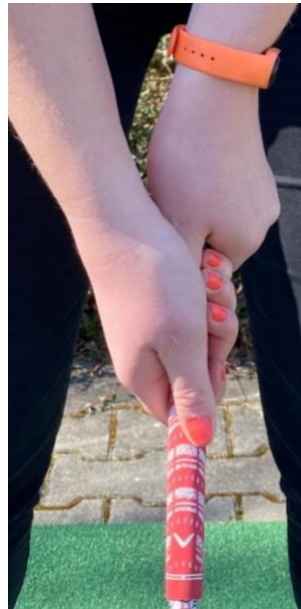
Arm Circles	<ul style="list-style-type: none"> • Raise arms out to side • Start with small circles with hands and gradually increase • Hands should feel light • After 15 seconds switch directions and repeat • Complete each direction MICE
Overhead Extension	<ul style="list-style-type: none"> • Grab club just outside shoulder width • Hold club overhead with arms extended • Feet shoulder width apart • Bring club down to legs and raise again • Repeat movement for 15 seconds
Overhead Sidebend	<ul style="list-style-type: none"> • Grab club just outside shoulder width • Feet shoulder width apart • Hold club extended overhead • Lean body to one side feeling stretch on opposite side • Hold for brief moment and go immediately to other side and repeat • Repeat each side 3 times each
Golf Rotations	<ul style="list-style-type: none"> • Place club over shoulders behind neck • Grab at each end of club • Assume golf posture and rotate up per body back and through • Keep lower body quite still and feel the stretch in mid section • Repeat each side 10 times
Modified Good Mornings	<ul style="list-style-type: none"> • Slightly flexed knees • Grab club and bend at hips • Let arms hang relaxed in front of legs • Stretch hamstrings and lower back by lowering club down legs • Return to starting position and repeat 15 times
Partial Squats	<ul style="list-style-type: none"> • Feet shoulder width apart • Place club in front of you and hold with both hands for balance • Lower body by bending at the knees not hips • Raise backup and repeat 15 times • Keep upper body very erect
Side Lunge	<ul style="list-style-type: none"> • Hold club behind neck, looking straight ahead • Step directly out to one side feeling a little pull up inside of leg • Repeat to the other direction • Alternate directions each time • Repeat 10 times each side

8.3 First full swing driving range lesson overview

0-2min - Coach welcomed participants and gave them clubs - iron 7. Coach made sure everyone was safe, warmed up and felt ready. Introduction to the content of the lesson was given by coach-long swing. Equipment needed was golf clubs and driving range with 5 practice mats.

2-7min - Full swing grip and posture were taught. The group was standing in front of the coach. Each participant had his own space, standing on the golf mat and they have listened to the instructions and watched coach to explain - gripping the club, posture, weight distribution, ball position. Then participants followed instructions and coach checked and adjusted each of them - gripping the club, posture, ball position.

Instructions for grip



Grip - hold club in right hand in the middle of the shaft in vertical position with leading edge aimed on you, hold the end of the grip in left arm fingers and then embrace the grip with palm and put left thumb on the grip, move your right hand to the left hand until they touch each other and cover left thumb in right palm; posture - from upright stance, legs shoulders width and straight arms holding club in vertical position in front of the body, bend forward from the hips, bend knees a little, hang arms loosely from the shoulders and hold club drops

to the ground; ball position - the club should be in the middle of the stance, where in front of club face is the position of the ball

7-10 min- Golf specific warm up was applied such as body rotations. Golf specific warm up with golf club and learn basic body, arms and club movements (rotations) – the coach had given instructions, demonstrated movements and checked the execution of movement provided by participants.

Instructions for stance



1 – Upright stance with legs shoulder width apart, gripping the club, arms straight in front of body, golf club aims to sky – rotations of the upper body starting around right leg (for the right-handed players) to the left leg with death arms and club. Rotation range is 90 degrees on each side. **2** – Participants do the same rotations right and left as in exercise 1 but starts from the golf posture (set-up position, which they learned before). Rotation range is to horizontal position of the club shaft on each side. Arms and golf club are still in the same position to the chest.

10 -15 min - "Golf swing basics – body rotation, arm and club movements. The coach has given instructions, demonstrated movements and checked the execution of participants.

Instructions for backswing and inswing



Front view



Side view

Backswing - same rotations to each side as in warm up exercise 2 with added arm motion and continued rotation of the upper body as close to 90 degrees. From the horizontal position of the club on the right side (from exercise 2), golf club is raised to the vertical position by shrugging the right arm, where left arm is still extended and pulled to the chest during

continuing upper body rotation to the backswing position. Spine should be in the same angle to the ground during rotation.



Front view



Side view

Inswing – from the backswing position upper body rotates to the left, golf club swings around the body to the extended arms when chest is in starting position and followed to the left side with continuing club swinging around the body. During the swing, golf club should touch the ground on the place where was positioned in set-up."



Front view

versus



Side view

15 – 36 min - Participants had 30 balls each to practice with. Participants were instructed to make practice swing in front of the tee with the ball and when they felt ready, they tried to strike the ball off the tee.

36 - 38 min - Coach thanked to participants, taken the clubs from them and sent them to the putting green (conclusion).

38 – 40 min – Going to the putting.

8.4 First short swing putting lesson overview

0 – 2 min - Coach welcomed participants and gave them clubs – putters. Equipment needed was putters, putting green .

3 – 7 min - The group were standing in front of the coach with at least of 2m space around themselves. They have listened to the instructions and watched the examinations of putter grip, posture, ball position and more.



Front view



Side view

8 – 12 min - Participants learnt and practiced basic rotational movements of the chest and control range of motion in order to control the distance (controlling the ball speed) and direction (controlling initial roll direction of the ball).

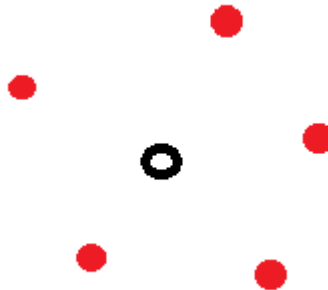
13 – 16 min - Each participant started on different prepared practice position and followed instructions for each of the six different exercises aimed on practicing distance, direction or both (appendix 4). Each participant played five balls on each position - total of 30 putts. Equipment needed was putters, putting green, golf balls, flags, tees, ropes, chalk, sticks

16 - 20 min - Participants either return clubs, if they are finished with lesson or go to the driving range. The coach thanks everyone for attending the lesson.

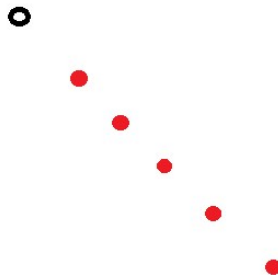
8.5 Putting training exercises

8.5.1 First instruction session exercises:

1. 5 putts from 1 m around the hole – task: hole the putt



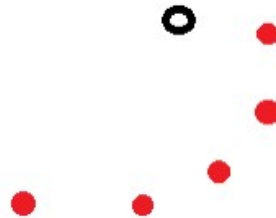
2. 5 putts ladder (1m, 2m, 3m, 4m, 5m) - task: hole the putt or end in 1m semicircle behind the hole



3. 5 putts one place (8m) - task: hole the putt or finish in 1m circle around the hole



4. 5 putts, half circle (1-5m) - task: hole the putt or finish in 0,5m circle around the hole



5. 5 putts one place (3m) - task: hole the putt or finish in 0,7m semicircle behind the hole



6. Zig-Zag 5 putts (1-5m) - task: hole the putt or finish in 1m circle around the hole



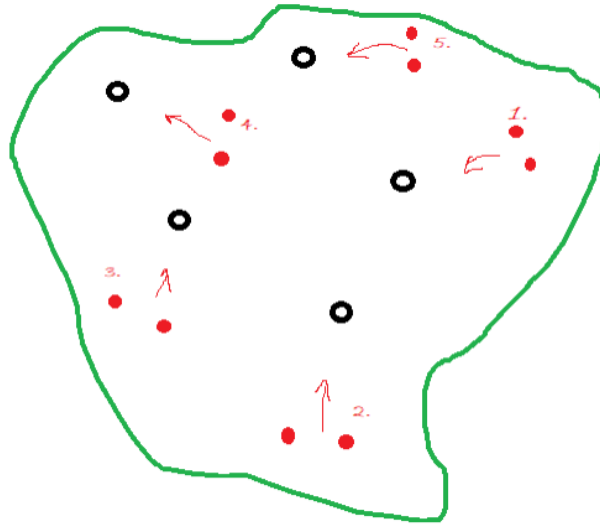
8.6 First practical lesson

The aim on the driving range for each participant was to hit 50 balls without further instructions given by coach. On the putting green, players were given one ball, putter and had to play 6 holes, three times in a row.

8.7 Putting training exercise

8.7.1 First practice session exercises:

1. 6 holes, played 3 times – task: finish 18-holes for as few putts as possible



8.8 The ethics committee's approval

UNIVERZITA KARLOVA
FAKULTA TĚLESNÉ VÝCHOVY A SPORTU
Josef Martího 31, 162 52 Praha 6-Vešleslavín

Žádost o vyjádření Etické komise UK FTVS

k projektu výzkumné, kvalifikační či seminární práce zahrnující lidské účastníky

Název projektu: Upskilling in Beginner Golfers: Assessing the Interaction between Movement Cognitions and Performance Following an Initial Coaching Programme

Forma projektu: výzkumná práce - diplomová práce

Období realizace: duben 2022 – červen 2022

Výzkum bude realizován v souladu s platnými epidemiologickými opatřeními Ministerstva zdravotnictví ČR.

Předkladatel: PhDr. Tomáš Gryc, Ph.D., LSM, FTVS UK

Hlavní řešitel: PhDr. Tomáš Gryc, Ph.D., LSM, FTVS UK

Místo výzkumu (pracoviště): Laboratoř sportovní motoriky, FTVS UK

Spoluřešitel(é): Prof. Ing. František Zahálka, Ph.D. (vedoucí LSM, FTVS UK), Mgr. Matěj Brožka (doktorant LSM, FTVS UK), BSc. Michaela Patzeltová (studentka FTVS UK), Dr. Howie Carson (The University of Edinburgh), Dr. Ray Bobrownicki (The University of Edinburgh)

Vedoucí práce (v případě studentské práce):

Finanční podpora: Programme for Development of Fields of Study at Charles University under Grant UNCE HUM/032, SVV 260599

Popis projektu: Cílem výzkumného projektu je posouzení vlivu tréninkového programu golfu na vnímání pohybu a zlepšování golfových dovedností. Konkrétně se bude jednat o dokumentaci sebereflexe o získaných zkušenostech v průběhu učení se golfovým dovednostem při lekcích golfu a individuálním tréninku za použití dotazníků Movement reinvestment scale a upraveného golf specific movement reinvestment scale, dále vyplňováním tréninkového deníku a hodnocení posunu pomocí testů golfových dovedností. Jedná se experiment, při kterém budou začínající hráči golfu absolvovat golfovou výuku a bude hodnocena změna jejich vnímání pohybového (golfového) tréninku a rozvoj dvou golfových dovedností – plného švihů a patování. Data budou sbírána pomocí dvou dotazníků, tréninkového deníku a dvou specificky připravených testů golfových dovedností. Všichni účastníci se zúčastní golfové výuky, intervence, v souladu s uznávanými standardy PGA dvakrát týdně a to po dobu tří týdnů (dohromady 6 lekcí přímé výuky golfu) po kterých vždy vyplní čtyř položkový tréninkový deník, dále budou v týdnu před a v týdnu po intervenci absolvovat testování úrovně golfových dovedností a vyplní dotazník golf specific movement reinvestment scale a dva týdny před a dva týdny po intervenci vyplní dotazník movement reinvestment scale. Intervence bude probíhat na Driving range Divoká Šárka, jejíž souhlas s konáním je přiložen. Testy golfových dovedností se budou skládat z testu patování (5 úderů na jamku ze vzdálenosti 3m) a testu plného švihů (10 úderů holi číslo 7 z umělé podložky a z gumového tyčka), tedy běžných tréninkových a herních situací v golfu, při kterých nehrozí zvýšené riziko zranění ani přetížení.

Charakteristika účastníků výzkumu: Výzkumu se bude dobrovolně účastnit 35 až 50 osob obou pohlaví ve věku 18 – 23 let. Všichni účastníci budou z řad studentů FTVS UK s platnou zdravotní prohlídkou bez omezení způsobilosti ke sportu a TV a s žádnou nebo minimální zkušeností s golfem.

Zajištění bezpečnosti: Celý výzkum bude realizován neinvazivními metodami. Účastníci výzkumu budou vyplňovat dotazníky online nebo papírovou formou a zúčastní se výuky golfu pod vedením zkušeného Profesionálních trenéra golfu, akademického pracovníka LSM FTVS UK, ředitele Vzdělávání české PGA, PhDr. Tomáše Gryce, Ph.D., v souladu s mezinárodními standardy pro výuku golfu začátečníků a při dodržení všech bezpečnostních pokynů v souladu s uvedenými standardy – účastníci budou opakovaně upozorňováni na zásady manipulace s golfovou holí, dále na zásady pohybu po tréninkovém prostředí v souladu s pokyny majitele areálu a před každou lekcí či testováním budou nabádáni k individuálnímu rozcvičení a dále budou absolvovat specifické golfové rozcvičení. Rizika prováděného průzkumu nebudou vyšší než rizika běžně očekávaná u aktivit v tomto typu výzkumu. Bezpečnost všech částí výzkumu bude zajištěna standardním způsobem.

Etické aspekty výzkumu:

Výzkumu se nebude účastnit žádná osoba z vulnerabilních skupin.

Potenciální střet zájmů: Nelze uvést žádný potenciální střet zájmů, v současné chvíli žádný není. Já ani nikdo jiný z řešitelského týmu nemáme soukromý zájem na výsledku výzkumu a ani výzkum nevede k osobnímu prospěchu. Trénink bude využívat běžných tréninkových metod.

Ochrana osobních dat: Všechna data budou shromažďována a zpracovávána v souladu s pravidly vymezenými nařízením Evropské Unie č. 2016/679 a zákonem č. 110/2019 Sb. – o zpracování osobních údajů. Budou získávány osobní údaje (email, věk, pohlaví, výška, hmotnost, data získaná výše uvedenými metodami), které budou bezpečně uchovány na heslem zajištěném počítači zaměstnance LSM FTVS UK, tedy v uzamčeném prostoru kanceláře, přístup k nim bude mít PhDr. Tomáš Gryc, Ph.D. a Mgr. Matěj Brožka. V zabezpečeném počítači budou data anonymizována pomocí kódů (ve formátu písmeno (m – pro muže, f – pro ženy) a číslo; např.: m12, f5) a teprve poté se budou sdílena v rámci celého řešitelského týmu. K vzájemné komunikaci a sdílení manuskriptu a dat jsou využívána zabezpečená úložiště, která poskytuje Univerzita Karlova (<https://cunicz-my.sharepoint.com/>).

Uvodomuji si, že text je anonymizován, neobsahuje-li jakékoli informace, které jednotlivě či ve svém souhrnu mohou vést k identifikaci konkrétní osoby – budu dbát na to, aby jednotliví účastníci nebyli rozpoznatelní v textu práce. Osobní data, která by vedla k identifikaci účastníků výzkumu, budou do 1 dne po testování anonymizována. Získaná data budou zpracovávána, bezpečně uchována a publikována v anonymní podobě v diplomové práci, případně v odborných časopisech, repositářích dat, monografiích a prezentována na konferencích, případně budou využita při další výzkumné práci na UK FTVS.

Pofizování fotografií/videí/audio nahrávek účastníků:

Během výzkumu nebudou pořizovány žádné fotografie, audionahrávky ani videozáznam účastníků výzkumu.

Text informovaného souhlasu (IS): příložen

Povinností všech účastníků výzkumu na straně řešitele je chránit život, zdraví, důstojnost, integritu, právo na sebeurčení, soukromí a osobní data zkoumaných subjektů, a podniknout k tomu veškerá preventivní opatření. Odpovědnost za ochranu zkoumaných subjektů leží vždy na účastnících výzkumu na straně řešitele, nikdy na zkoumaných, byť dali svůj souhlas k účasti na výzkumu. Všichni účastníci výzkumu na straně řešitele musí brát v potaz etické, právní a regulační normy a standardy výzkumu na lidských subjektech, které platí v České republice, stejně jako ty, jež platí mezinárodně.

Potvrzuji, že tento popis projektu odpovídá návrhu realizace projektu a že při jakékoli změně projektu, zejména použitých metod, zašlu Etické komisi UK FTVS revidovanou žádost.

V Praze dne: 29. 3. 2022

Podpis předkladatele:

Datum a podpis odpovědného pracovníka z místa výzkumu:

Vyjádření Etické komise UK FTVS

Složení komise: Předsedkyně: doc. PhDr. Irena Parry Martinková, Ph.D.

Členové: prof. MUDr. Jan Heller, CSc.

prof. PhDr. Pavel Slepíčka, DrSc.

PhDr. Pavel Hráský, Ph.D.

Mgr. Eva Prokešová, Ph.D.

Mgr. Tomáš Ruda, Ph.D.

MUDr. Simona Majorová


Projekt práce byl schválen Etickou komisí UK FTVS pod jednacím číslem: 140/2022

dne: 30. 3. 2022

Etická komise UK FTVS zhodnotila předložený projekt a **neshledala rozpory** s platnými zásadami, předpisy a mezinárodními směnicemi pro provádění výzkumu zahrnujícího lidské účastníky.

Řešitel projektu splnil podmínky nutné k získání souhlasu Etické komise UK FTVS.

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- 20 -


podpis předsedkyně EK UK FTVS

8.9 Pre and Post test spread sheet for researcher

Table 1 – Pre and Post test for putting accuracy and number of putts holed

Player n.:	1st shot	2nd shot	3rd shot	4th shot	5th shot	6th shot	7th shot	8th shot	9th shot	10th shot
In the hole: Yes or Not										
Radial error										

Table 2 – Pre and Post test for full swing parameters

Player n.:	1st shot	2nd shot	3rd shot	4th shot	5th shot	6th shot	7th shot	8th shot	9th shot	10th shot
Contact rate										
Carry distance										
Side error										
Clubhead speed										
Ball speed										